SANITATION SERVICES IN THE NORTHERN FRINGE OF CITY OF TSHWANE METROPOLITAN MUNICIPALITY: THE CASE OF GA-RANKUWA, MABOPANE, TEMBA AND WINTERVELD TOWNSHIPS

By

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A thesis submitted in accordance with the requirement
for the degree of

DOCTOR OF PHILOSOPHY

in the subject

PUBLIC ADMINISTRATION AND MANAGEMENT

at the

UNIVERSITY OF SOUTH AFRICA

Promoter: Prof EJ Nealer

PRETORIA

JANUARY 2020

DECLARATION

I, **Martha Pekane Mashiane**, hereby declare that this study: "Sanitation services in the northern fringe of the City of Tshwane Metropolitan Municipality: The case of Ga-Rankuwa, Mabopane, Temba and Winterveld townships" is my own original work and that all sources used or quoted have been accurately reported and acknowledged by means of complete references, and that this thesis represent original work by the author and have not otherwise been submitted in any form for any degree or diploma to any tertiary institution, or at any other University.

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Date: 20 January 2020

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SANITATION SERVICES IN THE NORTHERN FRINGE OF THE CITY OF TSHWANE METROPOLITAN MUNICIPALITY: THE CASE OF GA-RANKUWA, MABOPANE, TEMBA AND WINTERVELD TOWNSHIPS.

KEY TERMS:

Sanitation services, water services development plans, health and hygiene education, Water Services Authorities, toilet facilities, open defecation, pit latrine, water and sanitation hygiene, free basic sanitation, faecal sludge management

ACKNOWLEDGEMENTS

Firstly, I thank **God**, for guiding me through all the difficulties. “What would I do without you in my life?” Thank you for shining your light in my life, I will be forever grateful you are in my life.” You are the one who enabled me to complete my PhD. I would like to say special thank you to my enthusiastic promoter, **Professor EJ Nealer**. My PhD has been an amazing experience and I thank you wholeheartedly, not only for your tremendous academic support, but also for all the encouragement and continuous support throughout the many months I spent undertaking my research work at the University of South Africa. Without your academic guidance and constant feedback this PhD would not have been achievable. Furthermore, I express gratitude to **Prof Raga** for editing the thesis.

Undertaking this PhD was a truly life-changing experience for me and it would not have been possible without the support and guidance that I received from many people. I acknowledge gratitude to my colleagues in the Department of Human Settlements, Water and Sanitation in the National and Provincial Office(s), City of Tshwane Metropolitan Municipality officials and the respondents in Ga-Rankuwa, Mabopane, Temba and Winterveld for providing valuable input and credible ideas which contributed towards the completion of this PhD.

Last but not the least, I would like to thank my family for their unsurpassed and continuous support and love. To my husband, **Andries Mabeka Mashiane** and my children **Katlego Lukie Mashiane**, **Atlegang Sesinyana Mashiane** and **Raesetja Mawela Mashiane,** thank you for being my best friends and great companions, who loved, supported, encouraged, entertained, and helped me get through this difficult period. I am forever indebted to my late parents, **Agnes Ngobeni** and **Samuel Khazamula Ngobeni** for giving me the opportunities and experiences which have groomed me to be who I am today. They selflessly encouraged me to explore new directions in life and seek my own destiny. This journey would not have been possible without their presence in my upbringing. I dedicate this

milestone to my family and my parents. **“Ke leboga Modimo wa thaba ya Sione”**

ABSTRACT

Access to decent sanitation is a basic human right in South Africa which should be universally enjoyed by all citizens. The sanitation crisis is a growing “pandemic” in the country and in most developing countries as well as globally. South Africa’s water shortage and drought challenges cannot be isolated from sanitation services, as it is linked with wastewater management systems. Poor sanitation reduces human wellbeing and economic and social development, and is linked to the transmission of diseases such as diarrhoea, cholera, hepatitis A, dysentery, typhoid and polio, and aggravates stunting.

The sanitation crisis is exacerbated by the lack of political will to prioritise sanitation, limited financial resources, poverty, mushrooming shack settlements, urbanisation and a poor institutional response to the increasing demands in the City of Tshwane Metropolitan Municipality. Looking at the sanitation backlogs in the City of Tshwane Metropolitan Municipality in terms of the number of households without a hygienic toilet, the statistics show that, in 2006, the number was 158 000 and, since then, the sanitation backlog has increased annually at a rate of 0.62% to 168 000 in 2016. During 2009 and 2013 the city made advances in addressing the sanitation backlogs; however, the on-going increase in households, particularly in informal settlements, due to the high migration into the region, as well as population growth, has put additional strain on household infrastructure (Cogta 2020: Online). This study examined the provision of sanitation services in the country as well as in the northern fringe of the City of Tshwane Metropolitan Municipality. It investigated the approach used by the Municipality to provide sanitation services.

The emergence of a new democratic system in South Africa and the political changes in 1994 brought an opportunity in all sectors of government for a comprehensive review of policy, including the water services sector. The grounded theory is an analytical lens that is used in this study to discuss

issues relating to the provision of sanitation services. According to Bulawa (2014:147), the grounded theory was developed by Glaser and Strauss in the 1960s when they were working together on a staff's handling of dying patients in hospitals (Glaser & Strauss 1967). This study also focuses on sanitation frameworks, legislations and regulations. The Department formulates policies and the City of Tshwane Metropolitan Municipality implements sanitation services on behalf of the national department, while Tshwane residents are the beneficiaries of sanitation programmes.

South Africa requires innovation that is deployable on a large scale to solve its sanitation challenges, especially in densely populated areas such as the City of Tshwane Metropolitan Municipality where there is a tendency to store waste. Moreover, there is an absence of a sustainable approach to manage the waste at household level once the latrine pit or septic tank is filled. By improving the management of human waste, greater privacy, dignity, improved child health and personal safety, especially for women and children, can be ensured.

In 2017, the Department of Human Settlements, Water and Sanitation mentioned that the capital replacement value of the extant water and sanitation infrastructure was estimated at R1 362 billion. However, the extant assets are depreciating. Consequently, the Department of Human Settlements, Water and Sanitation posits that the current book value of the infrastructure stands at approximately R584 billion, or 43% of the capital replacement cost. Furthermore, the operational reality is that the existing infrastructure was "stretched" because of significant underinvestment in its maintenance, including delays in the renewal of aged infrastructure. The Department of Human Settlements, Water and Sanitation has an accumulated backlog of R59 billion in refurbishment (DWS 2018:49). The City of Tshwane Metropolitan Municipality posits that the 2021/22 budget will be geared towards stabilising the finances of the municipality and driving quality service delivery, while at the same time ensuring that the rates and tariff increases are as low as possible despite the steep increases from Rand

Water and Eskom. The tariff increases for the 2021/22 financial year are as follows: sanitation is 10% and water is 8% (CTMM 2021: Online). Moreover, the City of Tshwane Metropolitan Municipality Council has approved the City's budget for the 2021/22 financial year with a total budget of R43 billion – comprising of an operating budget of R39 billion and a capital budget of almost R4 billion.

The City of Tshwane Metropolitan Municipality has a dedicated division, named the Water and Sanitation Infrastructure Planning and Implementation Division, for the promotion of sanitation and hygiene services as well as the allocation of adequate funding, on an annual basis. The Water and Sanitation Infrastructure Planning and Implementation division is responsible for the provision of sanitation services, bulk water supply, and water and sanitation planning and implementation for the city and for capital projects, i.e. new developments.

ABSTRACT

Phihlelelo ya tlhwekišo ya digweregwe ke motheo wa ditokelo tša botho mo Afrika Borwa yeo e swanetšego go itumelelwa ke badudi ka kakaretšo. Bothata bja digweregwere ke "leuba" leo le golago mo nageng kudu go dinaga tše dintši tšeo di sa golago le lefase ka bophara. Tlhokego ya meetse Afrika Borwa gotee le mathata a komelelo di ka se ke tša hlokolelwa ka thoko go ditirelo tša digwergwere, ka ge di kgokagane le taolo ya meetse a go senywa. Digweregwere tša go se nweše meetse a mokgoko di fokotša boleng bja botho gotee le ikonomi le kgodišo ya leago, gape di kgokagane le phetetšo ya malwetši a bjalo ka letšhollogo, cholera, hepitatis ya A, dysenteri, typhoite le pholio, gape di godiša thibelo.

Bothata bja digweregwere bo godišwa ke tlhokego ya tshepedišo ya maleba ya dipolitiki yeo e ka beago bothata bja digweregwere sehloreng, tlhokego ya ditšweletšo tša mašeleng, bodiidi, go gologa ga bodulo bja mekhukhu, phalalelo go ya metseditoropong le bofokodi bja tšhetšo ya peakanyo ya kgolo yeo e oketšegago mo go Bodulo bja Maselapeleng wa Metroplitene wa Tshwane mabapi le dipalo tša madulo ao a se nago le ditshwaamare tša go hlweka, dipalopalo di laetša gore, ka 2006, palo e be e le 158 000 gape, go tloga moo, bothata bja digweregwere bo ile bja gola ngwaga ka ngwaga ka selekanyo sa 0.62% go ya go 168 000 ka ngwaga wa 2016. Ka ngwaga wa 2009 le 2013 naga e tšere matsapa a go bega bothata bja digweregwere; le ge go le bjalo, koketšego yeo e golago ya bodulo, kudu ya bommakaipeya, ka lebaka la khudugelo ya go tla ka mono tikologong, gotee le kgolo ya setšhaba, e ile ya oketša ngangego mo go mafarahlahla a tša bodulo (Cogta 2020: Onlaene). Diphatišišo tše di lekotše go tšweletšwa ga ditirelo tša digwegwere go tee le magomo a lebowa a Bodulo bja Masepala wa Meteropolitene wa Tshwane. E lekotše ka fao mokgwa woo o dirišitšwego ke

Masepala go tšweletša ditirelo tša digweregwere.

Go tšwelela ga mokgwa o moswa wa tokologo mo Afrika Borwa gotee le diphetogo tša dipolitiki ka 1994 di tlišitše monyetla mo go dikarolo ka moka go lekola leswa molao wa go kwešišega, gotee le karolo ya ditirelo tša meetse. Teori yeo e bego e dirišwa ya lense ya analytical yeo e bego e dirišwa diphatišišong tše go sekaseka dilo tšeo di amanago le tšweletšo ya ditirišo tša digweregwere. Go ya ka Bulawa (2014:147), teori ya boikemo e tšweleditšwe ke Glaser gotee le Strauss mengwageng ya bo 1960 ge ba be šoma mmogo go ya fao bašomi ba swarwago ka gona sa balwetši bao ba hlokofalago ka gona maokelong (Glaser le Strauss 1967). Diphatišišo tše gape di lebile dikgokagano tša digweregwere, melao gotee le ditshepidišo. Lefapa le dira melao gotee le Bodulo bja Masepala wa Metropolitene bja Tshwane bo tšweletša ditirelo tša digweregwere legatong la lefapa la naga, mola badudi ba Tshwane e lego majabohwa bja lenaneo la digweregwere.

Afrika Borwa e nyaka phetogo yeo e ka dirišetšwago lenaneo kgoparareng go rarolla mathata a yona a digweregwe, kudu mo go lefelo la badudi bao ba kgobakanego ka bontši bjalo ka Masepala wa Metroplitene wa Tshwane moo go nago le kgonego ya go boloka dilahlwa. Godimo ga moo, go na le tlhokego ya mokgwa wa go ya go ile go laola dilahwa maemong a metse ge ditshwamare goba ditanka tša dilahlwa di tletše. Ka go kaonafatša taolo ya dilahlwa tša batho, boitoto bja bogolo, seriti, kaonafatšo ya bophelo bja ngwana gotee le polokego ya botho, kudu basadi le bana, e ka kgonthišišwa.

Ka 2017, lefapa la Bodulo bja Batho, Meetse le Digweregwere e begile gore go thiba gape boleng bja mašeleng go oketša meetse le mafarahlahla a digweregwe bo be bo lekanyetšwa go di bilione tše R1 362. Le ge go le bjalo, bogolo bja dithoto bo a buhlama. Go latela seo, Lefapa la Bodula batho, Meetse le Digweregwere bo tšweletša gore boleng bja puku ga bjale ya mafarahlahla bo eme go fihla go dibilione tše R584, goba 43% ya mašeleng a go thiba ditheko. Godimo ga fao, bonnete bja ditiragalo ke gore mafarahlahla ao a lego gona a "ngangilwe" ka lebaka la bohlokwa bja go

boloka moo go sa lekanago mo go ditokišo tša wona, go akaretša ditiego mo go go ntshwafatša ga mafarahlahla a kgale. Lefapa la Bodulo bja Batho, Meetse le Digweregwere bo kokotleditše bothata bjo bo ka fihlelago dipilione tše R59 bja ditokišo (DWS 2018:49). Masepala wa Metropolitene wa Tshwane o tšweletša gore patšete ya 2021/22 e tla išwa go go lekanyetša mašeleng a masepala gotee le go tliša ditirelo tša boleng bja godimo, mola gape go kgonthišišwa gore ditekanyetšo le dikotlo tebelelo ge di oketšega e be ka boleng bja fase ka moo go ka kgonegago go theoga go oketšege go tloga go Rand Water go fihla go Eskom. Dikotlo tebalelo di oketšega ngwageng wa 2021/22 wa mašeleng di ka tsela ye: digweregwere ke 10% le meetse ke 8% (CTMM 2021: Online). Godimo ga fao, Khansele ya Masepala ya Metrpolitene wa Tshwane e ile ya amogela patšete ya Motse ya ditšhelete ya 2021/22 ka patšete ka moka ya dibilione tše R43 – ye e nago le patšete ya ditiro ya dibilione tše R39 le mašeleng a patšete yeo e ka le bilione tše R4.

Masepala wa Metropolitene wa Tshwane o beetše karolo, yeo e bitšwago Meetse le Digweregwere Peakanyo ya Mafarahlahla gotee le Karolo ya Ditiragalo, go kaonafatša digwergwere le go ditiragalo tša tlhwekišo gotee le go abela tekanyetšo ya mašeleng, ngwaga ka ngwaga. Meetse le Digweregwere Peakanyo ya Mafarahlahla gotee le Karolo ya Ditiragalo mošomo wa yona ke go tšweletša ditirelo, tšweletšo ya meetse a mantši, le meetse le peakanyo ya digweregwere go motse le diprotšeke tša mašeleng, seo se ra ditšweletšo tše diswa.

AMAGQABANTSHINTSHI

Ukufikelela kwezococeko olufanelekileyo lilungelo elisisiseko eMzantsi Afrika nelifanele ukufunyanwa ngothakazelelo ngabo bonke abemi. Ingxaki yezococeko "sisifo" esandayo kwilizwe kunye nakumazwe amaninzi asaphuhlayo nakwihlabathi jikelele. Ukunqongophala kwamanzi eMzantsi Afrika kunye nemingeni yembalela ayinakubekelwa bucala kwiinkonzo zogutyulo, njengoko inxulunyaniswa neenkqubo zolawulo lwamanzi amdaka. Ucoceko olukumgangatho osezantsi lunciphisa impilo yabantu kunye nophuhliso lwezoqoqosho nezentlalo, kwaye kunxulunyaniswa nokusasazwa kwezifo ezifana norhudo, ikholera, i*hepatitis* A, isifo segazi, i*typhoid* nepoliyo.

Ingxaki yezococeko yenziwa kukunqongophala kwemfuneko yezopolitiko yokubeka phambili ucoceko, ukunqongophala kwemali, intlupheko, ukuhlaliswa kwabantu kumatyotyombe, ukufudukela kwabantu ezidolophini kunye nokusabela okungathathi ntweni kwiziko kwiimfuno ezandayo kuMasipala oMbaxa weSixeko saseTshwane. Xa sijonga ukusilela kwezococeko kwiSixeko saseTshwane kuMasipala oMbaxa ngokwenani lamakhaya angenazo izindlu zangasese ezicocekileyo, amanani abonisa ukuba ngonyaka wama-2006, inani lalingama-158 000 kwaye, ukusukela ngoko, ukusilela kwezococeko kuye kwanda minyaka le ngezinga le-0.62% ukuya kuma-168 000 ngonyaka wama-2016. Ngonyaka wama-2009 nangonyaka wama-2013 isixeko senze inkqubela phambili ekulungiseni ukusilela kwezococeko; nangona kunjalo, ukwanda okuqhubekayo kwamakhaya, ngakumbi kwiindawo ezinamatyotyombe, ngenxa yokufudukela kwabantu phezulu kulo mmandla, kunye nokukhula kwabemi, kubeke uxinzelelo olongezelelekileyo kwiziseko zophuhliso zamakhaya (Cogta 2020: *Online*). Olu phando luvavanye/luphengulule ukubonelelwa kweenkonzo zogutyulo elizweni nakwinqanaba elingasentla loMasipala

oMbaxa weSixeko saseTshwane. Luphande indlela esetyenziswa nguMasipala ukubonelela ngeenkonzo zogutyulo.

Ukuvela kwenkqubo entsha yedemokhrasi eMzantsi Afrika kunye notshintsho kwezopolitiko ngonyaka we-1994 kwazisa ithuba kuwo onke amacandelo karhulumente lokuphononongwa ngokupheleleyo komgaqo-nkqubo, kuquka necandelo leenkonzo zamanzi. Inkcazo-bungcali yohlalutyo yemiselweyo (*grounded theory*) ethe yasetyenzisiwa kolu phando ukuxoxa ngemiba enxulumene nokunikezelwa kweenkonzo zogutyulo. NgokukaBulawa (2014: 147), inkcazo-bungcali emiselweyo (*grounded theory*) yaphuhliswa nguGlaser noStrauss ngeminyaka yoo-1960 xa babesebenza kunye ekusingatheni abasebenzi malunga nezigulana ezazisweleka kwizibhedlele (Glaser & Strauss 1967). Olu phando lukwajolise kubume bezikhokelo zococeko, imithetho nemigaqo. ISebe lenza imigaqo-nkqubo kwaye uMasipala oMbaxa weSixeko saseTshwane uphumeza iinkonzo zogutyulo egameni lesebe lesizwe, ngelixa abahlali baseTshwane bengabaxhamli beenkqubo zococeko.

UMzantsi Afrika udinga ukwenziwa kwezinto ezintsha ezinokusetyenziswa, ubukhulu becala, ukusombulula imiceli mingeni yezococeko, ingakumbi kwiindawo ezinabantu abaninzi ezifana noMasipala oMbaxa weSixeko saseTshwane apho kukho umkhwa wokugcina inkunkuma. Ngapha koko, kukho ukungabikho kwendlela ezinzileyo yokulawula inkunkuma kwinqanaba lekhaya kumngxunya wendlu yangasese okanye itanki yokubolisa. Ngokuphucula ukulawulwa kwenkunkuma yabantu, ubumfihlo obukhulu, isidima, ukuphuculwa kwempilo yabantwana kunye nokhuseleko lomntu, ngakumbi kwabasetyhini nasebantwaneni, kunokuqinisekiswa.

Ngonyaka wama-2017, iSebe lokuHlaliswa kwaBantu, aManzi noGutyulo lakhankanya ukuba ixabiso eliyinkunzi endaweni yeziseko zophuhliso lwamanzi nogutyulo lwelindle liqikelelwa kuma-R1, 362 yezigidigidi. Nangona kunjalo, ii-asethi ezikhoyo ziyahla. Ngenxa yoko, iSebe lokuHlaliswa kwaBantu, aManzi noGutyulo licacisa ukuba ixabiso langoku lencwadi kwiziseko zophuhliso limi malunga nama-R584 ezigidi zezigidi, okanye ama-

43% yeendleko zokutshintshwa kwemali eyinkunzi. Ngapha koko, inyani yokusebenza kukuba iziseko zophuhliso ezikhoyo “zoluliwe” ngenxa yotyalo-mali oluncinci kulondolozo lwayo, kubandakanya nokulibaziseka kohlaziyo lwezixhobo ezidala. ISebe lokuHlaliswa kwaBantu, aManzi noGutyulo liqokelele umsebenzi ongekenziwa we-R59 yezigidigidi kuhlaziyo (DWS 2018: 49). UMasipala oMbaxa weSixeko saseTshwane umisela ukuba uhlahlo-lwabiwo-mali lowama-2021/22 luza kujolisa ekuzinziseni ezemali kumasipala nokuqhuba ukuziswa kweenkonzo ezisemgangathweni, kwangaxeshanye kuqinisekiswe ukuba iirhafu kunye nonyuso lwamaxabiso luphantsi kangangoko ngaphandle kokunyuka okuthe chatha, isuka eRand Water nakwa-Eskom. Ukunyuka kwamaxabiso kunyaka-mali wama-2021/22 koku kulandelayo: ugutyulo li-10% kwaye amanzi asi-8% (CTMM 2021: Kwi-Intanethi). Ngapha koko, iBhunga loMasipala oMbaxa weSixeko saseTshwane livume uhlahlo-lwabiwo-mali lweSixeko kunyaka-mali wama-2021/22 ngohlahlo-lwabiwo-mali olupheleleyo lwama-R43 ezigidigidi - oluquka uhlahlo-lwabiwo-mali lokusebenza lwama-R39 ezigidigidi kunye nohlahlo-lwabiwo mali lwezigidi eziphantse zafikelela kwi-R4 yezigidigidi.

UMasipala oMbaxa weSixeko saseTshwane unecandelo elizinikeleyo, elibizwa ngokuba liCandelo lezaManzi nokuCocwa kweziSeko zoCoceko kunye nokuPhumeza, ukukhuthaza iinkonzo zogutyulo nococeko kunye nokwabiwa kwemali eyoneleyo rhoqo ngonyaka. ICandelo lezaManzi noCoceko lokuCwangciswa nokuPhumeza linoxanduva lokubonelela ngeenkonzo zogutyulo, ukuhanjiswa kwamanzi ngobuninzi, kunye nocwangciso lwamanzi nococeko, nokuphunyezwa kwesixeko kunye neeprojekthi ezinkulu, oko kukuthi, uphuhliso olutsha.

OKUFINGQIWE

Ukutholakala noma ukuba nendawo enezithunzi yendle kuyilungelo lomuntu eliyisisekelo ENingizimu Afrika okufanele lithokozelwe yizo zonke izakhamuzi. Inselelo noma inkinga youkuthuthwa kwendle “iyisifo” esandayo ezweni kanye nasemazweni amaningi asathuthuka kanye nasemhlabeni jikelele. Izinselelo zokushoda noma zokusweleka kwamanzi kanye nesomiso eNingizimu Afrika azikwazi ukwahlukaniswa nezinsinzakalo zokuthuthwa kwendle, njengoba kuxhunyaniswa nezinhlelo zokuphathwa kwamanzi angcolile. Ukuthuthwa kwendle okungekho ezingeni elifanele kunciphisa impilo yabantu yabantu nokuthuthuka komnotho nakwezenhlalo futhi kuxhumene nokudluliswa kwezifo ezifana nohudo, ikholera, i-hepatitis A, isifo sohudo,i- typhoid kanye novendle, kubhebhethekisa ukuqina.

Inkinga youkuthuthwa kwendle ibhebhethekiswa ukungabibikho noma ukusweleka kwentando yezepolitiki youkubeka phambili inhlanzeko, ukungabi namandla kwezimali, ubuphofu, ukuhlaliswa kwabantu emijondolo, ukufudukwelwa emadolobheni kanye nokuphendula ngendlela okungeyona ezikhungweni zezimfuno ezandayo kuMasipala weDolobha lase-Tshwane. Uma sibheka ukusilela emuva kokukhucululwa kwendle EMkhandlwini weDolobha lase-Tshwane ngenani lemindeni engenayo indlu yangasese ehlanzekile, izibalo zikhomba ukuthi, ngonyaka ka-2006, isibalo sasingu-15800 futhi, kusukela lapho, ukusilela kwenzanzeko kuye kwanda minyaka yonke izinga lika-0.62% kuya ku-168 000 ngo-2016. Ngonyaka ka- 2009 no-2013 idolobha lenze intuthuko ekubhekaneni nokusilela emuva kokuthuthwa kwendle; kodwa-ke, ukwanda okuqhubekayo komndeni, ikakhulukazi emijondolo, ngenxa yokufudukela kwabantu abaningi esifundenidue, kanye nokwanda kwenani labantu, kubeke ubunzima obungeziwe kwingqalasizinda

yezindluh (I-Cogta 2020: ku-inthanethi). Lolu cwaningo noma lesisifundo luhlolisise ukuhlinzekwa kwezinsizakalo zokuthuthwa kwendle ezweni kanye nasengxenyeni esenyakatho yoMkhandludoloba wase-Tshwane. Kuphenywe indlela esetshenziswa ngu-Masipala ukuhlinzeka ngezinsizakalo zokuthuthwa kwendle.

Ukuvela kohlelo olusha lwentando yeningi eNingizimu Afrika kanye nezinguquko kwezepolitiki ngonyaka ka-1994 kwaletha ithuba kuyo yonke imikhakha kahulumeni lokubuyekezwa ngokuphelele kwenqubomgomo, kubandakanya nomkhakha wezinsizakalo zamanzi. Ithiyori ebizwa kokuthi pheqelezi i- (*The grounded theory*) iyilensi yokuhlaziya esetshenziswe kulolu cwaningo noma kulesifundo ukuxoxa ngezinkinga eziphathelene nokuhlinzekwa kwezinsizakalo zokuthuthwa kwendle. Ngokusho kuka-Bulawa (2014:147), lethiyori ebiza ngokuthi i-(*grounded theory*) yasungulwa ngu-Glaser no Strauss ngonyaka wo-1960 ngenkathi besebenza bonke ndawonye ekuphatheni kwabasebenzi ngokuphathwa kweziguli ezishonayo esibhedlela(u-Glaser no Strauss 1967). Lolu cwaningo lubuye lubheke ezinhlakeni zokuthuthwa kwendle, imithetho kanye nemithethonqubo. UMnyango wenza iminqubomgomo futhi uMasipala waseDolobheni lase-Tshwane wenza izinsizakalo zokuthuthwa kwendle egameni lomnyango kazwelonke, kanti izakhamuzi zase-Tshwane yizo ezihlomula ngezinhlelo zokuthuthwa kwendle.

INginizimu Afrika idinga ukuqanjwa okusha okusetshenziswayo ngezinga eliphezulu ukuxazulula izinselelo zayo zokuthuthwa kwendle, ikakhulukazi ezindaweni ezinabantu abaningi ezifana noMkhandludolobha wase-Tshwane lapho kunomkhuba wokugcina khona imfucuza. Ngaphezulu kwalokho, ayikho indlela eqhubekayo yokulawula imfucuzo ezingeni lasekhaya uma umgodi wendlu yangasese noma ithangi lokubhuqa seligcwalisiwe. Ngokwenza ngcono ukuphathwa kwendle yabantu, ubumfihlo okukhulu, isithunzi, impilo yezingane ephephile nokuphepha komuntu siqu, ikakhulukazi kwabesifazane nezingane, kungaqinisekiswa.

Ngo-2017, uMnyango wezokuhlaliswa kwabantu, Amanzi nenhlanzeko

wabalula ukuthi inani elizobuyiselwa imali kwingqalasizinda ekhona yamanzi nokuthuthwa kwendle lalinganiselwa ku-R1 362 wamabhiliyoni. Kodwa-ke, izimpahla ezikhona zehla ngamanani. Ngenxa yalokho, uMnyango wezokuhlaliswa kwabantu, Amanzi nenhlanzeko uthi inani lamanje lezincwadi lengqalasizinda limi cishe ku-R584 wamabhiliyoni, noma ku- 43% wezindleko zokufaka imali enkulu. Ngaphezulu kwalokho, iqiniso okuyilona elisebenzayo ukuthi ingqalasizinda esivele ikhona"yeluliwe"ngenxa yokungabikhona kwemali eningi ekuyigcineni kwayo, kufaka phakathi ukubambezeleka kokuvuselelwa kwengqalasizinda endala. uMnyango wezokuhlaliswa kwabantu, Amanzi nenhlanzeko usilele emuva ngo-R59 wamabhiliyoni ekusetshenzisweni kabusha (DWS 2018:49). UMasipala weDolobha lase-Tshwane uthi isabelozimali sango-2021/22 sizobhekela izinsiza zimali zikamasipala nokuqhuba ukulethwa kwezidingo ezisezingeni eliphakeme, kanti ngesikhathi esifanayo siqinisekisa ukuthi amanani kanye nokunyuka kwamanani entengo aphansi ngangokunokwenzeka yize kukhuphuke kakhulu kusuka e-Rand Water nakwa Eskom. Ukunyuswa kwemali ekhokhwayo yonyaka wezimali ka-2021/22 imi kanje: ukuthuthwa kwendlle ngu-10% kuthi amanzi kube ngu-8% (CTMM 2021: inthanethi). Ngaphezulu kwalokho, uMkhandlu kaMasipala weDolobha lase-Tshwane usamukele isabelomali seDolobha sonyaka wezimali ka-2021/22 ngesabelomali esiphelele sika- R43 wamabhiliyoni – esifaka phakathi isabelomali sokusebenza sika-R39 wamabhiliyoni kanye nesabelozimali cishe esingu- R4 wamabhiliyoni.

UMkhandludolobha wase-Tshwane unophiko oluzinikele, olubizwa ngoPhiko lokuhlelwa Kanye nokusebenza kwengqalasizinda yamanzi nokuthuthwa kwendle, ukuze kuthuthukiswe izinsizakalo zokuthuthwa kwendle nenhlanzeko kanye nokwabiwa kwemali eyanele, njalo ngonyaka. Uphiko lokuhlelwa kwengqalasizinda yamanzi nenhlanzeko lubhekele ukuhlinzekwa kwezinsizakalo zokuthuthwa kwendle, ukuhlinzekwa ngamanzi amaningi, nokuhlelwa kwamanzi nokukhucululwa kwendle kanye nokuqaliswa kweDolobha kanye namaphrojekthi amakhulu, okungukuthi intuthuko entsha.

ABBREVIATIONS AND ACRONYMS

ANC	African National Congress
ASGISA	Accelerated and Shared Growth Initiative South Africa
CBD	Central Business District
CEDAW	Convention on the Elimination of all forms of Discrimination against Women
CMA	Catchment Management Agency
CTMM	City of Tshwane Metropolitan Municipality
DHSWS	Department of Human Settlements Water and Sanitation
DPME	Department of Performance Monitoring and Evaluation
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
FBS	Free Basic Sanitation
FBW	Free Basic Water
GEAR	Growth Employment and Redistribution Strategy
GDP	Gross Domestic Product
GNU	Government of National Unity
ICESRC	International Covenant on Economic, Social and Cultural Rights
IDP	Integrated Development Plan
IRS	Integrated Regulatory System
MDG	Millennium Development Goal
MIFF	Municipal Infrastructure Investment Framework
MIG	Municipal Infrastructure Grant
MSCOA	Municipal Standards Chart of Accounts
MTSF	Medium-Term Strategic Framework
MTEF	Medium-Term Expenditure Framework

NDP	National Development Plan
NSPU	National Sanitation Programme Unit
NWA	National Water Act
NWSMP	National Water and Sanitation Master Plan
NWRSA	National Water Resources and Services Authority
NWRSR	National Water Resources and Services Regulator
NWSRS	National Water Services Regulation Strategy
O&M	Operation and maintanance
PMU	Project Management Unit
RBIG	Regional Bulk Infrastructure Grant
RDP	Reconstruction Development Programme
RHIP	Rural Household Infrastructure Grant
RSA	Republic of South Africa
SALGA	South African Local Government Association
SABS	South African Bureau of Standards
SAHRC	South Africa Human Rights Commission
SDG	Sustainable Development Goal
STATSSA	Statistics South Africa
UDS	Urine Diversion System
UN	United Nations
UNICEF	United Nations International Children's Emergency Fund
USDG	Urban Settlements Development Grant
VIPL	Ventilated Improved Pit Latrine
WASH	Water Sanitation and Hygiene
WHO	World Health Organisation
WRC	Water Research Council
WSA	Water Services Authorities
WSA	Water Services Act (108) of 1997
WSDP	Water Services Development Plan
WSUD	Water Sensitive Urban Design
WTISPP	Water Targets Implementation Support Programme Plan
WWTW	Waste Water Treatment Work

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CHAPTER 1

INTRODUCTION TO THE STUDY

1.1 Introduction

Whenever a discourse on sanitation is presented, there is a tendency to assume that it is about water and sanitation. However, these two items are interdependent. Chapter 1 addresses provision of sanitation services in the northern fringe of the City of Tshwane Metropolitan Municipality (CTMM) and hygiene to achieve a positive impact on human health. Kwarteng, Agyemang-Duah, Arthur and Agyemang (2015:117) state that the second leading cause of poor health is poor sanitation. Pathogens occur in various ways and affect individuals as a result of poor sanitation. For example, waterborne diseases, which transpire through water as it disperses infections result in other water related diseases such as cholera.

Naughton and Mihelcic (2017:3) state that sanitation is one of the most important aspects of a community's well-being because it extends the life span, protects human health, and is documented to provide benefits to the economy. Although South Africa has made significant strides since the demise of the apartheid regime, the first democratic elected government has been reliant on existing services to improve the quality of life of the majority historically disadvantaged citizenry. Many municipalities including the CTMM lack the resources to deliver sustainable basic infrastructure services to unserved populations while rehabilitating the existing infrastructure. Therefore, there is a need to evaluate the quality of water services infrastructure, effective functioning of the services, and accessibility thereof.

Globally, the term "public service delivery" is a popular phrase which is utilised to represent the distribution of basic services and communal needs in the country, particularly land, housing, electricity, infrastructure, water and sanitation. However, in the South African context, the delivery of these basic services has occasionally proven unreliable, significantly endangering and

inconveniencing local communities. The resultant response by communities has been an intensification of protests for improved public service delivery (Reddy, 2016:1).

South Africa's post-1994 apartheid government embarked on a number of developmental efforts and major reform initiatives such as the Reconstruction and Development Programme (RDP) which was implemented to provide free basic water and sanitation (Ovens & Associates, 2015:16). Community Survey of 2016 highlight that access to flush toilet increased from 49% in 2001 to 63% in 2016 and 90% of households had access to piped water as compared to 84% in 2001 (Mutyambizi, 2020:2).

Furthermore, Ledger & Rampedi (2020:83) argues that 25 years later after democracy, it is clear that in many respects local government has failed to meet expectations as pledged by local government in order to be at the forefront of providing transformative service delivery to all South Africans, and to contribute directly to meaningful and sustainable improvements in the standard of living by providing the affordable access to services for the households.

Below, the following aspects of this study are expounded upon: an overview of the CTMM that is an analysis of the provision of sanitation services in South Africa; background and rationale for the study; research problem; scope of the research; research questions; significance of the research; followed by research objectives. Furthermore, the chapter also discusses the research methodology, research design, gathered data, identification of key concepts, and an outline of the chapters.

1.2 Background to the study

CTMM ranks water provision as one of the most primary service to be provided to communities as it is a critical component and a basic need in achieving a measure of healthy living. It is estimated that there are presently almost 29 000 households in the CTMM without access to a basic level of

water service, and almost 96 000 households are without a basic access to sanitation (CTMM, 2020: Online). Subsequently, the CTMM continues with its principle mandate to provide sanitation services to its communities as a fundamental input to social wellbeing and the growth of the economy.

Petterson (2019:30) posits that numerous South African households do not have access to adequate sanitation facilities. In certain instances, households have no access to sanitation facilities. Petterson (2019:30) further points out that according to Statistics South Africa, 45.6% of the households do not have ablution facilities in their homes; 75.5% of the population enjoys access to 'adequate' sanitation; while 12.2% utilise pit latrines. DPME (2014:66) states that since 1994, access to water, sanitation and electricity in rural areas has increased significantly. The provision of these services is still being addressed. Numerous rural communities do not have access to water, sanitation and electricity.

The CTMM, in line with the country targets in terms of delivery of services, places an on-going focus on the reduction of the sanitation backlog by ensuring universal access to sanitation (CTMM, 2021:60). The government delivered approximately 5.2 million households with sanitation facilities between 1994 and April 2017. However, service delivery protests are predominantly as a result of households which have not been provided improved sanitation. It is unacceptable that after 25 years of democracy, an extensive part of the citizenry still is unserved, or only have access to dysfunctional sanitation facilities (Department of Human Settlements Water and Sanitation, 2017:41).

Of the 5.2 million households served in South Africa the CTMM in 2017 had 833 818 (81.16%) households with flush toilets, 146 439 (14.25%) pit toilets and 25 894 (2.52%) ventilated improved toilets. Households using pit toilets were mostly in the informal settlements (COGTA, 2020: Online). Moreover, the CTMM reflects a positive change in terms of the number of households served with sanitation during 2018/19 financial year. The report highlights that

during 2018/19 the households using sanitation services are as follows i.e. flush toilets connected to public sewerage (588 824), Ventilated pit latrine (5 025), bucket system (0), flush toilet septic tank (0) and other (327 606) which is not specified (Municipalities, Online).

Montesano (2016:6) holds that poor sanitation has an immense negative impact on the economy and society at large, resulting in deadly and debilitating diseases through food with pathogen-laden human waste and contaminated drinking water sources. This in turn is associated with loss of productivity due to ill health, lack of proper toilet facilities, and increased healthcare costs to care for the sick. South African Cities Network (2016:5) state that cities throughout South Africa are consistently faced with challenges to provide adequate sanitation services to households. This is also partially attributed to migration from rural areas including foreign nationals from the African Continent. The effect on human health as a result of limited collected and/or treated wastewater can compromise the quality of the resources, for example, polluted run-off water. When either untreated or poorly treated water is released into rivers, communities who have settled downstream are affected negatively. COGTA (2020: Online) points out that despite the progress made by the CTMM in addressing sanitation backlogs between the period 2009 to 2013, the ongoing growth of households, due to high in-migration and population growth in the region, particularly on informal settlements has put additional strain on household infrastructure.

McDonald and Ruiters (2012:101) posit that CTMM comprises of 14 councils merged as part of the national municipal demarcation process which was formally ushered in during the December 2000 municipal elections. The Municipality covers an area of approximately 70km by 60km, and includes: Pretoria, Winterveld, Temba, Hammanskraal, Crocodile River, Centurion, Akasia, Centurion, Mabopane and Soshanguve. Through provision and the efforts of government, existing stakeholders and support agencies the percentage of households with access to improved sanitation increased by 20.4 percentages between 2002 and 2019, growing from 61.7% to 82,1%.

(StatsSA, 2019: Online). The CTMM is the largest metropolitan municipality in Gauteng in terms of size, the growth rate of the CTMM has been declining from 3.3% in 2011 to the current 2.2% in 2019 in line with national and provincial trends. The CTMM hosts the smallest population of 3,555 741 million (COGTA, 2020: Online). Figure 1 below is the map of the CTMM.

Figure 1: Boundaries: CTMM

Source: Tshwane e-GIS viewer map

Most black South Africans inherited key challenges from the previous regime, especially those who are residing in rural areas. Cognisant of the extent of underdevelopment and taking into consideration the areas in which the majority reside, is where sanitation is required most. The new democratic government prioritised sanitation to all citizens and targeted interventions which focused on the previously marginalised segment of the majority population. Although Ga-Rankuwa and Mabopane is smaller, both are densely populated. The residents rely on a combination of rural and urban economic activities to make a living.

Temba and Winterveld are more rural oriented and the farthest in relation to the former white urban centres. The former and latter (Winterveld) residents rely more on rural economic activities including small- scale farming and work on large plots in Winterveld (South African Cities Network Report, 2015:5).

Statistics South Africa posits that through the efforts of government, existing stakeholders and support agencies the percentage of households with access to improved sanitation increased by 20,4% growing from 61.7% to 82.1% (Statistics South Africa, 2021: Online). Furthermore, Statistics South Africa reported that South Africa is likely to experience a mass movement towards urbanisation which would place a greater burden on urban sanitation systems. Rural areas tend to experience a growth and varying types of human settlement which places increased strain on the small and limited sanitation systems. Adequate access to proper sanitation is imperative to preserve the population's health. In future, sanitation services are expected to accentuate appropriate human settlement systems, and significant consideration for resources, for example, water which would be required to select various types of sanitation systems. Hence, the government intends to increase the number of households with access to a functional sanitation service to approximately 90% by 2019 as well as eradicate bucket sanitation in formal areas (Statistics South Africa, 2016:25).

Since 2013 there was a general trend of declining number of bucket toilet when 100 610 consumers used a bucket toilet system. The number of municipal supplied bucket toilet decreased slightly, the number of consumer units decreased from 42 622 in 2018 to 42 434 in 2019. Municipalities often provide bucket toilets as a temporary measure while they develop improved sanitation facilities. Sometimes, one might wonder why municipalities supply buckets toilets at all. However, the difficulties delay the process of replacing buckets, making it hard to replace bucket toilets once the system has been introduced (StatsSA, 2021: Online).

Like the City of Ekurhuleni and the City of Joburg metropolitan municipalities, the

CTMM receives most of its water from the Vaal River system through water transfer schemes. CTMM still has much work ahead for its water and wastewater infrastructure before it can be considered adequate. On a per capita basis, the proportion of connections that is metered still falls below the 100% benchmark for metered connections. The level of investment is approximately R60 per person per annum (South Africa Cities Network, 2016:9). The Roodeplaat water treatment plant is currently one of the most advanced in Africa in terms of process configuration in the country (Van Schalkwyk, 2013:36). CTMM receives 81.3% of its water from Magalies Water and Rand Water whilst the remaining (18.7%) is supplied by CTMM from its own boreholes and dams (CTMM, 2021: Online).

In 2005, the CTMM commissioned 60 Mℓ/d at the Roodeplaat Water Treatment Works (WTW) as part of its larger Bulk Water Supply Project to augment the supply of water to the rapidly expanding northern areas of the CTMM from feasible local sources to extend its existing supply scheme from Rand Water (and effectively from Lesotho Highlands schemes). Van Schalkwyk (2013:36) also asserts that Roodeplaat Dam, which is situated approximately 20 km north-east of the Pretoria CBD, was identified as a feasible local source. Furthermore, a licence to abstract raw water from this dam was issued by the former Department of Water Affairs (DWA) to the CTMM, thereby approving the implementation of phase one of a 60 Mℓ/d bulk water supply scheme. Figure 2 below is the Roodeplaat Dam which supply's water to the CTMM.

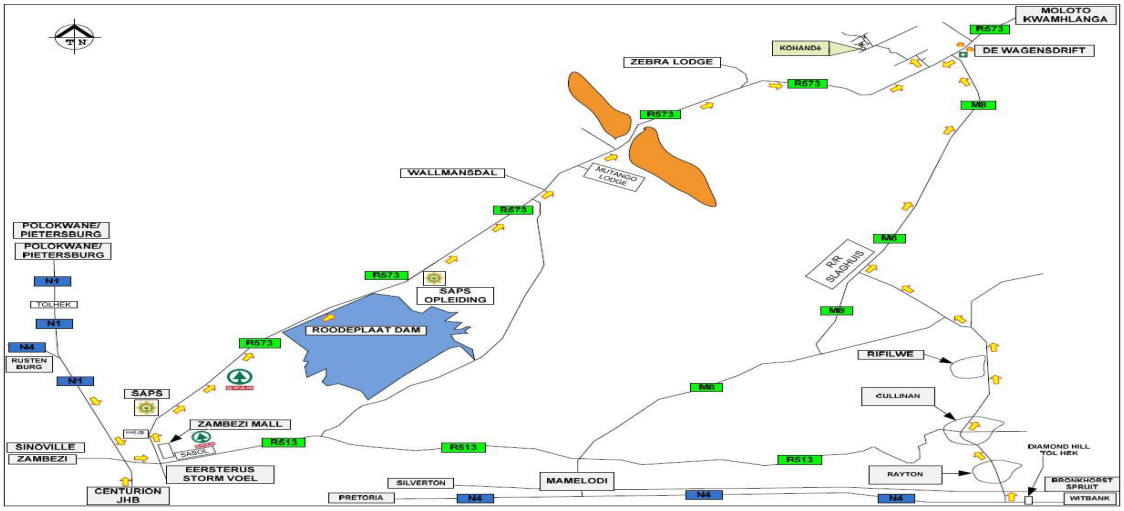


Figure 2: Roodeplaat Dam: supply to the CTMM in surrounding areas

Source: Tshwane e-GIS viewer map.

The DHWS owns most of the large dams including related water resource infrastructure in the country. Moreover, it undertakes essential planning and implementation of future water resource development projects. Roodeplaat Dam is located approximately 22 km north- east of Pretoria towards the northern fringe of CTMM geographical municipal area. Originally, the dam was called the 'Pienaars Rivier Dam', which was constructed in 1956 with the aim to supply the surrounding proprietors with water. The Roodeplaat Dam has developed into an important water source for the Pretoria area (Masindi & Duncker 2016:02). Furthermore, after commissioning the Roodeplaat water treatment plant in 2006, the Dam augments the supply of water to the northern areas of the CTMM through the Montana – Wonderboom - and Magaliesberg water reservoirs and is utilised as a direct water supply to the Doornpoort area (CTMM, Online).

Statistics South Africa (2016:35) further points out that South Africa achieved the Millennium Development Goals (MDG) target by 2012 to halve the proportion of the population without sustainable access to improved sanitation. Moreover, this goal was achieved three years before the 2015 target date. The percentage of persons with access to an improved sanitation facility increased from 49.3% in 1996 to 76,8% in 2013 (Stats SA, 2015). Thomas *et al*. (2018:33) hold that the Sustainable Development Goals target aimed: “By 2030, to achieve access to adequate and equitable sanitation and hygiene for all and end to open defecation, paying special attention to the needs of women and girls and those in vulnerable situations” (WHO/UNICEF, 2015:4). The MDG underscored access to improved sanitation facilities which is a single outcome, while the SDG sanitation target augmented by incorporating adequacy and equity.

1.3 Statement of the problem

The lack of adequate sanitation has had a serious impact on health -

economy - and social development, which is also considered as one of the world's leading development challenges (WHO, 2014). Proper sanitation facilities and washing one's hands after utilising the toilet would inhibit the transfer of diseases associated with poor sanitation which would subsequently contaminate water resources. Hygienic sanitation is necessary to ensure good health and human dignity, as well as sustain human life. As a result, the South African Government committed itself to provide all households with universal access to sanitation by 2014 (STATSSA, 2016). The Bantustans established homelands to implement its policy on separate development. The homeland system was the central feature to separate development and the majority black population was settled along the peripheries. All the cities were racially divided, and the black population were forced to live great distances from places of economic activity such as Ga-Rankuwa, Mabopane, Temba and Winterveld. Moreover, they were denied proper public amenities during the apartheid era. The strict social engineering of cities throughout the country during the apartheid regime implied that the black majority were consistently disadvantaged. This motivated the researcher to assess the provision of sanitation in the country with specific reference to the northern fringe of the CTMM. The relationships between the Winterveld and Ga-Rankuwa, Temba, Mabopane, Soshanguve townships, and Rosslyn industrial area should be considered within the context of the apartheid regime to encourage black urbanisation in the homeland.

Like all other municipalities in South Africa, the CTMM is constitutionally tasked with providing sustainable and quality services to the communities of Tshwane. This constitutional obligation is further articulated in the local government legislative framework. This means that the City has a constitutional and legal obligation to play a developmental role (growth and development) and deliver key basic services such as water, electricity, sanitation and refuse removal to the residents of Tshwane (CTMM, 2019: Online). This study aimed at assessing the degree of satisfaction among the residents related to the quality of sanitation services provided to the Ga-Rankuwa, Mabopane, Temba and Winterveld townships residents. This

research area was selected because currently, there is a concern with the delivery and access to sanitation which is below the levels prescribed by the RDP.

1.4 Research problem

The lack of universal access to sanitation, including water, throughout the country often translates to public dissatisfaction which in turn results in mass action through demonstrations, picketing and strikes. As per the discussion above, it is evident that the Government is aware of the challenges facing the country, especially water and sanitation. Government put in place different mechanisms in terms of funding and human resources including technical skills to deliver water services. Consequently, the government responded by setting universal access targets, millennium development goals, a national development plan as well as sustainable development goals to address both water supply and sanitation services. Subsequently, government came up with public programmes and special funding that addresses both water and sanitation challenges in both rural and urban areas. This led to the establishment of the Department of Human Settlements Water and Sanitation (DHSWS) to address the shortcomings in this area in the country.

The Sustainable Development Goals Target 6.2 highlights the following aspects: “achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations by 2030” (Statistics South Africa, 2017:97). Service delivery in South Africa is often marred by financial irregularities, corruption, and maladministration. Violent service delivery protests are caused by the high levels of inefficiencies and incompetency from local government (Masuku & Jili, 2018:1).

Twala (2014:159) posits that the provision of public services by the African National Congress (ANC) led government-of-the-day became central to the socio- economic transformation of South Africa. The slow delivery of basic

municipal services to the communities became a public discourse in South African politics. Twala (2014:159) states that the Municipal IQ Report for 2016 further highlights that nationally, public service delivery protests had reached 70 in total from January to April 2016. The local government elections were held in 2016, the year in which the highest number of violent service delivery protests was recorded by South Africans who demanded basic public services. The organisers of the protests perceived it opportune time to pressure the government to deliver the basic services (Nomarwayi, 2017:3). The CTMM experienced several violent service delivery protest in their offices. The protesters were demanding basic public services from local level of government including proper sanitation, clean drinking water, electricity, access to health care, formal housing and access to infrastructure (CTMM, 2020: 18).

This study investigated the provision of sanitation in the northern fringes of the CTMM in the Ga-Rankuwa, Mabopane, Temba and Winterveld townships. Chapter 6 of the study reviewed strategies that can be utilised to accelerate the delivery of sanitation in the CTMM. The study addressed the set sanitation targets which was provided by CTMM, which includes addressing service backlogs and poverty through improving the availability and universal accessibility of essential public services such as water and sanitation.

1.5 Purpose of the study

Kumar (2019:80) posits that the first and foremost step of the research process is to formulate a research problem, which is the identification of a destination before undertaking a journey. This study endeavoured to address sanitation problems in South Africa as well as in particular in the northern fringe of the CTMM, in order to ensure access to sanitation and to eliminate transmission of diseases caused by poor sanitation. The purpose of the study is to evaluate the provision of sanitation and assess the development of new intervention strategies to inhibit the rising poor sanitation in the CTMM. The ultimate goal of this study in Chapter 3 is to establish approaches to improve

public policies and guidelines for the provision of sanitation in the CTMM. The study further highlights the set targets and achievements of the CTMM with regard to the delivery of sanitation services in order to meet the National Development Plan and the Sustainable Development Goals target. The legal frameworks of sanitation services i.e. White Paper in Basic Household Sanitation (2001) and the Sanitation Policy (2016) were examined in order to identify feasible options either for improving the legal frameworks or to modify them in order to accommodate legal realities.

Petterson (2019:30) posits that numerous South African households remain without adequate sanitation facilities, despite improved access thereto, while in certain instances, there are no facilities at all Statistics South Africa reports that 75,5 percent of the population has access to sanitation; 45,6% of the households do not have a toilet inside their dwelling, while 12,2 percent utilise pit latrines. CTMM (2021: Online) points out that the City had a total number of 933 000 flush toilets (83.60% of total households), 16 300 Ventilation Improved Pit (VIP) (1.46% of total households) and 150 000 (13.42%) of total household's pit toilet.

1.6 Research questions

Research questions clearly set the fundamental core of the study to be conducted. Limited research has been conducted on the provision of sanitation in mixed settlement type, for example, the fringe of the cities. Most studies are conducted nationally in order to provide a national overview of the delivery of sanitation and they are not providing information about the current status of the delivery of sanitation in the fringes of the cities. Hence, the purpose of this study is to determine and evaluate the provision of sanitation services in the northern fringe of the CTMM with specific reference to the Ga-Rankuwa, Mabopane, Temba and Winterveld townships. This study also presents an analysis of the social situation and actions by the relevant actors tasked with the delivery of sanitation services to communities in the CTMM.

1.7 Objectives of the research

This research venture explored the approach to the provision of sanitation in the northern fringe of the CTMM. The following research objectives of the study served as a guide to collect relevant data and information:

- Identify and analyse key challenges faced by the CTMM in providing sanitation services in areas under its jurisdiction including the northern fringe of the CTMM with specific reference to Ga-Rankuwa, Mabopane, Temba and Winterveld townships.
- Explore the planning instrument(s) utilised by the sector to promote planning and budgeting for sanitation services.
- Assess and interpret the sanitation regulatory framework including the application of the provision of sanitation holistically in the CTMM.
- Assess the alternative service delivery mechanisms or technologies utilised in the CTMM to provide sanitation services to enhance service delivery.
- Provide guidelines and recommendations to the CTMM to improve sanitation service delivery.

The overarching research question is:

> *"What is the current status of the provision of sanitation services within the northern fringe of the* CTMM *with specific reference to Ga-Rankuwa, Mabopane, Temba and Winterveld townships*?"

The following research questions are formulated. However, the succeeding research questions are analysed in terms of the provision of sanitation services in South Africa.

- *What planning instrument(s) are utilised by the sector to promote planning and budgeting for sanitation services*?
- *What is the provision of sanitation regulatory framework in the country?*
- *What are the key challenges faced by the* CTMM *in providing sanitation services in areas under its jurisdiction including the northern fringe of it*

with specific reference to Ga-Rankuwa, Mabopane, Temba and Winterveld townships?

- *What are the alternative service delivery mechanisms or technologies utilised in providing the sanitation services in South Africa to enhance basic service delivery?*
- *What strategies and guidelines are utilised in South Africa and in the* CTMM *to improve the basic delivery of sanitation services?*

The study is designed to establish the extent to which the country and specifically in the CTMM provide sanitation services in the northern fringe and surrounding areas under its jurisdiction. Basic services are the fundamental building blocks to economic empowerment. The CTMM is mandated to provide basic services to its communities. The roles and responsibilities of the municipal officials in terms of planning, implementing, monitoring and reporting in the provision of basic sanitation services to beneficiaries were investigated and evaluated. This study would be of interest to the CTMM, public decision-makers, practitioners, non-governmental organisations, local and national government and the public. The study will make the following significant contributions in several ways:

First, the study will attempt to expand the body of knowledge on the delivery of sanitation services in mixed settlements, particularly in the CTMM.
Secondly, the public will be cautious that the sanitation problem is not unique to South Africa or to the rest of the world.
Thirdly, the study will be presented to the CTMM planners to identify how well the institution is meeting sanitation delivery expectations.

Fourthly, the findings of the study will expand the body of knowledge on the delivery of sanitation services in mixed settlements such as the northern fringes of the CTMM to enable public decision-makers, oversight bodies, DHSWS and communities to understand the challenges faced by the CTMM in terms of the sanitation service delivery.

1.8 Research methodology and design

The utilisation of grounded theory in this study was the basis of the research methodology. The grounded theory used to create categories from the data collected through the case study. Mackey and Gass (2016:3) define research methodology as the process of conducting research which involves practical considerations as well as theoretical conceptualisations. It is equally important to consider the selected research method and justify its adoption in light of our research questionnaires.

Adams, Khan and Raeside (2014:6), define research methodology as the science and philosophy of all research and how it differs from the research method. The literature search revealed two frequently adopted basic approaches to research methodology: qualitative and quantitative research. The former approach employs a method of data collection and analysis which is non-quantitative; including a number of methodological approaches based on diverse theoretical principles. Qualitative research methods describe reality as experienced by the respondents in the northern fringes of the CTMM as well as aims towards the exploration of social relations. Quantitative research adheres to strict standards of a research design which is based on the methodological principles of neo-positivism and it will quantify the information collected from the study.

Cresswell (2014:12) asserts that research design is types of inquiry within mixed methods, quantitative and qualitative approaches that provide specific direction for procedures therein. Kumar (2014:33) holds that the primary function of research design is to describe, justify and explain how one will establish responses to one's research question, and should include the study design *per se*, measurement procedures, logistical arrangements that one proposes to undertake, sampling strategy, frame of analysis and time frame. Based on the above explanation and formulated research questions, both the quantitative and qualitative methodologies were adopted for the study and the two types of data have created a solid foundation for drawing conclusions about the intervention of the study and also provided validation for each other.

The provision of sanitation was implemented by the CTMM in the northern fringes through the support of the Provincial and National government in terms of funding allocation.

The structured questionnaire was administered to respondents involved in the provision of sanitation in the National and Provincial DHSWS as well as in the CTMM. For the purpose of the study, data was collected through a structured questionnaire and interview schedule. A semi-structured questionnaire comprising of a mixture of open and closed questions was utilised and follow-up personal interviews so that the same questions could be posed to all the respondents to ensure consistency of gathered data. The structured questionnaires were sent to household members (80) benefitted from the programme, government officials (30) responsible for implementation of sanitation service and to the CTMM officials (10).

Throughout the research, an exploratory approach was used to acquire new insight and the researcher was open to new discoveries and willingness to accept alternative insight from other sources. This study encapsulates the provision of sanitation in the CTMM, and the primary sample from which inferences of the status of sanitation were drawn from the northern fringe of the CTMM.

1.9 Limitations of the study

Ross et al. (2019: Online) posit that the limitations of the study are influences a researcher cannot control during the study. In most instances, there are the shortcomings, conditions or influences that cannot be controlled by the researcher that place restrictions on research methodology and conclusions when a study is conducted. All foreseeable limitations that might influence the results of the study were highlighted. The researcher mitigated both the non-response and response errors beforehand. The researcher ensured that the data is not difficult to analyse and the analysis is not time consuming.

1.10 Provisional structure of chapters

This section will provide the following outline of the thesis.

- **Chapter one** provides the **Introduction and background** to the study. The scope of the study; background of issues researched; rationale of the study; outline of research problems; aims and objectives are defined; literature review; followed by the research methodology. The sequence of the chapters for the study is also provided.
- **Chapter two** provides **the theoretical overview of sanitation services in South Africa**. This chapter describes and defines the concept of the nature of sanitation provision in South Africa. It also acknowledges the literature and work of other researchers on the provision of sanitation services in the country. Furthermore, reviews, concerns, challenges, approaches, technology options, impact of poor sanitation and mitigation measures utilised in the CTMM to address sanitation problems are addressed.
- **Chapter three** outlines the **legislative and policy frameworks for sanitation in South Africa, Internationally and in the CTMM** in order to understand the implementation and implication of these legislative and policy framework with international practices. The legislative prescripts and policies which govern water services in South Africa including the CTMM, international and regional policy frameworks are discussed in detail.
- **Chapter four** presents the **research design and methodology** that was adopted in the study. It details the data collection techniques, sampling procedures, research population, validity, reliability, data analysis and study area. Furthermore, the chapter explains the aforementioned listed processes of research. A description of the geographical location of the selected study area is discussed. This study is predominantly a qualitative and quantitative assessment which presents both qualitative and quantitative analysis of the lived experiences of sanitation services in the northern fringe of the CTMM.

- **Chapter five** presents the **data analysis, interpretation and findings** based on data collected from the respondents during the study. The data was analysed manually and the text analysis was used to analyse the research findings. This chapter also presents the real-life experiences and challenges communities face with lack of sanitation in their geographical location. Once data was gathered from the above-mentioned methods and techniques, data analysis which involved an analysis of the information, data coding according to themes and subjects and presenting research findings were conducted.
- **Chapter six** considers the sequential **conclusions** of the study, and advances **recommendations** from the interpretation of the findings. It assimilates the findings of the study in relation to the provision of sanitation services on the northern fringe of the CTMM with specific reference to Ga-Rankuwa, Mabopane, Temba and Winterveld townships. The recommendations of the study will be forwarded to decision makers in government for consideration during the policy review. The scope for future research will also be advanced.

The following chapter will focus on the theoretical overview of the provision of sanitation in South Africa and the CTMM This chapter will explore various research conducted on provision of sanitation in the country, nationally and locally including the definition of specific sanitation and municipal governance related concepts, governance of water and sanitation, as well as access to sanitation and backlogs in the country.

CHAPTER 2

THEORETICAL OVERVIEW OF THE PROVISION OF SANITATION SERVICES IN SOUTH AFRICA

2.1 Introduction

This chapter will provide the theoretical overview of the provision of sanitation services in South Africa with the specific reference to the northern fringe of the CTMM. The focus of the study is based on grounded theory approach to uncover such things as social relationships and behaviours of groups of the beneficiaries of the household members benefitted from the sanitation programme in the northern fringes in Ga-Rankuwa, Mabopane, Temba and Winterveld. Furthermore, the study used both qualitative and quantitative data generation techniques focused on social actions and processes of the household members in the northern fringes of the CTMM which informs by grounded theory study.

Khan (2014:224) posits that a qualitative research approach is used in grounded theory studies. Hence, grounded theory approach is basically a step towards theory building and conceptual thinking rather than empirical testing of the theory. Grounded theory approach depends upon inductive approaches and it is the systematic development of theory in social settings. During the collection of the data the researcher observed the toilet facilities benefitted by the household members in the northern fringes of the CTMM and draw the conclusion based on data collected and observation.

Furthermore, Bulawa (2014:149) posits that other important condition suggested by Glaser (1992:16) as denoting the quality of grounded theory also drew the following i.e. the significance of the researcher getting out into the field to understand what is going on, the importance of theory which is grounded in reality, the nature and significance of experience in the

field for the participants and researcher as continually evolving, and the active role of persons in shaping the world they live in through the processes of symbolic interaction. The researcher went to the field in the northern fringes of the CTMM and collected data through the questionnaires and observation. Furthermore, personal interviews were conducted with the household members in Ga-Rankuwa, Mabopane, Temba, and Winterveld as well with the officials in the DHSWS addressing the incomplete questionnaires those were received by the researcher during data collection.

The focus of this chapter will be to provide an overview of the nature and extent of the South African government's provision of sanitation services in both the rural and urban areas. This chapter in section 2.3 will explore research conducted and literature available on the provision of sanitation in the country. Furthermore, the definition of sanitation and municipal management related concepts; water and sanitation governance; access to sanitation and backlogs throughout the country; establishment of a National Sanitation Programme to support sanitation functions; challenges faced by South African municipalities when sanitation services are delivered to communities as well as sanitation technology options; funding mechanisms and models to accelerate sanitation delivery, faecal sludge management and impact of poor sanitation in the country will be expounded upon. The chapter will also focus on the impact of the lack of adequate sanitation which affects health-, economy-, social - and psycho-social circumstances as well as environmental concerns.

2.2 Definition: concept "sanitation"

There are various definitions of the term sanitation and it varies substantially from one country to another. Different authors use various definitions and interpret the concept "sanitation" differently in respective countries. "***Basic sanitation services"*** is defined by the National Sanitation Policy of South Africa, 2016 as follows: "provision of a basic sanitation facility which is

environmentally sustainable, easily accessible to a household and a consumer, the sustainable operation and maintenance of the facility, including the safe removal of human waste, grey water and wastewater from the premises where it is appropriate and necessary" (DHSWS, 2016:8).

A "***basic toilet facility"*** is defined as a toilet which is safe, environmentally sound, reliable, and easy to keep clean, provides privacy and protection against the weather, minimise smells, is well-ventilated and inhibits flies and other diseases carrying pests (DHSWS, 2018:8). The study in section 1.2 posits that the CTMM without access to a basic level of water service, and almost 96 000 households are without a basic access to sanitation (CTMM, 2020: Online). In South Africa, a basic level of sanitation is considered a Ventilated Improved Pit Latrine (VIP), which is a dry toilet facility (DHSWS, 2018:30). According to the United Nations (2018:44), a safely managed sanitation service is defined as the utilisation of an improved facility neither shared with other households nor where excreta is transported and treated off site or safely disposed of in situ.

The White Paper on Water Supply and Sanitation Policy (1994) defines "***adequate sanitation"*** as services which meet the basic health and functional requirements including the protection of the quality of both surface- and underground water. Higher levels of service will only be achieved if the income of poor communities' increases substantially (DHSWS, 1994:15). Chapter 1 in section 1.3 clearly states that proper sanitation facilities and washing one's hands after utilising the toilet would inhibit the transfer of diseases associated with poor sanitation which would subsequently contaminate water resources.

The Strategic Framework for Water Services (DHSWS, 2003:3) states that a basic "***sanitation facility"*** must be safe, reliable, environmentally sound, provides privacy, well-ventilated, easy to clean, keeps smell to a minimum, provides protection against the weather, prevents the entry and exit of flies and other diseases carrying pests as well as enabling safe and removal of

human waste and accompanied by health and hygiene education. Chapter 1 in section 1.3 states that lack of adequate sanitation has had a serious impact on health, economy and social development, which is also considered as one of the world's leading development challenges. Hygienic sanitation is necessary to ensure good health and human dignity, as well as sustain human life.

Thomas, Andreas, Borja-Verga and Borja-Verga (2018:6) postulate that WHO and UNICEF define "***open defecation"*** as the "percentage of population that practices open defecation". Sanitation coverage and utilisation is measured only at the household level and does not provide a conclusion of access and utilisation in the city, neighbourhood and community.

In terms of the law, "**emergency sanitation"** is a situation declared as such which is likely to cause loss of life or injury. An emergency measure provides the user with privacy in close walking distance, is safe for disposal of human waste, and includes health and hygiene end-user education. Emergency sanitation considers other conditions and may vary from area to area (DHSWS, 2016:9). The CTMM has recently approved the Tshwane Informal Settlements Strategy, which seeks to provide clear short, medium and long term plan of emergency services which will focus on providing basic services such as water, sewerage infrastructure and electricity in the informal areas.

"End-user education" entails ongoing consumer education in sanitation services rights, recycle, reduce, reuse responsibilities, water demand management and water conservation, facility operation and maintenance and recover principles (DHSWS, 2016:9). The communities in the northern fringes of the CTMM benefitted sanitation and end user education as sanitation goes far beyond the issue of toilets only.

"Free Basic Sanitation" provides affordable ongoing services to the indigent households with no less than the basic level of sanitation (DHSWS, 2016:9).

2.3 Overview of access to sanitation: South Africa

Masindi *et al.* (2016:1) highlight that due to the alarming growth in population and drought in South Africa, pressure is mounting on the demand for fresh water resources suitable for consumption. This has in turn put pressure on sanitation systems and wastewater treatment works. The municipalities in South Africa face sanitation services provision challenges in the growing settlements - also along the urban fringes. The cities in South Africa have been experiencing an influx of people from neighbouring countries and rural areas in search of job opportunities, decent pay, and improved services.

Moreover, the CTMM, just like other major cities, has undergone major changes in parallel with the political changes of the last two decades. Residential areas close to the city centre have been abandoned by previous residents and reoccupied by large numbers of legal and illegal new migrants. Because of the lack of available inner-city residential space, peri-urban areas on the outskirts of Tshwane have been populated by informal settlements, accommodating a multi-cultural population, living in sub-standard conditions (CTMM, 2021: Online). Most of the immigrants find themselves living in unfavourable conditions on especially the urban fringes because they cannot afford decent accommodation closer in the cities. The rapid population growth along the urban fringes results in the lack of access to basic sanitation services. Moreover, the municipalities are faced with the provision of sanitation as an increasingly urgent concern (Masindi *et al.,* 2016:1).

The democratic government of South Africa identified the need to restore human dignity, inequality and poverty as the core challenges which confronted society. In response thereto, in 1994, the Reconstruction and Development Programme was promulgated as an overarching policy framework to address the core challenges which society faced for over sixty decades (Magadimisha and Chipungu, 2019:104). The CTMM households increased at an average annual rate of 3.17% from 2008 to 2018, which is higher than the annual increase of 2.13% in the number of households in South Africa. The City has high in-

migration into a region, the number of households increased, and putting additional strain on household infrastructure. In the short to medium term this can result in an increase in the number of households not living in a formal dwelling, as the provision of household infrastructure usually takes time to deliver (CTMM, 2021:44).

Muller (2014:36) asserts that the RDP was a new government policy foundation. One of the four pillars of the programme was “meeting basic needs” and prioritised access to water supply and sanitation services for the citizenry. In the same year a water supply and sanitation policy was published as a White Paper which provided detailed policy directions compared to the Reconstruction Development Programme document (RSA, 1994).The Department of Housing and Human Settlements within the CTMM provides the lower income earners in the city with adequate, safe, affordable and sustainable accommodation, administered in a transparent manner in accordance with good governance in order to “add significant value to sustainable living in Tshwane through the provision of sustainable housing”. The CTMM provides beneficiaries with a fully built house that is provided free of charge by the Government. However, beneficiaries of *‘RDP Houses’* are still required to pay for all municipal rates which may include water and electricity or other service surcharges (CTMM, 2020:online) .

Mosala, Venter and Bain (2017:331) posit that the launch of the RDP by the ANC shortly before the 1994 elections was a very ambitious and a comprehensive national project (Brits, 2014:507). The RDP base document was a radical one, and revised on several occasions to accommodate the interests of the business sector. Furthermore, the RDP was a product of the ANC-led alliance which required meeting the many tenets of the Freedom Charter. In 1994, the Government of National Unity (GNU) adopted the RDP White Paper and declared a firm commitment to monetary and fiscal discipline, while overlooking any reference to nationalisation.

The CTMM has embarked on a drive to alleviate poverty through its indigent

programme within the area of its jurisdiction. The municipal indigent programme is intended to improve the lives of those who are unable to pay for municipal services and to give them access to free basic services. The indigent programme was developed as an intervention to soften the impact of poverty and to help people escape the cycle of poverty (CTMM, 2020: Online). Furthermore, the implementation of the Reconstruction and Development Programme in 1994 was the first socio-economic policy framework and underscored that development and growth were essential pillars of a common strategy. First and foremost, the RDP focused on improving and creating opportunities and create jobs for the current and future generations of the citizenry, primarily for the marginalised majority and the poor through the development of skills to earn and income to meet the basic needs (Wilkinson *et al*., 2018:22).

Access to adequate water supply and decent sanitation is a basic human right, which should be enjoyed by all. In South Africa, different provinces have a disproportionate access to basic services. Regardless of statutory and constitutional provisions that guarantee the right to water and sanitation, these rights are neither equitable nor universally enjoyed (South Africa Human Rights Commission, 2018:6). The Constitution of the Republic of South Africa, 1996 enforces human dignity and guarantees health as a human right. In developing a new settlement, communities consider water-borne sanitation as the best solution. Water-borne sanitation is a more expensive option, however, the most cost- effective and efficient system over the long-term. This requires the residents to maintain the installation of toilets. This type of toilet requires a sewer reticulation system that is connected to a wastewater treatment works and in accordance with the relevant sections of SABS 1200:1996 (Stone, 2016:38). The CTMM at regional level, the region within the City with the highest number of flush toilets is Region 1 which includes Ga-Rankuwa, Mabopane and Temba, with 210 000 or a share of 25.13% of the flush toilets in Tshwane (CoGTA, 2020: Online).

The RDP comprised of fiscal flaws and in 1996 the government introduced a

macro-economic policy framework referred to as the Growth, Employment and Redistribution (GEAR) strategy. The latter strategy pursued most of the RDP social objectives with a purpose to stimulate faster economic growth in South Africa and provide the resources to meet social investment needs (Wilkinson *et al*., 2018:25). The dawn of democracy in 1994 finally brought freedom including several expectations for the masses. Every citizen looked forward to 'a better life for all' as advanced in the African National Congress 1994 Election Manifesto. The internationally recognised democratic government intended to be people-centred, and placed service delivery high on the agenda. However, to realise the promised quality service, the public service had to be transformed (Mpehle, 2012:213). Moreover, the CTMM ensured that its communities have "a better life for all" households in the northern fringes of the city benefitted from access to improved sanitation facilities defined as flush toilets connected to a public sewerage system or a pit toilet with a ventilation pipe.

Kasala, Burra and Mwankenja (2016:24) assert that the first thought which comes to mind in many persons who consider sanitation, is a toilet. However, in reality the concept sanitation goes beyond a latrine. Sanitation includes general cleanliness which ranges from safe removal, storage, collection, transportation and disposal of both solid and liquid waste, either from home or industries. Kasala *et al.* (2016:24), further argue that sanitation generally refers to the provision of facilities and services for the safe disposal of human waste. The term sanitation also refers to the maintenance of hygienic conditions through services, for example, garbage collection and wastewater disposal (World Health Organisation, 2014:87). Subsequently, the CTMM in line with the country, places an on-going focus on the reduction of the sanitation backlog by ensuring universal access to sanitation (CTMM: Online).

The majority of africans in South Africa, especially those in rural areas, have been one of the key problems inherited from the previous regime. Cognisant of the extent of underdevelopment in the country and taking into consideration the locations in which the majority of South Africans reside, it is in these areas that sanitation is required most. The democratic government prioritised sanitation to

all citizens and targeted interventions to focus on the previously marginalised segment of the population. A developmental approach for sustainable human settlements is premised on the idea that there is a symbiotic relationship between sanitation, water, health and housing, among other things. In South Africa, the number of persons who need housing is ever-increasing. For the past 18 years there has been an effort to address the provision of adequate housing and the development of sustainable human settlements (DHSWS, 2012a:30).

The CTMM places a premium focus on the provision of good quality, reliable, impactful and sustainable services to its residents or communities. The CTMM is concerned of the continuous improvements on extending the reach of services to unserved communities and households, ensuring meeting the commitments made on service delivery and the predictability of availability of services remained the focus of the City. Notwithstanding the many challenges experienced, the CTMM made steady progress in the delivery of services. While some notable progress has been made, the inability to meet all the targeted deliverables is a serious concern. In this regard, the City continues to find ways of addressing the root causes of the impediments in order to ensure that all commitments made are realised (CTMM, 2020: 262).

Mdlongwa (2014:39) postulates that in the 20 years of democracy, service delivery remains one of the biggest challenges. Strides have been made in certain key sectors of the economy, for example, health and education. However, the quality and efficient delivery of basic services such as housing, electricity, water and sanitation remain a huge challenge at the local sphere of government. In recent years one has witnessed corrupt practices in certain municipalities including an escalation in the number of violent service delivery protests across the country. Adherence to the regulatory framework and participatory processes and promoting transparent and practices in the CTMM by political appointees further creates an environment that promotes the ability to deal decisively with all issues constraining administrative effectiveness. In municipalities like the CTMM good governance becomes a reality when there is an effective political and administrative interface. For the political and

administrative interface to serve the best of the municipality, strong and effective leadership from both sides is necessary. This requires a clear separation of political functions from administrative or technical functions with a clear point of interphase between the two since both functions are mutually reinforcing. These arrangements must be made practical in a sustainable manner (CTMM, 2020:39).

Mpehle (2012:222) holds that one of the underlying reasons for the lack of municipal service delivery in South Africa is the inadequate human capacity. Approximately 71% of the community respondents hold that the municipal officials has inadequate human capacity, particularly those in strategic positions, had been appointed due to political affiliation and nepotism rather than for their qualifications, competence and experience (Mpehle, 2012:222). The former State President, Jacob Zuma confirmed the redeployment of cadres to senior municipal positions (Times Live, 08 August 2010). Moreover, this scenario has seriously compromised the performance of certain municipalities. This remains a major concern because it adversely affects service delivery. Furthermore, South Africa, like many developing country, is faced with the challenge of attracting professionals at all levels of government, with the provincial and local spheres being most the affected. Van Rooyen and Pooe (2019:140) point out clearly that South African consumers of municipal services often express dissatisfaction with service delivery by means of protests. However, these protests have not occurred to equal frequency in the CTMM. As much as pronounced service delivery vacuums exist in the CTMM, as in other similar municipalities, the infrequency and intensiveness of such does raise interest. Recent protests in Tshwane related to the political run-up to the elections, and service delivery weren't the primary reasons cited therefor.

Dugard (2013:13) argues that physical access to sanitation facilities remains a challenge in both rural- and informal settlements. Inadequate physical access has both gender and disability dimensions where people walk long distances to relieve themselves. Disabled persons suffer when sanitation facilities are physically inaccessible, and women's safety is a concern because it makes them

vulnerable to attacks by for example, fellow humans and wild animals. Subsequently, Engelbretch (2009:23) has conducted the study in the CTMM and highlighted that the buildings are required to provide facilities for disabled people and shall have one or more WC pans suitable for disabled persons in wheelchairs. Moreover, the distance a disabled person must travel from any point in a building in the CTMM to a disabled friendly bathroom or toilet shall not exceed 200m.

The objective of government is to ensure that all South Africans have access to basic water and sanitation services. Government has prioritised the provision of free basic services to poor households and rollout of water services infrastructure necessary to render these services. The sector also faces certain challenges because implementation capacity remains a constraint. The aging infrastructure requires almost 'disproportionate' additional (Treasury, 2014:130).

The prevalence of drought in South Africa and the alarming growth of the population place pressure on the demand for fresh water resources suitable for human consumption. This has in turn placed pressure on sanitation systems and wastewater treatment infrastructures. Although much has been done in terms of water and sanitation with reference to the post-apartheid regime, the population is surpassing the maximum carrying capacity of the existing treatment plants (Masindi *et al.*, 2016:1).

Trollip and Van Vuuren (2016:34) postulate that the provision of sanitation is a key development intervention, and lack of sanitation result to ill health, and will dominate a life without dignity. South Africa has been slow in achieving real gains in meeting the mandated sanitation requirements of the citizenry. Many households still experience service delivery breakdowns while the majority in informal settlements have no service at all or utilise interim services. In South Africa many rural areas still do not have access to basic services. Moreover, the initial target for access to basic sanitation for the entire nation by 2014 was not met. However, a new target date of 2019 was set in the 2014 Medium-Term

Strategic Framework (DHSWS, 2018:30). The CTMM prides itself for having delivered critical milestones and results for the residents or communities.

The City continued with the infrastructure development programme across all critical service areas i.e. water, sanitation, electricity, housing and so forth. This included building new infrastructure and undertaking the repair, maintenance, upgrade and refurbishment of existing infrastructure. Furthermore, in responding to the challenges faced by the poor communities and households, the CTMM provided informal settlements with basic water and sanitation services in an effort to alleviate the burden of informality in these settlements and to address the hazardous living conditions prevalent in those settlements (CTMM, 2020: 262).

Mpehle (2012:214) argues that regardless of the government's introduction of policies to address the imbalances of the past, and effected changes in certain communities which are apparent in specific basic delivery of services, the latter is still perceived to be proceeding at a snail's pace in numerous local municipalities throughout the nine provinces. The South African government's performance will always be assessed by international communities against its progressive policies including its own citizens with specific reference to the delivery of basic services. Furthermore, in a liberated country, the citizenry has the right to voice their opinions against any related issues of concern.

Muller (2014:36) posits that in 1994 it was estimated that approximately 14 million South Africans across the country lacked access to adequate water supply, while almost 21 million [half of the total population in 1994] required adequate sanitation facilities. Access to appropriate sanitation is important to preserve the citizenry's health. The ANC-led government aimed to increase the percentage of households with access to functional sanitation services to approximately 90% by 2019 and eradicate the bucket sanitation system in formal areas (StatsSA, 2016:35). Table 1 below illustrates the number of households that received basic sanitation and sewerage services per province between 2011 and 2015:

Province	Basic sanitation services				
	2011	2012	2013	2014	2015
Western Cape	1 014 527	1 036 963	1 061 682	1 085 493	1 116 636
Eastern Cape	1 021 752	1 041 070	1 142 293	1 344 641	1 421 781
Northern Cape	237 708	244 210	256 976	260 464	272 595
Free State	665 955	663 630	718 743	699 689	735 661
Kwa Zulu Natal	1 675 267	1 739 073	1 867 052	1 982 765	2 024 193
North West	588 158	609 845	679 569	726 637	752 275
Gauteng	2 708 004	2 511 510	2 459 296	2 564 540	2 617 211
Mpumalanga	820 665	872 629	906 416	969 952	1 104 528
Limpopo	635 586	681 752	761 966	800 403	825 580
South Africa	**9 367 622**	**9 400 682**	**9 853 993**	**10 434 584**	**10 870 460**

Table 1: Number of households that received basic sanitation and sewerage services per province: 2011 - 2015

Source: StatsSA, 2016

Table 1 above illustrates the number of households that have access to sanitation and sewerage services per province. The above table reveals that access to basic sanitation and sewerage services increased from 9 367 million households in 2011 to 10 870 million in 2015 in South Africa. The situation, however, varies significantly per province. Both, Kwa Zulu Natal (2 024 193) and Gauteng (2 617 211) provinces comprised of the highest number of households. This scenario was less common in Northern Cape (272 595) and other provinces (Stats SA, 2016:36). Table 2 below illustrates the distribution of household toilet facilities and the category of toilet facilities per type of sanitation technology and period of census 2001 to 2016.

Toilet facilities	Census 2001		Census 2011		Census 2016	
	N	%	N	%	N	%
Flush toilet (connected to sewerage)	5 500 012	49,1	8 242 924	57,0	10 260 829	60,6
Flush toilet (with septic tank)	312 986	2,8	442 481	3,1	461 934	2,7
Chemical toilet	218 387	1,9	360 703	2,5	713 856	4,2
Pit toilet with ventilation (VIP)	635 957	5,7	1 266 102	8,8	2 063 128	12,2
Pit toilet without a ventilation	2 557 476	22,8	2 786 068	19,3	2 315 279	13,7
Ecological toilet	0	0,0	0	0,0	49 277	0,3
Bucket toilet	457 376	4,1	297 847	2,1	377 231	2,2
Other	-	0,0	305 444	2,1	271 895	1,6
None	1 523 512	13,6	748 592	5,2	409 881	2,4
Total	**11 205 705**	**100,0**	**14 450 161**	**100,0**	**16 923 309**	**100,0**

Table 2: Distribution of household toilet facilities

Source: StatsSA, 2016

The government must ensure that all households throughout the country has access to decent toilets and improve the quality of life of the citizenry. Besides the progress since 1994, efforts to alleviate inequality and poverty will not be realised unless the municipalities address the challenges. For example, service delivery to various communities, which predominantly encompasses the provision of sanitation and energy. Since basic sanitation is a human right, the government has to ensure that all households have access to decent toilet facilities. Table 2 above illustrates that in 2016, a total of 10,260 million households had access to flush toilets connected to the sewerage system, while 2,063 million had access to pit toilets with ventilation.

Similarly, there is a decline in the proportion of households that utilise pit toilets without ventilation. The utilisation of ecological toilets increased from 0 in 2011 to 49 277 households in 2016. This trend is prevalent since 2001 (StatsSA, 2016:68). Table 3 below illustrates the location of toilet facilities per household. The table reveals the category of toilet facilities by type of toilet location per household.

Toilet Location	Number	%
In the dwelling/house	7 519 804	45,6
In the yard	8 167 115	49,5
Outside the yard	810 144	4,9
Total	**16 497 063**	**100,0**

Table 3: Location of toilet facilities per household

Source: StatsSA, 2016

Table 3 above illustrates that a higher proportion of toilets (i.e. 8 167 million) are located in the yard compared to 810 144 households which are outside the yard. Lastly, 7 519 804 toilets are located inside the dwelling / house. The location of toilet facilities is crucial for various reasons. The toilet facilities should be such that they are accessible by all members of the household,

including children and the physically challenged. It is crucial that toilet facilities are located such that these are adequate and suitable for everyone in the household; and positioned in a safe place to avoid endangering members who are vulnerable (StatsSA, 2016:69).

Moreover, the CTMM had a total of 833 818 flush toilets (81.16% of total the total households) 25 894 VIP toilets (2.52%) and 146 439 (14.25% of the total households) and all of them had piped water inside the yard (CTMM, 2019: Online). Historically, the middle- and upper-class white minority were provided with adequate water through reticulated house connections and waterborne sanitation services whilst the overwhelming majority black townships were provided with limited waterborne sanitation by the municipalities. In many urban towns the toilet bucket system was installed as an alternative sanitation technology while limited attention was paid to provide rural areas with sanitation. Given the past, the post-apartheid government is faced with enormous challenges to reverse the health and environmental consequences, especially the lack of dignity that the apartheid legacy left on the majority of South Africans (DHS, 2012a:7).

Good progress has been made in access to basic water and sanitation services. However, there is a decline in terms of the number of households which receive free basic sanitation and water because many municipalities are unable to provide these gratuitously. Many municipalities target free services to indigent households only. Furthermore, they perceive this as a positive development because it strengthens the sustainability of the basic services programmes (Treasury, 2014:135).

During 2018, there were 3.6 million people who were registered as indigents in the CTMM, saying 2.8 million of them had access to free basic water while 2.0 million had access to free electricity. Furthermore, 1.8 million indigent households benefited from support system of sewerage and sanitation while 2.3 million benefited from solid waste management provision (iol: Online).

Both water and sanitation services are not delivered to individuals, but groups of people who live together and share resources as households. A home can comprise of one or more individuals, while those [homes] which are most relevant benefit from government resources (Statistics South Africa, 2016:68). 600 815 fewer consumer units in the CTMM received free basic sewerage and sanitation in 2018 compared to 2017, while 246349 fewer consumers received free electricity in 2018 compared 2017, and 160 970 fewer consumers received free solid waste management in 2018 (iol, Online). The distribution of households in 2001, 2011 and 2016 per province is illustrated in Table 4 below:

Toilet facilities	Census 2001		Census 2011		Census 2016	
	N	%	N	%	N	%
Flush toilet (connected to sewerage)	5 500 012	49,1	8 242 924	57,0	10 260 829	60,6
Flush toilet (with septic tank)	312 986	2,8	442 481	3,1	461 934	2,7
Chemical toilet	218 387	1,9	360 703	2,5	713 856	4,2
Pit toilet with ventilated (VIP)	635 957	5,7	1 266 102	8,8	2 063 128	12,2
Pit toilet without ventilation	2 557 476	22,8	2 786 068	19,3	2 315 279	13,7
Ecological toilet	0	0,0	0	0,0	0	0,0
Bucket toilet	457 376	4,1	297 847	2,1	377 231	2,2
Other	-	0,0	305 444	2,1	271 895	1,6
None	1 523 512	13,6	748 592	5,2	409 881	2,4
Total	**11 205 705**	**100,0**	**14 450 161**	**100,0**	**16 923 309**	**100,0**

Table 4: Distribution of toilet facilities per household

Source: Statistics South Africa Community Survey, 2016

The government is responsible to ensure that all the countries citizenry has access to decent toilets as well as improve the quality of life of the citizenry. Table 4 above illustrates that in 2016, 10 260 829 households had access to flush toilets connected to the sewerage system compared to 8 242 924 in 2011. Correspondingly, there is a decline in the proportion of households

which utilises pit toilets without ventilation. There is a visible increase among those who utilise pit toilets with ventilation, a trend prevalent since 2001 (Statistics South Africa, 2016:68).

Strande and Brdjanovic (2014:1) highlight that 2.7 billion people's global sanitation is sewered by onsite sanitation technologies. This number is expected to rise to 5 billion by 2030. It is a common perception that onsite technologies fulfil the rural areas' sanitation needs, while in many cities onsite technologies have much wider coverage than sewer systems. However, in reality, approximately 1 billion global onsite facilities are in low- and middle-class urban areas. The pressure to meet sanitation targets in the 2000s in South Africa led to a proliferation of dry sanitation. Approximately 1 million VIP toilets have been installed throughout the country. Since most of these units are more than 5 years old, these would require emptying in the near future. This situation is aggravated by the fact that almost a third of the water services authorities had neither budgeted for the operation nor maintenance of these toilets when these were implemented initially (Pillay & Mwale, 2014:1).

Looking at the sanitation backlogs in CTMM the number of households without a hygienic toilet was 158 000 in 2006. The CTMM had a total of 833 818 flush toilets, though the City made advances in addressing sanitation backlogs in the period 2009 to 2013, the on-going growth of households, particularly in informal settlements, due to the high in-migration into the region as well as from population growth, has put additional strain on household infrastructure (CTMM, 2019:47).

According to the CTMM about 76.6% households during 2015 were having flush toilet connected to the sewerage. Furthermore, Petterson (2019:30) posits that many South African households are still without adequate sanitation facilities despite improved access thereto, while in certain instances there are no facilities. The lack of adequate and appropriate sanitation is a major concern. During the 2012 Sanitation and Water for All high-level

meeting, the Ministers committed themselves to assess human resources capacity; gaps to improve sector performance and skills; and implement appropriate action at national and decentralised levels to address these shortcomings. On the African Continent, sanitation capacity is being given higher priority, and moreover, the Ministers have set out to deliver services for all. This type of high-level commitment would neither hold government accountable to address the concerns, nor automatically translate into greater capacity on the ground (Piers *et al.*, 2013:172).

2.3.1 Sanitation services in informal settlements

The municipalities experience serious challenges in the provision of water and sanitation to households in informal areas because these settlements lack proper housing, water, and water reticulation infrastructure. Many of the complaints related to these challenges emanate from families and individuals who live in these informal settlements because they have been on the waiting list for formal housing for an extended period of time (SAHRC, 2014:30). Furthermore, the CTMM states that basic sanitation services provided in the informal settlements must conform to the approved Strategic Plan for the eradication of Water and Sanitation (CTMM, Online).

Furthermore, Barnes (2018:544) asserts that the poor in informal settlements continue to bear the burden of apartheid spatial and racial segregation. Despite the right to a healthy living environment enshrined in the constitution of 1996, the inadequate and inappropriate water and sanitation services in low income communities is of particular concern (Statistics South Africa, 2012). There is a distinct lack and sense of realisation of the rights of the citizenry as stipulated in the constitution to achieve long-term universal coverage. However, the government perceives the immediate provision of universal access to water and sanitation in informal settlements is impossible because of the backlogs and high infrastructural outlays.

Ensor (2016: online) postulates that people are migrating from rural life to

urban centres in large numbers. Consequently, many who settle in informal settlements face huge challenges to access water and sanitation services. The growing number of people who abandon rural life is expanding on a daily basis onto especially the fringes of the urban areas. These migrants generally settle in informal and illegal settlements. Although much progress has been made in rural areas in terms of the lack of access to water, the global community must focus on the world that is becoming rapidly urbanised and increases the threat to water supplies. Furthermore, Ensor (2016: online) mentions that since the change in climate patterns tend to continue, approximately 1.8 billion people across the globe will experience absolute water scarcity by 2025.

The DHSWS (2017:41) further states that informal settlements are by nature transitional which are generally unplanned, land ownership is not assured, and technologies are unsuitable to these conditions. The municipalities are reluctant to invest in informal infrastructure for these human settlements because land ownership is becoming an impediment; institutional structures are inconstant, and settlements are temporary; often there is a lack of space to install services. The CTMM posits that there are ten distinct areas functional areas in the CTMM where large concentration of government subsidised housing and informal settlements occur. These include the following areas in the CTMM i.e. Ga-Rankuwa, Mabopane, Temba, Winterveld, Soshanguve, Soshanguve South, Eesterus, Mamelodi, Attredgeville and Olievenhoutbosch. In all functional areas the dominant group of people is Black.

Sanitation continues to be a concern in informal settlements, which lack infrastructure for waste disposal and sewage. Toilets, in particular, present a serious challenge in informal settlements. The City posit that Mamelodi, Attredgeville and Olievenhoutosch recorded a high economic active population higher than 50% whilst Winterveld recorded a very low economic active population (37.4%). The rate of urban growth in the CTMM is greater than the rate of housing delivery. Furthermore, the City is reluctant to provide

housing where the institutional structures are inconstant and the land ownership is not assured which implies that informal residential areas are left with little or no services and other amenities (CTMM, Online).

Bernstein (2012:155) asserts that higher population density is linked to rapid and unplanned population growth that results in greater economic dynamics as well as the need for accelerated development. Chuene (2012:19) argues that the increase in informal settlements in South Africa affects the provision of water and sanitation. The informal settlements increase the municipal backlogs and those which are being formalised present significant challenges in terms of revenue collection. The water services assets fail to reach its maximum design and usually are poorly maintained.

Armitage, Fisher-Jeffes, Carden, Winter, Naidoo, Spiegel, Mauck and Coulson (2014:66) postulate that significant challenges are associated with the provision of appropriate including adequate sanitation in informal areas. A large proportion of urban areas is serviced by conventional waterborne sewage reticulation networks. Wastewater has the potential to become a valuable water resource because substantial quantities of wastewater are generated by domestic, commercial and industrial processes.

2.3.2 Urbanisation in South Africa

Tempelhoff (2014:53) holds that since 1994 many South Africans who moved to formal residential urban areas assumed that urbanisation implies access to a potable water supply, sanitation and proper storm water drainage infrastructure. South Africa's colonial history has been linked to a tradition of urban water governance dating back to the 17th century and classical times in Western Europe.

The CTMM is faced with rapid urbanisation, a fragmented settlements and urban sprawl. All political parties will acknowledge that the main challenge facing the CTMM is service delivery. This applies to both rich and poor

residents of the City, who in most instances define service delivery in different ways. The underprivileged will expect “affordable services” and improved “access to services and amenities” while the wealthy ratepayers will expect “value for money”. The majority of backyard shacks, shacks and informal houses are found in the northern periphery wards in the CTMM controlled by the ANC. It is likely that the reasons for the large number of informal houses in this area include both a historic backlog and a tendency of families to migrate from the rural periphery (CTMM, Online).

South Africa’s urban environment has a diverse range of socioeconomic contexts. The layout and location of the settlements present numerous technical challenges which must be considered carefully to ensure the proper functioning of sanitation systems. Sanitation within the country’s developing urban areas is largely associated with servicing informal settlements. However, the provision of appropriate sanitation each presents its own challenges. Several other factors also influences a sustainable sanitation system, namely: technical constraints, cost, social acceptance, and institutional accountability (Armitage *et al.,* 2014: 66).

Urbanisation is a process and not a problem. It is about the growth of cities, metros, and towns. Unplanned urban sprawl in the search for employment and opportunities and impoverished communities that result from the rapid movement of people is at the heart of this concern in South Africa. People unfortunately relocate to areas that provide limited or no supportive municipal infrastructure and services as well as areas that do not allow easy access to opportunities. However, urbanisation presents opportunities for water planners. An increase in water supply due to population growth is a requirement. In terms hereof, infrastructure planning, and community and household development require a shift. Current plans have not considered these shifts although there is also the need for increased services (McNamara *et al.,* 2015:5).

The global population is characterised by a consistent ever-increasing number

of people and subsequent rapid urbanisation, which have resulted in burgeoning informal settlements. The provision of services in informal settlements is one of the most composite issues on the municipal agenda. Some settlements are located in floodplains, low lying areas or hilly zones and even wetlands. These are considered difficult settlements for those responsible for the provision of services to urban areas in developing countries (WRC, 2015:1).

Urbanisation results in increased water extraction costs and the potential for environmental damage, which generally results in reduced infiltration and lowering of the water table (Armitage *et al.,* 2014:61). McKenzie *et al.* (2012), further argue that in South African cities where there are high levels of water leakage, the groundwater recharge can be increased. Furthermore, almost all Sustainable Drainage Systems (SUDS) promote infiltration which result in increased groundwater recharge. Hence, the DHSWS propagates that all users of groundwater should treat it as polluted until proven otherwise through an intense water quality analyses.

There are two reasons why urban areas should have better health than rural areas, without bias favouring the provision in former areas and be better served with water and sanitation. Firstly, urban area unit costs should be lower, and provide significant economies of scale and proximity for the delivery of piped water and provision for good quality sanitation and drainage. Secondly, many cities have a prosperous economic base than rural areas, and provide a higher average income for large sections of the population by facilitating government with greater possibilities to raise revenues to fund the provision of water and sanitation and retrieve costs from user charges, households as well as businesses (UN-Habitat, 2013: 57).

The CTMM points out that urban residents in their jurisdiction are more likely to see large disparities in socioeconomic status, the presence of marginalized

populations (e.g., sex workers) with high risk behaviours, higher rates of crime and violence, and a higher prevalence of psychological stressors that accompany the increased density and diversity of cities. Moreover, minority populations and residents of lower socioeconomic status are more likely to live in urban areas and are more likely to lack health insurance. Thus, these populations face barriers to care, receive poorer quality care, and disproportionately use emergency systems (CTMM, Online).

2.4 Goals to eradicate sanitation backlogs: South Africa and globally

In 2008, the DHSWS realised that the supply of water and sanitation to all by 2008 and 2010 was not an achievable target and reset the target date to 2014. To co-ordinate the Department's efforts to help municipalities to achieve this new target, the Department drafted the *Water Targets Implementation Support Programme Plan (Water TISPP)*. The plan provides for classification into sub-categories (i.e. no infrastructure vs those with infrastructure which is inadequate in various ways) and considered the term "backlog" as too simplistic (Still & O'Riordan, 2012).

2.4.1 National Development Plan

The National Development Plan (NDP) which is a long-term perspective plan for the country, aims to reduce inequality and eliminate poverty by 2030. South Africa can realise these goals by: growing an inclusive economy; enhancing the capacity of the state; drawing on the energies of its people; building capacity as well as by promoting leadership and partnerships throughout society. Rafa and Schunemann (2013:2) assert that understanding demographic trends such as the structure and size of a country's population is a significant aspect of government planning. This is fully acknowledged by the National Planning Commission, that is, ignorance of demographic trends can result in serious misallocation of resources and inappropriate interventions. Moreover, public sector investments is guided by such information which

ranges from employment and retirement to education and healthcare.

The CTMM, in line with the country NDP aims to eliminate poverty and reduce inequality by 2030, places an on-going focus on the reduction of the sanitation backlog by ensuring universal access to sanitation. The City focus on identifying and overcoming the obstacles to achieving improved service delivery, including the need to strengthen the ability of the City to fulfil its developmental role (CTMM, Online).

Mosala *et al.* (2017:335), state that the NDP is an updated ANC-led government macro-economic policy concerned with economic growth to manage the challenges associated with poverty, unemployment, inequality and redistribution. The NDP covers the period up to 2030 and the plan constitutes a long-term vision and targets the creation of 11 million jobs, eliminate income-reducing inequality and induced poverty. The Gini-coefficient should fall from 0.69 to 0.6 by 2030. Furthermore, the plan endeavours a corruption-free society, strong adherence to ethical conduct throughout society and a government which is accountable to its people. The CTMM (2020: 31) stipulates that number of households without a hygienic increased annually with the rate of 0.62 due to mushrooming of the informal settlements.

The National Development Plan acknowledges that poverty alleviation strategies must include marginalised and vulnerable communities. One of the key targets of the National Development Plan between 2012 and 2017 was to manage development of water resources, including waste water management and bulk water supply. There is a large discrepancy between the level of services in urban and rural areas, however, the NDP does not specify the level of service that this area will receive (SAHRC, 2017:31). The NDP 2030 sets ambitious targets and outlines a framework to guide key actions and choices to achieve these challenges. The targets span a broad range of key systems which impacts on and prioritises, *inter alia,* human development; advance education with increasing employment; as well as build government

capacity to implement development policy (Go *et al*., 2013:2).

The NDP clearly defines the role of water and sanitation in the country's socio-economic development. The DHSWS drives a number of activities which contributes towards this macro-economic outcome. The latter is clearly articulated in the DWS mission statement. The role of contributing towards socio-economic development is given further credibility in the nine-point economic intervention plan which defines the fundamental contribution of water and sanitation as a cross-cutting priority to support all economic programmes (DWS, 2017a:10). Furthermore, the CTMM posits that before 2030, all communities will have affordable access to sufficient safe water and hygienic sanitation to live and dignified lives. The City will retain responsibility for ensuring adequate service provisions in its areas, regional utilities will be used where the City have inadequate technical and financial capacities.

Chapter 4 of the NDP sets out a vision for South Africa which recognises access to water and sanitation, provision of services relating thereto including appropriate management as the key components of socioeconomic development. This is expressed in Outcome 6, 9 and 10 respectively of the Government's 2014 - 2019 Medium-Term Strategic Framework. The functions of the DHSWS are directly aligned with the aforementioned Outcomes (Treasury, 2018:2).

South Africa's National Development Plan 2030 was conceived under the notion that it would improve the standard of living of the majority of the poor citizens, and the plan would ensure the promotion of safety and security in the country. However, the interventions that the National Development Plan 2030 promotes in building safer and secure communities depend more on available human resources in the country in the form of inter alia, police officers and security guards, contrary to the National Development Plan 2030's own admission that such an orientation on safety and security entails self-imposed bottlenecks (Ramokoka, 2013:330).

2.4.2 Millennium Development Goals

The Millennium Development Goals (MDGs) mark historic and effective methods of global mobilisation to globally achieve a set of significant social priorities. Developing countries have made substantial progress towards achieving the MDGs (Sachs, 2012:2206). Masindi *et al*. (2016:10) highlight that South Africa committed itself to international declarations on: water services development; World Summit on Sustainable Development in Johannesburg (2002); Earth Summit in Rio (1992); and UN General Assembly resolution on the MDGs (2000).

South Africa's MDG target was to halve the sanitation backlog by 2015, which stood at 50.7% in 1996. South Africans were expected to have access to an improved sanitation facility to halve the sanitation backlog meant that by 2015. However, the country achieved this target in 2012, and 75.5% of the population enjoyed access to an improved sanitation facility. Progress in water and sanitation services stabilised after an initial period of rapid improvement. Recently, the issues of primary concern have been reliable and sustainable water supply and steady provision of water and sanitation services (StatsSA, 2015:103).

Globally, the MDG progress to halve the water and sanitation backlog by 2015 was reported as follows: 95 countries met the sanitation target whilst 147 countries had met the drinking water target; a total of 77 countries had met both the water and sanitation target. Since 1990, the percentage of people practicing open defecation globally dropped by approximately half and 2.1 billion people had gained access to improved sanitation. Furthermore, MDG progress reported that globally, one in three people (2.4 billion) utilised unimproved sanitation facilities. This figure included 946 million people globally who still practised open defecation by 2015 (United Nations, 2015:7).

Moreover, the CTMM seeks to improve the social and economic environment, as well as the management of the natural environment by providing affordable and quality services to the communities. This is addressed through

eradicating service backlogs and prioritising community needs. The City met the MDG target to halve the water and sanitation backlog by 2015 with 76% (CTMM, 2015: Online).

2.4.3 Sustainable Development Goals

In August 2005, Deputy President Phumzile Mlambo-Ngcuka announced the Accelerated and Shared Growth Initiative South Africa (ASGISA) which was launched the following year. The core objective of ASGISA conformed to the Millennium Development Goals (MDGs) to halve unemployment and poverty by 2014 as well as enhance the country's capacity to create jobs and economic performance. To achieve its objectives, it underscored the trickledown effect. The government sought to promote an average annual growth rate of approximately 4.5% from 2005 to 2009, and about 6% from 2010 to 2014. The state also endeavoured to bridge the gap between the first and second economies and promised to raise public expenditure on fixed capital investment to R370 billion over 3 years and intensify its initiative to reduce inequality as well as assist the marginalised majority. ASGISA, particularly aimed to eliminate the second economy it is difficult to measure its success due to the short period the initiative (ASGISA) was prioritised (Mosala et al., 2017:334).

The United Nations Conference on Sustainable Development (Rio+20) in June 2012 in Rio de Janeiro galvanised a process to develop a new set of Sustainable Development Goals (SDGs) which would fit into a global development framework beyond 2015 and keep the momentum generated by the MDGs (Masindi *et al.*, 2016:10). According to the South African Human Rights Commission (2018:8), the United Nations adopted the Sustainable Development Goals during 2016 aimed at eradicating inequality, ending poverty, injustice and fighting climate change within agreed time frames. The predecessor of the SDGs was the Millennium Development Goals which required States to halve the proportion of people without sustainable access to safe drinking water and basic sanitation. Table 5 below illustrates universal and sustainable access targets water supply and sanitation services for the

period 2020 and 2030.

Target	Date
Achieve universal, sustainable sanitation provision	2020:90% 2030:100%
Achieve universal, sustainable and reliable water supply Provision	2019:90% 2030:100%

Table 5: Universal and sustainable access targets for water supply and sanitation services

Source: DHSWS, 2018

The CTMM came with Sustainable and Inclusive Growth Strategy which conform to the NDP 2030. From a social perspective, the Sustainable and Inclusive Growth Strategy will also have a major role in transforming the CTMM in many ways. The CTMM will need to radically improve the services and infrastructure to its residents, improving the quality of living across the City that will be enhanced further by a strong focus on sustainability and green economy (CTMM, 2016: 64).

The national targets for water supply and sanitation services conform to both the global Sustainable Development Goals, including the aspirations of the NDP. The constitutional responsibility to supply water and sanitation services in South Africa lies with 144 municipalities which are water services authorities and must ensure that these targets are met sustainably, through effective operations and maintenance so that the service is provided reliably with the advent of time; accessible to all; including the physically challenged (DHSWS, 2018:21).

SDG 6 highlights challenges related to hygiene, drinking water and sanitation as well as water-related ecosystems. Without sustainable quality water resources and sanitation, progress in many other areas across the SDGs,

including education, health and poverty reduction, would be inoperative (United Nations, 2017:6).

Sachs (2012:2208) argues that the Sustainable Development Goals pose challenges for all countries and alludes to the entire planet, not what the rich should do for the poor. The SDGs target is for all countries, while the MDGs targeted primarily poor countries. The SDGs focuses on the global wellbeing of this generation and those to come. MDGs were targets to which wealthy countries would express their solidarity and contribute technologically and financially. Kobena, Korbla and Timothy (2017:13) argue that SDGs incorporate a range of key areas which were not fully covered in the MDGs, for example, climate change and energy. Furthermore, some of the targets which have expanded and specified by SDGs could scale up African development.

Naughton *et al.* (2017:6) argue that the challenge to realise the SDGs is the probability of universal and equitable water and sanitation for all by 2030. Moreover, the international community has previously been found wanting of universal and equitable water and sanitation for all. Also, the challenges have been noted as a result of the ever-increasing population including climate change primarily in urban areas.

The new ladder for global monitoring of sanitation also incorporates a higher level of service in terms of monitoring it globally, and considers the disposal and treatment of human waste. In 2015, 2.9 billion people utilised a basic facility that safely disposed of human waste referred to as “safely managed” sanitation service. Another 2.1 billion people utilised a “basic” service which was an unshared improved facility, while 600 million people used a “limited” service referred as an improved facility shared with other households (United Nations, 2017:30).

2.4.3.1 *Sustainable Development Goal 6*

Most parts of the world experience major challenges in achieving universal access to adequate and equitable sanitation and hygiene by 2030. Target 6.2 of the SDGs calls for countries to eliminate open defecation and ensure that systems are implemented for safe management of excreta, and access to basic toilet facilities. Furthermore, in 2015, 4.5 billion people lacked a safe-managed sanitation service. The excreta was safely disposed of in situ or treated off-site. In 2000, the proportion of the global population using at least a basic sanitation service was 59 percent, while the population increased to 68 percent between 2000 and 2015. However, 1 in 10 countries below 95 percent coverage is on course to achieve universal coverage by 2030. Globally, 2.3 billion inhabitants still lacked access to basic services. A total of 70 percent of these persons live in rural areas (United Nations, 2018:11).

Despite progress in the CTMM, the City still faces major challenges – inter alia high unemployment, high inequality and poverty levels and inadequate economic growth due to various structural constraints. Funding for Sustainable Development Goals in the CTMM remains a critical focal point. To scale up the current initiatives in the City requires significant funding resources which are currently scarce to fund the Sustainable Development Goals (CTMM, Online). Wilkinson *et al.* (2019:4) posit that SDG 6.2 which specifically relates to hygiene is the second WASH target which requires the country to report between 2016 and 2030. South Africa is expected to achieve hygiene for all and conclude open defecation, access to adequate and equitable sanitation, pay special attention to those in vulnerable situations, including the needs of women and girls by 2030. The second component of the SDG 6.2 is to report on access to hygiene which is as significant as having access to safely managed drinking water and sanitation services. Good hygiene includes washing one's hands with soap and water and has major positive influence on minimising exposure of individuals to sanitation-related diseases and limit the spread of communicable diseases.

2.5 Overview of the state waste water treatment works

Zimmer, Winkler and Albuquerque (2014:342) argue that the human rights framework demands that meaningful opportunities be provided for active participation in decision- making on programmes, policies, and activities on wastewater governance which has an impact on their lives. Armitage *et al*. (2014:73) assert that the towns and cities in South Africa produce large quantities of wastewater daily; and level of treatment required before re-use is dependent on the recovered quality of this water as well as its intended end utilisation. The exploitation of this valuable water source could significantly reduce the demand for potable water in the urban areas and the quantities of wastewater generated. Moreover, CTMM (2019:15) points out that access to sanitation is improving, municipal waste water treatment plants (WWTP) are suffering from poor operation, servicing and maintenance. This has a particularly negative impact on the CTMM natural resource base, such as water resources and the provision of a range of other ecosystem goods and services. Many Waste Water Treatment Works are not fully compliant with legislation regarding waste water discharge into the environment and the majority of the plants require interventions.

Flush toilets are connected to a centralised sewerage system in the country's metros and larger towns. The wastewater is transported by sewers linked to pump stations where it enters waste water treatment works on the outskirts of the city. This form of sanitation is of a high standard and considered of 'gold standard'. Furthermore, it is an aspiration for most of the South African citizenry. It is technically possible to connect more households to this network system provided that wastewater treatment plants are upgraded and maintained to manage the additional capacity (Colvin, Muruven, Lindley, Gordon & Schatschneider, 2016:75). Furthermore, the CTMM (2019:15) posits that it is estimated that over 55% of waste water treatment plants, especially smaller ones, do not meet effluent standards.

Large quantities of water are passed through wastewater treatment works and discharged into receiving waterways. Wastewater can be split into two broad components, namely: black and greywater. Blackwater refers to water with

high concentrations of faecal matter and urine whilst the latter to wastewater generated from all other domestic processes. Consequently, blackwater is highly contaminated and difficult to treat while greywater contains less organic pollution. Furthermore, greywater is only appropriate if human contact is limited to activities, for example, flushing the toilet and watering the garden (Armitage *et al.*, 2014:73). Toxopeus (2019:online) argues that effective sanitation services entail adequate facilities to collect and treat sewage effectively, and thereby contribute significantly towards the reduction of health risks and protection of the environment. Effective sanitation ensures that human dignity is secured and health is protected. Accessing safe and dignified sanitation facilities has been a long-standing problem for many South Africans, because both sanitation and wastewater treatment systems are under immense strain. Furthermore, the DHSWS planned to tighten enforcement and compliance measures against the CTMM to ensure that it complies with obligations to deal with low effluents standards (CTMM, Online).

Colvin *et al.* (2016:7) state that South Africa's water security depends on the sustained supply from the water resources in the country. It is vital that water resources are restored, conserved, maintained, monitored and managed carefully because these are the natural capital on which all investments into the water sector is dependent. Surface water includes lakes and rivers, and is often utilised in the country for large urban water supply. Groundwater is stored in the soil, aquifers, crevices, rock pores, and includes all sub-surface or underground water. It emerges as springs, seeps and is abstracted via wells and boreholes. Many rural communities in the country are solely dependent on groundwater for water supply. While access to sanitation is improving in the CTMM, municipal waste water treatment plants (WWTP) are suffering from poor servicing, operation and maintenance. This has a particularly negative impact on the CTMM natural resource base, such as water resources and the provision of a range of other ecosystem goods and services. Many WWTP are not fully compliant with legislation regarding waste water discharge into the environment and the majority of the plants require interventions (CTMM, Online).

South Africa is ranked the 30th driest country in the world, and it is not just a water scarce country, but also experiences extreme fluctuation in rainfall. The country is semi-arid and rainfall varies from less than 100mm per annum in the west to over 1500mm per annum in the east, which is well below the world average of 860mm per annum (DHSWS, 2018:7).

Despite declared intentions to integrate wastewater management into overall water management frameworks, wastewater policies lag far behind, while water management has been given priority by the public policy-makers. Wastewater has been neglected. Hence, both implementation and monitoring often fails (Zimmer *et al.*, 2014:337). The CTMM points out clearly that not all sewer flows in City are bulk metered at Wastewater Treatment Work (WWTW) inlets, and even where such bulk metering exists it is not always accurate. Therefore, a straightforward application of bulk metered sewer flows, to determine an accurate present Peak Day Dry Weather Flow (PDDWF), for the CTMM is not possible and these also affects the northern fringes of the municipality (CTMM, 2017:28).

Furthermore, performance rating of wastewater treatment works in South Africa (DWA, 2012) revealed that only 26% of municipal waste water treatment works are in sound working condition, while the others are overwhelmed by the inability to manage wastewater and water influx, lack of skills including appropriate and adequate infrastructure. Many of the municipalities experience backlogs which heightens their vulnerability to climate change. Moreover, the municipalities neither prioritise nor focus on climate change. Regardless of perceived heightened vulnerability, the attention is frequently to re-establish the municipality's functions to a state of excellence (Dube *et al.*, 2016:21).

Table 6 below illustrates the Green Drop comparative analyses on assessed performance category of the wastewater system by financial year. Wastewater services delivery is undertaken by 152 Water Services Authorities (WSAs) via

an infrastructure network of 824 wastewater collector and treatment systems. The CTMM (2019:15) posits that the city had a municipal Green Drop score of 63.8%, ranking 9th out of the 12 Gauteng municipalities.

Performance category	2009	2010/11	2012/13	Trend
Number of municipalities assessed	98	156 (100%)	152 (100%)	→
Number of wastewater systems Assessed	444	821	824	↑
Average Green Drop score	37%	45%	46.4%	↑
Number of Green Drop score >50%	216 (49%)	361 (44%)	415 (50.4%)	↑
Number of Green Drop score <50%	228 (51%)	460	409 (49.6%)	↑
Number of Green Drops Awards	33	40	60	↑
Average Site Inspection score	N/A	51.4%	57.0%	↑
National Green Drop score	N/A	71%	73.8%	↑
Improvement ↑	Digress ↓	No change →		

Table 6: Green Drop Comparative Analyses

Source: DWS, Green Drop Report, 2013

Zimmer *et al*. (2014:340) posit that water pollution also puts at risk many other human rights, such as the right to life; right to adequate standard of living; right to food; and the right to health. Access to sufficient water is a right and this right is realised if the quality of that water does not pose a health risk for human consumption. The DHSWS has developed the Blue Drop Certification Programme as an incentive-based regulation which allows proactive regulation and management of drinking water quality management based upon international best practice and legislated norms and standards (DHSWS, 2014:2). Table 7 below illustrates "the proportion of consumer units

which receive sewerage; and sanitation services and consumer units which take delivery of free basic sewerage and sanitation services from municipalities. According to 2017 estimates, approximately 3 589 829 consumer units had access to free basic sewerage and sanitation, while 11 392 480 consumer units received sewerage and sanitation services from municipalities in South Africa" (Statistics South Africa, 2017:6).

Province	2016			2017		
	Number of consumer units receiving sewerage and sanitation services	Number of consumer units receiving free basic sewerage and sanitation services	Proportion benefitting (%)	Number of consumer units receiving sewerage and sanitation services	Number of consumer units receiving free basic sewerage and sanitation services	Proportion benefitting (%)
Western Cape	1 149 520	796 373	69,3	1 172 568	796 425	67,9
Eastern Cape	1 508 333	591 130	39.2	1 535 110	601 552	39,2
Northern Cape	274 359	71 378	26,0	278 631	61 856	22.2
Free State	751 201	159 345	21,2	759 733	180 025	23,7
Kwa Zulu Natal	2 138 637	449 422	21,0	2 210 305	515 558	23,3
North West	736 866	68 955	9,4	744 003	71 983	9,7
Gauteng	2 643 628	901 566	34,1	2 745 252	1 064 229	38,8
Mpumalanga	992 249	110 958	11,2	1 031 007	95 890	9,3
Limpopo	879 565	197 947	22,5	1 015 771	202 311	19,9
South Africa	**11 074 358**	**3 347 074**	**30,2**	**11 492 380**	**3 589 829**	**31,2**

Table 7: Proportion of consumer units which receive sewerage and sanitation services; and free basic sewerage and sanitation services
Source: STATSSA Non-Financial Census of Municipalities 2017 report

North West Province, which receives the lowest proportion of consumer units benefitted from free basic sewerage and sanitation (68 955); followed by the Northern Cape (71 378) and Mpumalanga (110 958) provinces respectively. The province with the highest proportion was Gauteng (901 566); followed by Western Cape (796 373); and Eastern Cape (591 130) respectively. A total of 3 347 074 million consumer units received free basic sewerage and sanitation from municipalities in 2016 compared to approximately 3 589 829 million consumer units in 2017 (Statistics South Africa, 2017:6). Figure 3 below illustrates the water and sanitation value chain in South Africa:

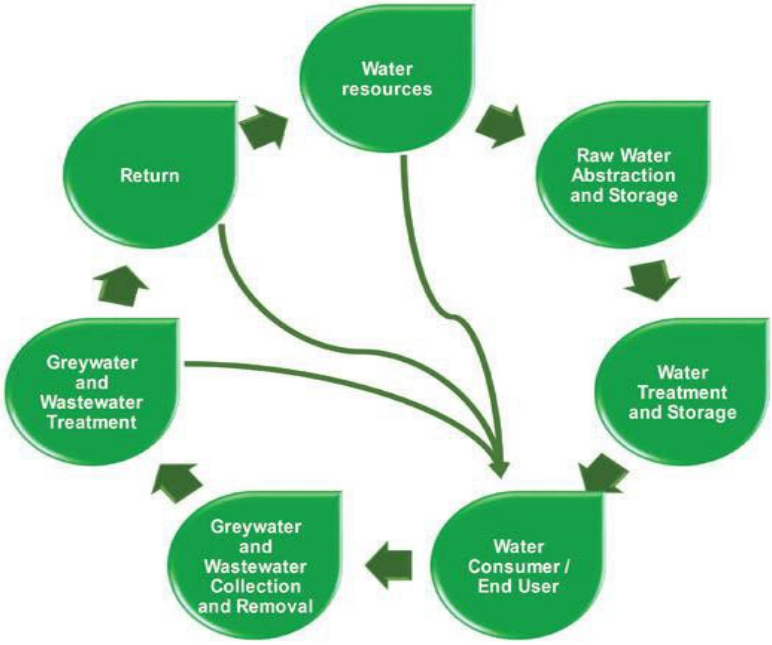


Figure 4: Water and sanitation value chain
Source: DHSWS, 2013

The Department of Water Affairs launched the Green Drop Programme in 2008 as an incentive-based mechanism. In light of challenges facing the implementation of the Enforcement Protocol, the aforementioned mechanism aimed to facilitate compliance with regulatory standards and objectives through enthusiasm and reward rather than direct regulation (Ntombela, Funke, Meissner, Steyn & Masangane, 2016: Online). The Green Drop Programme aimed to improve and sustain the quality of wastewater management. The programme was based on the DHSWS notion that rewarding positive behaviour would be more effective and efficient (Ntombela *et al.,* 2016:online).

The Green Drop regulation revealed that most water resources' quality failures were due to waste water treatment facilities operated by process controllers who lacked the required skills, or poorly designed waste water facilities with inadequate capacity. The deterioration of the quality of water

resources is often as a result of the declining main sewer collector, dysfunctional waste water treatments works, including pump sets (DHSWS, 2017:49). Furthermore, the status quo of the poorly designed waste water facilities is characterised by an under-capacitation of the two plants with various roles remaining vacant for an extended period. This has been attributed to budgetary constraints that make it difficult to hire new individuals once incumbents have left. It is also observed that the ability to attract the relevant skills is highly dependent on the ability of CTMM to compensate the individuals in a manner consistent with what the market offers. This may mean high salary bills which place even more strain on the CTMM budget. The CTMM has experienced a deteriorating Green Drop score with 7 of the 10 plants showing trends of increased risk profiles between 2009 and 2011 (CTMM, 2019:15).

The Water Services Directorate in the DHSWS administers the programme and ensures that all wastewater discharges from the water services sector meet the specified minimum standards in order to protect the environment and human health through the environmental regulation (Ntombela *et al.,* 2016:online). Moreover, while access to sanitation is improving, municipal waste water treatment plants (WWTP) are suffering from poor operation, servicing and maintenance. This has a particularly negative impact on the CTMM natural resource base, such as water resources and the provision of a range of other ecosystem goods and services (CTMM, 2019:15).

Ntombela *et al*. (2016:online) posit that the Green Drop Programme compares and measures the performance of Water Services Authorities and rewards or penalises it based thereon. As part of the Green Drop Programme, the DHSWS manages the Green Drop water and services audit and focuses specifically on the wastewater treatment function. The CTMM posits that as of May 2011, 32 of the 1 237 waste water treatment plants were certified with the Green Drop standard. The CTMM had a municipal Green Drop score of 63.8%, ranking 9th out of the 12 Gauteng municipalities (CTMM, 2019:15).

Largardien and Muanda (2014:1) postulate that despite severe constraints, the rights described in the Constitution of the Republic of South Africa, 1996 mandate local government to provide basic services to all settlements within their jurisdiction. The provision of services to informal settlements must be viewed in the broader context of housing delivery and spatial development.

The DHSWS (2017:36) points out that the provision of sanitation services is a key requirement for the establishment of sustainable, healthy communities and to protect the environment. Coordinated inputs from various stakeholders are required to achieve the 2030 sustainable sanitation for all target. Sanitation infrastructure and practices have a significant potential on women, girls, and other vulnerable members of society, particularly affected by poor sanitation services. Sanitation is not a waste management programme but holds potential resource recovery such as water supplies, fertilisers, and energy (SAHRC, 2014:46). The provision of safe and sustainable sanitation implies that the Government has to invest in opportunities across the entire sanitation value chain. Furthermore, the provision of sanitation is more than simply providing a latrine or toilet. Waste must first be captured, stored, extracted, transported, treated and disposed.

Largardien *et al*. (2014:17) further argue that spatial peri-urban areas are growing rapidly, and are already bigger than the formal areas resulting in low levels of sanitation services. The lack of sanitation services threatens the urban environment and public health as a whole, as well as peri-urban settlements. Informal settlements are characterised by limited water supply, lack of land tenure, high density population, lack of social cohesion, poor physical site condition, poor governance, complicated site layouts, low income levels and reliance on limited political influence and informal economy.

Palmer, Graham, Swilling, Robinson, Eales, Fisher-Jeffes, Kasner and Skeen (2014:8) state that storm water management in South Africa is funded from property rates and municipalities do not levy charges for the provision of storm

water services. Storm water departments throughout South Africa are chronically underfunded, therefore, they must compete with other departments which also have pressing needs when sourcing funding.

Sanitation is a highly complex policy question with five basic dimensions which should be considered. Firstly, sanitation facilities must be physically accessible and consider the needs of the elderly, children and physically challenged. Sanitation facilities must be constructed in the immediate vicinity of each household, or within an educational institution or workplace and available for utilisation 24 hours per day. The sanitation facilities must be associated with services such as the removal of wastewater and sewerage or latrine exhaustion (Wienecke, Atkinson & Botes, 2017:406).

Wienecke *et al*. (2017:406) postulate that a second dimension of sanitation is a delicate social issue. Generally, people learn sanitary habits very early in life and it is very difficult to change their habits. A third dimension of sanitation is physical safety in terms of social practices as well as hygiene (Wienecke *et al.*, 2017:406). Effective and safe sanitation prevents human, insect and animal contact with excreta and water must be available for good personal hygiene. Toilets must be affordable, safe, provide privacy and a dignified environment. Furthermore, Walsh, Shai and Mbangata (2019:3) assert that the ability to pay is a necessary requirement for affordability. A consumer can be said to be facing affordability constraints while is unable to pay for goods or services. Determining the ability to pay requires a value judgment and the ability to purchase goods or services does not necessarily translate into a willingness to do so.

The DHSWS sets standards for water and sanitation services and associated tariffs, while the Water Services Authorities set appropriate tariffs to promote efficient utilisation of water, operation and maintenance costs which are governed by the Local Government: Municipal Finance Management Act and the Local Government: Municipal Systems Act. Furthermore, Water Services Authorities are responsible for the formulation of by-laws and regulations for

water supply and provision of sanitation which the Authorities utilise within its area of jurisdiction (DHSWS, 2018:26).

Water, sanitation, social behaviour and hygiene are closely linked. Water is required to wash hands, flush toilets and for drinking purposes. In many countries water and sanitation remain largely hypothetical (Wienecke *et al.*, 2017:404). The enforcement of and implementation of regulation remains a serious challenge in many countries, which has left approximately 2.6 billion people having no access to basic sanitation and more than 884 million with limited access to adequate safe water (Beail-Farkas, 2013:765). The national economy of South Africa is fragile and water resources are scarce in arid countries, especially when the population is continuously on the increase.

Furthermore, Hedden and Cilliers (2014:1) state that there are additional obstacles, for example, financial constraints, inadequate administrative and technical capacity, lack of political will and inaccurate information on the needs in the sanitation sector. The gap between demand and supply is on the constant increase.

2.6 Overview of access to sanitation: City of Tshwane Metropolitan Municipality and Northern fringe areas

Ntema and Van Rooyen (2016:136) hold that the apartheid regime policy played a significant role in the manner in which South Africa's urbanisation was structured as well as related spatial and economic developments. The apartheid regime established homelands to give effect to its policy on separate development. The homeland system was a manifestation of the government's policies such as influx control and orderly urbanisation, while on the other hand, was central to separate development. The ultimate goal was to resettle, displace and dispossess the majority black population.

Winterveld was known as the R293 town that was established specifically to

redirect the urbanisation of blacks, non-Tswana African away from the urbanised Pretoria. The prevention of black African urbanisation in white proclaimed areas was a fundamental principle of the apartheid system. The amalgamation of Winterveld into the CTMM in 2001 was a key driver for the improved post-1994 provision of services and infrastructure, and this was an intergovernmental relation and joint initiative by the national-, provincial- and local sphere of government. Although in keeping with the spatial patterns and legacy of apartheid in the region, the subsidised bus system, for example, lost its initial role drastically in counteracting the out migration of Winterveld residents by providing cheap transport (Ntema *et al.,* 2016:137).

The CTMM, also known as the City of Tshwane is a metropolitan municipality in the northern Gauteng Province, and includes the city of Pretoria which is the capital of the Republic of South Africa (Leary & McCarthy, 2013:336). The growth of the economy is dominated by the government sector, and the manufacturing industry which is primarily automotive. The largest metropolitan municipality in South Africa is the CTMM in terms of the landmass and it covers an area of 6 368 square km. The Municipality comprises of approximately 3.3 million residents and experiences an annual growth rate of 2.6% which implies that effective, efficient and economical water and sanitation management is key. The CTMM water system encompasses almost 200 storage facilities and 11 500km of pipes valued at approximately at R22 billion. Similarly, the Municipality's sewer system is valued at approximately R28 billion including more than 10 large waste water treatment facilities (Loubser & Underhill, 2017:19). Moreover, the CTMM classified Ga-Rankuwa, Mabopane and Temba as the urban cores which referred to under serviced townships. The western part of the City is categorised as Region 1 and includes what were Bophuthatswana areas of Mabopane and Winterveld as well as the townships of Soshanguve and Garankuwa which were designed as labour reserves for the manufacturing hub of Rosslyn and the City (CoGTA, 2020: Online).

Chapter 7 in Section 155 (1) of the Constitution of the Republic of South

Africa, 1996 categorised the municipalities in South Africa. The CTMM which is situated in Gauteng Province is a metropolitan municipality or Category A that has exclusive municipal executive and legislative authority in its jurisdiction. During 2007, the Demarcation Board resolved that the boundaries of CTMM should be changed, which resulted in the incorporation of Metsweding District Municipality with the CTMM (Molepo, Maleka & Khalo, 2015:347).

Winterveld has a long history of discrimination and neglect. Most challenges and opportunities experienced by residents can be attributed to this singular history, 'which combines the legacy of continuous black land ownership, great pride and the social diversity that ensued from this status. Most of the original inhabitants were South Africans and not of Tswana origin, excluded from South African citizenship because of their race. Ethnically, despite residence within the former homeland of Bophuthatswana, residents were therefore also not acknowledged as citizens of Bophuthatswana by the Tswana rulers. Since 1994, the South African residents have acquired democratic rights and full citizenship, and the residents of the Municipality have advanced from the status of 'outsiders' to that of 'insiders'; and have progressed to new forms of inclusion' (South African Cities Network, 2015:1).

Winterveld is located approximately 50 km north of Pretoria within CTMM and is studied as a typical example of the problems and bottlenecks related to the provision of sanitation in a mixed urban fringe settlement. The area comprises of mixed settlement types that are informal and formal. While the formal parts of Winterveld receive waterborne sanitation services, the much larger informal areas are not provided with such services, while most households receive dry sanitation (South African Cities Network, 2015:1).

Winterveld, according to Ntema *et al*. (2016:137), is geographically divided into urban spaces referred to as 5 morgen areas and rural spaces as 10 morgen areas. The size of individual plots between 5 morgen and 10 morgens range from 4.8 hectares in 5-morgens to 8.6 hectares in 10-morgens. The older parts of Winterveld is classified as an informal settlement which

constitutes the largest section, which comprises of formerly 5 morgen, 10 morgens and Klippan, while the formal parts of the newly established sections constitutes of Slovoville, Beirut and Lebanon. Temba which also served as a dormitory for white Pretoria residents utilised to accommodate non-Tswana ethnic groups in the former Bophuthatswana. The incorporation of Temba and Winterveld into Bophuthatswana presented the Government with two separate areas which were not only non-Tswana, but also different from Ga-Rankuwa and Mabopane in terms of the socioeconomic profile. Despite the small geographical extent, Mabopane and Ga-Rankuwa seemed more densely populated. The residents rely more on a combination of rural and urban economic activities. On the other hand, Winterveld and Temba were more rurally oriented being the farthest in relation to the former white urban centres. Winterveld and Temba residents relied more on rural economic activities including small-scale farming and work on large plots in their respective areas. Although the South African government was eager to hand over the responsibilities of Winterveld, the Bophuthatswana government was reluctant to absorb the non-Tswana residents and land owners of (South African Cities Network Report, 2015:5).

The relationships between Winterveld and the Ga-Rankuwa, Temba, Mabopane, Soshanguve, and the Rosslyn industrial areas should be understood within the context of efforts by the apartheid government to encourage black urbanisation in the homeland. Winterveld has a particularly unique history. The apartheid regime was first realised through the displacement of blacks from Greater white Pretoria into two exclusively Tswana-speaking areas, namely: Ga-Rankuwa in the early 1960s and Mabopane in the late 1960s. Once the Bophuthatswana homeland had gained independence in 1977, the latter and the South African government were faced with two respective challenges, namely, of having to manage the South African apartheid government's transfer of non-Tswana people in Bophuthatswana, and secondly, a need for the South African government to create an economic foundation which would serve as a mechanism to sustain the homeland system on the periphery of white South Africa (South African

Cities Network Report, 2015:4).

The Gauteng Provincial Government, which is driven by the principle of intergovernmental relations through two of its departments, namely, Department of Social Development and the Department of Agriculture and Rural Development have revived the community social programme and small-scale community agricultural projects in 10 morgen areas as an investment in remote rural areas. The CTMM initiated a flagship referred to as Winterveld Reconstruction and Development project by providing drinking water, electricity and RDP housing (Ntema *et al.*, 2016:141). Table 8 below illustrates the type of toilet facilities built in CTMM between 2011 and 2015.

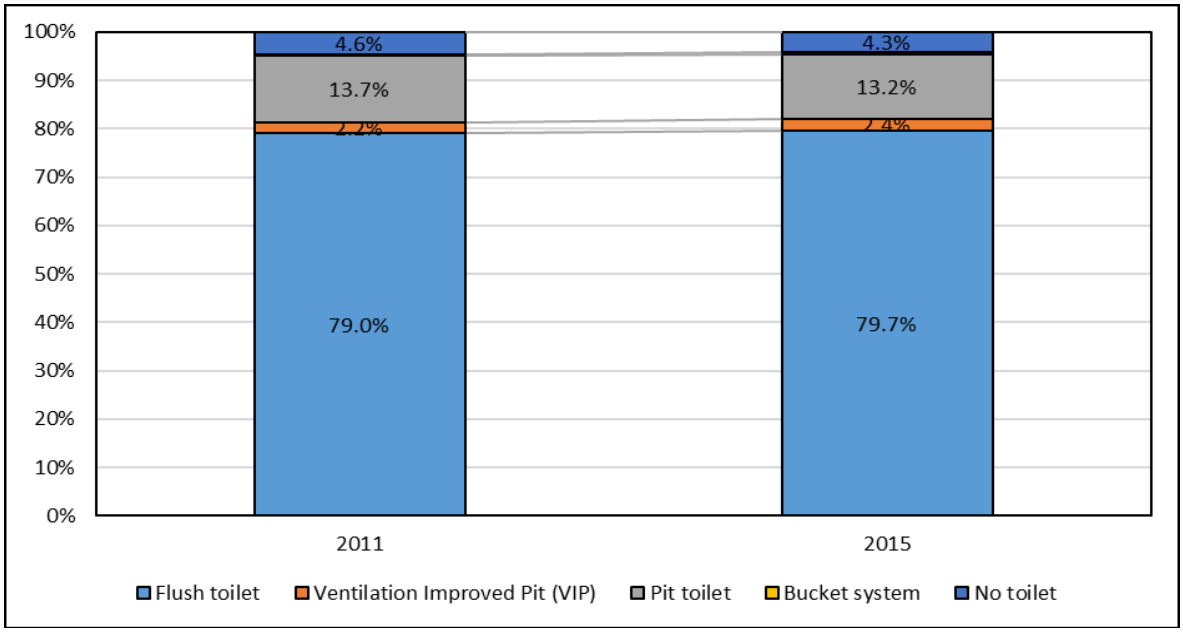


Table 8: CTMM type of toilet facility from 2011 to 2015

Source: CTMM, 2017

The aforementioned table illustrates that in the CTMM, the percentage of households with flush toilets had increased slightly from 79% in 2011 to 80% in 2015. The percentage of pit toilets declined from 13.7% in 2011 to 13.2% in 2015, while households with a ventilated pit improved slightly from 2.2% in 2011 to 2.4% in 2015. The percentage of households which utilise the bucket toilet system or have no toilet facilities declined from 5% in 2011 to 4.7% in

2015 (CTMM, 2017:27).

2.7 Planning: sanitation services in South Africa

The CTMM points out that maintaining financial viability of the City is critical to the achievement of economic objectives and service delivery. Revenue generation within the City is fundamental in strengthening the institutional environment for the delivery of municipal basic services and infrastructure. The capacity of generating revenue is challenged by the levels of unemployment thereby impacting on the ability of the household to pay their accounts (CTMM, Online). Planning is required to incorporate total life cycle management which should be accompanied by financial implications to illustrate persistent cost savings. Municipalities in rural areas experience difficulty in securing funding and generate revenue because industrial customers are limited. The root of the problem also lies in the general lack of funds in rural areas. Moreover, most of the households are poor and cannot afford to pay for water (Department of Economic Development, 2015:4).

Furthermore, “the capital required by the water sector totals approximately R90 billion per annum, that is, approximately R20 billion for sanitation and wastewater collection and treatment, and R70 billion for water supply infrastructure from source to end-user. Over the next decade a funding gap of R333 billion is anticipated between funding required (R898 billion) and available funding (R565 billion). South Africa will have a funding gap of R33,3 billion per annum to be reduced through purposeful interventions such as enhanced regulation, policy reviews, proper management of user expectation and demands, and implementation of cost-efficient measures” (DHSWS, 2018: 48). The CTMM has approximately 720 000 formal water customers on 580 000 stands in the billing systems. In addition, the City monitors water supply to 200 000 informal settlements units. The current water loss figure of 27% is the difference between the bulk water inputs from all the water sources, and the billed or monitored (metered) supply to customers and informal areas (CTMM, Online).

2.7.1 Water Services and Integrated Development Plans

Mjoli (2015:9) holds that Integrated Development Planning considers the linkages between development, democracy and delivery. The municipalities are required to develop strategies (IDPs) for participative planning to engage citizens, community groups and business on a continuous basis. Furthermore, The CTMM Strategic Framework for a Green Economy assist in the identification of new and existing projects and programmes to be included in the CTMM Integrated Development Plan (IDP) in the next planning cycle. The Integrated Development Plan for the CTMM for 2011 –2016 has made significant improvements in livelihoods by addressing service backlogs and poverty through improving the availability and universal accessibility of essential public services such as housing, water, sanitation, education and health care (CTMM, Online).

The Water Services Development Plan is the primary planning instrument for municipal water services. The Water Service Act 108 of 1997 stipulates that all Water Services Authorities must develop a five-year Water Services Development Plan. This must be updated on an ongoing basis and submitted annually to the now called DHSWS. The Water Services Development Plan feeds into the integrated development planning process, which indicates what services the Water Services Authorities plans (IDPs) over a 5-year period to provide universal access to water services (DHSWS, 2018:33).

One of the CTMM commitments is to promote consultation and public participation based on legal and constitutional obligations, including the governance model. To bring effect to this, the City has and will continue to promote participatory engagements with the communities in all its processes, including the development of the Integrated Development Plan. Public participation in the City is being done as a compliance exercise and as an honest engagement with communities in order for the municipality to outline all programmes that will be implemented within the five-year cycle of the

Integrated Development Plan that is informed by the priorities of the community. It also gives community members a clear understanding of the processes that have been put in place by the CTMM (CTMM, 2020: 58).

The local sphere of government and its municipalities experience a significant skill shortage in engineering, management, planning and social skills. The reasons for this scenario must be investigated. Generally, South African engineers choose not to work in these environments. The municipalities must align remuneration with market related salaries and create a conducive environment (McNamara *et al*., 2015:5).

The Water Services Act 108 of 1997 is the primary legal instrument which relates to the provision and the accessibility of water services. The responsibility of The DHSWS is responsible for the management of water resources which falls within its jurisdiction. However, the municipality is responsible for the delivery of services at the local sphere of government (SAHRC, 2014:29). Mjoli (2015:3) asserts that good sanitation governance is underpinned by the following principles: accountability, transparency, participation, and fairness. Furthermore, reference is made to the manner in which these services are managed, planned and regulated within a set of legal, economic, social and political system to ensure sustainability. Below figure 4 shows the alignment between Water Services Development Plan and project identification and implementation process.

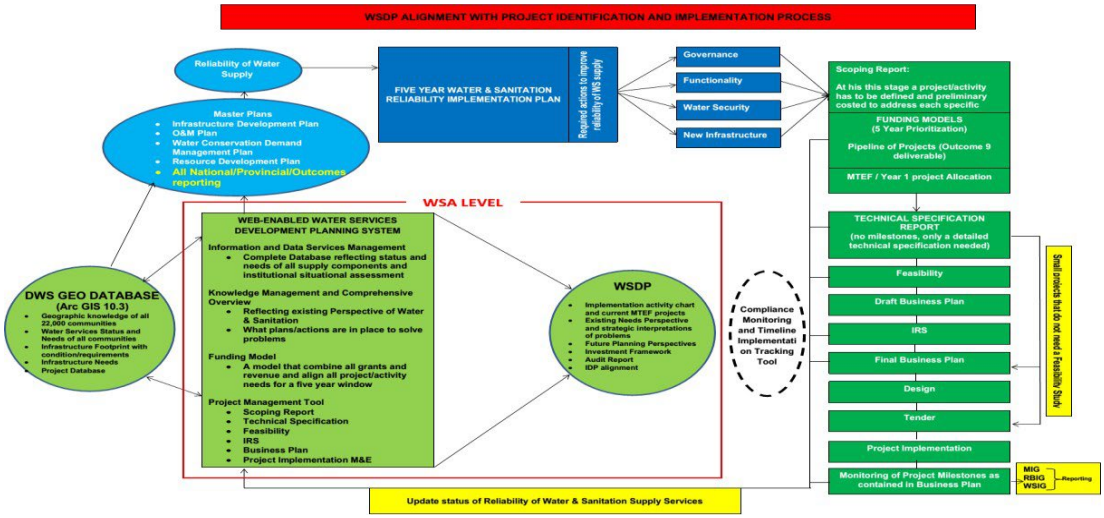


Figure 4: Water Services Development Plan: aligned with project identification and implementation process

Source: DHSWS (2016)

Inefficient planning and budgeting are at the heart of many issues pertaining to the infrastructure challenge in the local government sphere of the developing South Africa. The local government sphere and the service rendering public sector institutions (for example municipalities) should ensure that managers, decision-makers, and planners are adequately equipped to develop and execute plans and understand the significance of budgeting and planning (McNamara *et al*., 2015:5).

In line with the country, the CTMM, places an on-going focus on the reduction of the sanitation backlog by ensuring universal access to sanitation (CTMM, Online). The local government is constitutionally tasked and responsible for the provision of services related to domestic wastewater and sewage disposal. A municipality is expected to provide basic sanitation to its communities, and if unable to meet the requirements of its consumers, it must prioritise the provision of basic sanitation services within its area of jurisdiction. The municipalities are responsible for the provision of municipal services which must be reviewed regularly to improve, extend and upgrade the system. Water supply management on all spheres of government must ensure that sanitation services is provided sustainably, efficiently, and equitably. Therefore, it is imperative that national government must ensure that water resources are protected and provided along quality standards acceptable for human health and environmental sustainability. Moreover, the municipalities are responsible for the provision of sanitation and wastewater treatment services to their respective communities (Toxopeus, 2019). Montmasson-Clair (2018:15) highlighted that the global water and sanitation market, including both capital and operational expenditures during 2016 was estimated at R12 631.32 billion. The utility sector largely dominates the market (67%), followed by the industrial sector (15%) and the bottled water

segment (14%).

The DHSWS (2017:42) states that planning for the provision of services in many municipalities is a challenge because IDPs and Water Services Development Plans are outdated. Poor planning for non- capital costs such as operation and maintenance, building operational staff capacity, refurbishment, capital replacement, inadequate records of existing infrastructure and services in numerous municipalities are the primary contributors.

OECD (2015:online) points out that South African water services face a critical challenge in terms of prioritisation and poor planning, a changing workforce with an increasing lack of technical skills, increasing investment needs in poor economic conditions, ageing infrastructure and shifting patterns in water demands with rising energy costs. The DHSWS has conceptualised Municipal Strategic Self-Assessment (MuSSA) tool to support water utility business management, decision making and effective sustainable performance by municipal water utilities. The Municipal Strategic Self-Assessment tool helps to flag business vulnerability, convey the current overall business health of water services and indicate likely future performance of water services provision with early warnings. The DHSWS oversees and addresses identified vulnerabilities via associated Municipal Priority Action Plans (MPAP) which is a high-level planning process in order to support effective and appropriate planning across external and internal silos and implementation of sustainable solutions (DHSWS, 2017:42).

Chapter 5 of the Local Government: Municipal Systems Act, 2000 (Act 32 of 2000) stipulates that an IDP needs to be developed to ensure that CTMM strives to achieve the objectives of local government, and public participation is a legislative requirement for planning on the local sphere of government (Molepo *et al.*, 2015: 347).

2.7.2 National Water and Sanitation Master Plan

The National Water and Sanitation Master Plan (NWSMP) “aims to assist in the provision of water and sanitation services and to establish a consolidated plan for water and sanitation management to meet future needs. The plan would also identify key challenges that impede the provision of water and sanitation services in the country. The National Water and Sanitation Master Plan is necessary because there is a rapid growing and urbanised population in the country. This implies that there is an increase in water requirements for socioeconomic growth” (DWS, 2018:2). Certain challenges which impact negatively on the delivery of water and sanitation include: neglect of operation and maintenance; refurbishment of infrastructure development; poor planning for future water provision; high percentage of nonrevenue water; and skill shortage in the sector (DWS, 2018).

The CTMM has developed Water Resource Master Plan (WRMP) with an aim to comply with the National Water and Sanitation Master Plan (NWSMP) developed by the DHSWS. The aim of the CTMM when they developed the Water Resource Master Plan was to investigate the possible upgrading or extension of the City’s own water resources, with a view to reduce the dependence on imports from the Vaal River basin (via Rand Water). In accordance with the CTMM current water and sewer Master Plan which have been based on the City’s approved Spatial Development Framework, the City’s potable water demand is set to increase over the next 40 to 50 years from 987 Ml/d to 2600 Ml/d, with an associated increase in sewer return flows to 1600 Ml/d. The anticipated future water demands and sewer return flows are based on a population growth rate of ±2% p.a. The CTMM currently has an average potable water demand of 987 Ml/d. Furthermore, approximately 72% of the demand is supplied by Rand Water Board, the main water source being the Vaal River. The remainder is generated internally by CTMM own fountains, springs, boreholes and Water Treatment Plants (CTMM, Online).

Treasury (2018:3) reported that the DHSWS planned to finalise the water and sanitation master plan over the next three years, which would serve as a

roadmap for the planning and implementation of water and sanitation projects. The Department has reallocated R391,4 million over the medium-term from goods and services items to strengthen integrated planning. The municipalities are required to secure funding for sanitation master plans. A detailed municipal sanitation master plan for each Water Services Authority must be formulated and updated regularly to meet the backlogs within their area of jurisdiction. Initial master plans should be completed by all Water Services Authorities by 2019 and updated every 5 years (DHSWS, 2017:44).

The current National Water and Sanitation Master Plan comprises of actions that need to be implemented by the entire water sector in the country to achieve the government's goals and objectives. The DHSWS drafted the National Water and Sanitation Master Plan in consultation with the stakeholders in the entire water sector, considered the input from the stakeholders, and aimed to provide the basis for further consultations before finalisation. In general, the National Water and Sanitation Master Plan is envisioned as a living document, and therefore even after its initial finalisation, its content and the achievement of the set targets will be monitored and evaluated by the sector. Moreover, the document will be amended and updated annually based on inputs from other role-players and stakeholders and revised government targets and available budgets (DHSWS, 2018:1).

The National Water and Sanitation Master Plan sets out the framework for how South Africa will implement water and sanitation programmes and manage its water resources to achieve the targets set in the Government's National Development Plan; Medium-Term Strategic Framework (MTSF); and Medium-Term Expenditure Framework (MTEF). Furthermore, the National Water and Sanitation Master Plan also addresses the global and African agendas outlined in the African Union's Agenda 2063 and the Sustainable Development Goals (DHSWS, 2018:53).

2.7.3 Core norms and standards for sanitation in South Africa

The DWS (2017:33) states that sanitation services must implement sustainable and effective effluent management practices to inhibit contamination and protect public health, and maintain a pollution-free environment. In terms of the National Water Services Act (Act 108 of 1997), the Water Services Providers must be licensed. Natural water sources can only manage a limited pollution load. Every institution that discharges effluent into a water body (river, stream, lake, and reservoir) must be authorised to do so by the DWS.

Two of the CTMM wastewater treatment plants discharge into the Apies River i.e. Daspoort and Rooiwal Wastewater Treatment Works (WWTW). The Rooiwal Waste Water Treatment Works is a major contributor to the flows into the Apies River (CTMM, Online). The DHSWS points out that the authorisation specifies the types and maximum levels of contaminants that the effluent may contain. Off-site wastewater treatment is considered a specialised subject and if the introduction of a treatment works is considered, specialist consultants must be involved. The 2016 National Sanitation Policy underscores the 'polluter pays' principle, which suggests that a levy/penalty is issued for discharging polluted water. Should the discharge pose a risk to the treatment process or lead to a breach of the permit/license, the water services institution would only agree to accept the effluent if the harmful substances is removed or reduced. Industries can comply by pre-treating the effluent such that it complies with the permit/license conditions; separate effluent discharges; treat the harmful component of the discharges separately; or collect harmful streams which are removed by appropriate waste disposal contractors. The quality of effluent which emanates from a wastewater treatment works is legislated and must meet the licensing requirements (DHSWS, 2017:33). Figure 5 below illustrates the core, norms and standards of sanitation services developed by the DHSWS as a sector leader in terms of water and sanitation.

Hygiene promotion: People have the knowledge and the means to protect themselves from nuisance vectors and sicknesses likely to cause major risks to their well-being or health, and keep themselves and their environment clean.

Prevention of pollution: Preventing pollution entails protection of coastal water and surface waters, groundwater, effluent management, proper excreta disposal, greywater management, wastewater and sludge management.

Re-use: Sanitation services shall implement and advocate sustainable and effective greywater, wastewater and nutrient re-use practices to protect water resources and public health and prevent pollution of the environment.

Operation and maintenance: Sanitation services shall prevent pollution of the environment and protect water resources and public health by providing effective and efficient operation and maintenance of sanitation infrastructure.

Sanitation metering and tariffing: Sanitation services shall implement effective and efficient sanitation tariffing and metering to ensure sustainable, equitable and reliable services.

Solid waste management: Sanitation services shall advocate and assist with sustainable and effective solid waste management practices to protect water resources and public health and to prevent pollution of the environment.

Asset management: Sanitation services shall implement effective asset management practices to ensure reliable and sustainable sanitation services in the prevention of polluting the environment, water resources and protection of public health.

Figure 5: Core norms and standards of sanitation services

Source: DHSWS (2017)

Healthy inhabitants are essential to advance economic growth, human development and well-being. A water services authority is required to ensure that hygiene is promoted and included as part of the sanitation service. Furthermore, persons of appropriate ages are mobilised to adopt measures to ensure hygienic conditions prevail and are aware of the key public health risks to inhibit faecal-oral and other related diseases. It is also imperative that drainage; spillage; toilets; or discharge from sanitation systems does not contaminate groundwater sources, surface water, and/or coastal waters (DHSWS, 2017:34).

2.7.4 Water and sanitation skills development programmes

The CTMM is implementing a multimillion rand programme aimed at skills development and entrepreneurship programme known as Tshepo 10 000 which means “hope”. Tshepo 10 000 consists of three components, namely skills development, job creation, and entrepreneurship. The programme aimed to run for 12 months for each intake of 2 500 youth candidates. The CTMM in partnership with institutions of higher learning, will train candidates in areas where there is huge spending, such as infrastructure maintenance and services like electricity, water and sanitation, roads, housing and waste management (CTMM, 2013: Online)

Municipalities are located at the level closest to the people, and strive to provide quality services guided by principles of excellence, transparency as well as effective and efficient management of the local communities’ affairs. The departments responsible for the provision of basic services are tasked to improving standards of delivery and supply throughout the country. Thus, municipalities are avenues for learning a prerequisite as transformative and inclusive service delivery approaches to effective development (Municipal Institute of Learning, 2016). The DHSWS has initiated the Water and Sanitation Councillor Development Programme to provide well-informed political leadership the status of the delivery of sustainable water and sanitation services. The programme empowers councillors to take informed decisions which affect water and sanitation services as well as participate

actively in water and sanitation business processes within the municipalities and communities they serve (DHSWS, 2018: 39).

2.8 Establishment of National Sanitation Programme in South Africa

The Department of Water Affairs was established in terms of the Constitution of the Republic of South Africa (1996). The Department's legislative mandate stipulates that the country's water resources must be protected, managed, utilised, developed, conserved and controlled through regulations and support the delivery of effective water supply and sanitation. This is done according to the requirements of water-related policies and legislation which are critical for the right of access to adequate food and water, economic transformation and eradication of poverty (DHSWS, 2013). The CTMM has established the division which is responsible for the infrastructure planning and capital projects (development) for water and sanitation. The division has to ensure that infrastructure planning is done in conjunction with the Economic Development and Spatial Planning Department, so that the department aligns its projects with the development growth in the city. This division has to ensure that the water master plan is in place as required in terms of the Water Services Act 1997 (Act 108 of 1997 (CTMM, Online).

Historically, sanitation services were included with water supply. The DHSWS has grouped sanitation and water supply as water services and regulated it at the national government sphere. The lack of regulations is evident and policy guidelines remain pending. The DHSWS was delegated the responsibility for national sanitation programming and upgrading five years ago but in practice it had neglected these responsibilities (Palmer *et al*., 2014:13). Moreover, the CTMM has established the Bulk Water and Waste Water Services Division which is responsible for the provision of bulk water to the city through various water treatment plants and reservoirs in the city. The division is also responsible for the waste water treatment plants which ensure that raw sewage is treated before the water is released back into the rivers. Furthermore, the division is also responsible for ensuring that the water quality

is in line with the national DHSWS standards by ensuring that water and sewer tests are carried out regularly (CTMM, Online).

The presidential pronouncement to establish a new DHSWS resulted in the transfer of the sanitation function from the DHSWS. This transfer of the sanitation function was not just a re-arrangement of two complementary functions of water and sanitation but for improved sector co-ordination and provision of sanitation services in South Africa (DHSWS Annual Report, 2014). The DHSWS is currently working towards an understanding that sanitation is the provision of a function and an oversight of other authorities such as municipalities and water boards that have a significant role in the provision of sanitation (DHSWS, 2018:30).

During the AfricaSan +5 held in South Africa in February 2008 in Durban, the heads of delegations and Ministers from 32 African countries responsible for hygiene and sanitation made commitments at eThekwini Metropolitan Municipality. These included establishing one institution accountable to lead sanitation; develop a national plan to meet the related MDG; formulate a policy on sanitation; and allocate 0.5% of the GDP thereto. Moreover, Southern Africa has performed well by mainstreaming gender in sanitation programs in institutional settings, especially in schools. However, the region does not do well in implementing the sanitation monitoring and evaluation system and only meets the commitment of allocating 0.5% of the GDP towards sanitation (Cross & Coombes, 2013:168). The CTMM as one of the major economic hubs in the country has not been excluded from the negative economic growth and high unemployment trends and is accounting for 10% of national GDP and 28% of Gauteng's GDP. The City average growth has been amongst the highest of any City in South Africa (3.6% from 1994 to 2014), growth in employment has not kept pace.

The South African government set a target to provide all citizens with at least a basic level of water and sanitation within 7 years. However, this proved an over ambitious target because it took the government more time to ensure access to water and sanitation services (DWS, 2012:8). Masindi *et al.*

(2016:27), further state that according to the DWS Annual Report (2014), out of the 14,5 million households in South Africa, approximately 2,2 million experience a low basic level of sanitation or inadequate level thereof. Most of the citizens of South Africa use bucket toilet sanitation systems, especially those in informal settlements. The estimated number is 32 000 systems (DWS, 2014). Nationally, the percentage of households that continued to live without proper sanitation facilities had declined considerably between 2002 and 2014.

It was realised that the targets which were set during 1994 were over-ambitious. Cabinet approved the Strategic Framework for Water Services during September 2003 which outlined a revised water and sanitation target in respect of access thereto. The revised new targets in the Strategic Framework for Water Services aimed to ensure that all South Africans have access to a functional basic water facility by 2008 and a functional basic sanitation facility by 2010 (DHSWS, 2012a:8).When looking at the sanitation backlog in the CTMM i.e. number of households without hygienic toilets over time, the figures showed that in 2008 the number of households without any hygienic toilets in CTMM was 166 000, this number increased annually at a rate of 0.05% to 167 000 in 2018 (CTMM, 2021: 46).

2.9 Institutional sanitation: Schools

The history of school sanitation is acutely interconnected, that is, dispossession of native Africans; history of European colonisation; and forced racial segregation of the majority. The Department of Basic Education Action Plan of 2014 describes how the land dispossession and resettlement process initiated through the 1913 Land Act impacted on the location of schools which is most prevalent today. Less than half of South Africa's school children are enrolled in the former homelands. Under the apartheid regime, education was compulsory for all racial groups. The Bantu Education Act of 1953 stipulated the segregation of schools by race, while state subsidies towards learner spending was unequal, based on ethnicity, race, while the black schools in particular lacked access to, for example, water and sanitation (Louton & Still,

2016:6).

Water Sanitation and hygiene facilities should promote care and prevent harm to the environment. The children are taught about issues related to daily living. However, they must be made aware of environmental issues in the school setting. Moreover, schools must address public health concerns and avoid negative environmental degradation or effects thereof. School plans and maintenance must manage toilets that may contaminate soil and groundwater, for example, water taps and pumps that produce wastewater flows (UNICEF, 2012:13).

The CTMM further points out that all schools in the City must have sufficient number of sanitation facilities that are easily accessible, provide security, privacy, promote health and hygiene user education and comply with all relevant legislations. The choice of appropriate sanitation technologies in schools must be based on the assessment carried on the most suitable sanitation technology for each particular school in the City. School sanitation facilities could include conservancy tank or septic tank, ventilated improved pit latrines, waterborne sanitation, composting toilets and waterborne sanitation (CTMM, Online).

Noga and Wolbring (2012: Online), assert that although education is important itself for all children including those who are physically challenged, it is also instrumental for contributing towards employment and other areas of social activity. Education is perceived as fundamental to economic growth, improved standard of living, democracy and greater stability. The provision of universally accessible water sources is considered beneficial, that is, increases opportunities to attend school and acquire a formal education. UNICEF's Target 2 states: ensure that all schools have adequate child-friendly water and sanitation facilities, including a programme in hygiene education.

Louton *et al.* (2016:1), state that the Constitution of the Republic of South Africa (1996) provides a strong foundation for the equality and dignity of every

person in the Bill of Rights. Of significance is that children share these rights equally and certain these rights have significance in terms of school sanitation. The Bill of Rights states that:

- Everyone has inherent dignity and the right to have their dignity protected and respected.
- Everyone has the right to an environment that is not harmful to their health and wellbeing.
- Everyone has the right to privacy.
- Everyone has the right to bodily and psychological integrity.
- Everyone has the right not to be treated or punished in a degrading way.

Gauteng Province faces unique challenges relating to school infrastructure and sanitation compared to more rural provinces such as the Eastern Cape, KwaZulu-Natal and Limpopo. According to the official statistics, the Gauteng Provincial Department of Basic Education has no schools that currently violate the Regulations Relating to Minimum Uniform Norms and Standards for Public School Infrastructure, that is, issues of sanitation. Unfortunately, numerous schools still have inadequate access to sanitation and the learners are forced to utilise unhygienic and undignified facilities to relieve themselves. According to the legally-binding Regulations Relating to Minimum Uniform Norms and Standards for Public School Infrastructure (hereafter referred to as the Norms and Standards), all public schools in the country must have had access to water and sanitation facilities by 29 November 2016. Moreover, by 29 November 2020, all schools must be provided with access to adequate water and sanitation facilities (Louton *et al.*, 2015: 6).

Separate toilet facilities should be built for girls and boys, younger and older children particularly adolescents including male and female teachers, while at pre-schools special provision must be made for smaller children, especially for different age groups who utilise the same facilities. Pre- schools must make special provisions, for example, build a step in front of a pump or toilet seat, or an additional seat cover with a smaller hole. Sanitation facilities must also provide adolescent girls to dispose of sanitary pads without being harassed by

either boys or bullies. Water supplies and sanitation facilities must be situated in appropriate positions including easy access thereto. A facility may not be utilised if it fails to consider practical, cultural and environmental aspects (UNICEF, 2012:14).

The CTMM posits that schools influence communities and children through outreach activities and schools are often more than just places for learning and behaviour change. If school's sanitation and hygiene facilities are absent, or are badly maintained and used, schools become places where diseases are transmitted and causes health hazards for the surrounding community at large. It is therefore important that schools have proper potable water and sanitation facilities, particularly built for boys and girls including male and female teachers (CTMM, online).

Schools are inherently spaces with high levels of person to person contact and diseases are easily transmitted at schools that lack adequate sanitation and hygiene. The learners' susceptibility to health hazards is at risk and can contract a variety of diseases such as diarrhoeal diseases, and worm and malaria infections as a result of schools providing poor sanitation. The lack of access to clean water and inadequate sanitation and hygiene are said to be the cause of 88% of global diarrhoeal diseases (Louton *et al*., 2015: 6).

2.10 Types of sanitation technology options implemented in South Africa

Winecke *et al*. (2017:407), argue that alternative sanitation can substantially lower the cost of provision and maintenance, as well as the impact on the natural environment. A wide variety of opinions exist on what can be considered as improved sanitation. Improved sanitation can vary significantly and is defined as a ventilated improved pit latrine, pour flush latrine, connection to public sewer and to septic tank open pit latrine.

South Africa requires innovation that is deployable on a large scale to solve sanitation challenges, especially in densely populated areas because there is

a tendency to store waste. Moreover, there is a lack of sustainable approach to manage the waste once the latrine pit or septic tank is filled. By improving the management of human waste, greater privacy, dignity, improved child health and personal safety, especially women and children can be ensured. Ground breaking improvements such as pit emptying, toilet design and sludge treatment can benefit local government and their partners to meet the enormous challenge of providing quality public sanitation (Trollip *et al.,* 2016:34).

Naughton *et al*. (2017:online), assert that “sanitation does not necessarily have to be implemented on a large scale that utilises expensive and complex systems connected to chemical intensive unit processes and energy”. There are many lower cost options such as dry desiccating, compositing toilets, On-Site sanitation systems, septic systems and natural systems. The Presidency (2014:112) reported that in 1994 an estimated 50% of the households lacked basic sanitation services and in response thereto, the democratic government prioritised the rapid delivery of sanitation services to the poor. Despite the rapid progress, undignified sanitation as well as the bucket toilet system, and reliance on fetching water from streams prevail in certain areas. Focus should be on eradicating the remaining backlogs urgently.

South Africa has a mix of old, new, and obsolete and in many instances, overdesigned water and sanitation infrastructure which are not fit for the purpose. There is a positive movement towards establishing the required skills. Recently, it was realised that technology must be assessed to meet the sanitation requirements. Development is taking place although the required knowledge still needs to be acquired (McNamara, Manuel, Ragbhubir & Naidoo, 2015:2).

McNamara *et al.* (2015:4), further postulate that there is a lack of alignment at the local sphere of government between technical requirements and political processes. Politicians lack knowledge and exhibit limited understanding of what it entails to operate and maintain infrastructure such that it provides sustainable services as well as what is required to rehabilitate and develop

new infrastructure for growth. As a result, operations and maintenance bear the brunt in the allocation of funds, especially budgetary constraints.

Armitage *et al.* (2014:67), hold that appropriate sanitation has become a significant consideration since South African cities comprise of diverse socio-economic profiles and there is a need for urgent service delivery. South Africa is faced with difficult physical constraints which limit the feasibility of full waterborne sanitation systems, especially in informal settlements. Many sanitation systems, if operated properly under suitable conditions, fulfil the required health objectives although this does not guarantee its sustainability.

Currently, South Africa utilises various types of sanitation technologies, for example, pit latrines with or without ventilation, replace chemical toilets with appropriate technology types, on-site flush toilets with septic tanks and disposal facilities, flush toilets with waterborne and central treatment works, including the bucket system which government must prioritise and eradicate (Treasury, 2014:131).

To effect incremental improvements to promote a healthier living environment, sanitation does not simply imply access to a latrine. It demands a greater hygienic environmental awareness and capacity from the communities. It involves a wide range of waste controls such as human excreta, solids and domestic wastewater which form part of the behavioural and environmental context. Technologies are devices that serve the community in stewardship of resources and protection of the environment. However, if the communities will wane, technologies are rarely accepted or utilised (DHSWS, 2012:51).

The sustainability of any sanitation system is expansively dependent on a community's acceptance thereof. Expectation is a particularly sensitive concern in South Africa because the systems need to meet the cultural norms and practices including those of the community if these are to be operated and maintained appropriately. The slightest deviation from what is conventionally provided to middle-income households can have unfortunate consequences. Moreover, the inequalities of the past and political promises to

address these issues have placed significant pressure on service providers to supply full waterborne sanitation systems (Armitage *et al.*, 2014:68).

The variable nature of sanitation challenges faced by informal settlements is interlinked across social institutional, economic and technical perspectives. Socially, informal settlements' sanitation problems are associated with poverty, high levels of unemployment, disorganised social landscapes, accountability and lack of leadership. Institutionally, informal settlements' sanitation challenges are associated with poor governance, poor planning, fragmentation of responsibilities and lack of dedicated operation and maintenance budget as well as complicated institutional arrangements. From an economical perspective, cost is a key contributing factor for informal areas to select sanitation technologies. Other incurred costs that are intentionally ignored include the cost of operation and maintenance, replacement and suitability to the physical settlement's, thus rendering sanitation solutions unsustainable. The technical perspective of sanitation problems can be attributed to the lack of both alternative options and operation and maintenance or low level; high operation and maintenance costs; and irrelevance of the sanitation solution in the local context (WRC, 2015:1).

Naidoo *et al*. (2011:4), hold that the selection of the sanitation system depends on the community's sanitation needs and is inter-dependent on other services. This could range from on-site sanitation systems such as VIP, chemical toilets, septic tanks and full waterborne systems such as small-bore, and conventional gravity. The sanitation package must not only include the households, but consider wide-range of technical options such as the institution's needs; for example, churches, schools, taxi ranks, and bus-stops. The choice of a sanitation system should review (DWAF, 2001) improvements to health, affordability for the household, compliance with environmental protection regulations, operation and maintenance requirements, sustainability and the ability of community-based contractors to implement such.

Armitage *et al.* (2014:68), postulate that apart from achieving the objectives of

improved health, sanitation systems must be robust. These systems are often subjected to intensive utilisation and often open to mismanagement, particularly in communal or public facilities. Furthermore, sanitation systems are more likely to be sustainable when users assume responsibility for its operation and maintenance. Sanitation systems must be easy to construct, operate and maintain.

The CTMM posit that contributes to human dignity and quality of life and is an essential pre-requisite for success in the fight against poverty, hunger and child deaths among other pressing socio-economic challenges South Africa faces. The City had a total of 833 818 flush toilets (81.16% of total households), 25 894 VIP toilets (2.52% of total households) and 146 439 (14.25%) of total household pit toilets (CTMM, 2021: Online). In a view of the current sanitation backlog and the increasing number of people living without access to basic sanitation, municipalities have provided a number of sanitation technologies. Communal sanitation technologies are provided in dense informal areas where space is lacking, and includes, *inter alia,* full flush communal toilets, communal ablution blocks, ablution facilities, shared facilities, and pour flush toilets. Individual sanitation technologies are provided in low and medium dense informal areas which include Ventilated Improved Pit, Enviroloo and Urine Diversion and so forth (Water Research Council, 2015:2).

Figure 7 below illustrates the decision tree, which is utilised to describe the selection of optimum sanitation solutions with reference to related technology options. It covers all human settlement types and indicates both rural and urban technology choices such as dry and waterborne sanitation.

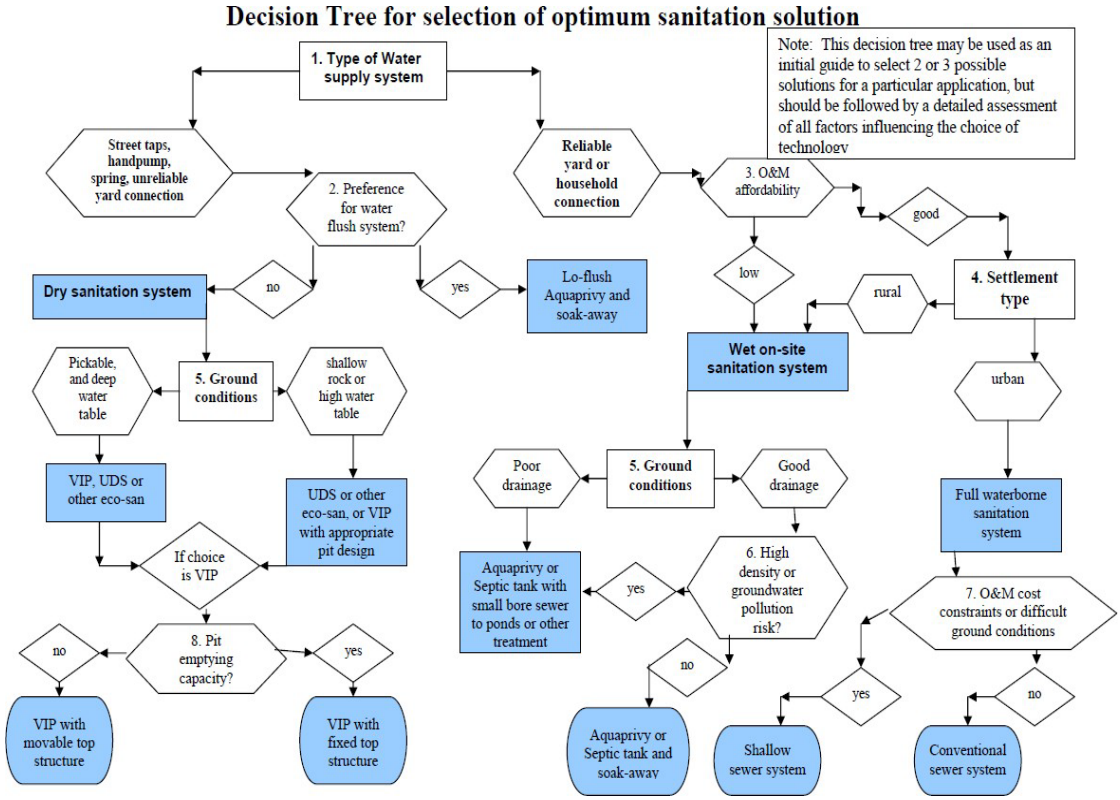


Figure 7: Decision tree: selection of optimum sanitation solution

Source: DHSWS

The decision tree is provided as a support in the initial screening of the application for technology options. Although a decision tree is provided, a thorough feasibility study should be undertaken before finalising the selection (DHSWS, n.d:7).

Bonthuys (2017:19) argues that despite remarkable achievements, the danger from our own excreta is a problem of how to manage it safely. Globally, it is acknowledged that nearly one in four of the world's population still defecates in the open. Sanitation efforts need to provide safe, appropriate options and more hygienic toilets to people in the developing world.

Van Vuuren (2014:16) highlights that safe sanitation is significant towards the wellbeing and preservation of health, especially among children. Moreover, safe sanitation must not only be an issue of dignity. Intestinal infections are widespread in South Africa, especially among children. There is an urgency to serve the remaining communities which have no access to toilets and those

who defecate in the open. Open defecation results in the spread of parasitic worms such as (helminthic) infections and helminth eggs are passed into the soil.

The adoption of latest technologies has consequences and requires a development plan and comprehensive training in light of the skills gap. The Department designed the internal skills development, succession and retention plans to enhance its human resource development whilst the sector skills development one is under review (DWS, 2017A:11).

2.10.1 Traditional pit latrine

Njoh (2016:175) highlights that the most common sanitation technology to collect human waste is with a pit latrine. The traditional pit latrine comprises of three major components such as a pit dug into the ground, earth or concrete slab fitted with a squatting hole, a platform of wood, and the latrine or superstructure house. The traditional pit latrine is inexpensive and easy to construct. However, it is encumbered with a number of problems.

Picture 1: Unimproved traditional pit latrine

Source: DHSWS technological options

The unimproved traditional pit latrine comprises of a top structure around and /or over a pit, generally unlined where soil conditions allow a pedestal or squat-plate. There is no ventilation pipe on the system. It is not recommended due to bad odours and insect infestation (DWS, n.d.:5).

2.10.2 Ventilated Improved Pit (VIP) toilet

Van Vuuren (2014:16) asserts that in South Africa, the Ventilated Improved Pit toilet is an improvement from having no access to sanitation. It has become a symbol of basic sanitation. Moreover, imposing one size fits all solution can result in rejection of the technology. Colvin *et al*. (2016:76), highlight that costs associated with the provision of universal access to conventional waterborne sanitation is beyond the reach of most developing countries. The greatest challenge exists outside the towns sewered boundaries because of a lack of infrastructure. South Africa implemented Ventilated Improved Pit (VIP) latrines to provide sanitation in areas outside the sewered network which is considered the basic minimum sanitation intervention. The primary advantages of Ventilated Improved Pit latrine technology is that it does not require water to function. The technology, if utilised and maintained properly can serve as a barrier between people and faecal waste. Moreover, it can be installed faster than conventional waterborne sanitation because it does not require complex sewers and treatment works. In South Africa, the rapid up-scaling of VIP latrines led to approximately an installation of 3 million units. However, the lack of maintenance capacity and clear guidelines of how to manage a full Ventilated Improved Pit latrine have proved to be a major impediment.

Jacobs, Du Plessis, Trollip and Van Vuuren (2014:88), posits that many municipalities continued to consider VIP as the minimum level of sanitation which is responsible for improving access to services in their peri-urban and rural communities. During the past 2 decades, millions VIP units have been constructed throughout the country. Ventilated Improved Pits offer a good basic sanitation delivery option even though the characteristic or contents of the pits is historically not well understood or familiar. The long-term sustainability of the pits poses a number of challenges when these fill up and can no longer fulfil its function to provide hygienic, safe and dignified sanitation.

Lorentz, Wickham and Still (2015:2), assert that on-site dry sanitation does

not rely on water to function and is an effective process to dispose of human waste (faeces and urine) insitu; these systems are referred to as waterless toilets (Franceys *et al*., 1992). Typically, on-site dry sanitation comprises of a pit excavated in the ground; sides of the toilet is lined from top to bottom; and the concrete slab has a toilet pedestal to cover the hole.

According to Still *et al*. (2012:1), a pit is required for an on-site sanitation system to gather accumulating sludge even though it ultimately reaches its capacity. The local entrepreneurs and municipal sanitation departments use a vacuum tanker because the technology is commonly utilised to empty the pit. The vacuum tankers are characterised by high capital and maintenance costs; service large areas; remove waste and cart it to treatment sites. Vacuum tankers have proven to be an effective technology which easily accesses pit latrines and septic tanks. Furthermore, waste is fairly liquid and not mixed with solid waste. However, in South Africa, pits typically encompass domestic waste which can block the vacuum hoses, resulting in making the job extremely difficult, time consuming and untidy. Service providers occasionally limit their services to planned areas because the challenges in unplanned areas often cannot be reached by a tanker truck. Furthermore, the households which need to be serviced are not reached because the paths are too narrow to negotiate and roads are in a poor condition.

2.10.3 Pour and low flush technology

Colvin *et al*. (2016:77), highlight that one of South Africa's major sanitation sector challenges is to acquire technologies that can bridge the gap between Ventilated Improved Pit latrines and the full waterborne sanitation. The country lacks annual adequate water supply for those who utilise waterborne sanitation. Another technology is a "Pour Flush toilet, which is designed to flush used poured water. This toilet does not require a constant pressurised water supply to function. The toilet can also be upgraded with a cistern which would utilise approximately three litres per flush. Ndida, Uzodike and Winaar (2013:99), write that the poor people are targeted for free basic sanitation. Unfortunately, the targeted households do not pay towards the capital costs

for installation of the sanitation facility. However, households are responsible for day to day costs of maintenance of the facility, including cleaning as well as ensuring that solid waste is appropriately discharged. The pour flush toilet is perceived as a significant step up the sanitation ladder from VIPs. The user pours the water in the pour flush toilet rather than from a cistern. The pour flush system utilises approximately 1 to 2 litres of water rather than 5-7 litres required for conventional flush toilets. A pour flush toilet is much cheaper to install, maintain and operate since there is no waste water treatment network and complex sewerage required (Van Vuuren, 2014:17).

Pour flush sanitation and low flush technology comprise of the toilet block attached to two leach pits. When one leach pit is full, the pit is switched allowing the full pit to dry out over a period of two years and then emptied. Pour flush and low flush sanitation systems utilise small amounts of water or greywater i.e. 1.0 to 2.5 litres to flush. It bridges the gap between on-site dry sanitation and full waterborne and eliminates the need to dig deep pits. It provides greater convenience to users in terms of smells and fly control. Moreover, this technology can be built closer to the house (Trollip *et al.*, 2016:38).

2.10.4 Waterborne technology

In South Africa, waterborne sanitation is considered top of the sanitation ladder and it is often perceived as a standard representing dignity and equality to which people aspire. However, providing everyone with a flush toilet is neither desirable nor probable when one considers the fact that South Africa is a water scarce country and the cost of constructing such infrastructure for every person is almost improbable (Van Vuuren, 2014:16).

The CTMM acknowledge that access to safe and dignified sanitation services significantly contribute to protecting the environment, reducing health risks and securing human dignity. The CTMM focus on ensuring households have access to flush toilets that are connected to public sewerage toilets. The

sanitation services, which are water-borne, in the CTMM also increased by 10.2 percent for the 2017/18 financial year. The city expects the increase of revenue from sanitation services to be follows i.e. R 983 million (for the 2017/18 financial year), R 1 billion (for the 2018/19 financial year) and R 1.1 billion (for the 2019/20 financial year) (UN-Habitant, 2020:62).

The provision of effective and high-quality sanitation services is one of the targeted improvement areas of the CTMM. This commitment made by the City is expressed through, among others, the installation of waterborne sanitation infrastructure, addressing sanitation service backlogs, extending the capacity of waste water treatment works, replacing, upgrading and constructing waste water treatment works, as well as focusing on sewer reticulation (CTMM, 2018: 60).

Moreover, Silveti and Anderson (2019:2) postulate that for most people the ideal is flush toilets which carry waterborne excreta away from households, and is connected to underground sewerage grids to transport waste to a centralised treatment plant. However, these flush sewerage grids systems require major infrastructure investment, particularly to ensure that the sewage is treated adequately. The systems consume large amounts of water - generally treated potable water - which may be in short supply in certain instances and could be an escalating problem in light of climate change. Moreover, these systems do not allow easy recovery and safe re-utilisation of potential valuable resources in the waste streams.

Bonthuys (2017:19) argues that due to water scarcity in South Africa, dry on-site sanitation is also likely to remain a permanent part of the national sanitation reality. Ringwood (2015:45) asserts that South Africa’s apartheid legacy deprived a generation of South Africa’s families plumbed sanitation in their homes.

Hoseein *et al*. (2014:1337), hold that after 1994, the historical standard of waterborne sanitation was considered for the poorer segments of society and this standard took many years to deliver due to aridity of the area and

infrastructure challenges (DHSWS, 2012).

2.10.5 Bucket toilet sanitation system

One of the worst sanitation systems is the bucket toilet sanitation because of its violation of human dignity for the users and for those responsible for collection and disposal of human waste from the bucket toilet. Furthermore, the bucket sanitation system is considered expensive and unhygienic to maintain (Mjoli, 2016:2). The bucket toilet system comprises of a top-structure with the seat positioned above a bucket or container located in a small compartment beneath. It is not recommended due to the exposure of the faeces to insects and vermin which can spread disease, both during utilisation and when emptying (DWS, n.d: 5). Figure 8 below illustrates the proportion of consumer units which utilise the bucket toilet system provided by municipalities in each Province during 2016 and 2017. According to the 2017 estimates, in most provinces the bucket toilet backlogs have decreased.

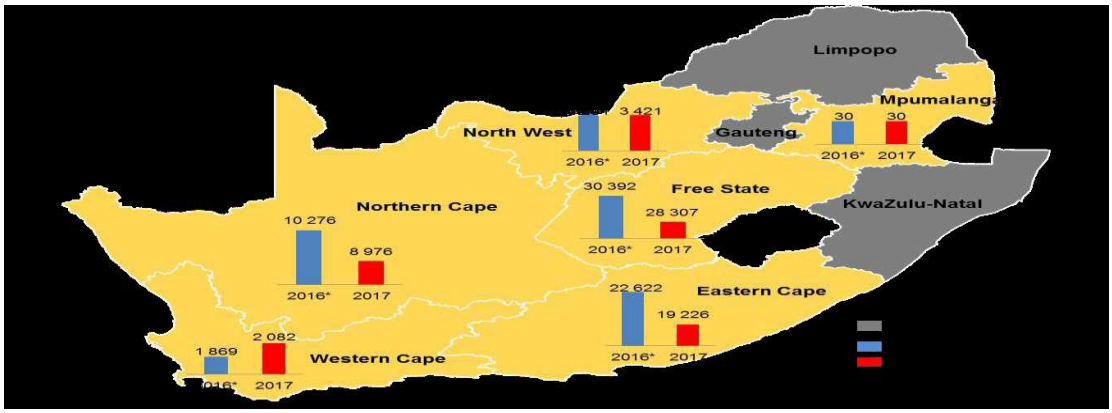


Figure 8: Number of consumer units using bucket toilet system provided by municipalities in each Province: 2016 and 2017

Source: Statistics South Africa Non- Financial Census of Municipalities 2017 report

From 2016 to 2017, Limpopo, Kwa-Zulu Natal and Gauteng, were the only

provinces which had not provided bucket toilets. However, the Western Cape and North West provinces reported an increase over this period. A decrease in the provision of bucket toilets was reported by all the other provinces except Mpumalanga where the scenario remained unchanged (Statistics South Africa, 2017:2). Sanitation services were skewed including all other services in favour of the white minority, that is, waterborne sanitation was provided to the middle and upper class white suburbs in cities and towns, while the bucket toilet system was predominant in both the black rural areas and townships. In 1994 the government acknowledged the lack of basic sanitation as a key indicator for the underdevelopment of the black majority. It sought to remedy this and eradicate the bucket toilet system because it is considered unacceptable and a degrading form of sanitation (Dugard, 2014:11).

Picture 2: Bucket toilet
Source: DWS Sanitation technological options

The Conventional Gravity Sewers is the sewer network connection system which is commonly found in developed urban areas. A main gravity sewer distribution network connection pipe diameter varies between 100mm and 150mm depending on flow volumes accumulated upstream, and conveys accumulated sewage through house connections to a main disposal facility (sewage treatment plant/ works) in a developed area. The main sewer line varies from 300mm to

larger diameters and it forms part of a network of sewer lines which gravitates to a wastewater treatment plant (Little, 2004). All sanitation and sewage effluent is disposed of directly from the house and a typical connection comprises of a pipe connected directly from the house to the main sewer pipe through the single connection pipe into the collector or the main sewer line. There is no septic tank or interceptor. However, a vacuum facility is required between the collector or main sewer and the house (Van Vuuren *et al.*, 2011:14).

2.11 Technological research conducted by various institutions

Increased access to sanitation is a global priority, while enhancing the facility it has significant economic benefits. Currently, one in five children die from diarrheal-related diseases, which is more than malaria, measles and HIV/AIDS. However, the provision of adequate sanitation is not resolved when on-site sanitation technologies are built. The promotion of on-site sanitation dramatically reduces open defecation (Strande *et al*., 2014:2).

Provision and maintenance of sanitation services in urban informal settlements still create a challenge because of the following factors: geo-physical, economic, legal and socio-political. The provision of sanitation in many such settlements tends to take the form of toilets in concrete cubicles along the edge of the settlements. Moreover, fewer toilets are provided to residents. Households either have to share toilets or rely on public toilets accessible to all including visitors, passers-by and other settlement residents. The users state that it is not their responsibility to clean or maintain the toilets. Consequently, such circumstances have often led to filthy and dysfunctional toilets (Trollip *et al*., 2016:44).

Recently, the Water Research Council developed an innovation known as Arumloo, which is a microflush toilet that uses biomimicry in its design capable of flushing on less than a litre of water. The so-called Arumloo is cast in ceramic, vortex shape and altered P-Trap design. The toilet is elegant, efficient and hygienic inspired by optimum vortex shape. The two-stage flush

enables the user to select an appropriate mode of flushing. The associated reduction in water consumption when using Arumloo means the toilet will pay for itself in less than 2 years due to the saving in water cost (Trollip *et al*., 2016:36).

Armitage *et al.* (2014:75), highlight that many waste water treatment plants in South Africa do not conform to the desired quality standards in terms of performance. The waste water treatment plants are deemed to be in a critical condition. Approximately 40% of the waste water treatment plants require urgent intervention in all aspects of the wastewater services business. This has major implications for these sites natural waterway health downstream. One way in which wastewater treatment works can improve performance is through compliance with the DWS Green Drop certification programme. This certification process aims to improve Water Sensitive Urban Design (WSUD) in South Africa and it is an incentive-based regulation programme in the DWS.

The process compares and measures the results of the performance of water treatment works. Furthermore, it also acknowledges the service provider through evidence of their performance in terms of excellence or failure to adhere to the minimum standards and requirements defined in the Green Drop certification guideline. Compliance with the minimum requirements of the Green Drop process will have a significant impact on the quality of treated effluent discharged into the waterways and could promote a shift to sustainable aquatic ecosystems within the urban setting.

The Waste Water Treatment Works impacts directly on the environment and on human health and indirectly on downstream drinking water purification systems. The country has 1363 registered waste water treatment works, of which 897 are municipal owned; 73 owned by the Department of Health or Department of Public Works; and 393 privately owned. In South Africa, the total design capacity of treatment plants is 6509.7Ml/day and the actual flow received in the plants is 5128.8Ml/day, which leaves a spare capacity of 1380.9Ml/day (DHSWS, 2018:53).

2.12 Faecal sludge management

Faecal sludge comes from onsite sanitation technologies, and it is partially digested or raw, semi solid or slurry, which has not been transported through a sewer. Examples of onsite technologies include pit latrines, septic tanks, unsewered public ablutions blocks, aqua privies and dry sanitation (Strande *et al.,* 2014:1). The CTMM posits that sludge must be buried on-site after removal from a pit or it must be transported to another point for storage, disposal or processing. The City is budgeting for the disposal of pit latrine sludge and large number of pits in the rural areas anticipated to reach capacity soon. The waste water treatment works has been found to quickly overload the works in addition to being counterproductive in a number of respects. The policy of the South African stresses the value of human excreta and sludge management as a resource although utilisation must be done within strict parameters due to the hazards of contamination (CTMM, Online).

Rao, Kvarnstrom, Di Mario and Drechsel (2016:1) postulate that on-site sanitation systems such as pit latrines and septic tanks are a major pillar in the provision of access to toilets in rural areas. The global cost of inadequate water supply and sanitation was estimated at an annual sum of USD 260 billion. Strande *et al*. (2014:1), highlight that in the past, sludge management received limited to no attention, while on-site facilities were neither a priority for the municipalities nor engineers. Several generations of engineers have considered sewer-based systems and waterborne as the most viable, long-term solution to fulfil sanitation needs. Traditionally, on-site technologies have been viewed as temporary solutions until sewers were built.

Chinedu, Yofe, Henry, Wethe, Djagoun, Doucoure and Ali (2013:3), assert that the benefits of providing quality sanitation to the poor is colossal, and the social and economic benefits are realised at very high cost to utilities or investments. Charges, prices and tariffs is the means by which the public and private utilities achieve fiscal sustainability. Just like in most sectors, cost recovery is crucial for investments in the sanitation sector. The high costs are as a result of the need to cover at least partial operations and maintenance

costs and recover investment. African utilities (both public and private) operate in a high-cost environment.

Operations and maintenance costs to maintain older plants can often be much higher than capital expenditure costs. Operations and maintenance costs include chemicals (consumables) to treat wastewater, administration costs, salaries and electricity costs. Many costs are associated with operations and maintenance, while the ever-increasing price of electricity places a severe strain on wastewater budgets. A detailed understanding of the current wastewater expenditure is a prerequisite before drivers of each aspect can be applied to forecast future expenses and its impact on overall costs and the charges required (Naidoo, Pearce, Visser, Crafford, Maila & Harris, 2016:16).

Cross *et al*. (2015:3), assert that the challenges in faecal sludge management are most severe in poor urban areas because of limited space for more users and individual toilets. Furthermore, in these areas there is a higher risk of public health problems due to limited access to mechanised pit emptying, land tenure issues, and high density of the living area. The sanitation breaks repeatedly at weak links such as the lack of sludge disposal points; access to empty pit trucks in the narrow streets of informal urban areas; household users unable to pay for a pit emptying service; and funding for the truck operator to haul the sludge over long distances to the treatment facilities.

Strande *et al*. (2014:2), further argue that increasing access to sanitation is a global priority, and it has economic benefits. However, the provision of adequate sanitation facilities is not concluded when onsite technologies are built. The promotion of onsite technologies has greatly reduced open defecation, and the crisis in sludge management has a significant impact on human and environmental health.

2.13 Funding mechanisms to address sanitation needs in South Africa

National Treasury plays an important role in the water supply and sanitation sector and provides oversight of municipal finance and provision of grants for

the water and sanitation sector. In 2017, National Treasury introduced a municipal standards chart of accounts (MSCOA) which imposes the uniform collection on asset maintenance and management including local government transactional information (DWS, 2018:38).

National Government has established related allocation and new funding mechanisms to support Water Services Authorities to deliver improved water and wastewater services through the Water Services Infrastructure Grant (WSIG); Municipal Infrastructure Grant (MIG); and Regional Bulk Infrastructure Grant (RBIG). The operations and maintenance costs for water services infrastructure in municipalities is subsidised through the Equitable Share. However, the challenges and problems in the municipalities and sector have multiplied. Institutions have weakened governance and experienced significant loss of skills. Local-level investment in water infrastructure has been characterised by either poor planning, or too low and excessive pricing (DPME, 2019:173).

The CTMM is facing challenges in the provision of adequate infrastructure solutions for its residents. The City has a critical shortage of affordable housing stock and infrastructure services to address the needs of its growing population. The infrastructure services are lagging behind, as the CTMM does not have adequate financial resources to maintain a big proportion of its existing infrastructure, let alone provide all of its much-needed new infrastructure (Un-Habitat, 2020:7). Financial support plays a role to achieve a better life, proper housing, as well as clean and safe toilets for the citizenry. However, hardships have to be perceived as careless, especially relating to sanitation concerns due to the lack of financial support (Kasala *et al*., 2016:30). Part B of Schedule 4 of the Constitution of the Republic of South Africa, and the Water Services Act and the Local Government: Municipal Systems Act, mandates the primary responsibility for sanitation (and water) services lies with local government. Furthermore, when acting in terms of authority to conduct water services, it is referred to as a Water Services Authority. McNamara *et al*. (2015:4), state further that a general shortage of funds in rural areas is the root of the problem. Local government strives to

secure funding in rural areas and to generate revenue because most of their household consumers are poor, cannot afford to pay for water usage, and industrial customers are limited.

Dugard (2013:8) holds that the provincial- and national government spheres have the constitutional responsibility to support the local government sphere and to strengthen the municipalities' capacity to perform their functions optimally. Municipal budgets include the provision of sanitation including the implementation of such projects. However, since the implementation of sanitation is not prioritised, it culminates in service delivery protests. There is a lack of transparency in the allocation of the budget for sanitation in and by municipalities. The government's goal to eradicate the bucket toilet programme was not fully realised. The municipalities failed to accelerate the bucket toilet eradication programme in urban areas due to budgetary and environmental constraints (DHSWS, 2012:70).

The national government has allocated funds to support municipalities to accelerate the delivery of water supply and sanitation services to their communities. Several sources of funding available to local government to improve sanitation services include: Municipal Infrastructure Grant (MIG); Rural Household Infrastructure Programme; and Equitable Share, which is a funding transferred from national- to local government as well as revenue collected by local government (DHSWS, 2012:51).

Financing water and sanitation infrastructure follows the same path as that of any other infrastructure; and funds are raised through revenue and income grants. The latter and former have to cover operational costs as well as maintenance whilst the alternative option is to borrow the necessary or outstanding money against the balance sheet (McNamara *et al.*, 2015:11).

The majority of the municipalities do not have the required balance sheet and the third option is generally not a workable alternative to borrow funds. In many instances, new infrastructure planning and maintenance is neglected

and the municipalities do not raise adequate funds through revenue income to cover maintenance. With a finite fiscus required to do so much, the CTMM relying solely on inter-governmental transfers will not be able to service all the needs of its constituency, at least not optimally. Nor selling of utilities like water and electricity and the collection of rates and taxes, on their own, proved adequate. This makes alternative financing sources a must for the CTMM. While grants and subventions would be great these are not easily forthcoming. The City has little choice but to resort to borrowing from financial institutions and issue bonds (UN-Habitant, 2020:9).

The DWSs total expenditure is expected to increase at an average annual rate of 3.7% from R15,6 billion in 2017/18 to R17,8 billion in 2020/21. Funding from the Water Services Infrastructure Grant is expected to be utilised to construct 180 small interim water and sanitation systems across the country, and replace the remaining 11 844 bucket toilet systems in the Northern Cape and Free State provinces with waterborne sanitation services in 2018/19. Allocations are expected to increase at an average of 2.4% from R44 billion in 2017/18 to R47 billion in 2020/21 (Treasury, 2018:3).

2.13.1 Municipal Infrastructure Grant (MIG) funding

Kopung *et al*. (2016:115), posit that the Municipal Infrastructure Grant (MIG) is utilised to redress the imbalances of the past (CoGTA, 2014), hitherto the MIG is the largest local government infrastructure development disbursement in the country. The Municipal Infrastructure Grant (MIG) is provided by the national government as a conditional grant towards capital finance to poor households. It is intended to provide basic municipal infrastructure to households with an income of below R1100 per month. Furthermore, it provides subsidies to limited micro enterprises and deserving institutions. The Municipal Infrastructure Grant targets to remove access to basic municipal services backlogs over a decade and aims to support municipalities in rural development and urban renewal (DHSWS, 2012:52).

The CTMM has combined all existing capital grants for municipal infrastructure into one consolidated grant. The various capital grants have

been consolidated so that the City have control of infrastructure projects in their jurisdiction, as well as have cost effective planning and integrated service delivery. The Municipal Infrastructure Grant operates on the following key principles in the City i.e. funding the provision of basic infrastructure (basic level of service), provision of service to the poor and employment creation in the provision of infrastructure (CTMM, Online).

Wilkinson et al. (2014:50), highlight that MIG as a conditional grant has the purpose to provide specific capital finance for basic municipal infrastructure for poor households, micro enterprises and social institutions servicing poor communities. MIG is the grant that can be utilised for the construction of new infrastructure, the rehabilitation of existing infrastructure, as well as the upgrading bulk and connector infrastructure. Furthermore, the grants are transferred directly to local government.

2.13.2 Equitable Share funding

The national government provides the equitable share to the local government sphere's municipalities to subsidise operating costs to overcome the burden of service delivery to the poorest. The equitable share cannot be conditional which implies that it cannot be used for any other purpose other than the one it was intended for. The equitable share is the intergovernmental transfer of funds from national to local government. If the cost of service delivery exceeds the amount that is billed to the poorest households, the subsidy contributes towards the local authority's general operating account (DHSWS, 2012:53).

Palmer *et al*. (2017:29), highlight that the local government equitable share of national revenue's transfer is unconditional, and is a constitutionally protected allocation to municipalities. The political objective of the local government equitable share ensures that services are provided to poor households which cannot afford to pay for these services themselves. The formula to allocate the amount of funds to individual municipalities assumes what it takes to fund

the cost of basic services to poor households. The CTMM further argue that the equitable share has been designed in a manner to ensure that the City have the resources to render basic services to poor households or low income and to enable the CTMM to build an administrative infrastructure. The equitable share is intended to provide the City with sufficient funds for the operational costs of providing free basic services to their poor households (CTMM, 2021: Online).

Wilkinson *et al.* (2014:60), argue that the Local Equitable Share is an unconditional grant based on estimates of national revenue raised annually in the country and divided among 278 municipalities. One of the key components of this formula is the basic services component worth 99.1 percent of the value of the equitable share for poor households. The local equitable share formula comprises of three of five components namely: one that assists municipalities to provide households that fall below an affordability threshold with free basic water, sanitation, electricity and refuse removal. During 2013/14 the basic services component subsidised R278 per month to each of these households. The allocation to each municipality is calculated by multiplying the monthly subsidy by the number of households below the affordability threshold. The free basic services subsidy includes sanitation and refuse removal based on service levels prescribed in national policy, water (6 kilolitres per poor household per month) and energy (50 kilowatt hours per month) (Treasury, 2013).

2.13.3 Urban Settlement Development Grant (USDG) funding

The Urban Settlement Development Grant (USDG) was introduced by the government in the 2011 Division of Revenue to enable the eight large urban metropolitan municipalities in the country to respond to pressures created by continued growing urban poverty and urbanisation. This new grant funding is available for the provision of basic services that were previously funded through a combination of the basic service portion of human settlements development grant and municipal infrastructure grant. It funds infrastructure development in metropolitan municipalities in order to upgrade urban informal

settlements. This grant funds for purchasing and servicing a vacant land or upgrade existing settlements but separates funding for land and services from that of top structures (Wilkinson *et al.*, 2014:56). Furthermore, the CTMM points out that the introduction of the Urban Settlement Development Grant in 2011 and the roll out to the metros made a significant impact to service delivery in the CTMM where for the first time the creation of human settlements inclusive of social amenities were realised (CTMM, Online).

2.13.4 Rural Household Infrastructure Grant (RHIG) funding

The Rural Household Infrastructure Grant is a transfer of funds to local government to build on-site water and sanitation facilities in rural municipalities where bulk dependent services are not viable. The grant administration was shifted from the National DHSWS to local government and it also funds training for beneficiaries of how to maintain the facilities provided including health and hygiene practices. The grant was directed to municipalities for the projects in 2013/14 because these sanitation projects had involved significant community consultation processes (Wilkinson *et al.,* 2014:57).

The Rural Household Infrastructure Programme enhances the provision of water supply and sanitation to rural communities and is administered by the DHS. A similar approach does exist at provincial government sphere where funds are given to provinces to support the municipalities with the delivery of water and sanitation. Allocated funds support local government with a specific project such as water and sanitation programmes. These funds are conditional grants and gazetted in the Division of Revenue Act (DHS, 2012:51).

2.13.5 National bucket toilet sanitation programme

The bucket toilet sanitation system is considered one of the worst sanitation systems in the country because of its violation of human dignity, especially those responsible for its collection and disposal. Moreover, it is considered expensive and unhygienic to maintain. The South African national government set a target for the eradication of all pre-1994 bucket toilets from formal townships, and it was decided to accelerate the eradication of the system. Eradication of the bucket toilet system required replacement with the conventional waterborne sanitation system in the majority of the municipalities throughout the country (WIN-SA, 2013:3).

2.13.6 Regional Bulk Infrastructure Grant (RBIG)

The Regional Bulk Infrastructure Grant (RBIG) is required to connect water resources over extensive areas across multi-municipal boundaries on sub-regional or macro scale with reticulation and internal bulk systems. The RBIG provide Sub-Regionals within a specific local and district municipal area, and is a large bulk infrastructure serving communities over a large area. The RBIG project is implemented by the nine regional offices of the DHSWS, the funding comes from the National Treasury and is directed through the DHSWS for oversight role (Mutamba & Busari, 2014:83).

2.13.7 Municipal own revenue funding and municipal services infrastructure

The CTMM points out that maintaining financial viability of the City is critical to the achievement of service delivery and economic objectives. Revenue generation is fundamental in strengthening the institutional environment for the delivery of municipal basic services and infrastructure (CTMM, 2021:70). The local authorities utilise their own discretion of the level of services and how projects are funded. Local authorities utilise their own revenue to cross subsidise the poor and wealthy households. A broad assessment of rural municipal income highlighted that the direct cost recovery is only applied to subsidise electricity and other services. Cost recovery is a matter that requires

urgent attention in many areas. Any shortfall of funding for other services is financed through inter-governmental transfers or executed by the service provider. The local authorities (municipalities) utilise their Integrated Development Plan (IDP) to avoid the duplication of subsidies. It is a mechanism utilised to prioritise, coordinate and foster service delivery (DHS, 2012:53).

The municipal services infrastructure grant differs from the previous disparate infrastructure grants in that it is a funding arrangement which consolidates all the previous capital grants into a single consolidated grant for municipal infrastructure (Mutamba *et al*., 2014:83).

2.13.8 Local authority revenue funding

A broad assessment of rural municipal income (areas which have the greatest sanitation need), revealed that currently, direct cost recovery is only applied to electricity. Any shortfall in funding other services is either carried by the service provider or financed through inter-governmental transfers. The total cost of rural service provision with the exception of electricity, is currently subsidised. The local authority's own revenue can be utilised to cross subsidise wealthy and poor households (DHSWS, 2012). Cost recovery in many areas remains a matter of urgency. The local authority has the discretion to compose the service delivery packages, levels of service, and how these are funded. The Integrated Development Plan (IDP) is the mechanism to prioritise, foster and coordinate service delivery to avoid the duplication of subsidies and construction of houses without services (DWS, 2012:53).

2.13.9 Municipal Infrastructure Investment Framework (MIFF)

Palmer *et al*. (2017:29), state that the Municipal Infrastructure Investment Framework (MIFF) was first undertaken in 1994 when the World Bank supported South Africa in preparing for the new democratic government. The Development Bank of Southern Africa and national government initiated the

MIFF to assess the capital requirements to provide adequate municipal infrastructure and capital finance options to cover this expenditure. The feasibility was assessed by operating expenditure requirements relating these to the available operating revenue to municipalities. The Development Bank of Southern Africa no longer supports the Municipal Infrastructure Investment Framework (MIFF) although National Treasury has commissioned ongoing analysis which has much in common with the MIFF. Moreover, the CTMM points out that local authority revenue funding includes funds from the City's tax base or revenue, for example property taxes, subsidies, funds collected for Municipal services and various consumer tariffs levied and so forth. These internal fund sources tend however to be limited especially for the rural municipalities with a weak rates base. However, the City highlights that the funding of basic services for poor household is mostly addressed through other capital grants and equitable share transfers (CTMM, 2020: Online).

2.14 Challenges faced by South African municipalities to deliver sanitation services

Some of the key challenges which impede service delivery in local government include the following: human resource challenges related to capacity and skills in municipalities. Across South Africa, many municipalities do not have the required technical skills to render services. In many municipalities maladministration and corruption have become prevalent. Rendering basic services to the communities due to the lack of transparency or accountability is a serious cause for concern. A number of local municipalities across South Africa are either on the brink of bankruptcy or bankrupt, which affects their ability to provide quality service delivery to the people. The communities' lack of knowledge and awareness of their rights impedes service delivery because they generally do not know how or who to approach when faced with service delivery challenges. When local municipalities do consolidate their responsibilities, there is slow roll out of services and a tedious process which impede the efficiency and quality of service delivery (Mdlongwa, 2014:39).

Furthermore, over the past two decades the majority of the municipal managers have possessed limited knowledge of appropriate technological solutions required for their respective areas. Although the required skills are not completely in place, development takes place gradually. There is a lack of alignment between political processes and technical requirements at the local sphere of government. Politicians exhibit limited understanding of what it entails to operate and maintain infrastructure to provide sustainable services. They lack the required skills to rehabilitate and develop new infrastructure for growth. Consequently, during the allocation of funds process, and especially if budgets limited, operations and maintenance is basically ignored (Infrastructure Dialogues, 2015: 21).

Booysen (2012:11) points out that local government is a mirror of the larger political and economic forces, problems and cleavages that shape South African society. The White Paper on Local Government coined the concept developmental local government to propose a new vision of post-apartheid policy. The national reconstruction and development programme would be guided by local development plans. The municipalities would partner with citizens to build non-racial communities, and municipalities would redistribute service delivery expenditure to poor black communities. When implementation began in 2000, the force of the transformative vision was already spent; overwhelmed by the scale of institutional changes involved; overtaken by economic realities and politics; and the distance between the ideal and delivering practical charge.

2.14.1 *Sanitation and climate change*

The CTMM is committed to address climate change and it has put all the essential building blocks in place to prepare a meaningful and well-informed response to climate change. The City is taking climate change seriously while ensuring that its residents receive access to the services they need, and reducing poverty and joblessness (CTMM, 2020: online). Despite significant strides made in increasing sanitation coverage, there are challenges in

maintaining existing infrastructure. Furthermore, full flush connected to the sewers and waste water treatment works is unaffordable for the whole country. There is an uneven and climatically induced constrained water supply, with technical limitations that affect the way in which provision of sanitation services is approached. As an alternative, dry sanitation (waterless) is provided to unserved, deprived populations (Atkinsete, Bhagwan, Hicks, Knezovich, Naidoo & Pillay, 2019:4).

Dube, Maphosa and Fayemiwo (2016:33), posit that South Africa is a signatory to the convention of United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The national government of South Africa response to climate change is framed by its commitments. It has committed to achieving a 34% reduction in greenhouse gas (GHG) emissions. The response to climate change is framed by its commitments against a business-as-usual trajectory. Moreover, the South African government has committed to reducing greenhouse gas emissions by 42% by 2025 against a business-as-usual trajectory. These commitments are, however, subject to financial, capacity development and technical assistance from the more developed nations. The national commitments are subject to future deviations since the Paris protocol is currently under deliberation.

In managing inequalities of the past, coupled with dichotomy in society as a result of apartheid spatial planning and new exposures in the form of climate change places pressure on rolling out sanitation in the future. In 2015 the DWS hosted the National Sanitation Summit at which the former Deputy President, Cyril Ramaphosa issued a clarion call: “it’s not all about flushing”. This was a call and acknowledgement that climate change will place greater constraints on sanitation than drinking water. This was a call and acknowledgement that our destiny on sanitation should not be attached to flushing human waste (Atkinsete *et al.*, 2019:4). Furthermore, flushing is often associated with a feeling of convenience and ease, i.e. mind-set of promoting a “flush-and-forget”. The latter makes the disposal of waste a local government responsibility (Winecke *et al.*, 2017:409). Furthermore, poor and vulnerable communities in Ga-Rankuwa, Mabopane and Temba township are

particularly affected mainly as a result of the skewed apartheid spatial planning which saw them being located in areas prone to flooding and other natural disasters (CTMM, Online).

The United Nations (2016:37) states that climate change may increase the severity, concentration and frequency of the extreme weather events and worsen multiple threats to the availability of water. There is consensus among scientists that climate change will change spatial and temporal patterns of precipitation, deteriorate water quality and availability and alter stream flow regimes (Intergovernmental Panel on Climate Change, 2014: Online). Although the geography of these changes is highly variable and uncertain, this will place an increasing portion of the global population under risk of water scarcity, whilst the regions that are currently arid and semi-arid are likely to be most exposed to increased drought risk.
Areas which experience a decrease in precipitation, wastewater and water infrastructure will be affected by an increased flow of water, primarily wastewater purification systems which also receive storm water (Clark, Zhiwei & Buchberger, 2011: online). This will result in increased levels of pathogens as a result of partially treated wastewater, reduced quality of potable water being dispersed and increased concentration of organic matter (Dube *et al*., 2016:24).

The impact of climate change on the sanitation infrastructure depends on the nature of the changes likely to occur, which is a mix of negative and positive. Countries which are likely to become drier, the risk of groundwater pollution may decline because the distance between the base pits and groundwater including the impact on simple on-site sanitation infrastructure may be positive. The changes in the types of technologies demanded by households and climate change may be susceptible to damage and destruction due to occasional short-term flooding. The drying environment may also imply that seasonal groundwater pit flooding will be infrequent. By contrast, both increased flooding and declining availability of water will pose major threats to septic systems and sewerage (Howard, Calow, MacDonald & Bartram, 2016:258).

Various communities in South Africa experienced a comparatively high level of exposure to the water sector and climate change due to the widespread poorly functioning wastewater service systems and the failure to improve the expertise, repair and maintenance capacity in the water systems. The water sector differs in vulnerability in various regions which is highly dependent on the suitability and availability of skills, lack or presence of an effective catchment management agency and water board, water demands and utilise patterns, topography of such regions including the structure of community settlements in terms of urbanisation. Small and rural facilities also lack operators and the situation is vulnerable and occasionally have no water purification chemicals which result in an unwarranted water situation. The prefabricated modular structures implemented for water treatment in many rural municipalities makes it difficult to adjust the circumstances in the face of climate change. Furthermore, many municipalities lack financial resources which makes them increasingly vulnerable to climate change (Dube *et al*., 2016:18).

Ziervogel, New, Van Garderen, Midgley, Taylor, Hamann, Stuart-Hill, Myers & Warburton (2014:609), hold that impact studies of the water resources sector in South Africa have begun to investigate beyond changes in the partitioning of streamflow into stormflows and baseflows, reservoir yields, streamflow to changes in the timing of flows and extreme hydrological events. The Long-Term Adaptation Scenarios (LTAS) project drought events and higher frequencies of flooding under all climate scenarios. Higher levels of complexity in the water resources sector is revealed by the impact of land use and management including the linkages to society, the economy, health as well as complexities of the hydrological cycle than in other sectors.

Furthermore, Dube *et al.* (2016:36), postulate that the major knowledge gaps remaining in adapting to practicing climate change is due to the lack of complicated, climate scenario products and contradictory climate information which adversely affects the efficiency of a causal chain from the biophysical influences of the aforementioned (Ziervogel *et al.,* 2014). South Africa lacks a

full-bodied national system of spatially extensive climate and it is affected by the incomplete impact of modelling approaches, lack of cross-sectoral integration, inadequate process understanding including socioeconomic and vulnerability assessments, poor traceability between impact assessments and the climate scenarios. Moreover, there is a lack of consistent best practice and updated information in hydrology which is becoming difficult to acquire and increasingly expensive. Furthermore, there is a lack of cost estimates and appropriate finance mechanisms, which is another major stumbling block for adaptation to climate change (Ziervogel *et al*., 2014).

2.15 Impact of poor sanitation: South Africa

Thousands of people suffer from a range of water and sanitation related illnesses and an estimated 10,000 people die daily worldwide. The poor are impacted by inadequate water and sanitation services, because they are poorly served by the public- and private sectors. Poor households build their own water and sanitation services which are inadequate to meet a basic survival need. Consequently, they pay vendors a high price for limited quantities of water or walk long distances to gain access thereto. Water and sanitation related diseases place severe burdens on health services and it has a greater significance link to poverty (DHS, 2012:21).

The economic and social impact to improve sanitation is unquestionable. Politicians at national, international and local government spheres must place sanitation firmly at the top of the agenda and reflect this in all budgeting and planning processes (Montesano, 2016:10).

2.15.1 Economic cost of poor sanitation

Thomas*et al*. (2018:33), postulate that sanitation behaviours encompass anal cleansing, urination, defecation, deposition of children faeces, handwashing, menstrual hygiene, separation of solid and liquid waste, adherence to sanitation facility use and faecal sludge management. The economic returns

on investment in sanitation include direct healthcare savings by individuals, health agencies and national economies. The indirect economic benefits include productive days gained per year for persons 15 to 59 years of age, increased school attendance, and time saving in terms of working days gained (Velleman *et al*., 2011.

The CTMM asserts that the economic benefits of clean water supply and improved sanitation services creates opportunity for the poor and it is a progressive strategy for economic growth. The poor gain directly from improved access to water services through improved health while poor sanitation services lead to effort losses, high risk of diseases and lower productivity in the City. The municipality creates awareness on Health and Hygiene to communities and has a dedicated section within the Department of Water and Sanitation Planning Infrastructure (CTMM, Online).

The cost of poor sanitation is distributed unequally. The average cost of inadequate sanitation is related to a greater proportion of the poor's income. The highest economic burden falls disproportionately on the poorest than a wealthier person. Access to sanitation demonstrates inequities between the wealthiest and the poorest. On average, 20% of the poorest population is 270 times more likely to practice open defecation than same percentage of the wealthiest. Poverty is a double-edged sword for the poorest and result in them having to pay proportionately more for its negative effect (UNICEF, 2012:2).

2.15.2 Environmental impact on poor sanitation

The CTMM posits that Rooiwal and Temba waste water treatment plant pose serious environmental concerns emanating from the plant. The seepage also of climate sensitive chemicals and heavy metals is contaminating soil thereby causing havoc to the ecosystem and biodiversity around the place (CTMM, Online).Ringwood (2015:45) holds that the impact of the environment on poor sanitation includes surface- and groundwater contamination. A pit latrine is better than no sanitation, however, if poorly installed, it aggregates pathogens. The latter results in 80% of diseases which affect the poor and

developed countries. Sanitation systems involve the treatment and disposal of waste. If the system is inappropriately designed or maintained, it can result in a variety of pollution risks to the environment and pollute ground- and surface water resources. Waterborne diseases are caused by direct contact with faecal contaminated water from polluted water due to an inadequate or failed sanitation system. Failed sanitation systems also result in other health risks such as blue baby syndrome in bottle fed infants and loss of bio-diversity as well as aquatic plant growth in water which increases treatment costs (DHSWS, 2011:16).

Cross (2015:2) highlights that sludge collection is primarily discharged untreated directly into surface water through irrigation fields, open drains or directly into the environment. Illegal dumping by trucks that collect faecal sludge occurs regularly. A single truck of 5 m3 of sludge is equivalent to five thousand (5 000) people defecating in the open. The consequences of untreated waste released into the environment accesses nutrients in the surface water resulting in increased child mortality rate, eutrophication, cost of health, decrease in nutrient absorption due to diarrheal diseases, and low social and economic development because of the lack of social capacity.

Atkinsete *et al*. (2019:4), postulate that South Africa's climate is expected to become warmer. This will impact on both evapo-transpiration and rainfall with temperature increases of between 1 to 3 degrees Celsius. Increased evapo-transpiration and changes in run-off will affect water storage and drier parts of the country may have reduced storage and may record lower dam levels. Thus, climate change will result in significant changes in future water availability and it will become increasingly difficult for water resources planners to plan effectively. What is clear for the future is that service providers and planners must become responsive to adapting and planning the future because climate change will have major implications for most sectors of the economy, for example, agriculture, forestry, mining and energy. Oates, Ross, Calow, Carter and Doczi (2014:1), further posit that securing and extending access to water and sanitation services plays a key role in poverty reduction.

2.15.3 Psychological and social problems associated with poor sanitation

Adequate sanitation is fundamental to the social and psychological wellbeing of communities, poverty reduction, personal dignity and security, economic development, gender equality and environmental sustainability. Poor sanitation promotes the spread of preventable diseases such as cholera and diarrhoea. Moreover, it places stress on those living with HIV/AIDS which weakens the immune system (Tissington, 2011:13). Winecke *et al.* (2017: 404), assert that water, sanitation, hygiene and social behaviour are closely linked factors. Water is required for drinking purposes, flushing toilets and hand-washing.

Sanitation is often a low priority on national development agendas which is obscured by the politically attractive focus on safe drinking water. The lack of sanitation is due to non-prioritisation because the bulk of Water Sanitation and Hygiene (WASH) funding is allocated to the water infrastructure. Poor global prioritisation of sanitation is mirrored in national priorities and policies. The 2009 World Bank Africa Infrastructure Country Diagnostic Report revealed that the average sanitation annual public spending is no more than 0.2% of the GDP (Velleman *et al.*, 2011).

A sense of ownership can be created among children by including them as active participants in promoting hand washing practices with soap in schools where new behaviour is more likely to be adhered to. These key hygiene habits such as good handwashing practice also contribute towards two of the MDGs (2 and 4). These key hygiene habits can be taken further into adulthood and millions of school children can be encouraged to engage in these good repetitive, non-reflective behaviours. In developing countries school children account for approximately half of the population. Hence, it is necessary and relevant to promote good hygiene behaviour and hand washing practice among children. In Ghana, the National Community on Water and Sanitation Programme planned to increase the number of school children aged between 6 - 15 years to wash their hands with soap, especially after using the toilet (Steiner-Asiedu, Van-Ess, Papoe, Setorglo, Asiedu &

Anderson, 2011:294).

Poor sanitation causes illness, inability to work and high healthcare expenditure, which collectively undermines livelihoods, impacts on the children's education, and women suffer from both embarrassment and inconvenience. Therefore, government has good reasons to promote sanitation and persuade households to invest in it to achieve the benefits. However, local governments seldom have dedicated staff or departments to promote sustainable sanitation (Sansom, 2011:286). Moreover, Ndida *et al.* (2013:99), postulate that the conception of sanitation in South Africa acknowledges the fundamental link between sanitation, hygiene and health, and moreover, the concept extends beyond the notion of toilet. Good sanitation includes behaviour, appropriate hygiene and health awareness, affordable, sustainable and acceptable sanitation services (DWA, 2001:14). Sanitation is conceptualised in terms of the hygiene facility and the broader environment. Hemson (2016:28) states that the cholera 2000 - 2001 epidemic and outbreak in waterborne diseases demonstrates the health risks associated with gaps in achieving a healthy and sustainable environment. The epidemic was unexpected and the majority of cholera cases were reported in KwaZulu Natal Province where the outbreak originated. This led to 114 000 cases resulting in 260 deaths.

Hemson (2016:28) further argues that the rapid spread of the cholera epidemic through KwaZulu Natal Province to the Eastern Cape Province and beyond, showed weaknesses and gaps across the rural water and sanitation landscape. The spread of the disease from epidemic hotbeds to distant areas has been attributed to the transportation of pathogen through hydrological networks along and upstream from coastal areas, and mobility of people, possibly without symptoms.

2.15.4 Impact of poor sanitation on health

The construction of appropriate sanitation systems is of significance. Generally, the citizenry's health improves when they have access to basic clean water and sanitation. Moreover, the safe disposal of human excreta controls infectious and other communicable diseases. The provision of suitable sanitation is imperative component. Furthermore, proper construction and sanitation systems planning alone do not provide a guarantee that the general health of the citizenry would improve. However, a holistic approach to health care is necessary and sanitation is successful when factors which affect the community's social and health is linked effectively. Sanitation is a complex system of interrelated factors and is deemed suitable when it is affordable, appropriate, reliable and acceptable (Van Vuuren *et al*., 2011:2). The CTMM has controls in place to eliminate or reduce the hazards, and does operational monitoring to ensure that barriers in the system are functioning efficiently. In addition to faeces-borne pathogens, other microbial hazards are monitored to eliminate illnesses and to improve citizenry's health (CTMM, Online).

Mills and Cumming (2016:15), posit that diarrhoeal diseases defined as the passage of three or more loose or liquid stools per day and characteristically transmitted via the faecal-oral route. Poor water, sanitation and hygiene (WASH) increases an individual's exposure through multiple pathways to faecal pathogens. It was estimated that in 2012, 842,000 cases of deaths due to diarrhoea was as a result of inadequate WASH (280 000 due to sanitation, 502 000 due to water and 297 000 as a result of hand hygiene. This represents an estimated 1.5% of the total disease burden or over half of diarrhoeal diseases (Prüss-Üstün *et al*., 2014).

Makaudze, Du Preez & Potgieter (2012:6), posit that proper sanitation facilities has highlighted the incredible importance to HIV and AIDS epidemic and the level to which proper sanitation can reduce diarrhoea in humans. In South Africa, the local government's role is to provide a basic sanitation facility which is easily accessible to a household, including the safe disposal of wastewater and human waste from the premises, while the responsibility for the provision of sanitation lies with households.

Furthermore, Makaudze *et al.* (2012:7), hold that promoting hygiene practices can improve the quality of life and prolong the lives of HIV and AIDS infected persons. Caregivers and family members are also protected against contracting diarrhoea. It is not possible to be infected with HIV through faecal oral transmission or by touching an infected person's faeces, however, the presence of diarrhoea-causing pathogens in faeces can be compounded. Therefore, caregivers and family members are at greater risk of contracting diarrheal disease when they are exposed in the late stages of AIDS, which is when diarrhoea is severe and persistent, if hygiene practices are not improved (USAID, 2008).

Tilley, Strande, Luthi, Mosler, Undert, Gebauer and Hering (2014:online) posit that diarrhoea is as a result of exposure to pathogens which are transmitted as a result of poor hygiene and environmental exposure. Poor hygienic practices, inadequate treatment of human excreta, lack of household-level toilet facilities and the lack of access to safe water contributes directly towards diarrhoea. The provision of safe drinking water is a measure which addresses only a single pathway and may result in limited enhancement of one's health. An increased amount of untreated wastewater in the immediate environment may also result when water supply to the households is increased without the concurrent improvement in sanitation. Moreover, the CTMM is regularly monitoring residential, business and public premises to ensure that there are no health nuisances. This is done to ensure compliance with the applicable legislation, the principles of Agenda 21 and the "Healthy Cities" approach, and the minimisation of any detrimental environmental health risk caused by poor sanitation(CTMM, Online).

Wilkson *et al.* (2012:2), highlight that hand hygiene is a process that refers to regular washing to inhibit and reduce the transmission of diseases, which are generally acquired through contact with faecal matter. Improving and maintaining human health is financially and fundamentally an effective means to enhance hand hygiene. There were a number of interventions both nationally and internationally which focus on improving hand hygiene

behaviours. The interventions include: Implementation of awareness programmes and hygiene education to enhance hygiene-related knowledge, specifically hand hygiene, i.e. wash one's hands at crucial times. Provision of hygiene infrastructure to include the provision of soap, water supply and handwashing devices. Hygiene awareness, education and promotion of such programmes which target improved hand hygiene procedures and processes such as the correct way to wash hands.

Makaudze *et al*. (2012:7), further highlights that hygiene improvement and awareness thereof is a worthy approach to limit diarrhoeal disease. The evidence based on the impact of hygiene to limit the overall diarrheal disease is remarkable and unquestionable. However, to document the relationship between the enhancement of hygiene and reduction in diarrheal disease morbidity in people living with HIV and AIDS is just emerging. Certainly, sanitation, water disinfection, hand washing and safe storage has each proven to significantly reduce the rate of diarrhoea.

Given the knowledge of illness transmission routes and possible prevention thereof, the most recent estimate suggests that adequate WASH could prevent 5.5% of deaths in that age group or approximately 361,000 children under the age of five (Prüss-Üstün *et al*., 2014). Moreover, a different estimate suggests that WASH in addition to other interventions such as exclusive breastfeeding and oral rehydration treatment, proposes that 95% of diarrhoeal deaths in children under the age of five could be inhibited by 2025 as a result of targeted scale-up of such proven interventions (Bhutta, Das, Rizvi, Gaffey, Walker & Horton, 2013:online).

Moreover, Whitley, Hutchings, Cooper, Parker, Kebede, Joseph, Butterworth, Van Koppen and Mulejaa (2019:online), state that transmission routes are at least narrowed or blocked through improved infrastructure, specific domestic practices and the safety of water sources. Sanitation, which is perceived as the primary barrier, can isolate faecal pathogens to inhibit it from reaching the environment. Secondary barriers such as washing one's hands and water treatment, hinders faecal pathogens from multiplying in the environment and

reaching new hosts while tertiary barriers impede faecal pathogens, such as those on household utensils from reaching the host (Curtis *et al*., 2000).

Prüss-Üstün, Bartram, Classen, Colford, Cumming, Curtis, Bonjour, Dangour, De France, Fewtrell, Freeman, Gordon, Hunter, Johnston, Mathers, Mäusezahl, Medlicott, Neira, Stocks, Wolf and Cairncross (2014:895) postulate that inadequate drinking water, sanitation and hygiene are the country. In 2011, an estimated 768 million people relied on 'unimproved' water supplies which were believed to have high levels of pathogen contamination (as defined by the WHO/UNICEF Joint Monitoring Program for Water and Sanitation – JMP). Many people utilise sources classified as 'improved' but considered unsafe for human consumption (Bain *et al*., 2014). More than 2.5 billion people lack access to an improved sanitation facility; globally, 80% of the population is still faced with inadequate hand hygiene practices which have been estimated to affect tens of thousands of people (WHO & UNICEF, 2014).

South Africa's sanitation policies are transformational and the concepts of re-use, recovery, recycling and reduction are not addressed in the sanitation sector but focuses on addressing backlogs. Reduction in the waste sector requires minimisation thereof, however, the amount of urine, faeces and human waste cannot be. Sanitation services can minimise the resources in the treatment, storage and collection as well as ensure that natural resources such as water supply can be kept to the absolute minimum (DHSWS, 2016:46).

Prüss-Üstün, Wolf, Bartram, Classen, Cumming, Freeman, Paul, Hunter, Medlicott and Johnson (2019:766), argue that regardless of the enhancements, inadequate water, sanitation and health remain a major global risk. In 2015, 844 million people lacked a basic drinking water service, while billion lacked a basic sanitation service. Those who lacked access to basic drinking water, which is a drinking water source protected from recontamination within a 30 minute round-trip, was approximately 30% of the global population, that is, they did not have a non-contaminated drinking water

source located on the premises and moreover, manage this water service when it is available (WHO & UNICEF, 2017).

The lack of access to sanitation refers to an improved sanitation facility that is not shared with other households. Moreover, approximately 60% do not utilise a safely managed sanitation service, that is, a sanitation facility which ensures that excreta is safely treated off-site or disposes excreta in-situ safely (WHO & UNICEF, 2017).

Mills *et al*. (2016:38), assert that women and young girls experience vulnerability to violence, including access to water and sanitation which places them at risk to negative psychosocial outcomes. These experiences are shaped by socially constructed gender roles they are expected to perform in households and behave as expected by the community (Sommer & Caruso, 2015). The negative outcomes of poor sanitation can be further aggravated when the lack of appropriate and hygienic sanitation facilities, either at home or public places, forces both the young and senior women to adopt a range of coping strategies. Furthermore, Bhutta *et al*. (2013:463), posit that community-based interventions to improve new-born circumstances, while child and maternal health is widely recognised as important strategies to deliver key maternal and child survival interventions which has revealed a reduction in inequities in childhood death due to diarrhoea and pneumonia.

2.16 Conceptualising key sanitation concepts

The provision of basic sanitation services in South Africa is stipulated in the Constitution of 1996. Section 152 of the Constitution dispenses the responsibility of local government to, amongst others, (b) ensure the provision of services to communities in a sustainable manner and (d) promote a safe and healthy environment (Wilkinson *et al.*, 2014:17). The DHSWS (2016:8) posits that basic sanitation is the minimum acceptable level namely:

- Appropriate health and hygiene awareness and behaviour;
- Lowest cost, and appropriate systems to dispose of human excreta;

household waste and grey-water, which considers resource constraints is acceptable and affordable to the users; safe for children; hygienic; easily accessible; and does not have a detrimental effect on the environment;

- A toilet and hand washing facility;
- Ensure a clean living environment at a household and community level;
- Consider small children; physically challenged; including persons with special needs defecation practices (DHSWS, 2016:8).

A basic sanitation facility is the infrastructure which considers natural resource protection (land; water; and topography), is safe; private; reliable; socially acceptable (including children); protected from the weather and ventilated; available local skilled and capacity to conduct operations and maintenance; minimise smells; is easy to keep clean; minimises the risk of the spread of sanitation-related diseases by facilitating the appropriate control of disease carrying flies and pests; facilitate hand washing and enable safe and appropriate treatment and/or removal of human waste and wastewater in an environmentally sound manner (DHSWS, 2016:8).

End user education is an ongoing consumer tutoring of sanitation service rights, facility operation and maintenance, responsibilities, water conservation and demand management including reduction, recycle, reuse and recover principles (DHSWS, 2016:8). Free basic sanitation provides affordable ongoing services on the basic level for indigent households (DHSWS, 2016:8).

2.17 Conclusion

In this chapter, a theoretical overview of the provision of sanitation in South Africa was addressed. Sanitation is characterised by both achievements and challenges. South Africa's democratic government struggled to eradicate sanitation backlogs, however, has made significant progress in the provision thereof to the households and government institutions.

This chapter also underscored that the establishment of the National Sanitation Programme played a major role since no national government department was responsible for water supply and sanitation prior 1994. The CTMM also has established a dedicated division to address both bulk water and sanitation, named Water and Sanitation Planning Infrastructure and Implementation to address both water and sanitation challenges on the northern fringes of the CTMM in Ga-Rankuwa, Mabopane, Temba and Winterveld and other parts of the municipal area. There is a need for improved service delivery planning on the three spheres of government (national, provincial and local level) including the development of sanitation planning. Reducing the disparities in access to sanitation is complicated by the need to improve the financial sustainability to provide services.

The long-term viability of sanitation services requires user fees and beneficiaries' inputs. At the same time, finances can be obstacles to the poor communities and households, resulting in inequitable benefits. Sanitation technology is closely related to demand and requires people to select different levels of service from a range of priced sanitation options. Low cost technologies are not always optimal solutions for all households, but provides opportunities for progress particularly for the poorest of the poor. The following chapter will focus on the legislative and policy frameworks of sanitation as well as international and regional treaties on the provision thereof.

CHAPTER 3

LEGISLATIVE AND POLICY FRAMEWORKS FOR SANITATION

3.1 Introduction

The previous chapter 2 elucidated on the overview of the South African perspective of sanitation services including an overview of the nature and extent of the government's provision of the service in both the rural and urban areas.

This chapter conceptualises the legislative and policy frameworks for the provision of sanitation services in South Africa and internationally. This chapter provides an outline of what public policy-makers, legislators and civil servants should consider when applying legal and policy frameworks to ensure that these are compatible with the rights to sanitation. It outlines the history of sanitation policy development; alternative sanitation technologies; and strategies adopted to address the crisis to previously unserved communities.

This chapter further discusses the Constitution of the Republic of South Africa, 1996 in terms of the provision of sanitation as a basic human right because it represents the supreme law of the state. The legal frameworks specific to the provision of water and sanitation services such as the Water Services Act of 1997, National Water Act 1998, National Sanitation Policy 1996, White Paper on Basic Household Sanitation 2001, Strategic Framework for Water Services 2003 and International and Regional Treaties on legislative policy frameworks will also be expounded upon.

3.2 Background

According to section 36 of the Republic of South Africa Constitution, 1996 the right to sanitation neither implies that the government has an obligation to provide citizens with free sanitation facilities nor does it not exclude the

private sector from providing these services. Furthermore, Bos (2016:6) posits that the government does have the obligation to create a legal and regulatory framework that supports universal access to adequate sanitation.

In South Africa, both the Water Services Act (Act No.108 of 1997) and National Water Act (Act No. 36 of 1998) regulates domestic water and sanitation, irrespective of whether the service is provided to a household, clinic, school, hospital, student residence or community site. Both Acts are regulated by the DWS, which falls under the ambit of the Minister of Human Settlements Water and Sanitation. The Minister is mandated as stipulated in the aforementioned Acts as related to the domestic water utilisation sector to provide minimum standards for water and sanitation services; monitor and regulate service provision; establish, monitor and regulate guidelines to address national water and sanitation policies; as well as set criteria to guide subsidies. The actual delivery of the water and sanitation services is the responsibility of local government as stipulated in the Constitution of the Republic of South Africa,1996 and the DHSWS (DHSWS, 2017:8).

The CTMM is also regulated with both Water Services Act (Act No. 109 of 1997) and National Water Act (Act No. 36 of 1998) in terms of domestic water and sanitation, the municipality provide guidance to the service providers during the implementation of water and sanitation services and there are guidelines and standards set by the municipality (CTMM, Online).

Legislative and policy frameworks are frequently formulated at the national level and municipalities are incumbent to implement these. They often lack financial and human resources, as well as technical skills to discharge their duties effectively. Where institutional frameworks assign responsibilities to municipalities, states must ensure that local authorities have the necessary human-, financial- and other resources to discharge their duties effectively (Zimmer *et al*., 2014:341). According to UN-Habitat (2020:7) points out that the CTMM does not have adequate financial resources to maintain a big proportion of its existing infrastructure, let alone provide all of its much needed new infrastructure.

According to Rhodes and McKenzie (2018:2), the South African government declared basic water and sanitation as a human right during 1997 as stipulated in the Water Services Act (1997), which is consistent with the Bill of Rights. Albuquerque (2014:16) argues that urinating and defecating in the open is prohibited by law in many countries. This type of prohibition has a discriminatory effect on people who do not have access to a toilet while there are clear health reasons for such laws.

3.3 International and regional treaties on legislative and policy framework for sanitation services

Wienecke *et al.* (2017:403), argue that the United Nations has played a leading role in advocating water provision as a human right and the South African Constitution enshrines water as a human right for the citizenry. Neumeyer and Van De Lande (2014:299) argue that the international human rights law contains common obligations of all states, either because states have ratified human rights treaties or norms are customary law applicable to all states. All states that have implemented international human rights treaties or are party to the International Covenant on Economic, Social and Cultural Rights (ICESRC), have a duty to create and uphold national legal frameworks and commitment to gradually realise equal enjoyment of water and sanitation services which is non-negotiable. By virtue of their international legal obligations the Constitution of the Republic of South Africa, 1996 laws, regulations and policies must ensure that they comply with the state's Covenant obligations. The Committee on Economic, Social and Cultural Rights sets out in general the right to water that governments should review policies, strategies and legislation to constitute the formal and binding expression of a state's intentions, which should be amended in cases of inconsistencies.

Furthermore, Albuquerque (2014:14) posits that the fundamental significance of equality and non-discrimination to human rights in general including the right to water and sanitation is highly desirable for a State's

constitution to guarantee non-discrimination and equality. International human rights does not force governments to include a guarantee to water and sanitation in their constitutions although the formal recognition thereof in a constitution ensures greater legal certainty and content of these rights (Albuquerque, 2014:12). Kamga (2013:617) argues that the Habitat Agenda (1996) was endorsed by 171 states and recognised the right to an adequate standard of living, for example, water and sanitation. The Guiding Principles of Internal Displacement requires competent authorities to provide medical services and ensure safe access to sanitation to displaced persons.

3.3.1 International Covenant on Economic-, Social- and Cultural Rights (ICESCR)

The International Covenant on Economic-, Social- and Cultural Rights (ICESCR, 1966) does not prescribe an explicit reference to the right to sanitation which is the primary convention that governs socio-economic rights. Historically, it was closely linked to the right to water. Recently, this right has been linked to an adequate standard of living in Article 11(1) of the International Covenant on Economic, Social and Cultural Rights. However, the right to sanitation has always been explicitly recognised in relation to a vulnerable identity group including children, rural women and prisoners of war (Dugard, 2013:3).

Wienecke *et al.* (2017:407), posit that the right to water and sanitation is implied by the International Covenant on Economic, Social and Cultural Rights signed by 158 parties including almost all African countries. Implementing human rights can be expensive, and affordability is an inadequately understood factor at both the government and household level (Wienecke *et al*., 2017:407). Moreover, the CTMM posits that its policies are in line with the International Covenant on Economic, Social and Cultural Rights article number 11 that says that the States Parties must recognize the right of everyone to an adequate standard of living for himself and his family, including adequate food, clothing and housing, and to the continuous improvement of living conditions. The CTMM takes appropriate steps to

ensure the realization of this right, recognizing to this effect the essential importance of international co-operation based on free consent (CTMM, Online).

The economic-, social- and cultural rights are in many instances about individual entitlement to basic needs in terms of goods and services. The right to an adequate standard of living covers access to food and housing, as well as safe drinking water and sanitation and they are also linked to health (Bos *et al.*, 2016:37).

The right to sanitation entitles everyone, without discrimination, to have physical and affordable access thereto in all spheres of life, that is, hygienic, secure, safe, and socially and culturally acceptable, to ensure dignity and provide privacy. The right to sanitation as water is derived from the right to an adequate standard of living. The UN special rapporteur stated that governments should ensure that the management of human excreta does not impact negatively on human rights and subsequently, the right to water and sanitation (Human Rights Watch, 2019:9).

3.3.2 Convention on the elimination of all forms of discrimination against women (CEDAW)

Khanna *et al.* (2016:2), argue that other international human rights instruments address women's human rights comprehensively and prohibit discrimination on the basis of sex. The human rights instruments focus on ending all forms of discrimination against girls and women, and guarantee their rights in all spheres of life.

CEDAW requires countries to eliminate discrimination against women in the family, including private as well as the public sphere, and recognises that traditional gender roles and stereotypes must be eliminated to terminate all forms of discrimination against women and girls. CEDAW seeks to achieve equality or substantive equality which stresses that there should be equal opportunities, equal access, and equal results for women and girls. CEDAW states that countries are obligated to take necessary action that may be

required to ensure that women and girls actually experience equality in their lives (Khanna *et al.*, 2016: 2). The CTMM experienced several violent service delivery protest in their offices but this violence was not in the forms of discrimination against women and girls. The protesters were demanding basic public services from local level of government including proper sanitation, clean drinking water, electricity, access to health care, formal housing and access to infrastructure. This study investigated the provision of sanitation in the northern fringes of the CTMM in the Ga-Rankuwa, Mabopane, Temba and Winterveld townships (CTMM, 2020: Online). Kamanga (2013:619) asserts that the right to basic sanitation is also provided by the CEDAW, which compels state parties to afford women an adequate standard of living to ensure housing, electricity, water and sanitation. The Convention also prohibits discrimination against women.

3.4 Governance of water and sanitation: South Africa

The CTMM posits that one of the key attributes of a developmental state of the City is that is has strategic orientation premised on people-driven and people-centred change. Tshwane Vision 2055, which is aimed at improving the quality of life for its citizens, revitalising the economy and industrial development, regenerating townships and attracting investment is a clear example of this attribute in action. However, it is important to put in place mechanisms and instruments to recognise and monitor the contribution of external stakeholders and the community at large towards the achievement of Tshwane Vision 2055, moving beyond the IDP as the principle instrument of delivery and legislated quarterly reports as the means of accounting to stakeholders (CTMM, 2014: Online).

This section stipulates the phenomena that underlie governance practices in CTMM regarding the provision of water and sanitation, the purpose is to understand the nature of governance and the factors influencing it. It offers a response to a number of concerns raised about the effectiveness of the CTMM governance practices. Culture and leadership in the CTMM are identified as providing the most suitable theoretical framework for this study,

and through grounded theory (GT), an empirical study is undertaken to identify the nature of corporate governance practices in the City, the factors that influence such practices and the outcomes of this influence (CTMM, Online).

Ekane, Nyvist, Kjellen, Noel and Weitz (2014:244), postulate that governance challenges exist at different levels of society and the responsibility to address these challenges rests on different stakeholders or actors such as the private sector, government, households and individuals. In order to better understand expectations as well as problems, sanitation governance entails an ongoing dialogue between private and public sanitation stakeholders (Mjoli, 2015:5). Poor governance and corruption undermines the realisation of long-term development goals and has a negative impact on all citizens, especially the poorest who lack access to social services because budgets allocated for the development projects is diverted for fraudulent activities or utilised for inadvertent purposes (Tearfund, 2012).

Public participation goes hand in hand with transparency, and in the developed world, citizens are no longer willing to merely trust - they wish to have a say in water and wastewater developments that affect their lives and the environment. For most people it is important that they have an opportunity to participate, even though this implies that those who do not are not necessarily representative of the majority of the population (Rouse, 2013:11).

Sebake & Mukonza (2020: 347) posit that the Mayoral outreach and stakeholder unit in the CTMM should be the custodian of community engagements (CTMM, 2015). In illustrating this, the CTMM outlined the following mandate i.e. to provide community participation to conform with the Municipal Systems Act and to ensure that the CTMM provides an enabling environment to conform to the stipulations of the Constitution in respect of the people's constitutional rights (CTMM, 2015).

Mjoli (2015:2) holds that good sanitation governance is strengthened by the following principles: accountability, participation, fairness, transparency and how sanitation services is managed, regulated and planned within a set of legal, political, social and economic systems to ensure sustainable services (African Development Bank, 2010). In July 2014, the Minister of Cooperative Governance and Traditional Affairs launched the Back-to-Basics Programme for change which advocated a caring, responsive and accountable local government. CoGTA's Back-to-Basics Local Government Strategy key performance areas intersect with the elements of the framework for good sanitation governance for example:

- Basic Services – Create proper living conditions for communities;
- Good Governance – Prudent expenditure of public funds, transparency; accountability and appointment of competent personnel; and
- Public Participation – Establish effective public participation platforms for stakeholder engagement and communities (Mjoli, 2015:2).

Failure to integrate and coordinate different actors and activities successfully at different levels of society results in weak institutional enforcement and framework for improved sanitation. The formal sanitation institutions' guidelines, policies, standards, statement and strategies are formulated at the macro level, and executed by meso level actors whilst the actual implementation is at the micro level (Ekane *et al*., 2014:247). Rouse (2013:29) highlights that the Millennium Development Goals are perceived as an important driver for progress. "The Joint Monitoring Programme" should serve as a global discussion platform to facilitate the formulation of possible next generation in terms of global water, sanitation and hygiene targets. It will be difficult to set a firm date to achieve the final goal of universal coverage for both water and sanitation due to uncertainties in population growth.

The CTMM adopted and continued to implement a governance model that seeks to promote administrative effectiveness, promote continuous improvements in service delivery and achieve the City's growth and

development objectives. Although the process of implementing the governance model continues to experience a myriad of challenges, the City is continuously putting in efforts to ensure that all issues constraining administrative effectiveness are attended to in a manner that is appropriate with its capabilities and resources. The City attempts to entrench viable political and best administrative practices in the management of its business (CTMM, 2020: 29).

Mjoli (2015:5) posits that poor governance and corruption has a negative impact on the citizenry, especially the poorest communities who lack access to social services. Poor governance undermines the long-term achievement of development goals because budgets allocated to these projects are diverted towards acts of corruption and not utilised for the intended purpose. Poor governance at a community level denies the poorest access to basic social services such as water and sanitation services. The South African Human Rights Commission (2018:8) reports that macro conditions such as slow economic growth and corruption have resulted in low levels of service delivery to outlying and poor areas. The poor do not secure appropriate redress for the violations of basic rights and are least likely to have access to reliable and safe water supply and decent sanitation services.

Masindi *et al*. (2016:3), posit that the DHSWS regulates and oversees the water business through appropriate regulations and policies which are implemented through its nine provincial offices and four water management clusters. Furthermore, the DWS also regulates the quality of drinking water; effluent against industry standards; monitors the sector performance; and recommends changes to the business environment within which the various role players function.

In the context of cooperative governance and legislation, municipalities are expected to accelerate the provision of infrastructure and services to marginal communities. According to Section 151 (3) of the Constitution of the Republic of South Africa, a municipality has the right to govern the

community's local government affairs (Masindi et al., 2016:5). Kopung, Meyer, Lubbe and Klopper (2016:117), posit that the Department of Cooperative Governance and Traditional Affairs is the custodian of infrastructure and leads the sector, while the National Treasury coordinates the overall allocation of funds through government's contribution towards infrastructure development (Singo, 2012). However, CoGTA (2014) maintains that local government is the primary site for delivery of services in South Africa. Moreover, the residents, businesses and stakeholders of the CTMM are encouraged to submit their inputs on the draft 2021/22 budget and Integrated Development Plan (IDP). The IDP for the medium term (2021–2026) seeks to ensure that the poor remains a priority, and that current projects are completed timeously and within the budget. The CTMM population is growing faster than the national average and its population is estimated to be well over 3,5 million people. This number is increasing year on year and places an increased demand on basic services. Infrastructure needs remain imperative and the demand for service delivery is important (CTMM, Online).

Mjoli (2015:2) states that good sanitation governance refers to the manner in which these services are planned, regulated and managed within a set of social, economic, political and legal system to ensure sustainable services. Good sanitation governance is underpinned by the following principles: accountability, participation, transparency and fairness. The DHSWS leads and regulates the water sector. South Africa's water resources management includes water storage, river systems and catchment management functions, water abstractions including return flow management. Water is a scarce resource, therefore, it must be protected and managed in an integrated way and utilised to its full potential (Masindi *et al*., 2016:2).

3.4.1. *Roles and responsibilities: households and communities*

The CTMM consider working with communities in order to promote changes in the hygiene behaviours even though households and communities may have different perspective and see hygiene promotion and sanitation as an

opportunity to engage with a wider social development process (CTMM, online).The White Paper on Basic Household Sanitation (2001) states that homeowners are responsible for household toilets. Good sanitation begins in the home, and it is its responsibility is to improve its own practices. Households and communities are first and foremost responsible for their own health, a clean environment and improved sanitation. Inadequate hygiene can jeopardise not only one's health but also the community and the nation at large. Hygiene practices can be improved by washing one's hands, *inter alia,* before handling food, after utilising a toilet, and changing babies' nappies. Community members have the responsibility to create awareness among fellow community members of the significance of sanitation and sound hygiene practices, and spread this message daily (DHSWS, 2001).

3.4.2 Roles and responsibilities: municipal government

Furthermore, the CTMM posits that the Ward Councillors and municipal officials have a key role to play in order to ensure that water and sanitation goals happen. The City ensures effective planning, delivery, operations and maintenance of water and sanitation infrastructure for sustainable service provision. The City source funding from various sources and work together with communities to identify community needs in terms of provision of water and sanitation (CTMM, Online). The municipalities are accountable for the provision of sanitation services and play a central role in integrating programmes. They should work with communities and households to promote and improve the significance of sanitation. The local sphere of government is also responsible to provide households sanitation as well as create awareness among communities of its significance and implications on one's health. It must work together with the communities to identify toilet facilities, launch health and hygiene promotion programmes, prioritise these needs and help households to build toilet facilities through specific projects. Furthermore, local government must budget and source funding for the programmes from various sources, for example, revenue collection including provincial and national government. The third sphere of government must ensure that

the environment is protected during the implementation of the sanitation programme (Water Services Act, 1997). Furthermore, the major source of the CTMM revenue is service charges and property rates for water, sanitation, electricity and refuse removal, which make up 80,7% of the revenue basket. The remainder of the revenue comes from transfers and minor charges in various facilities. The capital budget deals mainly with investment in infrastructure (like reservoirs, constructing roads, the electricity distribution network and upgrading community facilities (CTMM, Online).

3.4.3 Roles and responsibilities: national government

The generic roles and responsibilities of national government include: formulation of policies, legislation, norms and standards. The national departments are responsible to co-ordinate and monitor national programmes and provide support to other spheres of government. Furthermore, national departments are required to regulate service provision; intervene if there is a lack of capacity; provide advocacy including guidance. The roles of all of the national departments must be both clarified and co-ordinated at the national sphere to avoid duplication (Water Services Act, 1997).

Good leadership in the CTMM in terms of the Batho Pele Principles is a critical component of successful delivery of basic services such as water, sanitation, housing and electricity. Furthermore, the CTMM ensure that municipal functionaries deployed to the City, especially those holding leadership positions, such as mayors, municipal managers, speakers and executive and senior managers, are committed and passionate about enhancing service delivery and improving the lives of residents (CTMM, Online).

Kopung *et al*. (2016:117), postulate that the role of the Department of Cooperative Government and Traditional Affairs is to ensure proper coordination between sector departments at the provincial sphere of government and all municipal infrastructure programmes; monitor municipal

performance; assist to maintain programme management systems; and functioning Project Management Units (PMUs); ensure regional scale infrastructure is guided by provincial government collaboration as well as provide technical support through all phases of an infrastructure project (Singo, 2012).

3.4.4 Roles and responsibilities: Department of Human Settlements Water and Sanitation

The DHSWS is responsible for the regulation of water supply and sanitation provision, water use, water resources planning, oversight of water sector institutions, operation and maintenance of associated bulk infrastructure and 320 large dams, water and sanitation policy, collection and assessment of water data. The Department is the executive arm of national government in terms of water supply and sanitation services (DHSWS, 2018:38). Figure 6 below illustrates possible future institutional arrangements for the water sector.

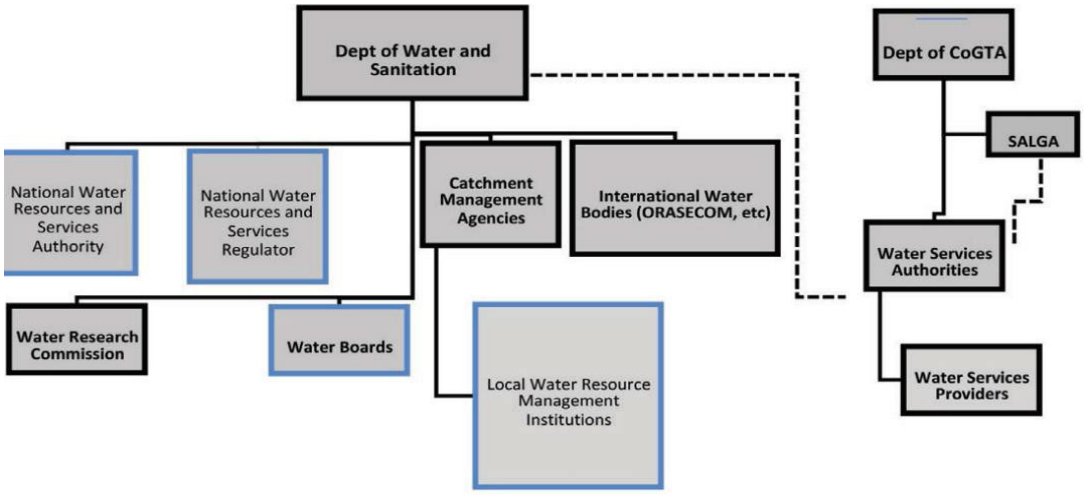


Figure 6: Future institutional arrangements: water sector

Source: DHSWS (2018)

A National Water Resources and Services Authority (NWRSA) must be established and responsible to: develop, manage, finance, operate national water resources infrastructure and sanitation, monitor, implement, develop

as well as review regulation across the water and sanitation value in accordance with the provisions of the National Water Act (1998); Water Services Act (1997); as well as related water and sanitation policies. The Water Boards differ in competencies and size. A limited number are financially and technically sound, each serving one or more major city. However, the smaller boards are financially and technically overextended and serve economically weaker and less dense areas. The establishment of Catchment Management Agency (CMAs) progressed sluggishly. Consequently, only two of the planned nine CMAs were established and are functional (DHSWS, 2018b:40).

The former Department of Water and Sanitation - renamed - DHSWS together with the other national-government role players are responsible for the development of norms, standards, and sanitation. The DHSWS and the of Cooperative Governance and Traditional Affairs must co-ordinate the Water Services Development Plans with the municipalities' Integrated Development Plans (IDP's). Furthermore, the DHSWS must provide both the provinces and municipalities support in the planning and implementation of enhanced sanitation programmes. The Department is required to monitor the outcome of such programmes; maintain a database of sanitation requirements and interventions; provide capacity building support to provinces and municipalities; financial support; and conduct pilot projects in-low cost sanitation programmes (Department of Water Affairs, 2001).

The DHSWS within the CTMM is responsible for the sanitation services, bulk water supply and the infrastructure planning in the city. The department consists mainly of two divisions which are the Bulk Water and Waste Water Services Division and the Planning and Development Division. The Bulk Water and Waste Water Services Division is responsible for the provision of bulk water to the city through various reservoirs and water treatment plants. The division is also responsible for the waste water treatment plants which ensure that raw sewage is treated before the water is released back into the rivers. Furthermore, the division is also responsible for ensuring that the water quality is in line with the national DHSWS standards by ensuring that water and sewer tests are carried out regularly. The Planning and

Development Division is responsible for the capital projects (development) and infrastructure planning in the department. The division has to ensure that infrastructure planning is done in conjunction with city planning and that the department aligns its projects with the development growth in the city. Furthermore, this division has to ensure that the water master plan is in place as required in terms of the Water Act (CTMM, Online).

The DWS operates all three spheres of government and is accountable for all elements of the water cycle in South Africa, i.e. water resources management, distribution of potable water, water processing, wastewater collection, treatment, and discharge. However, the DHSWS does not execute all these functions, because several are constitutionally assigned to municipalities. In South Africa, the DWS leads and regulates the water and sanitation sectors, develops strategy, formulates policy, as well as provides support. The Department is governed by two Acts, namely: Water Services Act (1997) and the National Water Act (1998), which are in the process of being merged (DHSWS, 2018:1).

Masindi *et al.* (2016:2), postulate that in South Africa the management of water resources has been decentralised, and the DHSWS is directly responsible for most of the large water resources infrastructure. The Department undertakes planning and implementation of large resource development projects such as inter-basin water transfer schemes and the construction of dams. The Minister of Water and Sanitation has declared that nine water management areas have been established as a component of the National Water Resource Strategy 2 in terms of section 5(5)(1) of the National Water Act. The boundaries for each water management area are described and a Catchment Management Agency will be established in each water management area. (DHSWS, 2016). One of the primary principles of the National Water Act (Act No. 36 of 1998) is to focus on the decentralisation of functions. Decentralisation rests on the subsidiary principle, and it accentuates public participation in water management and related decision-making processes.

The primary responsibility of a Catchment Management Agent is to manage

water resources at the surface water catchment level (Masindi *et al.*, 2018:2). Sustainable and effective water and sanitation management depends on the participation of a range of stakeholders. Target 6b focuses on including local communities to promote local ownership and long-term sustainable services. “Participation implies provision of mechanisms to enable affected communities and individuals to meaningfully contribute to decisions related to water and sanitation planning and management” (Sustainable Development Goal 6, 2018:99).

Masindi *et al.* (2018:7), highlight that the DHSWS is primarily responsible for the development and implementation of public policy that governs the water sector. Toxopeus (2019) asserts that DHSWS is the custodian of water in South Africa. It is ultimately responsible to ensure that water as a resource from lakes, rivers, ground water and dams is allocated equitably and utilised beneficially in the public interest while promoting environmental values.

3.4.5 Roles and responsibilities: Water Research Commission

The DHSWS plays a significant role in comprehending both the priorities and needs of the sector by promoting information sharing, technology, funding, stimulate research, enhance knowledge, and build the water sector capacity. These were conducted through its Water Research Commission (WRC) entity. The latter Commission conducts research in key areas to support the DWS strategic plan on dam safety, non-flush sanitation, water sensitivity design, adaptation to climate change, environmental goods and services, formulate the water and sanitation policy, strategy and legislation. A Design School of Infrastructure has also been established to support the sector with operations, maintenance, smart technologies and innovative development (DWS, 2017a:11).

3.5 South Africa: Sanitation policies and legislation

The adoption of the Republic of South Africa Constitution of the Republic of

South Africa, 1996 was informed by the need to repair injustices of the past. The Constitution of the Republic of South Africa 1996 in Section 7 stipulates that a nation must be based on democratic values, fundamental human rights and social justice. During the apartheid regime, human dignity for black South Africans was cruelly denied. The majority black was forced by law to utilise separate, inferior sanitation facilities (Kamanga, 2013:625).

Magadimisha *et al.* (2019:103), posit that the preamble to understand the policy landscape in South Africa should in no explicit terms be separated from the Constitution of 1996. In principle, the latter has emerged as the essential point of appeal for pro-poor rights and equality. Key extracts of the Republic of South Africa Constitution, 1996 as cited by Nyamnjoh *et al.* (2013:18), revolve around the following issues which has a direct reference on service delivery:

3.5.2 Improve the quality of life of all inhabitants.

3.5.3 Heal divisions of the past by creating a society based on fundamental human rights, social justice and democratic values.

3.5.4 Create an open society whereby every citizen is protected by law and government will is driven by the people.

Sanitation is an extremely private social sphere of the water value chain including a public good. Water and sanitation are inseparable, a small amount of water is essential for people's physical survival, basic personal hygiene and household uses whilst basic sanitation services are required to ensure personal and public health (White Paper on Water Supply and Sanitation Policy, 1994). Currently, the country's sanitation sector and the CTMM is regulated by the following four public policy documents, namely:

3.5.5 White Paper on Water Supply and Sanitation (1994).

3.5.6 White Paper on a National Water Policy of South Africa (1997).

3.5.7 White Paper on Basic Household Sanitation (2001).

These policy documents provide rules, allocation mechanisms, and procedures for sanitation which are implemented through economic measures, education and information programmes, policy instruments of

laws and regulations, and obligation of rights and responsibilities for the provision of services (DWS, 2016:3).

Magadimisha *et al*. (2019:103), postulate that the Constitution of 1996 was explicitly premised on the principles of accountability, participatory democracy, representative and public involvement (RSA, 1996). This in simple terms implied that participation was not only limited to the right to elect representatives or hold elections, it was translated to participate in decision-making which influences people's destiny. Therefore, guided by the fundamentals to achieve the *status quo*. Furthermore, Section 146 of the Constitution of the Republic of South Africa, 1996 provides scope for national government to develop national norms and standards, including a framework and policies which provide uniformity across the country for functional areas which fall under Schedule 4 of the Constitution. The CTMM has developed sanitation norms and standards which provide uniformity across the City during the implementation of sanitation services. Moreover, the CTMM approves performance norms and standards for quality service delivery. The City through a mayoral committee resolution has approved benchmarked norms and standards that form part of the performance blueprint for all departments including the DHSWS. The purpose of these norms and standards is to provide the minimum acceptable level of services (CTMM, Online).

3.6.1 Constitution of the Republic of South Africa, 1996

The Constitution of the Republic of South Africa of 1996 places in a nutshell the Bill of Rights to achieve socio-economic, political and civil rights. Kamanga (2013:637) posits that in the South African context, the Bill of Rights does not provide for an explicit right to sanitation but guarantees the right to adequate housing. The CTMM ensures that people in their areas have at least the basic services they need. Despite the provision of housing in terms of the RDP, which was criticised for being unable to respond to the diverse housing needs the City is also incrementally upgrading informal settlements through the Upgrading Informal Settlements Programme (UISP) in order to provide its communities with services (CTMM, Online).

The Constitution of the Republic of South Africa 1996, Section 152 (1) (b) stipulates that the local government sphere of the country must ensure that it provides its communities with services in a sustainable manner. Section 152 (1) (d) further stipulates that local government is responsible for the promotion of a safe and a healthy environment. Saul, Kinley and Mowbray (2014: Online), argue that the state must ensure that discrimination in all spheres of life which has an impact on the physical and economic access to sanitation is safe, secure, socially and culturally acceptable, hygienic, provides privacy and ensures dignity. The Constitution arranges the "social contract" between the citizens and the government of South Africa by stipulating public policies and structuring the three spheres of government.

Moreover, the CTMM posit that By-laws are laws that are passed by the council of a municipality in this instance the CTMM in order to regulate the affairs and the services the municipality provides in its area of jurisdiction. The City derives the power to pass a by-law from the Constitution of the Republic of South Africa, 1996, which gives specified powers and competencies to local government as set out in Part B of Schedule 4 and Part B of Schedule 5. The main function of the CTMM by-laws is to ensure that the City is an orderly city to live and work in (CTMM, Online).

The principle of equality demands that everyone benefits from adequate services, and equality applied to the human rights to water and sanitation does not imply that everybody must benefit from the same level or type of service as defined by human rights to water and sanitation (Neumeyer *et al.,* 2014:296).

Section 146 of the Constitution stipulates that national departments may develop frameworks, formulate policies, standards and norms which are uniform across the country as a whole for functional areas that fall under Schedule 4 of the Constitution. Sanitation norms and standards are required for the sector. The Water Services Authorities must submit evidence as part of their Integrated Development Plans (IDPs) which prescribe minimum national norms and standards.

3.6.2 White Paper on Water Supply and Sanitation Policy (1994)

The White Paper on Water Supply and Sanitation Policy (1994) explains adequate sanitation as services to all which meet basic health and functional requirements including the protection of the quality of both surface- and groundwater. Moreover, in line the White Paper on Water Supply and Sanitation Policy (1994) the CTMM ensure that citizens have access to basic services. The main challenges for the City lie in the area of sustaining sanitation services. Operation and Maintenance budgets is not adequate and there are insufficient resources from tariffs and subsidies to properly sustain the services provided by the City (CTMM, Online).

The White Paper on Water Supply and Sanitation Policy (1994) recognises the role of water supply and sanitation in the process of development in South Africa. It considers the imbalances of the past apartheid regime, and advocates that sanitation should be integrated into programmes for the provision of other basic needs. The White Paper proposes to fill the gap as a result of the lack of a comprehensible policy in water and sanitation since the oppressive Water Act (1956). The function of the White Paper is to provide a framework to ensure equitable access to water supply and sanitation and to provide standard outlines for the delivery of services at the local sphere of government (StatsSA, 2016:16).

The former Department of Water Affairs and Forestry policy (currently renamed the DHSWS) was to ensure that the citizenry has access to basic services and the support they need to achieve these. The provision of these services does not imply that it is necessarily the direct responsibility of the DHSWS (White Paper on Water Supply and Sanitation Policy, 1994).

3.6.3 Draft National Sanitation Policy (2012)

The DHSWS in conjunction with sanitation sector partners reviewed the White Paper on Water Supply and Basic Sanitation (1994); White Paper on

a National Water Policy of South Africa (1997); and White Paper on Basic Household Sanitation (2001). This process was followed by the formulated Draft National Sanitation Policy (2012) to regulate sanitation in the country. The sanitation sector is currently regulated by the above-mentioned policy documents. The Draft National Sanitation Policy (2012) was not gazetted as the policy for the country despite extensive consultation. The draft policy did, however, identify gaps in the earlier policies and addressed the key areas. The Draft National Sanitation Policy was formulated to address the entire sanitation value chain whilst the White Paper on Basic Household Sanitation focused largely on rural sanitation and on-site systems (StatsSA, 2016:19).

3.6.4 National Sanitation Policy 2016

Saul *et al.* (2014:911), define sanitation as a system for the collection, treatment, disposal, transport or reuse of human excreta associated with hygiene, and provides privacy and ensures dignity. South Africa is committed to ensure the provision of at least the basic level of sanitation to the populace and address the universal service obligation. Sanitation must be provided as part of a municipal service package. Sanitation services are provided largely based on the arrangement the people have agreed to. The inhabitants in informal urban settlements experience the same suite of interrelated problems, that is, either limited or no access to basic services including no security of tenure. Inadequate sanitation services have a significant impact on the country's natural resources (DWS, 2016:12).

3.6.5 White Paper on Basic Household Sanitation (2001)

The White Paper on Basic Household Sanitation (2001) mandates that all South Africans have access to adequate sanitation. The White Paper primarily addresses the service backlog challenges in low density rural areas. It favours a demand-responsive approach, that is, a direct contribution by each household, for example, construction of a toilet is taken as a proxy for demand. From the health and hygiene perspective, the policy reveals that educational programmes are required at local-, provincial- and

national government spheres with strong media coverage, advertising and promotion in schools and clinics (DWS, 2016:16).

3.6.6 Strategic Framework for Water Services (2003)

Ndida *et al.* (2013:99), highlight that the Strategic Framework on Sanitation (2009) differentiates between the notions of the free basic sanitation, sanitation service and facility. These concepts are similar in that these accentuate the removal of grey water and human waste. Wilkinson *et al.* (2014:23), postulate that the Strategic Framework for Water Services focuses on the following three forms of sanitation subsidisation in the country:

- Infrastructure (hardware) subsidy: is a capital subsidy from the Municipal Infrastructure Grant and fiscal budget for the provision of the sanitation facility.
- Software subsidy (subsidy from Municipal Infrastructure Grant) from the national government to address health and hygiene promotion.
- Operational subsidy: Free Basic Sanitation subsidy from Local Equitable Share from the fiscal budget to operate and maintain costs of the service.

The Strategic Framework for Water Services (2003) and Water Services Act (1997) responsibility is to invest adequately and appropriately to ensure the progressive realisation of the right of all people in its area of jurisdiction to receive at least a basic level of water and sanitation services, that is, a universal service obligation (DWAF, 2003). To meet this universal service obligation, it requires each South African to have access to at least both a basic water supply and sanitation facility (DHSWS, 2017:8). The Strategic Framework for Water Services (2003) is the umbrella framework for the water services sector. It outlines the roles and responsibilities for Water Services Authorities and Water Services Providers, various government departments as well as identified stakeholders. The Strategic Framework is an update of the 1994 White Paper and addresses the full spectrum of water supply, sanitation services and relevant institutions.

The purpose of the Strategic Framework for Water Services (2003) is to set out the framework that will enable the sector to achieve the vision of water services for the entire South Africa. The DHSWS together with other role players in the sector work together to implement this Strategic Framework. The DHSWS as a sector leader reviews the water and sanitation legislative framework which impacts on the Water Services Act and water services guidelines and tools.

Hoossein, Whittington-Jones and Tandlich (2014:1336) further state that after the adoption of the Strategic Framework for Water Services, the implementation of the sanitation service delivery was administered by the former Department of Water Affairs now referred to as the DHSWS through the Community Water Supply and Sanitation Programme (DWA, 2012).

3.6.7 Water Services Act (Act 108 of 1997)

Section 3 of the Water Services Act (Act 108 of 1997) stipulates that everyone has the right to basic water supply and basic sanitation and every water services institution must take reasonable measures to realise these rights. The Act also defines basic sanitation as the minimum standard of services necessary for the safe, hygienic and adequate collection, removal, disposal or purification of human excreta, domestic waste water and sewage from households which includes informal households. It further defines basic sanitation as the prescribed minimum standard of services necessary for the safe, hygienic and adequate collection, removal, disposal or purification of human excreta, domestic waste water and sewage from households, including informal households (Tissington, 2013:18).

The primary aim of the Water Services Act (1997) is to consider the interest of the consumer and assist municipalities to conduct their role as water services authorities. The Act prescribes sound planning throughout the country including the provision of the water service provider to cater for everyone. The objective of the Act is to provide the following:

(a) Right of access to basic water supply.
(b) Right to basic sanitation necessary to secure adequate water and an environment not harmful to human health.
(c) Set national standards and norms including criteria for tariffs in respect of water services (WSA, 1997).

The Act provides a framework for the provision of water supply and sanitation services to households in the country. It sets the standards for the local and provincial agencies and establishes the tariffs for norms and standards. It outlines the rights and duties of the State including water services providers in monitoring the latter and promote effective water resource management.

3.6.8 National Water Act (1998)

The National Water Act (1998) was passed to outline the role of government in terms of managing water resources for public benefit. The purpose of the National Water Act is to ensure that water is protected, developed, used, managed, conserved and controlled in ways which are sustainable and equitable. The NWA reaffirms the role of government as the public trustee of South Africa's water resources and it also provides the framework for the management of water resources. The Act must be read together with the Water Services Act (1997) which conforms with constitutional obligations, and is concerned with access to water services. The Act also mandates government to develop a water resource strategy which conforms to its framework, as well as develop a strategy in consultation with relevant stakeholders (StatsSA, 2016:17).

The National Water Act provides for the transformation and establishment of institutions to help the DHSWS to give effect to its core mandate. The challenges related to the delivery of water services and efficient regional water infrastructure management and the lack of local government

accountability (DWS, 2017:10).

3.6.9 Free Basic Sanitation Policy (2001)

The Free Basic Sanitation Policy was adopted in 2001 which aims to address issues of affordability of basic services and is linked to the indigent policy which targets the poorest sections of the communities. Water supply, sanitation, solid waste collection and electricity fall within the basket of free basic services policy. During 2005, public policy implementation gained momentum in respect of the provision of a basic amount of electricity, free water, and work on sanitation and solid waste (SAHRC, 2012:8).

The CTMM indigent programme is aimed at including those currently excluded from access to basic services, through the provision of a social safety net i.e. basic services. The City posits that common need of poor people in South Africa is to have access to basic services that will facilitate their productive and healthy engagement in society. The indigent policy programme is part of the City's Indigent Policy which is implemented in line with the national government's call to alleviate poverty (CTMM, Online).

Since 1994, the South African government has introduced policies, laws and strategies to improve the socio-economic conditions of the poor households. The provision of the Free Basic Services through the implementation of the municipal indigent policy has been undermined. The implemented indigent policies are faced with problems of deciding on how to target beneficiaries' and which benefits should be handed to which beneficiaries (Tissington, 2013:9). Municipalities differ in providing free basic sanitation to their communities. Certain municipalities provide free basic sanitation to only registered indigent households while others to all households (Moodley, 2011:49).

In South Africa, the Constitution of the Republic of South Africa (1996) is the overarching document that supports both development and access to sufficient water supply. Section 27(1)(b) of the Constitution (1996) stipulates

that everyone has the right to have access to sufficient water and in terms of sanitation, there are a number of clauses that implicitly refer to a right to basic sanitation or are fundamentally related to the enjoyment of this right.

In terms of the Constitution (1996) the provision of basic services is a local government function. Local government has executive authority in respect of (and right to administer) basic municipal services (Tissington, 2013:13).

In 2009, the Free Basic Sanitation Implementation Strategy was adopted to guide Water Services Authorities to implement their own Free Basic Sanitation policies and provide all citizens with such service by 2014. This conforms to the country's national policy (Tissington, 2013:19).

3.6.10 National Framework for Indigent Policies

Fuo (2013:09) argues that the National Framework for Indigent Policies acknowledges that each municipality is obliged to provide indigent households with a basic sanitation facility which is private, reliable, safe, protected from the weather, ventilated and which keeps smell to the minimum. Furthermore, The CTMM posits that with the indigent programme, the ultimate goal is those who qualify will receive free basic municipal services and ensure that the poor rise on the ladder of prosperity and become self-sufficient. Anyone who does not have access to basic services is considered indigent. The City indigent programme is intended to improve the lives of those who are unable to pay for municipal services and to give them access to free basic services with an aim to alleviate poverty. The City has developed indigent programme as an intervention to soften the impact of poverty and to help people escape the cycle of poverty (CTMM, Online).

Section 104(1) (i) of the Local Government: Municipal Structures Act (2000) stipulates that the responsible Minister for local government must regulate or provide for the development and implementation of an indigent policy (Wilkinson *et al.,* 2014:19). The Act stipulates that municipalities must develop their own indigent policies to target Free Basic Services to poor households. The Act requires a municipality to maintain, adopt and implement a debt collection policy and credit control which must make

provision for indigent debtors that are consistent with its rates and tariff policies and any national policy on indigents (Tissington, 2013:14). Table 9 below illustrates the implementation guidelines which outline the responsibilities of key role players in the provision of free basic sanitation in all spheres of government.

Municipalities	Municipalities are responsible for developing indigent policies for implementation of Free Basic Sanitation (FBS) in their areas of jurisdiction (which must list criteria for assessment, an implementation plan, approach to indigent management and methods to engage communities about Free Basic Services). Municipalities are also responsible for the monitoring and tracking of effective FBS implementation.
Department of Cooperative Governance and Traditional Affairs	Department of Cooperative Governance and Traditional Affairs is responsible for introducing standards and legislation applicable to the implementation of Free Basic Services (FBS). The national department must guide, coordinate and monitor national programmes and provide grants to municipalities to enable the delivery of FBS.
Department of Human Settlements Water and Sanitation	DHSWS is the water sector regulator in the country and is responsible for defining regulation and policy relevant to support Free Basic Water and Free Basic Sanitation, as well as providing support to Water Services Authorities to implement Free Basic Water and Free Basic Sanitation.
National Treasury	National Treasury is responsible to ensure funds for Free Basic Services and for determining the equitable share allocations to municipalities. National Treasury plays a supportive role on financial aspects of Free Basic Service in the country and advises provinces accordingly.
South African Local Government Association	South African Local Government Association (SALGA) is responsible for facilitating the implementation of the Free Basic Services policy framework and guidelines and creating an enabling environment for Free Basic Services. SALGA also plays a role in monitoring the delivery of FBS in the country, compiling reports on support required and the reports on status of implementation, profiling good practice and lessons learned, mobilising municipalities, and commissioning research and surveys on FBS.
Provincial Departments	Provincial departments are responsible for ensuring provincial coordination and assisting municipalities with FBS delivery.
Ward committees	Ward committees are often given powers and functions by municipalities to identify beneficiaries for indigent grants and are the formal information routes between communities and municipalities, to assist with the development and rolling out of the municipal indigent policy.

Communities	It is the community's responsibility to inform the municipality of any challenges related to the provision of services, illegal connections, faulty systems, abuse or misuse of services etc.

Table 9: How the Implementation Guidelines outline the responsibilities of key role-players in all spheres of government in terms of the provision of Free Basic Services

Source: Tissington (2013:34)

In most municipalities, ward councillors or indigent committees sign off on indigent applications. The actual signature of the councillor is required before an applicant is registered for Free Basic Services. In many municipalities social workers or inspectors are sent to the household to verify the status of the applicant in order to conduct an on-site audit of the household (Tissington, 2013:59).

3.6.11 National Sanitation Strategy (2005)

The National Sanitation Strategy was published in 2005 to provide a coherent approach to sanitation services delivery in South Africa, and to take into consideration recent developments in sanitation, including the White Paper on Basic Household Sanitation (2001); Strategic Framework (2003); and establishment of the Municipal Infrastructure Grant for municipalities.

3.7 CONCLUSION

In this chapter, the legislative framework and its application to the CTMM was outlined, including those related to sanitation strategies, foundation for the provision of sanitation in South Africa and globally. State parties are mandated to respect the right to water and sanitation, and guarantee that this right is exercised without discrimination.

Generally, under international law, sanitation is rarely a standalone right or inferred under housing, environment and health but as a twin of water supply. Despite this strong legislative prescript, the departmental sanitation regulation has been unclear over the past few years, while the provision of

sanitation services was assigned to local government as mandated by the Constitution of 1996.The CTMM is mandated to provide basic services such as water, sanitation, housing and electricity to its communities and guarantee that this right is exercised without discrimination. The City's progress with the policy intents was benchmarked against these international policies by employing the systematic measurement and comparison against a selected set of indicators.

Legislative transformation and the development of Free Basic Sanitation Services have contributed towards meeting the needs of present and future generations, that is, promote equitable access to sanitation services. The 1994 White Paper on Water Supply and Sanitation Policy acknowledges the role of the water supply and sanitation process in South Africa. It considers the imbalances of the past, and advocates the integration of sanitation into programmes to provide other basic needs. The following chapter will focus on the research design, adopted methodology, research instrument, study area, and limitations of the study.

CHAPTER 4

RESEARCH DESIGN AND METHODOLOGY

4.1 Introduction

This chapter presents the adopted research design and methodology of the study presented on Chapter 1 in section 1.8. The data collection techniques, design and administration of a research questionnaire, sampling procedures, research population, data analysis, study area as well as limitations of the study are expounded upon.

The mixed methods, quantitative and qualitative approaches that provide specific direction for procedures and case study research approach which were applied in this study will be accentuated. The questionnaire was designed to acquire information from the DHSWS, Provincial offices of the Department, CTMM officials and beneficiaries who benefitted from the government sanitation services programme in Ga-Rankuwa, Mabopane, Temba and Winterveld townships.

This study was designed as discussed in Chapter 1 of this thesis in section 1.8. The research methods and choices utilised to respond to the research questions contained in the questionnaire in order to determine and evaluate the provision of sanitation services in the northern fringe of the CTMM as well as the research design used on the study.

Ringwood (2015:45) posits that the lack of basic sanitation is one of the factors which contribute towards environmental degradation and infant mortality in South Africa. Many South Africans still lack sanitation services, and prioritisation thereof is low. Moreover, it affects the quality of life of millions of people. Mdlongwa (2014:39) states that certain strides have been made in key sectors of the economy, however, the quality and efficient delivery of basic services such as water and sanitation, housing, and electricity remain a huge challenge at the local sphere of government. This

situation also affects Ga-Rankuwa, Mabopane, Temba and Winterveld townships which are located on the northern fringe of the CTMM due to lack of funding to eradicate basic service backlogs.

Adequate sanitation is vital for good health and contributes towards an improved economy to alleviate high levels of poverty. The purpose of this study is to determine and evaluate the provision of sanitation services in the northern fringe of the CTMM with specific reference to Ga-Rankuwa, Mabopane, Temba and Winterveld townships. The study also investigated available technological options provided for basic sanitation services to determine planning instrument(s) utilised by the sector to promote planning and budgeting for sanitation services; describes different financing options and explores and analyses different challenges currently faced by the CTMM including probable solutions or intervention measures.

The unit of analysis includes employees at the DHSWS, CTMM, and household members on the northern fringe of aforementioned Municipality, namely: Ga-Rankuwa, Mabopane, Temba and Winterveld townships which benefitted from the government sanitation programme post-1994. Table 10 below illustrates the total number of the sampled respondents participated on the study.

Sampled respondents	Sample size
CTMM officials	10
DHSWS officials (Provincial and National Office)	30
Mabopane	20
Ga-Rankuwa	20
Temba	20
Winterveld	20

Table 10: Sampled respondents participated on the study

4.2 Research methodology

Bryman (2016:40) argues that a research method is a technique to collect data. It can involve a specific instrument such as participant observations,

structured interviews or self-administered questionnaires. This study was explanative and descriptive in nature because one of the objectives was to describe the current status of the provision of sanitation and identify challenges faced by the CTMM in the provision of sanitation services in the northern fringe of the City. Therefore, the findings are grounded in reality and not only the researcher's beliefs and the study will contribute to grounded theory.

Ferrell, Lukas, Scrembi and Niininen (2015:90) postulate that descriptive research is conducted to clarify the characteristics of certain phenomena to solve a particular problem and generally demands much prior knowledge. This research was conducted systematically and the following sources were consulted: books, theses, dissertations, websites, public policies, magazines, accredited scientific journals, legislation, government documents, Google Scholar, and reports.

Kumar (2014:26) writes that the qualitative approach is flexible, open and unstructured to enquiry, and is embedded in the philosophy of empiricism which aims to explore diversity rather than quantify, accentuate perceptions, describe, narrate feelings, experiences and perceptions rather than the measurement, and communicate the findings narratively, thereby placing less or no emphasis on generalisations. During data collection the researcher was having structured questionnaire, in addition to this open ended questions were used to gather more information about perceptions on the households benefitted sanitation services in the northern fringes of the CTMM. The quantitative approach, on the other hand, follows a structured, rigid and predetermined set of procedures to explore, underscores the measurement of the objective and variables of the process, gives importance to the reliability and validity of findings, communicates the findings in an aggregate and analytical manner, and draws conclusions and inferences which can be generalised. Moreover, during data collection the researcher quantified information gathered during the study and arrange the findings in figures.

This study adopted a qualitative approach because it focused on how the

delivery of sanitation in the northern fringes of the CTMM was done, experienced and interpreted. The evidence was gathered using a structured questionnaire to gather information from the beneficiaries and government officials. Kuada (2012:95) highlights that a qualitative method allows the participants to raise issues which could be critical towards the investigation including topics which one may not anticipate. Furthermore, the participants can express their perspectives in their own words including their feelings.

4.3 Research design

This study was designed as reflected in Chapter 1 in section 1.8 of this thesis. It highlights what needed to be researched, collected, analysed and achieved. The researcher has described the approach that was used to gather data in the northern fringes of the CTMM. Cresswell (2014:12) states that a research design is types of inquiry within mixed methods, quantitative and qualitative approaches that provide specific direction for procedures. Kumar (2014:33) argues that the main function of a research design is to describe, justify and explain how one will find answers to one's research question, and should include the study design *per se,* measurement procedures, logistical arrangements one proposes to undertake, sampling strategy, frame of analysis and the time frame.

Hakin (2012:10) asserts that from a research design perspective, the fundamental differences between qualitative research and case study is that the latter is concerned with acquiring a rounded overview of a person's life, usually through a variety of methods and sources of information, while qualitative research gathers people's own accounts of events and situations and reports their feelings and perspective. For purposes of this study, the qualitative research methodology was adopted to gather -information from the households benefitted from government programme in terms of the provision of sanitation in Ga-Rankuwa, Mabopane, Temba and Winterveld.

This study sought information related to the provision of basic sanitation in the townships on the northern fringe of the CTMM. According to Yin (2018:1),

there is no formula to utilise case study research, and the more one's questions seek to explain current circumstances, the more this approach would be relevant. The researcher planned to gain extensive insight of the provision of basic sanitation on the northern fringe of the CTMM.

Miles *et al.* (2013:11), highlight that qualitative data accentuates people's lived experiences, fundamentally well-suited to locate the meanings people place on the processes, their lives, events and connects these meanings to the social world around them. The study is qualitative in approach, descriptive and explanative. One of the objectives is to analyse and identify key challenges faced by the CTMM in providing sanitation services under its jurisdiction including the northern fringe of the CTMM with specific reference to Ga-Rankuwa, Mabopane, Temba and Winterveld township. The researcher's findings are grounded not on one's personal belief but grounded in reality.

Primarily, this research utilised a literature review, questionnaire, interview schedule and personal observation. A literature review is a method to gather relevant information on the subject under discussion, and in this instance, the provision of basic sanitation in the northern fringe of the CTMM. The researcher acknowledges the literature and work of other researchers on the provision of sanitation services in the country and in the CTMM. Fink (2013:252) highlights that a literature review is a systematic, evaluative, explicit, reproducible method to identify, and synthesise the existing body of work completed and recorded by scholars, practitioners and researchers. The study consists of scholarly work of current knowledge with substantive findings and it provides both theoretical and methodological contributions towards the subject under study. The following secondary sources were utilised: relevant text books, official government documents such as legislative prescripts and Acts, academic and professional publications and internet sources which were critically analysed.

A questionnaire as a data collection tool was used in this study. The questionnaire that was utilised for this study was relevant to the research cited in Chapter 1 in section 1.8. The study utilised and administered a

standardised questionnaire as a practical method to collect relevant data. Patten (2017:11) highlights that a questionnaire research is economical and yields responses that are generally easy to score and tabulate.

Kuada (2012:95) postulates that when one deals with a subject that people are unwillingly to discuss or uncomfortable with, one may observe as part of one's technique to gather data. Goodwin (2012:142) further states that participant observation is a data collection method which requires the researcher to play an active role in the research and often be in close contact with the people at the site. The researcher may draw inferences of what is observed or utilise observations simply to describe the phenomenon, or even draw personal assessments. During data collection in the northern fringes of the CTMM in Ga-Rankuwa, Mabopane, Temba and Winterveld the researcher observed the cleanliness of the toilet and checked the surrounding area of the toilet if there are no faeces of children.

Given that the researcher is an employee in the DHSWS, responsible for Monitoring and Evaluation of sanitation programmes, this aspect of data collection is invaluable. Relevant officials responsible for the provision of sanitation services in the DHSWS, both in the National and Provincial offices as well as the CTMM department of Water and Sanitation Infrastructure Planning were identified to provide responses to the questionnaire. The same procedure was applied to the household members who benefitted from the government sanitation programme. Inferences were drawn by observing members from households who had benefitted from the government sanitation programme.

During the data collection, the researcher observed the conditions of the toilet facility used by the household members in Ga-Rankuwa, Mabopane, Temba and Winterveld in order to verify if the toilet facility is having water to flush and there is a soap for washing hands and the responses provided by the household members were verified whilst data collection process is carried on. Bacon-Shone (2015:40) postulates that the observation may be significant to gather how people behave but may not provide some of the detail, because people and organisations may respond differently when they are aware that

data is being collected. Observation usually takes place in a real situation, and it involves the collection of existing data.

The researcher observed the functionality of the toilet facility and the cleanliness of the toilets during data collection in the northern fringes of the CTMM. Social research needs a structure or a design before data can be collected and analysis commences. Data was collected through the following approaches: performance reports on the provision of sanitation in South Africa; analysis of secondary data and questionnaires received from officials in the DHSWS responsible for provision of sanitation services across the nine provinces, the CTMM officials responsible for the provision of water and sanitation in the division water and sanitation planning infrastructure and households which had benefitted from the government's sanitation programme in the northern fringe of the CTMM i.e. Ga-Rankuwa, Mabopane, Temba and Winterveld.

4.4 Data collection techniques

The primary and secondary data sources used for data collection in this study were as follows:

4.4.1 Primary data

The empirical investigation included, *inter alia*, the following primary information sources:

- Structured questionnaire to gather rich data that could provide insight into the provision of sanitation on the northern fringe of the CTMM.
- Interviews with knowledgeable and experienced officials responsible for the provision of water and sanitation programmes in both the DHSWS and the CTMM Department of Water and Sanitation Infrastructure Planning.
- Ga-Rankuwa, Mabopane, Temba and Winterveld townships that benefitted from the government's sanitation programme.

4.4.2 Secondary data

Secondary data refers to data that already exists, of which the collection thereof is not undertaken by the researcher. Goodwin (2012:151) postulates that secondary information offers relatively inexpensive responses to many questions, including other information collected by researchers and archived in some form. This empirical investigation included consulting secondary data sources such as the following:

- Relevant text books on water and sanitation services.
- Journal articles (academic and empirical investigation including consulting primary information sources).
- Research reports.
- Official DHSWS and the CTMM documents.
- Legislation (Acts and policies).
- Policy magazines.
- Internet.

The secondary data acknowledged in this thesis was gathered from existing data. The researcher consulted accredited journals, documents accessible to the public, research reports, legislation, policies, annual reports from the DHSWS and the CTMM, text books and the internet. Below, a brief overview of how the questionnaire was applied to gather data.

4.5 Designing and administering the research instrument

The researcher developed a questionnaire to draw perceptions, observations, opinions, and experiences on the provision of basic sanitation in South Africa. The questionnaire was subsequently administered by the researcher to thirty (30) respondents in the DHSWS, ten (10) respondents in the CTMM and to eighty (80) household members who had benefitted from toilet facilities in Ga-Rankuwa, Mabopane, Temba and Winterveld townships.

Rowley (2014:311) highlights that the purpose of a data collection questionnaire is to gather data from the participants whose responses are a sample drawn and selected to represent the wider targeted population. The

advantage of a questionnaire is to gather responses from a large number of participants, and typically utilised in a survey situation.

Bhattacherjee (2012:75) explains that questionnaires are instruments which comprise of open- or closed-ended questions or statements to be responded to or completed in writing by selected respondents in a standardised manner. Kuada (2012:107) highlights that there are two types of questions that one may pose to the respondents. The demographic information from the respondents were collected through closed ended questions. The researcher will ensure that the questionnaire is well-designed to extract maximum relevant data from the respondents. The questionnaire was designed such that the same questions was posed to all the participants. This will enable an increased response rate, easy processing, analysis, and interpretation of data at the end of the study. The research questionnaires were administered in the DHSWS, the CTMM in the Department of Water and Sanitation Infrastructure Planning and on randomly selected sampled households in Mabopane, Ga-Rankuwa, Winterveld and Temba township.

Open-ended questions were utilised to gather more information from the participants. Rowley (2014:314) posits that open-ended questions allow the respondents to express their own views in their own language. Open-ended questions are useful for in-depth insight, although more time consuming to complete and analyse.

4.5.1 Piloting: research questionnaire

A pilot study was conducted on the 20th to 23rd May 2019 before the survey questionnaire was distributed to the targeted respondents. Also, the piloted questionnaire was utilised to determine the length of time the respondents would take to complete, sequencing of the questions, establish whether the respondents clearly understand all the questions without ambiguity and establish whether useful questions have not been omitted.

The pilot questionnaire included the submission of the initial questionnaire to

the DHSWS, both national and provincial offices. The questionnaire was piloted to selected ten (10) officials responsible for the provision of sanitation in South Africa to both rural and urban areas in order to test the proposed study design, test survey length and to obtain advance warning if the study will fail. It was piloted among officials not participating on the study in the DHSWS at the national office to ensure that the questionnaire is well-designed, clear and easily comprehendible before it was sent to the targeted respondents.

After piloting the questionnaire in the DHSWS, comments and suggestions received from the officials were utilised to compile the research questionnaire and conduct an analysis of the data to improve its objectivity and validity. All shortcomings were identified and addressed before the questionnaire was distributed. This pilot exercise assisted the researcher to ascertain how the final tables of the data collected during the survey should be presented and, whether the questions are relevant to the identified objectives of the study. After the successful conclusion of the pilot exercise, the final questionnaire was emailed and hand delivered to the sampled population in the DHSWS, the CTMM in the department of Water and Sanitation Infrastructure Planning and to the households members sampled on the northern fringes in Ga-Rankuwa, Mabopane, Temba and Winterveld.

Prior to conducting the research, permission was sought from the participants through formal letters of request to the identified study participants. The letters included the DHSWS, the CTMM officials and households sampled to participate in the study. It is clearly stated in all communication that this study is conducted for personal academic purposes and not the Department. A letter of permission to conduct the research was sent to the Deputy Director-General Planning and Information Management and the CTMM Strategic Executive Director responsible for the Division of Water and Sanitation.

The purpose and significance of the study was explained by the researcher to the respondents in the covering letter which included the self-administered questionnaire. A copy of the letter granting the researcher permission to

collect data in the DHSWS (both national and provincial offices including the CTMM) was attached. Emails were sent to remind participants of the submission date for the questionnaire and clarify the purpose and significance of the study.

The questionnaires were emailed during the month of June 2019 to the sampled population in the National DHSWS in the following Chief Directorates (Sanitation, Policy and Planning) as well as Department's provincial offices and the CTMM officials in the Water and Sanitation Division. The targeted officials were selected based on experience and knowledge they acquired during the implementation of sanitation programmes.

The gathered data was utilised to measure different responses to the same set of questions. The officials' roles and responsibilities with regard to the provision of sanitation services in the DHSWS are the same irrespective of the office - national or provincial office. National and Provincial sanitation coordinators job descriptions in terms of project management is the same. Appointments for personal interviews were made in advance with the participants in order to follow up on outstanding information not answered fully in the questionnaire. Detailed field notes were taken during the interview.

4.6 Sampling procedure and data collection

Bacon-Shone (2015:35) posits that unit of analysis are sampling elements, and which refer to any countable objects such as households and people. The researcher used purposive sampling technique during the study and the researcher relied on their own judgement when choosing members of the population to participate on the study. This study sampled thirty (30) officials in the DHSWS national and provincial offices who work in the planning and implementation of sanitation services; ten (10) officials from CTMM in the department of Water and Sanitation Infrastructure and Planning involved in the implementation of the sanitation programme; and 80 households which benefitted from the government's sanitation programme in the northern fringe of the CTMM in Ga-Rankuwa, Mabopane, Temba and Winterveld townships.

A standardised questionnaire and interview schedule was utilised to gather data. This process included a semi-structured questionnaire which comprised of open- and closed-ended questions whilst a structured questionnaire was self-administered. Follow-up personal interviews allowed the researcher to pose the same questions to all respondents. This procedure has contributed towards ensuring consistency of the gathered data.

A structured questionnaire has saved considerable time during data analysis and interpretation because it is easier to quantify information. Furthermore, the research was conducted systematically through various secondary sources of data such as sanitation policies, information from the public domain, books, websites of the DHSWS and the CTMM, accredited journals, published reports such as annual reports and Annual Performance Plans, books and magazines published by both the DHSWS.

An observation checklist was compiled and utilised throughout the study. A total of 80 households were randomly selected in Ga-Rankuwa, Mabopane, Temba and Winterveld townships which benefitted from the government's sanitation services programme. The selected respondents were interviewed and sanitation structures built in Ga-Rankuwa, Mabopane, Temba and Winterveld townships observed to determine compliance in terms of norms and standards set by the DHSWS. The information was gathered through observation and tape recordings during data collection. The data collected through observations was analysed, interpreted and recommendations were provided thereon.

DePoy and Gitlin (2013:173) highlight that non-probability sampling is utilised when random selection is not desirable or feasible or when it is not possible to identify a sampling frame. Kumar (2014:41) postulates that non-probability sampling is a sample procedure which does not afford any basis to estimate the probability of inclusion of each item of population in the sample whilst probability sampling is referred to as random sampling. The researcher has used non-probability sampling technique and relied on his own judgement when choosing the participants for the study in the northern fringe of the

CTMM. Bacon-Shone (2015:35) asserts that probability sample is a requirement for all statistical models and hypothesis testing. All sampling units have a known non-zero probability of selection in probability sampling.

Furthermore, the researcher has selected the respondents based purely on his knowledge and credibility regarding the study. The researcher has chosen only the officials in the DHSWS, officials from the CTMM responsible for the provision of sanitation services and household members benefitted from the programme who deemed fit to participate in the study. Purposive sampling technique was used to select respondents namely: senior, middle and junior managers at the DHSWS and the CTMM. These managers are responsible to deliver sanitation services in the country and in the northern fringe of the CTMM.

The questionnaire was administered by the researcher to the DHSWS (national and provincial) employees available at the time of study and willing to participate in the study. The target population includes all levels of management (Assistant Directors, Deputy Directors; Directors and Chief Directors) but exclude Deputy Director General and Director General. Directors and Chief Directors were included as the target population because their primary function is to oversee the implementation of the sanitation programme. The second category of respondents comprises of deputy directors because they possess technical skills and information of how sanitation is implemented. The third category of respondents comprises of assistant directors because they interact at the level at which the actual work is performed and the impact is felt and either contained or rejected. Table 11 below illustrates sampled respondents in the DHSWS.

Sampled respondents in the DHSWS according to levels (National and Provincial)	**Sampled size**
Directors	2
Deputy Directors	16
Assistant Directors	12

Table 11: Sampled respondents in the DHSWS (National and Provincial officials)

This implied that the targeted respondents have offered credible insight into the study because they are adequately knowledgeable and responsible for the provision of sanitation services in the DHSWS. Measures were undertaken during the study to ensure that the sample is representative, i.e. number of years' experience, gender, age and race. The respondents from the DHSWS has been involved in the provision of sanitation with more than ten years working experience.

4.7. Monitoring data collection instruments

A submission deadline was determined and presented to all the respondents to complete and return the questionnaire on the 26 August 2021. These deadlines were utilised as a control measure to promote a higher response rate. A short deadline rather than a lengthy one ensured that the respondents responded swiftly and submitted all completed questionnaires timeously. A written reminder was sent to the respondents to submit the completed questionnaire before the due date. A date was set aside to follow-up with non-respondents after the submission date had elapsed.

The researcher undertook fieldwork to obtain additional information on the questions those were not adequately addressed by the respondents, by visiting selected officials in the DHWS, Provincial DHSWS, and CTMM and conducted one-on-one interviews with the selected respondents. Appointments for interviews were arranged in advance, and the respondents were provided with information on what is required.

To enable the researcher to trace non-respondents or respondents who have submitted the incomplete information, the researcher distributed self-administered questionnaire by hand to the beneficiaries in Ga-Rankuwa, Mabopane, Temba and Winterveld townships during data collection. All completed questionnaires were verified by the researcher as soon as they

were received from the respondents to ensure that all questions are answered.

4.8 Data analysis

Research questionnaires which were collected from the respondents participated on the study and responses gathered from interviews were utilised as a primary source of data collection. The responses from the DHSWS national and provincial offices were grouped together by the researcher during data analysis. Tie et al (2018:4) states that concurrent data collection and or data generation and analysis is fundamental to grounded theory research design. The researcher analysed each question and grouped the responses provided for the same question by all the respondents in the national and provincial offices. The questionnaires from the government sanitation programme beneficiaries in Ga-Rankuwa, Mabopane, Temba and Winterveld were grouped based on each township. The qualitative and quantitative data was analysed manually and only the main categories from questions contained in the questionnaire and text analysis were utilised to interpret the findings. The responses were captured manually as provided by the respondents with a view to not distort the facts. The information was interpreted based on actual responses provided by the respondents.

4.8.1 *Categorisation of data and data coding*

Miles *et al*. (2013:12), postulate that data condensation occurs continually throughout the life of any qualitative project, and refers to the process of focusing, transforming, selecting, abstracting the data that appears in the full corpus of interview transcripts, documents, written up field notes and other empirical materials. The data was labelled and coded, the researcher used Statistical Package for the Social Sciences (SPSS version 16.0) to identify similarities and differences easily.

The collected data was re-arranged and re-categorised by breaking it down into units, and open a filing system for the information. All gathered information was entered in a computer programme for coding, counting and analysis. This has assisted the

researcher to establish commonalities and compare themes through grouping. Categories of information that were grouped is presented below:

- Group personal information.
- Implemented sanitation legislation and policies.
- Types of dry sanitation structures implemented.
- Household information.
- Government's responsibility: provision of sanitation services.
- Implement agents' responsibilities.
- Councillor participation in projects.

Data analysis is concerned with reducing the large body of information, which is fundamentally about reducing gathered data to read logically. The researcher utilised content analysis to categorise data which was collected verbally during follow-up interviews, for purposes of classification, tabulation and summarising. The information was categorised by grouping information, which would involve data coding and labeling (Bryman, 2016:11).

4.8.2. *Presenting data*

Raw data gathered from questionnaires, follow up interviews, participant observation and field notes were analysed. Tables and charts were utilised to categorise data collected from the field. Thereafter findings were presented in themes as sections with relevant sub-sections.

4.8.3 *Storing and destroying research data*

The gathered data was stored in a safe accessible only to the researcher. To ensure further confidentiality, emails and data stored on the computer was password protected. All collected data will be destroyed after a period of five (5) years from the date of publication of this study.

4.9 Validity and reliability

Data collected during the study in the northern fringe of the CTMM raised issues of validity and reliability. The primary data which was gathered for this

study was considered valid and reliable because the information was sourced directly from the officials involved in the provision of sanitation services in the DHSWS. In this study the questionnaire and interview schedule were utilised as an instrument that is accurate to measure the intended goal to achieve the objectives of the research. Ferrell, Lukas, Scrembi and Niininen (2015:90), hold that the research method must measure what it is supposed to measure thereby ensuring validity. For this study, a questionnaire was developed based on the reviewed theoretical framework and ensured that the collected data is validated by interviewing experts.

Ferrel *et al*. (2015:90), hold that in designing the research, it must be ensured that if the techniques produce almost identical results in repeated trials, it is considered reliable. Baumgarten (2012:5) defines "reliability as the consistency of measurements of a concept using an identical measurement procedure, and the replicability of the findings. Reliability is often subdivided into internal and external. Internal reliability described the consistency of the indicators whilst external reliability established whether the findings can be generalised beyond the specific research context".

Bacon-Shone (2015:53) postulates that reliability means consistency of the same results when measuring repeatedly. Although the participants were from different provinces, the majority of the responses in terms of provision of sanitation was the same which yielded consistent findings. The study dependent on sanitation officials as the primary source of information for this study, because the officials are responsible for the provision of sanitation services. The researcher also utilised the same questions in Chapter 1 section 1.7 for all the sanitation officials and at no point the respondents were led to respond in a specific manner or direction. The gathered data was considered reliable because the information was collected from the primary source, that is, respondents responsible for the provision of sanitation in both rural and urban areas in the DHSWS and the CTMM.

4.10 Limitations of thestudy

The researcher mitigated both the non- response and response errors

beforehand. The researcher ensured that the data is not difficult to analyse and the analysis is not time consuming. The respective respondents were provided with deadlines for submission of the completed questionnaire. Some questionnaires were collected personally from the respondents benefitted from sanitation programmes in Ga-Rankuwa, Mabopane, Temba and Winterveld townships. The study was delayed because certain respondents from the DHSWS Provincial offices and CTMM did not submit their responses timeously, only 118 research questionnaires received.

Rowley (2014:314) posits that one of the limitations of questionnaires is that one will never know whether the respondents had taken time to provide accurate data, or understood the questions. The researcher revisited all completed questionnaires immediately after data collection to Unanswered questions could be as a result of the respondent being unwilling to provide certain information, lack of time, bored, do not have an opinion or understand the question. The researcher ensured that all the questions were answered by the respondents. The researcher pretested the questionnaires before the study and ensured that all questions in the questionnaire were worded in a similar manner to make them easy for respondents to read and understand them.

4.11 Conclusion

Chapter 4 addressed the adopted research methodology for this study as discussed in Chapter 1 in Section 1.8. The following research paradigms appropriate for this study included in Chapter 4 are research design, sampling techniques, data collection techniques, data analysis, piloting research questionnaire, monitoring data collection instruments and limitations were expounded upon. The qualitative and quantitative research methodologies utilised in this study were discussed in detail. Both the quantitative and qualitative methodologies were adopted for the study and the two types of data created a solid foundation for drawing conclusions about the intervention of the study and also provided validation for each other. Furthermore, the researcher discussed the qualitative research methods that described real situation

experienced by the respondents in the northern fringes of the CTMM in Ga-Rankuwa, Mabopane, Temba and Winterveld. The following chapter focuses on data collection, i.e. questionnaire responses, how these were analysed as well as presentation of the research findings in Section 5.2.

CHAPTER 5

EMPIRICAL SURVEY: PROVISION OF SANITATION SERVICES IN THE NORTHERN FRINGE OF CITY OF TSHWANE METROPOLITAN MUNICIPALITY

5.1 Introduction

Chapter 4 in section 4.3 analysed the research design, methodology of the study and data collection techniques. The research questionnaires utilised in the study explored the effectiveness and efficiency of the provision of sanitation in the CTMM. This chapter presents and discusses the results gathered by the researcher during the study. The questionnaire was structured to gather information that would respond to the primary research questions listed in Chapter 1 in section 1.7, section 5.4 to section 5.8 of this thesis. Although every effort was made to ensure that key officials respond to the research questionnaire, it should be noted that participation was voluntary and the respondents could withdraw at any time.

The questionnaire was designed such that it gathered data based on the experiences of the respondents in annexure B and C involved in the provision of sanitation services. The questionnaire was categorised into three sections, i.e. DHSWS National and Provincial offices, CTMM officials and households which had benefitted from the government sanitation programme in the northern fringe of the CTMM in Ga-Rankuwa, Mabopane, Temba and Winterveld townships.

The content of the structured questionnaire utilised to gather data collection ranged from the broad understanding of the sanitation planning instruments, legislation, relevant frameworks, regulations, policies, sanitation technologies, alternative service delivery options, challenges faced with the current implementation approach, impact of government sanitation programme on households which had benefitted from the service, possible recommendations and interventions to manage the challenges. Annexure A to C of the

questionnaire comprised primarily of open- ended questions to provide the respondents an opportunity to express themselves based on their experiences without limitations.

A case study approach in qualitative research methodology was adopted for this study. The information acquired during the study was evaluated and the findings related to the provision of sanitation in the northern fringes of the CTMM were presented. The challenges encountered during the study in the northern fringes of the CTMM and the findings are also presented. The researcher administered questionnaires and the data was gathered from the officials responsible for the provision of sanitation services in the DHSWS, the CTMM and from the households which had benefitted from the government sanitation programme in the northern fringes of the CTMM.

5.2 Qualitative research findings

Department of Human Settlements Annual Report (2016) reveal that the DHSWS is a sector leader in terms of sanitation services. Furthermore, CTMM is responsible for the provision of sanitation in the northern fringes of the C. In order to gain a thorough CTMM understanding of the context of the provision of sanitation in the northern fringes of the CTMM in Ga-Rankuwa, Mabopane, Temba and Winterveld townships, the questionnaire was structured to elicit information to respond the primary research questions listed in Chapter 1 of this study. Moreover, follow-up interviews were also conducted with certain respondents.

The effort was made to ensure that key officials from the DHSWS and CTMM as well as household members in Ga- Rankuwa, Mabopane, Temba and Winterveld who had benefitted from the government sanitation programme responded to the questionnaire. It should be noted that the response process was voluntarily. The in- depth interviews were conducted with randomly selected members of the households who had benefitted from the government programme in Ga-Rankuwa, Mabopane, Temba and Winterveld and the

officials in the DHSWS based in the National office.

The aim of the research was to evaluate the provision of sanitation and assess the development of new intervention strategies and responses to the research questionnaire was captured. A pilot study was conducted in the DHSWS beforehand to identify probable gaps on the research questionnaire. The questionnaire was emailed to the respondents in the DHSWS National and Provincial offices including the CTMM. The researcher travelled to the identified randomly selected households to gather data in Ga-Rankuwa, Mabopane, Temba and Winterveld townships.

All the interviews were audio-taped and detailed field notes were taken from the responses. The completed questionnaires received from the DHSWS National and Provincial were analysed together, while those from the CTMM were also analysed but separately. Those from townships were recorded according to respective townships. No personal details such as names, position, office numbers and household details were recorded to reassure the respondent's anonymity. Only opinions, thoughts and concepts which were expressed by the respondents during the data collection phase were noted.

5.2.1 Observations

There are two primary categories of the observational methods namely: laboratory and naturalistic observation. The observational method which is also referred to as field observation, human and animal behaviour is observed closely. The naturalistic method has a major advantage in that the researcher observes the participants in their natural environment (Hale, 2016:online). Observation implies that the researcher is an outside observer and takes closely monitors what takes place in a specific situation in the townships.

An observer is a participant but focuses primarily on his or her role as observer in the situation (Maree, 2012:83). The researcher looks for patterns of behaviour in a particular community to make sense of the social dynamics, as well as comprehend the participant's assumptions, values and beliefs. However, the researcher remains isolated and does not influence the

dynamics of the setting. For this particular study, the toilets from which the selected participant households had benefitted from sanitation programme in the northern fringes of the CTMM were observed by the researcher to check health and hygiene user education. The situation was investigated by the researcher during data collection to identify and address probable shortcomings in terms of health and hygiene user education.

5.2.2 Case study method

The case-study method was adopted for this study in the northern fringes of the CTMM in Ga-Rankuwa, Mabopane, Temba and Winterveld, which involved an in-depth investigation about the real situation of the provision of sanitation by the DHSWS and the CTMM (unit of analysis) as an institution of government. The case study was utilised as a methodology to conduct an in-depth investigation on the provision of sanitation. The objective was to understand the boundaries of the research and complexity of the behaviour patterns of the beneficiaries who had benefitted from the government's sanitation programme and to acquire the richest possible detail of the circumstances. It was found that the beneficiaries of sanitation services in the northern fringes are happy with sanitation services provided by government.

5.2.3 Interviews

For the purpose of this study, the questionnaire and interviews was planned precisely. The researcher distributed the questionnaires to the target group through emails to the officials in the DHSWS and the CTMM as one of the best methods of conducting research. Emailed questionnaires provide higher response rates compared to most other methods. The interviews were conducted in a pleasant and transparent manner. All the participants were assured of their anonymity if they chose to participate in the research interviews. Appointments were made in advance with the respondents in their offices at the DHSWS in the Chief Directorate National Sanitation Services and selected households who had benefitted from the government sanitation programme in Ga-Rankuwa, Mabopane, Temba and Winterveld townships. An objective stance was maintained throughout the interview to distinguish

between the perceptions of the respondents, facts and those of the researcher. Interviews were conducted with selected households and officials in the DHSWS. The respondents from the DHSWS, the CTMM and households beneficiaries in the northern fringes of the CTMM considered the open-ended questions as more convenient to express themselves in detail than writing.

5.3 Research findings

The DHSWS is a sector leader in terms of the provision of sanitation services in South Africa. The respondents were sampled from the DHSWS national and nine (9) provincial offices. The results of the study provided insight into the provision of sanitation services to ensure that communities have access to sanitation services as highlighted in Chapters 1 and 2 of this study. The responses from the households members in the northern fringes of the CTMM mentioned that the provision of sanitation services has impacted positively on the households who gained access to sanitation services through the government sanitation programme. Thirty (30) research questionnaires were distributed equally to the DHSWS National and Provincial offices.

The researcher distributed ten (10) questionnaires to the CTMM officials involved in the provision of sanitation services. CTMM was identified as a sole authority responsible for the provision of sanitation services in Ga-Rankuwa, Mabopane, Temba and Winterveld townships. The Water and Sanitation Planning Infrastructure Department in the CTMM is responsible for the bulk water supply, sanitation services, infrastructure planning and development. The questionnaire for the households members were utilised to examine the roles and responsibilities of municipal officials in terms of planning, regulation, implementation, monitoring, reporting and engagement with communities identified as beneficiaries from the sanitation programmes. The data was analysed according to each statement as presented in the questionnaire.

The household's members benefitted sanitation services from government programmes in the northern fringes of the CTMM was surveyed for the purpose of this study. It was revealed that three wards comprised of a mix of

dwelling types, that is, formal houses such as self-built and RDP houses in Ga-Rankuwa, Mabopane and Temba while Winterveld township comprised of self-built houses and privately-owned property. The classification of the dwelling type on the northern fringes was of significance for this study as this dictated the type of sanitation services either accessed or not by members of the household.

A total of eighty (80) questionnaires were administered to the households which had benefitted from the government sanitation services programme in the northern fringes of the CTMM in Ga-Rankuwa, Mabopane, Temba and Winterveld; 60 questionnaires were administered to the beneficiaries in the formal sections of the northern fringe (Ga-rankuwa, Mabopane and Temba), while 20 to the beneficiaries in the informal section of Winterveld. The separation of the two settlement patterns in the northern fringe of the CTMM was necessary because it was observed that the formal sections are provided with waterborne toilets while the informal sections (Winterveld) Ventilated Improved Pit Latrines.

The research was conducted with the sampled households to establish the impact of sanitation services provided by the municipality. The household questionnaire was utilised to examine the behaviour, attitudes, knowledge and levels of the beneficiary's satisfaction of the sanitation services by the CTMM. The questionnaire analysis adopted both the qualitative in terms of in-depth interviews and quantitative techniques through descriptive research in order to gather the presented data discussed in the study.

The household questionnaires were administered by the researcher who was accompanied by a resident of the township to those who had benefitted from the sanitation programme. The councillors was informed about the study that took place in his ward. Due to many residents' low level of education in the certain areas identified for the study, translation from English to Tswana was necessary in certain households. The sampling method utilised by the researcher for the selected households was random systematic sampling (RSS), which is more representative than random sampling.

5.3.1 Problems encountered during the survey

All the questionnaires which were distributed to the DHSWS were returned to the researcher. Several questionnaires comprised of inadequate information. Consequently, the researcher had to follow-up with the respondents to gather more information to the unanswered or partially completed questionnaires. The researcher, who is employed by the Department had the advantage in the sense to secure appointments with the officials of the DHSWS.

Several questionnaires were distributed to randomly selected household respondents comprised of gaps, especially those which were handed to those households by researcher. The researcher administered the study to the same group of respondents and compared the responses at the two time points. The narrative section comprised of several gaps due to lack of clarity in questions. Consequently, the researcher had to follow-up with the respondents to acquire detailed information through one on one interview.

Despite numerous efforts to gain a full comprehensive survey, there was limited co-operation from the CTMM municipal officials. Only nine (9) out of ten (10) municipal officials responsible for the provision of sanitation services responded and returned the questionnaire. Limited responses were received from the CTMM after two (2) months. The sampled respondents from the CTMM agreed to participate in the study but the responses were not provided. As a result, only one hundred and eighteen (118) questionnaires could be administered as opposed to the initially planned 120 questionnaires.

5.3.2 Ethical considerations

Ethical considerations were considered throughout the study. Prior to the data collection process, ethical approval (Annexure F) was granted by the Ethics Committee of the University of South Africa. Voluntary participation in the

research was accentuated in the ethics application. Moreover, the participants were informed of their rights to withdraw from the study at any stage if they wished to do so. The respondents from the DHSWS, the CTMM and household members benefitted from sanitation programme in Ga-Rankuwa, Mabopane, Temba and Winterveld participated on the study on the basis of informed consent. Furthermore, the researcher provided adequate information and assurances of the implications of participation and to reach a fully informed decision, without pressure or coercion.

The use of discriminatory, offensive or other unacceptable language was avoided in the formulation of the questionnaire and interview schedule. The respondent's privacy and anonymity was of paramount significance during the study. The researcher acknowledged the works of other authors, academic scholars acknowledged in the thesis through the Harvard in-text source referencing method.

5.4 Section A: Respondents' biographical information

Section A of the questionnaire concentrates on the respondent's biographical profile in order to provide and understand background of the participants. The researcher established the biographical profile of the respondents for statistical purposes, that is, the opinions of the household member who benefitted a sanitation facility from government sanitation programme. The profile considered gender, home language, race group, age group and individual's highest qualification (refer to Annexure A).

5.4.1 Gender of household members who had benefitted from government sanitation programmes in Ga-Rankuwa, Mabopane, Temba and Winterveld townships

The purpose of this question was to establish the percentage of males and females who responded to the questionnaire in the selected households which had benefitted from the government sanitation services in the northern fringe of the CTMM in Ga-Rankuwa, Mabopane, Temba and Winterveld townships. It was deemed important to highlight gender issues in the study in order to

understand response rate in terms of women and men participated on the study, especially when recommendations were provided.

The study identified the number of males and females who had participated in the study. The reviewed literature suggests that women in any given societal grouping are generally the majority as far as the provision of sanitation is concerned. The respondents' gathered from the questionnaires for Ga-Rankuwa, Mabopane, Temba and Winterveld townships were as follows:

Gender	N=80	Percentage
Male	28	35
Female	52	65

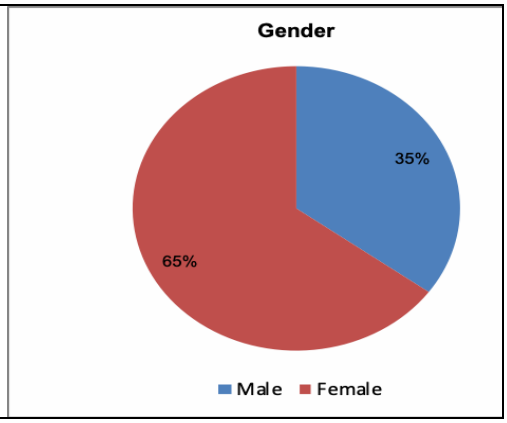


Table 12: Respondents gender

The response to this question revealed that 52 females participated in the study than males. The findings also revealed that in most instances during the study, women were in their homes attending to household chores while the men were either at work or loitering around the townships due to high unemployment rate. Traditionally, females play key roles in terms of the provision of sanitation compared to men. Women in most instances are more vulnerable to severe consequences from sanitation related diseases.

Many women become prisoners of daylight as they are unable to defecate in open spaces and they must ignore their natural bodily functions, they only use toilet facilities only the night as privacy. Certain respondents, especially the men, were not comfortable with the researcher's request to participate in the study as sanitation is not important like water, but expressed concern about the poor sanitation services. Initially, the respondents were sceptical to participate in the research until the consent letter was distributed to them and

the purpose of the questionnaire was purely for academic purposely only.

From the interaction with the identified selected respondents, it was inferred that opportunities be created for men and women to participate in the study, and thereby possibly contribute towards probable changes in the CTMM in Water and Sanitation Infrastructure Planning department, which is responsible for the bulk water supply, sanitation services and the infrastructure planning and development.

5.4.2 Home language

The purpose of this research question was to establish the selected respondents home language as home language plays a major role in terms of reading and understanding the research questions. Home language is considered a medium for communication therefore it naturally becomes a research resource during data collection. The findings revealed that 64% of the respondents are Tswana speaking, 20% Tsonga speaking, 1% Xhosa speaking while 15% indicated other language. Table 13 below illustrates the respondents' home language.

Home Language	N=80	Percentage
English	0	0
Afrikaans	0	0
Tsonga	16	20
Tswana	51	64
Xhosa	1	1
Other	12	15

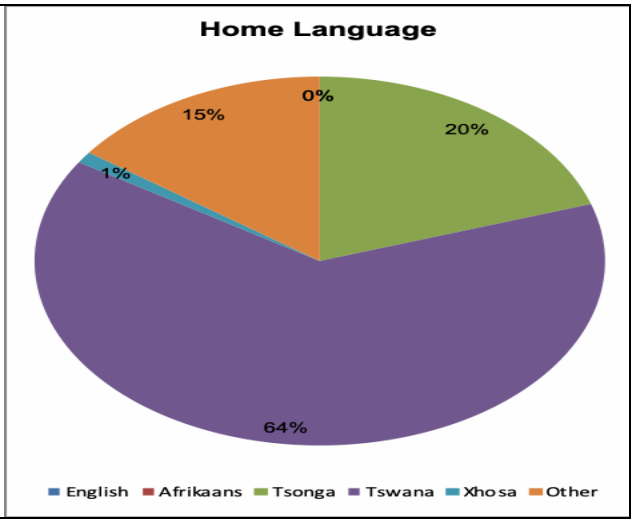


Table 13: Respondents home language

It is evident that the majority (64%) of the residents are Tswana speaking and they have a satisfactory understanding of English as a medium of communication and the respondents were able to complete the questionnaires

in English. During the study the researcher followed-up with the respondents to establish whether they could respond in English.

5.4.3 Race group

The purpose of this question was to determine the racial group of the respondents who participated on the study in order to understand which group of race participated on the study. The pie chart below illustrates the respondents in the northern fringe of the CTMM responses:

Race group	N=80	Percentage
African	80	100
White	0	0
Indian	0	0
Coloured	0	0
Other	0	0

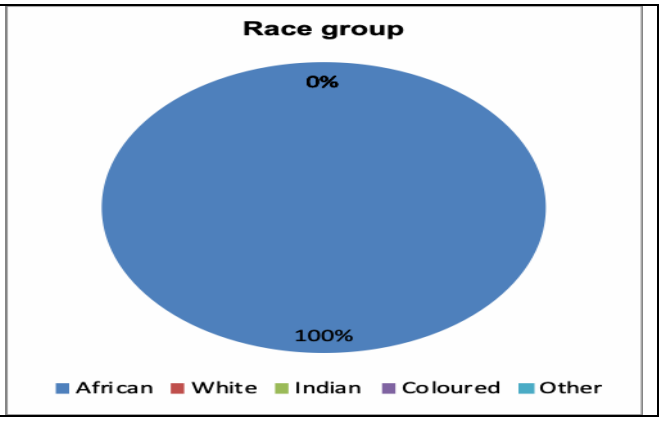


Table 14: Respondents race group

All the respondents (100%) who participated on the study are African. The objective of an in-depth understanding of the racial groups who participated in the study was to establish whether sanitation services are equally provided across the country's racial groups and in the northern fringe of the CTMM. A respondent's race may influence his or her response to the study.

5.4.4 Respondents age

The purpose of this question was to determine the number of respondents per age group who participated in the study. The randomly selected participants from each household had to be over the age of 18 because they are considered matured to provide reliable responses to the study. Furthermore, age of the respondents will assist the researcher to understand which age

group have participated on the study as most respondents participated on the study were beneficiaries. The following responses were gathered from the respondents: 10% were between 18 and 24 years of age, 7% between 25 and 35, 29% between 36 and 45, 43% between 46 to 60 while 11% were over the age of 60. The respondents between 46 and 60 years of age showed much concern of the sanitation services in the townships in the northern fringes of the CTMM as sanitation is of outmost importance for their health. Table 15 below illustrates the respondents' age groups.

Age	N=80	Percentage
18 – 24 Years	8	10
25 – 35 Years	6	7
36 – 45 Years	23	29
46 – 60 Years	34	43
Over 60 Years	9	11

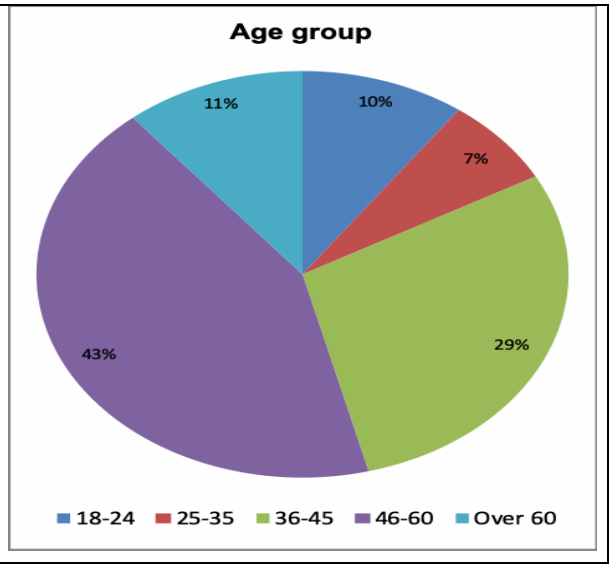


Table 15: Respondents age group

The gathered data revealed that the remaining 11% were older respondents aged over 60 years and dependent on government grants, pension and unable to pay for basic sanitation services due to spillage in their yard. A total of 7% of the sampled respondents were between the age of 25 and 35 years. The majority of respondents (43%) who participated in the study are aged between 46 and 60. The purpose of this question was to determine the respondents' highest education qualification and this will give the researcher an understanding of the level of education of the beneficiaries participated on the study. The respondents who completed a diploma / degree at a college or university may respond to questions differently compared to those who may have left school after completing grade 8 or had not been to school.

Highest Education	N=80	Percentage
No Schooling	13	16
Up to grade 8	29	36
Matric	33	42
Diploma / Degree	5	6
Other	0	0

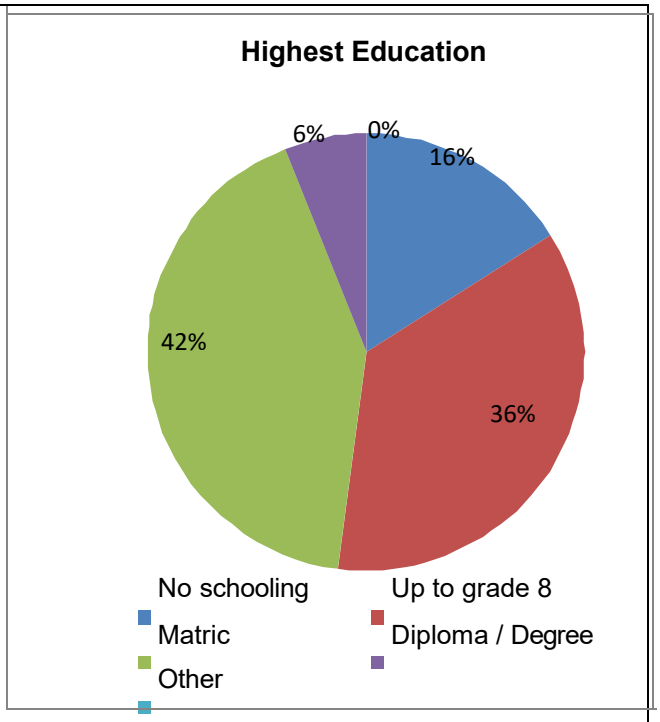


Table 16: Respondents highest education

The level of education of the respondents determines the level of understanding of the developmental issues, especially the provision of sanitation in households or townships. The objective of this question was to establish whether the respondents understood the Municipality's responsibility to provide sanitation in their area. The findings revealed that many of the respondents are not in possession of either a Diploma or Degree which is a matter of great concern. The majority of the respondents (42%) have a Matric qualification and are literate in English.

5.5 Household members responses: provision of sanitation services

The responses to the research statements in this section of the questionnaire is summarised in the tables and pie charts provided below. The responses in this section are related to the third objective of this research study namely: to assess sanitation services provided by the CTMM, to the northern fringe townships in Ga-Rankuwa, Mabopane, Temba and Winterveld townships. The

objective was to establish key challenges faced by the CTMM in providing sanitation services in the northern fringes in Ga-Rankuwa, Mabopane, Temba and Winterveld. The results were analysed based on the frequency of the responses.

The open-ended questions and comments in Section B of the questionnaire afforded the respondents the opportunity to list any successes, problems and or challenges in the provision of sanitation services. This information was required to establish the level of adequacy of the provision of sanitation services and to serve the needs of households in the northern fringe of the CTMM such as Ga-Rankuwa, Mabopane, Temba and Winterveld township. Urban sanitation refers to adequate treatment and disposal of human excreta and sewage, and the process involves sewer wastewater treatment and the water emitted to the river after it is treated. Figure 7 below illustrates the process flow of urban sanitation in Ga-Rankuwa, Mabopane and Temba, i.e. ventilated improved pit, full flush toilet connected to the sewer; sewage is cleaned at the waste treatment works; and chemicals are added to kill germs in the waste, and the treated water is emitted to the river.

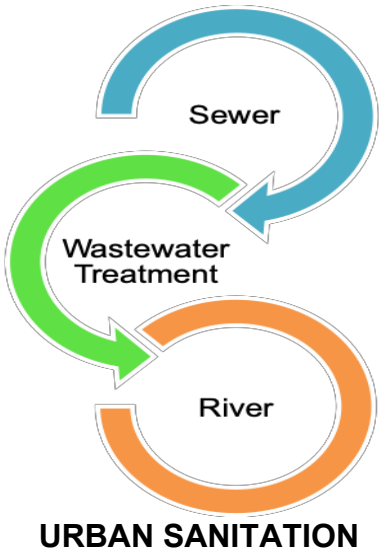


Figure 7: Urban sanitation process

The above figure illustrates the process flow of urban sanitation; full flush connected to the sewer; waste directed to wastewater works for treatment and directed to the river after being treated.

Figure 8 below illustrates the process flow of rural sanitation when implemented in communities. The rural areas such as Winterveld are experiencing problems especially when the pit toilets are full. The household members are provided with Ventilated Improved Pit Latrines. However, the Municipality is responsible to remove faecal sludge and clean the pits in their area of jurisdiction.

Process flow diagram of rural sanitation of the household

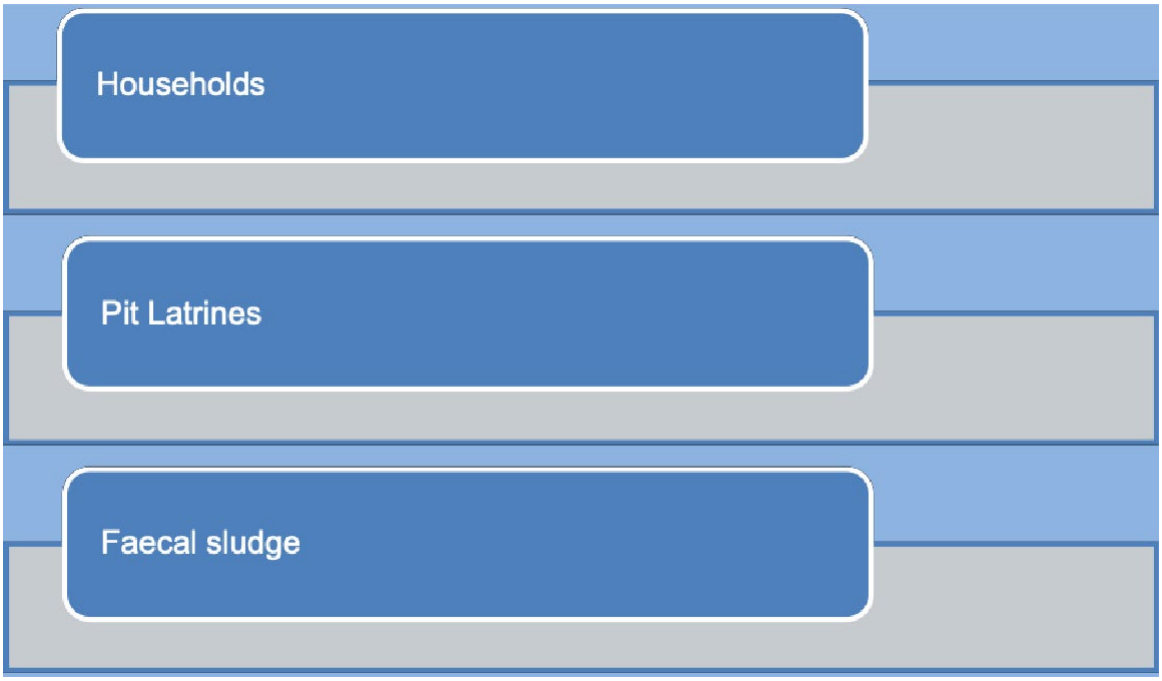


Figure 8: Rural sanitation process

Source: Researcher

Figure 8 above illustrates the process flow of rural sanitation. The household receives a toilet facility - pit latrine (government provide households with ventilated improved pit latrines). The faeces turns into a sludge which must be removed by the municipality or household when it is dry.

5.5.1 Analysis and interpretation of household empirical data

A household is a basic residential unit for the families to reside in. A household survey was conducted to understand the general situation and specific characteristics of individual and all households who benefitted from

the government sanitation programme. The information was required to determine the impact of the provision of sanitation in the northern fringes of the CTMM. The participant's responses were recorded.

During a household survey, the researcher investigated and recorded facts, observations and experiences from the randomly selected households which were representative of all in the study area. Tools utilised to gather data included a questionnaire, observation and audio tape records used during follow up interviews.

Question HB.1 ***Have you benefitted from your municipality's sanitation facility*?**

The purpose of this open-ended question was to establish whether the respondents had benefitted from a sanitation facility provided by the CTMM. Furthermore, it was also of significance to determine whether household members were aware of the provider and management of sanitation services in the townships namely Ga-Rankuwa, Mabopane, Temba and Winterveld; and confirm that it is the national government and the CTMM which provides sanitation services in the area. The responses revealed that the respondents are aware that their main provider of sanitation services is the CTMM and the researcher observed cleanliness of the toilet facility in order to determine if household's members practices health and hygiene user education. The responses were recorded as illustrated below:

Have you benefitted a sanitation facility from your municipality?	**N=80**	**Percentage**
Yes	70	88
No	10	12

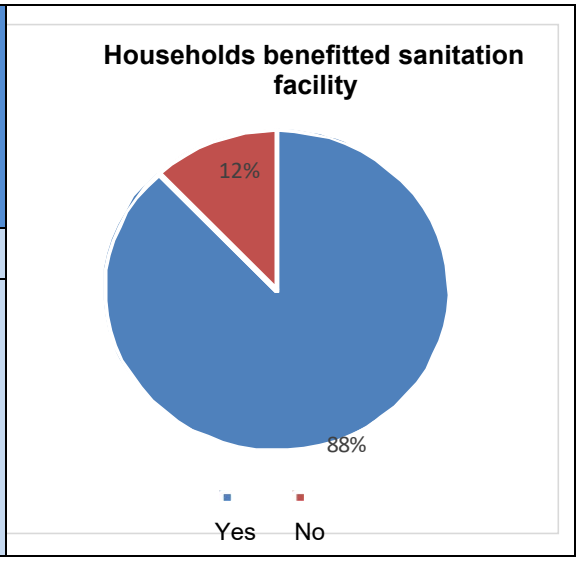


Table 17: Households which benefitted from government sanitation

programme

The majority of the respondents, 88%, agreed that they had benefitted from the CTMM sanitation facility. The responses were objective, the household members provided independent responses based on one's personal beliefs. Hence, it can be inferred that the residents were familiar with or had been informed of the sanitation services provided by the Municipality in the townships. Of the 88% respondents who benefitted from the government sanitation programme, 12% has received a ventilated improved pit latrine (VIPL).

Charman, Tonkin, Denoon-Stevens and Demeestere (2017:12) posit that rural and urban settings are affected by a racial–spatial divide as a result of apartheid. Apartheid urban planning established townships on the fringe, often distant from the central business districts and minority white neighbourhoods, but close to industrial centres. The relationship between Ga-Rankuwa, Mabopane, Temba and Winterveld townships, and Rosslyn industrial area should be considered with the context of the apartheid regime to encourage black urbanisation in the homeland. Land use as well as access thereto in the townships was strictly controlled. The objectives of the apartheid state was multiple, that is, restrict residents from operating businesses and independently embrace entrepreneurship, inhibit the encroachment of township settlements onto adjacent land, enable the state to exercise maximum political control and preserve and foster a residential dormitory characteristic to the settlements whereby the residents were afforded access to certain urban labour markets (low wage and unskilled).

The researcher followed-up with the respondents who had indicated that they had not benefitted from the government programme. It was revealed that 12% of the respondents who had not benefitted from the government’s sanitation programme were from Winterveld township and reside on privately-owned land. The Municipality is expected to provide sanitation services to its communities and landlords are encouraged to provide acceptable sanitation services to their tenants on privately-owned land.

Clearly, local residents in Winterveld township have the perception that local management of water services is poor and inadequate. The researcher is aware (clearly illustrated in the responses during data collection) that local residents had not been involved in the planning stages of the provision of sanitation, especially in Winterveld township. Households which had benefitted from a Ventilated Improved Pit Latrine (VIPL) provided by CTMM do not understand why waterborne sanitation had not been installed instead. The researcher is mindful that no consultation had taken place between the respective Ward Councillors and Winterveld beneficiaries regarding sanitation technology options provided by the CTMM. Picture 3 below illustrates a Urine Diversion System which a household in Winterveld township had benefitted from the government sanitation programme.

Picture 3: Urine Diversion System: residents in Winterveld had benefitted from the government sanitation programme

Source: Author (2019)

The above picture illustrates the toilet facility (urine diversion toilet). The Rand Water in partnership with the CTMM is involved in a community sanitation

project in Ten Morgan, the most rural part of Winterveld. The key objectives of the sanitation project in Winterveld is to achieve health improvement by changing current poor hygiene behavioural practices and improve sanitation facilities by constructing Urine Diversion System (UDS) and ventilated improved pit latrine (VIP) toilets (Rand Water,n.d: Online).The urine diversion system (UDS) remains one of the most cost-effective ways of providing sanitation to peri-urban areas such as Winterveld township (Rand Water, n.d.: Online). The researcher had observed that the residents understand how the latrine works. The UDS latrine is simple to use by households members, the waste drops into the pit, where organic material decomposes and liquids seep into the surrounding soil. A urine diversion system allows continuous airflow through the top-structure and above the vent pipe, it eliminates smells and releases gases into the atmosphere. A urine diversion system, as observed during site visits in Winterveld township did not make provision for people with special needs.

The beneficiaries / users are taught to close the toilet facility after use to maintain a darkened interior because insects which enter the pit are attracted towards the light at the top of the vent pipe and trapped by the fly screen. From personal observation, it was noted that compliance in relation to the use of soap and water to wash hand was noticeably low after using the toilet. World Health Organization (2019:13) states that hygiene interventions include promoting handwashing with soap at critical times. Handwashing facilities with soap and water is included as a hygiene indicator under the household SDGs. This was despite lessons provided of the significance of health care and hygiene. Unfortunately, numerous users ignore the importance of washing hands. This was also observed during data collection.

An inspection of selected toilets during data collection revealed that the toilet seat was not closed, some toilets were dirty with a bad smell and multiple flies circled the toilet pit. Furthermore, the researcher, who is an employee of the DHSWS is aware that many South Africans reside on the land which they do not own and is generally located on commercial farming land. Many of these individuals are unemployed and live on privately-owned land without sanitation services. The household members in Winterveld utilise unsafe and inadequate sanitation services at higher risk of contracting sanitation-related

diseases. Picture 4 below illustrates poorly maintained pit toilets used by Winterveld residents living on privately-owned land. The facility poses a danger to residents, is unhygienic, bad smell emit from the facility and multiple flies swarm over the toilet seats.

Picture 4: Toilet and doors collapsing

Photo: Researcher (2019)

The Winterveld township area belongs to smallholding owners and the landlords own the land for agricultural farming. The layout of Winterveld housing within each plot is informal in character which constitute a large scale irregular subdivision of the agricultural smallholdings into rented portions resulted in haphazard homestead sizes and road patterns (WRC,n.d. Online). During the interview the respondents living on privately-owned land pointed out that it would not be an easy task to tackle the issue of poor sanitation because most of the landlords are wary of having their serviced by government due to communities occupying land as soon as there are signs of development in the area.

Observation of privately-owned land in Winterveld revealed that the condition of the toilets constructed by landlords on privately-owned land was extremely poor and unsuitable for humans. The structures constructed by the landlords were mostly made of bricks and roofed with iron sheets. The toilets were inspected to verify the participants responses, that is, the toilets are very poorly constructed, unhygienic, shallow and unsafe for use. Some walls had cracked with signs of probable collapse at any time which poses a danger to the residents and their children. The researcher observed that certain residents used the bush close to relieve themselves and the ground was littered with an unbearable stench of faeces. A closer inspection of the toilet facilities revealed that on privately-owned land, provision had not been made for persons with special needs. The top structure of the toilet was not sturdy enough, which rendered the facility unsafe for the disabled to utilise the toilet. Due to the unhygienic conditions and inconvenience to access the toilet, most of the community reverted to unhygienic ways to meet their sanitation needs:

> *"We don't have proper toilet that provides dignity and the toilets are always with a bad smell and flies. Now we don't go to unsafe toilets to defecate instead we use buckets and newspapers to relieve ourselves as our toilets (Winterveld respondent)".*

Question HB.2 ***What type of sanitation facility was installed by the Municipality?***

The respondents understand that the type of sanitation facility installed by the Municipality is guided by several factors which need to be considered when selecting the most appropriate latrine technology for the area. The purpose of this question was to determine the type of sanitation technology option installed by the Municipality in the four selected townships for this study. The responses clearly revealed that the beneficiaries understood the type of sanitation facility implemented in their townships. The responses were recorded as illustrated in the Table 18 below.

Type of Sanitation Facility	N=80	Percentage
Flush Toilet Connected to a public Sewerage System	60	75
Flush Toilet Connected to a septic Tank	0	0
Ventilated Improved Pit toilet	11	13
Bucket Toilet	0	0
Other	9	12

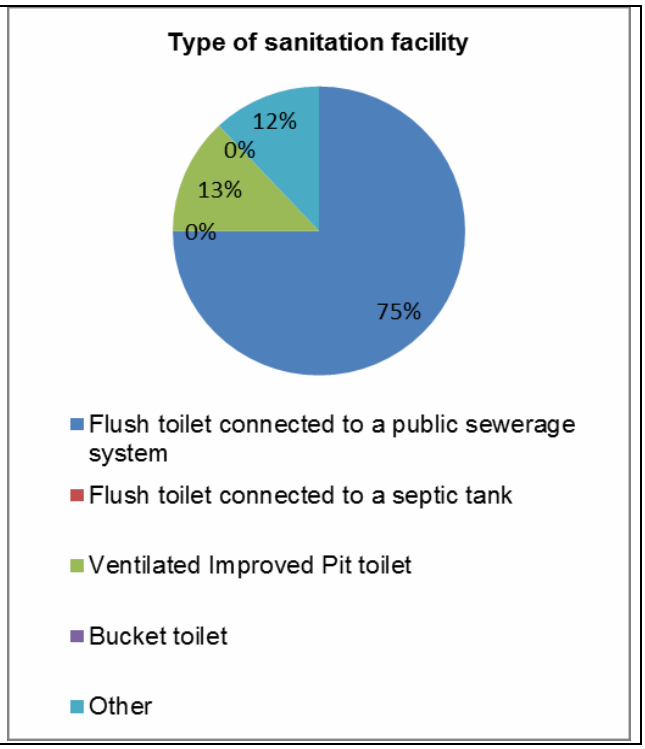


Table 18: Type of sanitation facility

The majority of the respondents (75%) revealed that they utilise flush toilets which are connected to a public sewerage system in Ga-Rankuwa, Mabopane and Temba. Based on the responses it was inferred that there is sufficient water supplies in Ga-Rankuwa, Mabopane and Temba to accommodate all residents to flush toilets.

Only 13% of the respondents revealed that the urine diversion system sanitation facility was utilised whilst 12% held other in Winterveld township. The responses revealed that 13% of the residents had a urine diversion system because the area is rural and there is no sewer network in Winterveld. The urine diversion system is acceptable compared to the regular pit latrines. A total of 12% of the respondents revealed other on the type of sanitation facility on privately-owned land. They were subjected to pit latrine toilets which were in a bad condition,

dirty and posed a health risk.

During the interview in Winterveld township the following verbatim responses were revealed:

- *"Some respondents do understand that in order to obtain a waterborne toilet there is a complex technical process that needs to be considered by the Municipality before it can be implemented, such as the distance from houses and the availability of water in order to determine whether or not a water-flushed system is possible. If adequate water supply is available in the area, pour-flush or cistern-flush toilets can be considered as a technological option.*
- *Respondents failed to understand why government provided them with urine diversion system whilst there is a funding for sanitation services. They referred to UDS as inadequate sanitation.*
- *The respondent further mentioned that in future government must consider providing them with flush toilets".*

The DHSWS is the custodian of all water resources in South Africa in terms of the National Water Act of 1998 on behalf of the country's residents. The CTMM is a Water Service Authority in terms of the Water Services Act of 1997, which is mandated to ensure that all end-users in the Municipality receive potable water and sanitation in its area of jurisdiction (National Water Act, 1998).

It can be inferred that a sustainable sanitation system is generally the most important consideration when selecting a specific technological option for a community. Sustainability in this instance refers to both measures to minimise breakdowns and operational cost of a sanitation scheme, and steps taken to maximise its positive social effect while minimising any negative environmental consequence.

Question HB.3 ***Do you share the toilet facility with other***

households?

The aim this question was to establish whether the respondents share the toilet facility with other households or neighbours, to check the key challenges faced by the household members as well as investigate whether the respondents understand the pros and cons of sharing a toilet facility. The following responses revealed that:

Households benefitted sanitation Facility	N=80	Percentage
Yes	9	12
No	71	88

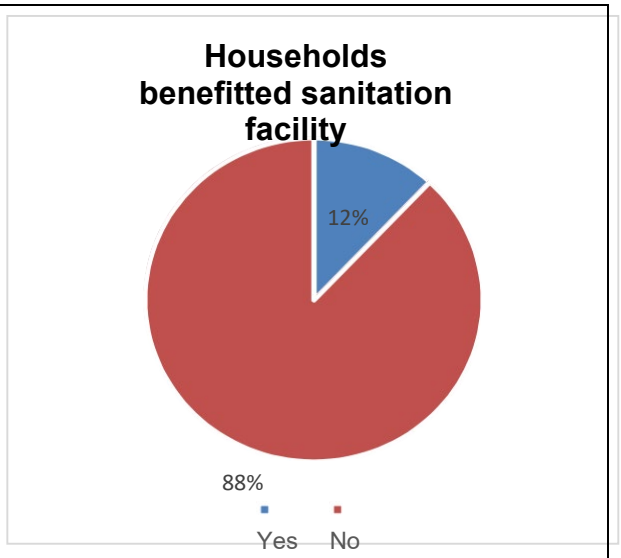


Table 19: Households which benefitted from sanitation facility

The majority of the respondents (88%) reported that they did not share a toilet facility with other households. Only 12% of the households in Winterveld township residing on a privately-owned land share toilet with their neighbours. The beneficiaries who had received a UDS from the CTMM do not share a toilet with their neighbours. Sanitation is all about dignity. Sharing a toilet allows communities who do not have such in their individual homes to access toilets their neighbours. However, sharing toilets is not considered as an improved level of sanitation.

The findings revealed that sharing toilets was prevalent only in Winterveld township. Furthermore, the respondents revealed that adequate and proper sanitation facilities are key to prevent diseases such as diarrhea and cholera.

The residents who reside on privately-owned land are frustrated for having to share the toilets due to the landlord does not allow them to dig their own toilets. Moreover, a respondent revealed that shared toilets were poorly maintained and dirty. The study also revealed that sanitation facilities on privately-owned land was shared by between three to six households who resided on the same smallholding, especially those who rented rooms. Furthermore, the respondent's revealed an overall dissatisfaction of the shared facility provided by landlords which were unsafe and poorly constructed. The respondents revealed discontent of physical appearance of the structure:

> *"Block toilets built by Landlords are falling apart and the door frames are falling out. When you sit on the toilet seat you feel that you are going to fall inside the toilet and you see the mess. When it is dark you cannot go to the toilet alone and it is not suitable for elderly, children and women. All toilets built on private properties did not make provision for people with special needs namely, disabled and elderly who need assistance when they go to the toilet. There are 8 or more people using the same toilet".*

Block toilets pose a health risk rather than minimise threat to community members. Toilets were left uncleaned by the number of households did not want to take responsibility to clean the facility which was utilised by other people. Globally, increasing access to sanitation largely focused on shifting households from engaging in open defecation or using unhygienic facilities to private household sanitation facilities. Moreover, household's members in Winterveld shared block toilets due to unavailability of adequate toilets that meet RDP standards. Shared sanitation facilities in certain areas may provide access to sanitation among communities where the installation of private latrines for the household is impractical or sustainable due to cost, maintenance, space, or other related challenges.

Question HB.4. ***In your opinion, how satisfied are you with the sanitation services provided by the Municipality?***

The purpose of this open-ended question was to determine whether the respondents are satisfied with the provision of sanitation services provided by the CTMM in their respective townships in Ga-Rankuwa, Mabopane, Temba and Winterveld. The following responses were received:

Level of satisfaction About Sanitation Services	N=80	Percentage
Extremely Dissatisfied	24	30
Poor service with room for improvement	7	08
Neutral – no Opinion	0	0
Satisfied, but room for improvement	33	42
Extremely Satisfied	16	20

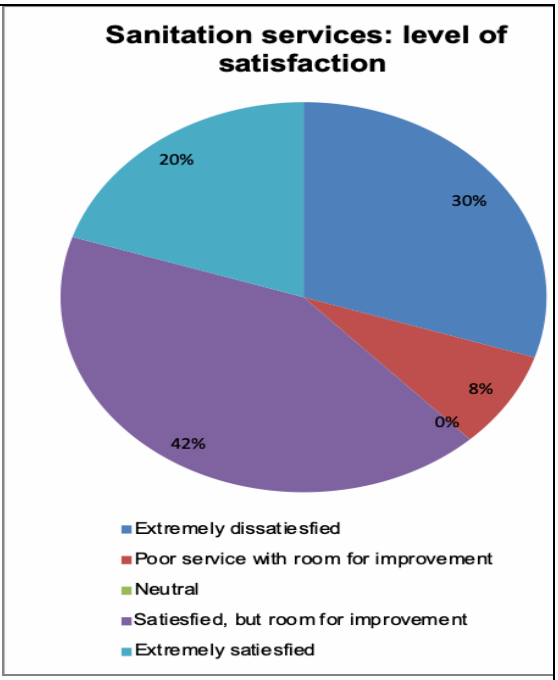


Table 20: Sanitation services: level of satisfaction

The level of satisfaction or dissatisfaction of the sanitation services delivered by the CTMM is specifically the beneficiary's inference thereof. A total of 30% of the respondents replied that the level of sanitation services delivered by the CTMM fell short of its expectations (extremely dissatisfied). Only 20% of the respondents were extremely satisfied with the sanitation services to meet their expectations or beyond those of the beneficiaries. This implies that the actual performance of the Municipality in delivering sanitation services was below the expectations of the beneficiaries although 42% had indicated that they are satisfied with conditions of the toilet facilities. However, there was room for improvement.

The majority of the respondents (42%) are satisfied, however, hold that the Municipality has room to improve the provision of sanitation services; 20% expressed extreme satisfaction with the services provided; while 30% were extremely dissatisfied. However, the responses revealed that the respondents

who are extremely dissatisfied are the beneficiaries from Mabopane and Winterveld townships. One approach to determine the extent of the beneficiary's satisfaction is to acquire data of their expectations and perceptions of the sanitation services provided by the Municipality. Indeed, expectations has a central role in influencing satisfaction with the sanitation services provided.

Question HB.5 ***If you reside in an area which has waterborne toilets, have you experienced recent blockages or overflow of sewerage near your property / street?***

The purpose of this question was to establish whether the respondents had experienced recent blockages or overflow of sewerage near their property / street. The responses received from the respondents reflects that household's members connected to the sewer network in Ga-Rankuwa, Mabopane and Temba do not throw foreign objects in the toilets and the do not experience sewer blockages. The researcher also wanted to determine the level of knowledge and experience of the respondents on reporting sewer blockages in the township. The response to this question would reveal whether the baseline information is clearly understood. The following responses revealed that:

Recent blockages / overflow Sewerage	N=80	Percentage
Yes	67	84
No	13	16

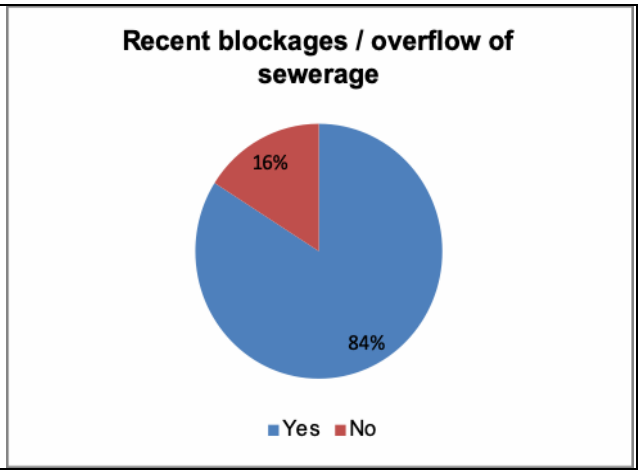


Table 21: Recent blockages or overflow of the sewer in the area

The majority of the respondents (84%) revealed that they had experienced recent blockages or overflow of sewerage near their properties. However, the

respondents were neither familiar with the customer care toll free telephone service established by the CTMM, nor did they appear to have any idea of how to report blockages within 24 hours of occurrence. Most households in the Mabopane township complained about the blockages and overflow of the raw sewerage and human excrement which would not be attended to for more than a month.

Most respondents revealed that they have accepted the circumstances because reporting blockages is a waste of time. Moreover, sewer blockages has become a regular occurrence and customer care agents are difficult to reach. Despite the Municipality serving all the households in the townships with sanitation services, maintaining the existing infrastructure and implications of having to extend sanitation services remained a challenge. It was also observed that full flush toilets connected to the sewers and waste water treatment works is unaffordable and there is an acute sanitation post-infrastructure implementation challenge. The following comments were revealed in response to question 5:

- *"Respondents complained about the main sewer line that gets blocked regularly. The respondents are only concerned when sewer overflows into their yards for a number of days.*
- *Most manholes in the area are blocked due to capacity to accommodate sewerage of the whole township and some of these sewer overflows occur because of system failures in the townships.*
- *Sometimes blockages can be attributed to improper disposal of personal items, such as diapers, feminine hygiene products, fat from cooking oils, towels and rags thrown into the sewer system.*
- *The population of Mabopane has increased due to unplanned population (family households increased) and has overloaded the infrastructure such that water pressures are low and sewers frequently block and overflow".*

The respondents were unaware that to report an overflowing sewer as a matter of urgency to the Municipality is their human right. Access to good sanitation is of outmost important for beneficiaries in the northern fringes of

the CTMM, overflowing sewers are regarded as unhygienic. Therefore, it is important for the CTMM's to acknowledge that community members in the townships are unaware of the customer care line to report sewer blockages.

Poor maintenance of the infrastructure results in sewer blockages and this in turn increases non-payment of services which is one of the primary threats to the financial sustainability of many municipalities in South Africa. The CTMM has personnel dedicated for the provision of sanitation services in the northern fringes and the municipalities has appointed permanent operators to manage sewer networks. Maintenance and repair of the existing sewer networks can reduce blockages and help to meet the growing demand of sanitation services in the Tshwane municipal area. The CTMM is the primary source of sanitation services. Therefore, it is crucial that the Municipality undertakes proper planning to attend to related issues.

Question HB.6 ***Have you had a complaint in the last 3 months regarding the provision of sanitation or your sewerage system?***

The purpose of this question was to establish whether the respondents had experienced sewerage system or provision of sanitation services in their area. The following responses were received:

Complains in the last 3 months	N=80	Percentage
Yes	53	66
No	27	34

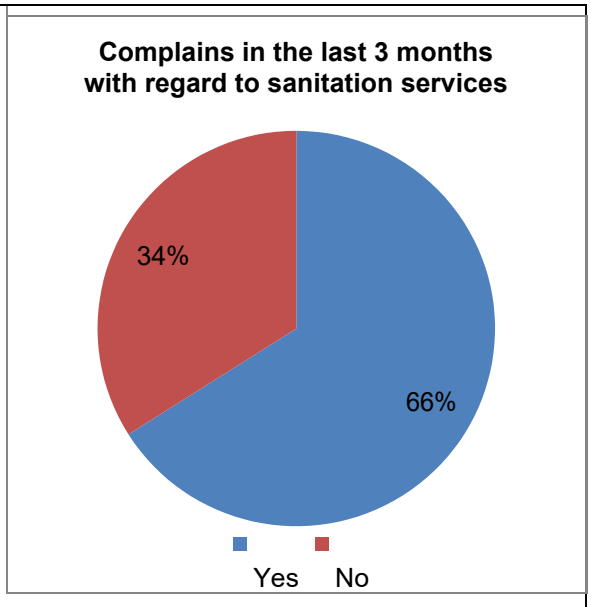


Table 22: Complains in the last 3 months on sanitation services

This question was posed to measure the respondent's perceptions of the Batho Pele principles aspired to by the CTMM in terms of service delivery. The respondents were measured against principle three (3) of the principles: 'citizens should be treated with courtesy and consideration during service delivery'. The majority of the respondents (66%) agreed that they had received sanitation service complaints in the last 3 months but no action had been taken by the Municipality to address the concerns. A total of 34% of the respondents disagreed totally (utterly) that they had never complained. The responses revealed that the provision of sanitation is inadequate in the northern fringe of the CTMM especially in Temba and Winterveld. Moreover, the residents no longer complain to the relevant officials.

Complaints	Consequences
Lack of information	Residents do not know who is responsible for complaints about sewer blockages. Therefore, they do not know to whom to direct their complaints.
Inadequate bulk sewer line	Non-functioning or defective infrastructure is poorly maintained and is not designed to meet the needs of growing population in the townships. This results in an overflow of sewers in the townships.
Lack of sanitation services	Lack of sanitation services is the biggest human rights violation. Consequently, the residents utilise unhygienic pit latrines and defecate in the open fields.

Table 23: Complaint categories

Data source: Questionnaire results

Question HB.7 ***If your response is yes to the previous question, do you have any suggestions of how to improve sanitation services to your households?***

The results revealed that only 66% of the respondents responded positively to the previous question. These respondents utilise waterborne toilets in Ga-Rankwa, Mabopane and Temba. The study revealed that the respondents complain regularly about sewer blockages in the area. The residents understand that the Municipality is experiencing challenges in terms of

blockages which had become a regular occurrence due to sewer network problems especially in Ga-Rankuwa and Mabopane. In most instances' blockages are reported, however, the residents receive no response from the Municipality. Hence, the residents have stopped reporting blocked sewers in their area. The respondents' verbatim comments revealed that:

- CTMM *must go to all length and budget for bulk infrastructure, and the status of bulk sanitation infrastructure must be improved.*
- *The Municipality must prioritise refurbishment and upgrading of sanitation infrastructure that has been neglected for many years, as this is the reason for sewer blockages.*
- *The Municipality to assess sanitation infrastructure on an annual basis, this will assist them to identify problems experienced by residents".*

Question HB.8 ***Where do children below the age of five defecate?***

The purpose of this open-ended question was to establish sanitation behaviour in terms of proper disposal of children faeces/ stools. Furthermore, to also determine whether the residents sense the important link between defecating in the toilet compared to open defecation. The following responses revealed:

Children below the age of 5 Defecate	N=80	Percentage
Latrine	58	73
Potty	10	12
Veld / outside the toilet	7	9
Not applicable	5	6

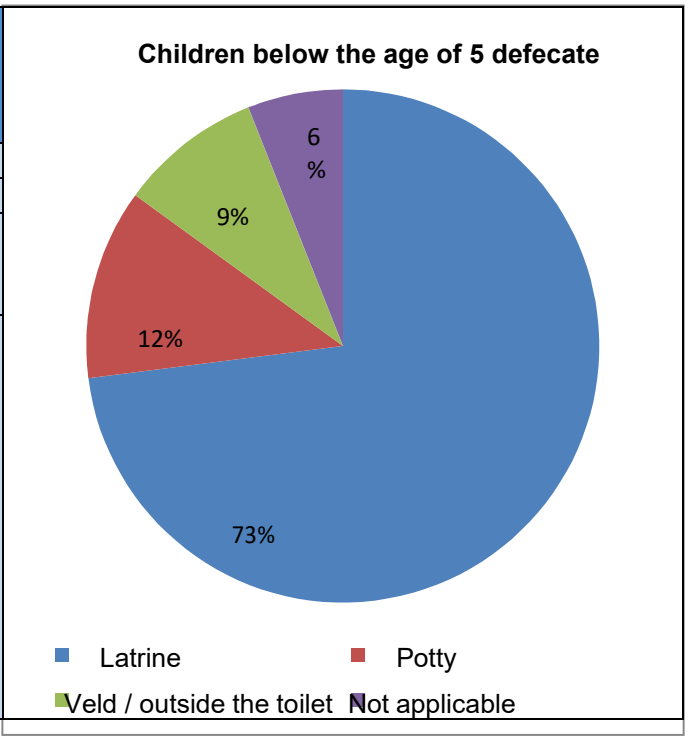


Table 24: Response to the disposal of faeces of children aged below 5

An overwhelming 73% of the respondents in the northern fringes of the CTMM disclosed that they dispose their children's faeces aged below five in the latrine. The safe disposal of children faeces under the age of five is important in inhibiting the spread of diseases such as diarrhea and hepatitis. Approximately 9% of the respondents who reside in Winterveld on privately-owned land revealed that children defecate in the veld or outside the toilet. According to the National Council of Educational Research and Training (2017:3) states that maintaining proper sanitation and good hygiene practices are necessary for healthy living. These respondents are fully aware that if the faeces is not disposed of properly, diseases can be spread through contact with animals or direct interaction with household members.

According to Bonthuys (2017:19) argues that despite remarkable achievements, the danger from our own excreta is a problem of how to manage it safely. Globally, it is acknowledged that nearly one in four of the world's population still defecates in the open. However, the findings also revealed practicing open defecation by household members was the last resort for those who do not have a proper toilet facility, especially in Winterveld townships. Moreover, these residents are not prioritised and are exposed to daily indignity by having to defecate in open spaces, e.g. open veld. Certain respondents in Winterveld township confirmed that they would rather defecate in the open space than utilise unhygienic toilets.

Question HB.9 ***What is your understanding of suitable sanitation, health and hygiene user education?***

The purpose of this open-ended question was to determine the respondent's level of knowledge of the meaning of suitable sanitation, and its link to health and hygiene. The responses revealed that the participants understand the meaning of suitable sanitation and its link to health and hygiene. The National Council of Educational Research and Training (2017:4) posits that one of the important factors to maintain proper sanitation is to end the practice of 'open defecation and this can be achieved through the involvement of individuals and community members in order to build, maintain and use toilets. The majority of the respondent's revealed that suitable sanitation is washing hands with soap after utilising the toilet. However, certain respondents were unsure

about exactly what suitable sanitation entails and moreover, unfamiliar with the term sanitation. Some of the respondents referred to the quality of the building materials as suitable sanitation. The responses revealed that there is a need to educate the respondents and the community's at large of the significance of good sanitation so that they fully understand what is meant thereby and ensure that the environment is sustainable for future generations.

Question HB.10 ***The respondents were requested to provide general remarks related to sanitation services provided by the Municipality.***

The purpose of this question was to establish whether the respondents had any suggestions and submissions to make to the CTMM to improve the provision of sanitation in their townships. This question is related to the research question in Chapter 1 section 1.7 that wants to identify and analyse key challenges faced by the CTMM in providing sanitation services in the northern fringes of the City. Furthermore, did the respondents want to make an input in making the CTMM more efficient or rather demand suitable sanitation services? However, certain respondents did not provide responses to the question whilst others revealed that:

- *"The Municipality is interested on payment of services instead of providing them with adequate sanitation services.*
- *The Municipality must upgrade existing manholes as this will assist in future blockages in the area; and*
- *The Municipality must provide them with clean water in order to allow the household members to flush the toilets".*

5.6 Participants responses: provision of sanitation services by the Department of Human Settlements, Water and Sanitation National and Provincial office

This section focused on the demographic profile of the officials who participated in the study in the DHSWS, both national and the nine (9) provincial offices. Data was gathered from thirty (30) selected respondents in the Department responsible for the provision of sanitation services. The researcher collected the demographic information from the respondents

through the closed ended questions, the researcher aimed to understand demographic information of the research respondents and the information of the respondents is necessary for the determination of whether the individuals in the study of the provision of the sanitation services in the northern fringes of the CTMM is a representative sample of the target population for generalization purposes. The Department, as a sector leader, has been in the forefront reviewing water and sanitation policies in the country. The department is mandated to serve the people of South Africa by making a positive impact as custodians of its water and sanitation resources. The following employee profile of the respondents who participated in the study for statistical purposes included: gender, home language, race group, age range and highest level of education. Furthermore, data was gathered related to the respondent's opinions, experience, planning instruments, regulations, policies, sanitation technologies as well as monitoring and evaluation.

5.6.1 Respondents gender

The purpose of this question was to determine the percentage of females and males who responded to the questionnaire in the DHSWS at both the national and provincial offices. The researcher was interested on indicating the number of males and females participated on the study. Gender played an important role in public administration in terms of advocating the equality and non-discrimination. For this study, the researcher identified the importance of gender by examining masculine or feminine dichotomy to identify the ways in which respondents think about administration and bureaucracy. Gender was highlighted to in the study when assessments were conducted and recommendations provided.

DWS Gender	N=30	Percentage
Males	18	60
Females	12	40

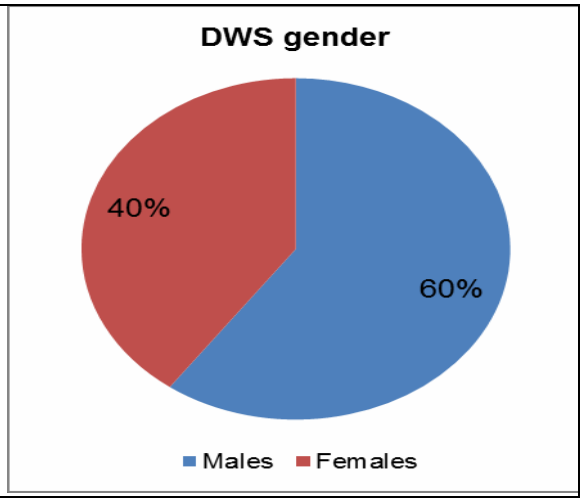


Table 25: Officials gender: DHSWS

The responses to this question revealed that more males participated in the study than female employees. The gap in the sample revealed that there may be a gender imbalance in top management positions. The findings revealed that most males are project managers and are responsible for the provision of sanitation services compared to their female counterparts. The researcher wanted to know the involvement of women in project management of water services projects. Furthermore, women will only be able to contribute meaningfully if the DHSWS addresses the reasons for gender inequality in project management positions and create more posts for appointment of women in the identified position. The researcher holds that women empowerment and strengthening their participation in managerial positions is an intrinsic element of a transformative development agenda.

5.6.2 Home language

The purpose of this question was to determine the respondents home language. The following data was revealed:

Home Language	N=30	Percentage
English	1	3
Afrikaans	0	0
Tsonga	4	13
Tswana	3	10
Xhosa	5	17
Other	17	57

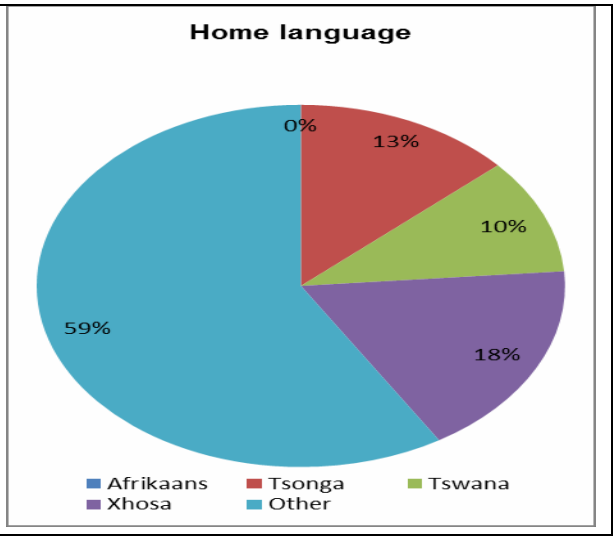


Table 26: Home language: DHSWS

The gathered data revealed that the majority (57%) falls under other language. According to the DHSWS the language policy in the department if based in the principle of understanding that good language management is needed to ensure efficient public service administration that will meet the needs of the public and promote equitable access to the services and information of the department. A total of 17% of the respondents are Xhosa-speaking. No Afrikaans-speaking officials participated in the study. Several respondents also spoke the following languages: Sepedi, IsiZulu and TshiVenda, while no official spoke isiNdebele, siSwati and Sesotho. The researcher acknowledges that the following languages were omitted: isiZulu, TshiVenda, Sepedi, isiNdebele and Sesotho.

5.6.3 Race group

The purpose of this question was to determine the race group of the respondents who participated in the study in the northern fringes of the CTMM, the researcher took into account the race of the respondents as this has an impact on the responses gathered during data collection. The following responses were gathered:

DWS race Group	N=30	Percentage
African	30	100
White	0	0
Indian	0	0
Coloured	0	0
Other	0	0

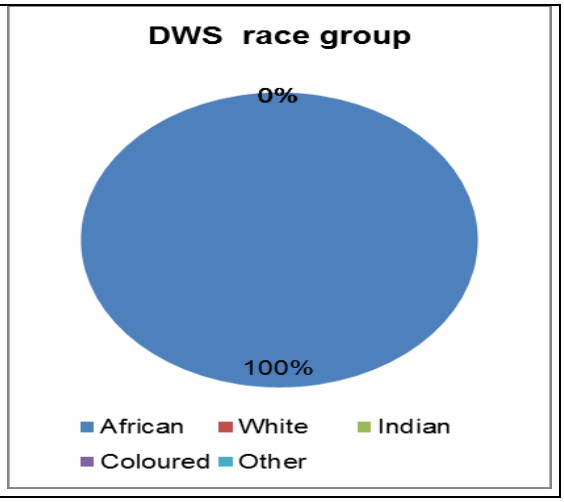


Table 27: DHSWS: race groups

The majority (100%) of the respondents are African. The DHSWS comprises of other racial groups; however, most employees are African.

5.6.4. *Age range*

The purpose of this question was to determine the age group of the respondents who participated in the research. The respondents who completed the questionnaire fell into the age group of 25 to 60 years, which confirmed the trend that besides other core competencies, experience is also utilised as a criterion to fill vacancies in the DHSWS. The researcher considered age range of the respondents participated in the study as age is an important and the responses received during data collection in the northern fringes of the CTMM. The following responses were gathered from the respondents:

DWS age group	N=30	Percentage
18-24	0	0
25-35	3	10
36-45	9	30
46-60	18	60
Over 60	0	0

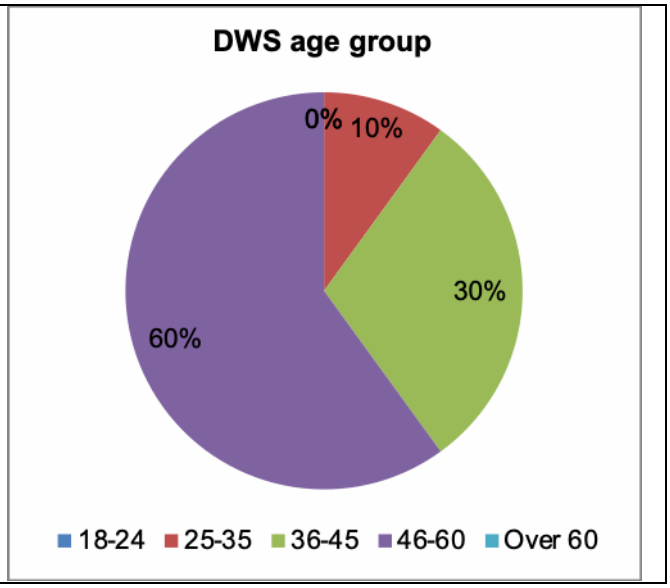


Table 28: DHSWS: age groups

The majority of the respondents (60%) are between 46 and 60. There were no respondents between the age of 18-24 and over the age of 60. In most instances, the respondents between 25 to 45 are considered younger adults who are creative thinkers, advanced intelligence and have a valuable outlook of the global village. The researcher holds that young adults work energetically and enthusiastically, and thereby enhance organisational performance and they stimulate an organisation's atmosphere. However, it is important that sanitation project managers and policy implementers also have the necessary experience to be considered for appointment given the strategic nature of their positions and the current delivery challenges experienced by the DHSWS.

5.6.5 Highest education

The purpose of this question was to establish the selected respondent's highest education qualification. More often than not there are clear differences in opinion between respondents in the study with a different educational level. The researcher has identified that level of education has the impact on the responses provided by the respondents in the CTMM. The officials' responses would likely be determined by their educational status. Hence, the variable

highest educational level was investigated and the responses thereto is presented the pie chart below.

DWS highest Education	N=30	Percentage
Postgraduate	26	87
Diploma / Degree	4	13
Matric	0	0
Grade 8	0	0
No Schooling	0	0
Other	0	0

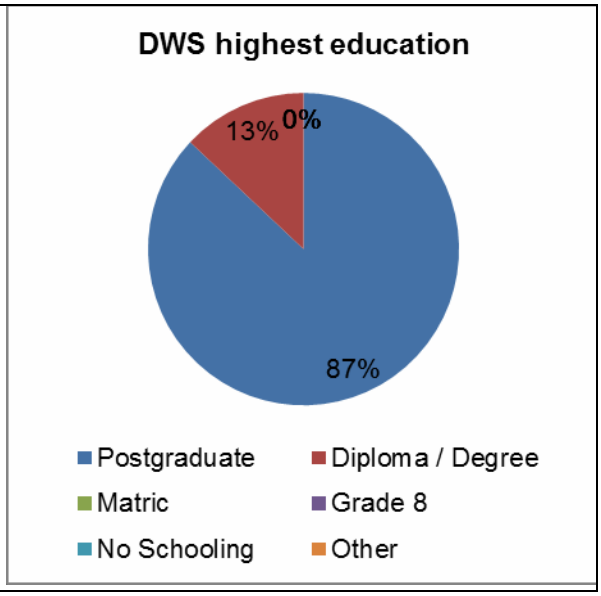


Table 29: DHSWS: highest level of education

The respondents are well-educated, that is they possess postgraduate, diploma or degree qualification. Education is one of the most important characteristics which could affect an individual's perceptions, attitudes and the manner in which perceiving and understanding any particular social phenomena. The responses revealed whether the respondents understood government policies in terms of provision of sanitation. The findings revealed that many of the respondents possess a postgraduate qualification (87%) and none hold a qualification below a degree / diploma.

5.7 Analysis and interpretation of empirical data: Department of Human Settlements, Water and Sanitation

Question DB.1 ***What planning instrument(s) are utilised by the Department to promote planning and budgeting for sanitation services?***

The purpose of the question was to confirm the respondent's level of knowledge and experience of the DHSWS and establish whether they are aware of the significance of the planning instruments utilised by the Department to promote sanitation services planning and budgeting. The researcher asked this question with an aim to address the research objective

in Chapter 1 section 1.7 on the planning instruments utilised by the sector to promote planning and budgeting for sanitation services in the northern fringes of the CTMM. The response to the question will reveal whether the selected participants are familiar with the planning instrument and the Department's budgeting processes.

Kvarnström & McConville (n.d.: Online) posit that there have been numerous frameworks and support tools designed to aid in planning processes for wastewater or sanitation planning and management. While. methodologies vary in their emphasis on bottom-up and top-down planning techniques, there is a growing consensus on the need to include stakeholder opinions during the planning process. The majority of respondents, approximately 98% revealed that the planning instrument(s) utilised by the Department to promote planning and budgeting is Water Development Plans (WSDPs). Furthermore, the officials are encouraged to participate in the Integrated Development Plans (IDPs) at the local sphere of government. Moreover, the Department has developed a National Water and Sanitation Master Plan and Provincial Water and Sanitation Master Plan for the provinces. The respondents also revealed that planning to deliver sanitation at local sphere is Water Services Authorities (WSAs) mandate which is governed by the Water Services Act .108 of 1997.

The participants response to Question 1 is revealed below:

- *"The Department considers Spatial Planning and Land Use Management Framework and guidelines for Human Settlements Planning and Design.*
- *Backlog eradication strategies per Water Services Authorities indicating sanitation needs or backlogs.*
- *The Municipal Infrastructure Grant (MIG) or Water Services Infrastructure Grant (WSIG) gazetted funds for implementing sanitation projects, Appropriate Sanitation Technology Options, Technical Report Guidelines received from the Department of Cooperative Governance and Traditional Affairs, technical report appraisals and recommendations, as well as the Red Book and MIG costing*

Guidelines.

- *When planning for sanitation one needs to consider the following, physical infrastructures such as water supply, sanitation, roads, electricity and communications.*
- *National Development Plan 2030".*

The majority of the respondents revealed that Water Services Development Plans and Integrated Development Plans (IDPs) are critical planning instruments. This demonstrated that the majority of the respondents indeed understand the Departments planning instruments. The responses revealed that the primary planning instrument in the water services sector is the water services development plan (WSDP). The responses to the question revealed that WSDPs together with the business plans requires consideration of the physical, social, economic, financial, environmental and institutional aspects of water services provision in a particular area of a water services authority. It is, therefore, important to acknowledge that the respondents are familiar and have insight of both the planning and budgeting instruments. Furthermore, the respondents revealed that the provision of sanitation throughout the country is particularly fragmented and uncoordinated, largely due to the vast array of institutions involved in offering of this service. This vital information is important to draw any general conclusions from the study.

Question DB.2 ***What framework does your Department have in place to regulate sanitation services? Please provide detailed information of the policies, legislation and mechanisms.***

The purpose of the question was to establish which frameworks were in place to regulate sanitation services by the DHSWS. In many countries, sanitation services are regulated by municipal authorities through one or more departments. The strength and accountability of local government, in this instance the CTMM is the key determinant of the coverage and sustainability of sanitation services, both in rural and in more urban settings. Most countries have weak regulatory capacity and few have regulatory organisations for water and sanitation. The following verbatim comments revealed that:

- *"The sanitation sector in South Africa is currently regulated by three policy documents in the DHSWS, namely the White Paper on Water Supply and Sanitation (1994); the White Paper on a National Water Policy of South Africa (1997); and the White Paper on Basic Household Sanitation (2001).*
- *The Constitution of South Africa (1996) provides the right of all people in South Africa to dignity and environment that is not harmful to health and wellbeing of peoples.*
- *The Water Services Act, 1997 (Act number 108 of 1997), the overall objective of the Water Services Act (1997) is to assist municipalities to undertake their role as water services authorities and pay attention after the interest of consumers.*
- *White Paper for Basic Household and Sanitation Policy (2001) was reviewed by the Department which resulted into the National Sanitation Policy 2016*.
- *The National Water Services Regulation Strategy and the Green Drop System in an effort to ensure that waste water treatment works progressively improve their operations so as not to impact negatively on water bodies into which they discharge their product.*
- *The implementation of sanitation policies has been guided by a Strategic Framework for Water Services (2003) which advanced in addressing sanitation services delivery essentials for 10 years and norms and standards for water services.*
- *The Department is committed in achieving the Sustainable Development Goals (SDGs) and is currently formulating strategies and implementation plans to achieve the water and sanitation related goals".*

The majority of the respondents revealed that the Department had implemented frameworks to regulate the country's sanitation services. The respondents revealed that the Department has three policy documents which regulates sanitation: White Paper on Water Supply and Sanitation (1994); White Paper on a National Water Policy of South Africa (1997); and White Paper on Basic Household Sanitation (2001). However, the DHSWS has been

in the forefront of reviewing the White Paper on Basic Household Sanitation which resulted in the National Sanitation Policy 2016. The above responses revealed that the Department has frameworks, policies and legislation to regulate sanitation services. The responses to the questions revealed that a system is in place to manage the country's provision of sanitation.

The following policy document acknowledges sanitation as a basic right, therefore, the following documents namely: White Paper on Water Supply and Sanitation (1994); White Paper on National Water Policy of South Africa (1997); and White Paper on Basic Household Sanitation (2001) was formulated. The Water Services Act of 1997, which is the primary legislation relating to water and sanitation in South Africa explicitly refers to the right of access to basic water and sanitation which this is subject to the principle of progressive realisation of water and sanitation services. The DHSWS anticipates prioritisation of the provision of sanitation through the formulation of a National Sanitation Integrated Plan (NSIP) which is aligned to the National Development Plan (NDP) 2030.

The NSIP process will be comprehensive in nature and attempt to identify the linkages between sanitation frameworks and policies. The National Sanitation Integrated Plan will provide the sanitation sector with the roadmap and focus on the implementation of sanitation policies to address its delivery. Despite this strong legislative environment, the departmental sanitation regulatory responsibilities have been unclear over the past few years, and the sanitation function was shifted between departments i.e. Department of Water Affairs to Human Settlements, while responsibility for provision of sanitation services devolved to local government, as required by the Constitution of South Africa Act 108 of 1996. The sanitation mandate has been affirmed with the mandate.

Question DB.3 ***How does the sanitation framework contribute towards the implementation of sanitation, that is, availability, acceptability and affordability?***

The purpose of this open-ended question was to establish whether the DHSWS has implemented a suitable sanitation framework to manage sanitation effectively and how the framework plans to improve service delivery. The study in Chapter 2 in Section 2.4 points out that the toilets must

be affordable, safe, provide privacy and a dignified environment. Furthermore, ability to pay is a necessary requirement for affordability. A consumer can be said to be facing affordability constraints while is unable to pay for goods or services. Determining the ability to pay requires a value judgment and the ability to purchase goods or services does not necessarily translate into a willingness to do so. The researcher felt that one of the principles of public administration includes some responsibilities for determining the government policies and programs in terms of implementation of sanitation services.

The following comments were noted:

The Department has a Strategic Framework for Water Services (2003) which outlines a comprehensive approach with respect to the provision of water services in the country, which ranges from small sanitation schemes and community water supply in remote rural areas to large regional schemes which supply water and wastewater services to the communities and industries in the largest urban areas. It outlines variations of the approach required to achieve the objectives of the water and sanitation policy as a result of the progress made in establishing democratic local government including development in the sector since 1994.

- *The sanitation framework set has 33 policy statements across the whole sanitation value chain and settlement types. It sets clear norms and standards for basic sanitation, rights, roles and responsibilities of Water Services Authorities, service providers, civil societies and communities or end-users. Sustainable sanitation services are strongly dependent on availability of resources and settlement conditions, community acceptability and so forth.*
- *The framework outlines the roles and responsibilities of the Department, the implementing agents and service providers implementing on behalf of the Department. Furthermore, the framework outlines the outcomes and outputs of the projects in line with standards sets by the Department, looking at the acceptability and affordability of the standard of the sanitation services provided.*

- *The framework set uniform standard and provide guidelines in terms of appropriate sanitation technologies and Groundwater Protocol to ensure that our water sources are not contaminated.*
- *Sanitation framework determines the appropriate technologies applicable for implementation and provides guidance that is relevant in determining the acceptable standards in line with affordability.*
- *The Water Services Act 108 of 1997, Section 10 clearly stipulates the national tariff standards which addresses the issues of affordability.*
- *The framework makes provision on how sanitation infrastructure projects should be rolled out in order to align planning to current and future demands. For any infrastructure development that takes place communities are consulted to ensure that the infrastructure is affordable".*

The above responses revealed that the DHSWS has a framework for water and sanitation which contributes towards the implementation of sanitation that addresses the standards, acceptability and affordability. The frameworks are implemented by the Department as well as agents to provide the service on its behalf. The responses to the question revealed that systems have been implemented to manage the provision of sanitation services. The sanitation frameworks set uniform standards for the sector and serve as a guideline when sanitation projects are implemented. The utilisation of the strategic framework as a foundation for water services enables the development of projects to achieve the objectives through which the overall vision of the Department is realised.

Question DB.4 ***What regulatory measures have been implemented in the Department to ensure affordable access to sanitation services for citizens and municipal residents who are vulnerable and economically disadvantaged?***

The study in Chapter 2 in Section 2.3 points out clearly that the toilet facilities should be such that they are accessible by all members of the household, including children and the physically challenged. It is crucial that toilet facilities are located such that these are adequate and suitable for everyone in the household; and positioned in a safe place to

avoid endangering members who are vulnerable. The verbatim responses to this question is listed below.

- *"The sanitation sector in South Africa is currently regulated by three policy documents in the DHSWS, namely the White Paper on Water Supply and Sanitation (1994); the White Paper on a National Water Policy of South Africa (1997); and the White Paper on Basic Household Sanitation (2001). In addition to this, the Department has Free Basic Sanitation strategy which guides Water Services Authorities in the provision of sanitation services. The municipalities are required to have indigent policies and Bylaws to ensure access to basic sanitation services by all.*
- *The Department implements dry sanitation to ensure affordable access for citizens and municipal residents that are economically disadvantaged. During implementation of projects groundwater protocol is considered.*
- *Municipalities of South Africa have developed indigent policy in order to provide sanitation services to vulnerable communities. Furthermore, the Department has developed Free Basic Sanitation Strategy in order to target the indigent households to provide them with sanitation services as a basic service without financial implication.*
- *The National Sanitation Policy (2016) points out that Free Basic Sanitation should be provided as part of the basket of social services available to support and assist indigent households. Moreover, the department has developed and implemented the Free Basic Water and Sanitation Policies to ensure that the poor are not denied access to water and sanitation due to financial constraints".*

The majority of the respondents revealed that the DHSWS had implemented regulatory measures to ensure affordable access to sanitation services for citizens and municipal residents who are vulnerable and economically disadvantaged. The various regulatory measures implemented by the DHSWS accentuate cooperative governance. The approach is entrenched in the White Paper on Basic Household Sanitation

(2001) which is based on the fundamental principles and objectives for a new National Sanitation Policy (2016). The researcher is a permanent official of the DHSWS and concurs that free basic sanitation is meant for the poor households. The poor households receive free basic sanitation which implies that the service is provided at no cost. Poor households are primary intended recipients to benefit from free basic sanitation and the national policy stipulates the provision thereof. The responses revealed that the free basic sanitation policy is intended to promote affordable access to indigent households a basic level of sanitation services.

Question DB.5 ***How does the Department ensure that sanitation regulation(s) have been implemented properly by the municipalities?***

The purpose of this question was to establish whether the Department ensures that sanitation regulations are implemented properly by the municipalities. The following verbatim comments were noted. The Regulatory Performance Management System (RPMS) initiated by the Department monitors the performance of water services authorities against the key performance indicators provided in the Strategic Framework for Water Services (2003).

- *The Department conducts monitoring and evaluation of the information found during the inspection conducted by officials from the Department whereby recommendations and findings are written to the municipalities for implementation.*
- *The Department insists that the District Municipalities submit their water and sanitation business plans with technical report and ground water reports to apply for funding. The Department conducts appraisals on the business plans to ensure that all information requested by the Department to be included on the technical reports are incorporated in the business plans.*
- *Through the bilateral engagements starting with planning of project, monitoring and evaluation of the implemented projects. The Department conducts workshops to enhance knowledge and capacity in the sector.*

- *The Department promotes incentive-based regulations by encouraging and supporting local government to perform their universal access to sanitation services in hygienic function efficiently, effectively and sustainably.*
- *Furthermore, the Department is in the process of rationalising its regulatory systems into the product referred to as the Integrated Regulatory system which will be rolled out in 2019. The latter will initially serve as a tool to facilitate the relationship between Regulation and Management of Water Supply Systems in the Department, while also keep relevant stakeholders informed on compliance of all registered supply systems. The objective of the Integrated Regulation Information System (IRIS) is to enable the Department to regulate the water services sector more effectively in South Africa.*

The question was aimed to confirm whether technocrats are familiar with the implemented regulations and its impact on the municipalities. An overwhelming majority of the respondents revealed that the Department ensured that sanitation regulations are implemented properly by the municipalities. This is done through site inspections, project and programme monitoring, as well as evaluation. This outcome confirmed that the DHSWS regulates sanitation services implemented by municipalities.

The founding principles of the Constitution of the Republic of South Africa (1996) requires the country to formulate sanitation regulations and policies. By the beginning of the twentieth century, the country developed the White Paper on Basic Household Sanitation (2001) and the Strategic Framework of Water Services (2003) to address the historical backlogs. Section 62 of Water Services Act (1997) stipulates that the Minister and the Province monitor the performance of every water services institution to ensure compliance with all applicable national standards, every applicable development, policy statement or adopted business plan prescribed under the Water Services Act.

The Water Services Authorities allow the Minister to access its records,

books and physical assets when deemed necessary to execute the monitoring function. The responses revealed that the Department is responsible to monitor planning and implementation of sanitation services provided by the municipalities. Moreover, the Municipal Infrastructure Grant policy outlines the manner at which the grant is utilised in the provision of basic services to rural areas and disadvantaged communities.

Question D.B 6 ***Please provide examples of how your department monitors and enforces regulations in the sanitation sector***.

- *The purpose of this question was to establish whether the Department had implemented monitoring systems. The implementation of the regulatory and monitoring system is not about commanding municipalities execute certain tasks, but to ensure that the functions are achieved correctly and collectively. The Department's focus is a risk-based approach in terms of sanitation, and utilise resources in those areas with the highest risk to the economy; environment and the recipients. The following verbatim responses were provided by the respondents.*
- *"The Department has established a Provincial Sanitation Task Team forum (PSTT) and it is held quarterly for municipalities to report progress on sanitation on sanitation delivery*.
- *The Department conducts verification process during implementation of the project to check compliance with norms and standards set by the department and ensure remedial actions for non-compliance.*
- *The Department conducts assessments and monitors the performance of Water Services Institutions through the Regulatory Performance Measurement System (RPMS), Green Drop for measuring sanitation and Blue Drop for measuring water compliance. The Green Drop programme includes wastewater quality monitoring, reporting and compliance certification, this has improved the quality of municipal wastewater discharge. The Department issue non-compliance letter to non-complying municipalities. If the Municipality fails to comply within a stipulated period, the Department takes the Municipality to court.*

- *The municipalities are expected to report on a monthly basis and submit their monthly and quarterly report and site visit schedule.*
- *The Department involves internal and external auditors to audit sanitation projects. In addition to this, the Department has warm bodies on the ground to monitor compliance and enforcement".*

The findings revealed that the DHSWS has been measuring and monitoring the performance of Water Services Authorities through the Regulatory Performance Measurement System, Blue Drop and Green Drop. The Department had developed the RPMS tool to measure performance of Water Services Institutions in the water sector consistently, transparently, and objectively. It is of utmost importance that municipalities do not pollute ground water to the detriment of downstream end-users. Due to the lack of capacity in the country, the focus had always been on the Water Services Authorities (WSAs) and not the entire water value chain.

In 2014, the Department established a new Chief Directorate referred to as Economic and Social Regulation as a means to identify dedicated capacity to manage the regulation of the country's entire water value chain. The Department has eradicated non-compliance by conducting assessments and site visits to the projects implemented by the sector. Significant development and improvements have been reported in the RPMS since its inception.

Based on the responses it can be inferred that the Department had implemented effective monitoring and regulatory measures. The municipalities are well-informed of their expectations and the consequences of non-compliance. In this way they can assist in the management of ground water pollution in the municipal area. The enforcement of protocol aimed at the prosecution of organs of state was developed and is aligned to Public Administrative Justice Act as well as the Intergovernmental Relations Framework.

Question DB.7 ***What does the current sanitation technology legislation and regulation in your Department stipulate?***

The purpose of this question was to investigate the current sanitation technology legislation and regulation in the Department with regard to options provided by municipalities to its beneficiaries.

The following verbatim responses are presented below.

- *"The current legislation and regulations in the Department support research and development on new innovative technologies that minimises the misuse of the natural resources. However, the Strategic Framework for Water Services (2003) states that the selection of sanitation technologies is strongly dependent on settlement conditions.*
- *The Department approves sanitation technologies based on the research conducted by Water Research Council (WRC) and other relevant stakeholders.*
- *Sanitation technology choices must be appropriate and affordable for the communities. Availability of local material and skills must be part of the choice of technology. The design of sanitation services facilities must maximise the use of local resources and should include resources*
- *Current water challenges encourage municipalities to implement appropriate technologies which minimise negative impacts on natural resources. The Department has introduced Sanitation Innovation Challenge to look at new ways of providing sustainable sanitation services through innovation. Sanitation Innovation Challenge seeks to provide a variety of sanitation technologies that will bring innovations and solutions to the sanitation challenges in the country".*

The DWS is the custodian of all water resources in the country. Furthermore, it mandates the municipalities to ensure that all water resources are protected and provide appropriate sanitation technologies to end-users by taking into consideration natural resources and the environment. The municipalities conduct feasibility studies when they implement dry sanitation to avoid ground water pollution. The majority of the respondents revealed that legislation and regulations in the Department ensures that municipalities implement

appropriate sanitation technologies in the area of its jurisdiction.

Question DB.8 ***Does the Department review sanitation legislation and guidelines gazetted since 1994? If yes, what is the reason for such review?***

The purpose of this question was to confirm whether the Department had reviewed sanitation legislation and guidelines gazetted since 1994. Furthermore, determine whether the respondents understand the benefits of sanitation legislation, the review of guidelines and how it contributes towards sanitation policies.

- *Since 1994, sanitation has changed significantly both in South Africa and globally. Both the Water Services Act (Act 108 of 1997) and the National Water Act (Act 36 of 1998) stipulate significant enhancement in policy, specifically the institutional framework. It has become increasingly evident to revise the current sanitation policy to accommodate aspects of the transformed service delivery environment including priorities to address gaps identified by the sector. The National Sanitation Policy review provides policy positions an opportunity to address these gaps and challenges, as well as to focus on the new national and global development imperatives.*
- *Enhancement in the sanitation sector has taken place since the approval of the White Paper on Water Supply and Sanitation (1994); White Paper on National Water Policy of South Africa (1997); White Paper on Basic Household Sanitation (2001); Strategic Framework for Water Services (2003) which are based on several years of implementation. Several challenges and unintended consequences have been identified which requires a review of the sanitation policy and consequent legislative amendments.*
- *The Department has reviewed sanitation legislations and guidelines those were gazetted in 1994 in order to cater for gaps and challenges identified by the sector and to cater for national targets as outlined in the National Development Plan as well as Medium Term Strategic Framework.*

- *Community needs changes and the policy has to be relevant to the current needs of the communities. A number of reviews have been made by the Department to respond to changing trends within the sanitation services delivery".*

The majority of the respondents agreed that the Department had reviewed sanitation policies and guidelines gazetted since 1994. Furthermore, most of the participants revealed that policy reviews ensure that these remain consistent and effective. The comments further substantiated that the Department had conducted policy reviews which was followed by the implementation of strategic policy positions outlined in the Strategic Framework for Water Services (2003). However, it is envisaged that the Strategic Framework for Water Services (2003) will in future be superseded by a water and sanitation strategy for the country. This policy review included the policy positions of the Strategic Framework for Water Services to ensure a sustainable sanitation sector in South Africa.

Question DB.9 ***What public policy changes should the DHSWS effect in terms of sanitation?***

The purpose of this statement was to establish whether respondents had perceptions of amendments to public policy which the Department should implement in terms of sanitation. Chapter 1 of the study stipulates that the emergence of a new democratic system in South Africa and the political changes in 1994 brought an opportunity in all sectors of government for a comprehensive review of policy, including water services sector. The responses revealed that addressing sanitation matters requires significant support in complicated political and financial circumstances, although the majority revealed deep concern about sanitation on privately-owned land.

- *"The Department should make changes to address sanitation provision on privately owned land, sanitation services in informal settlements, and sanitation services to backyard dwellers.*
- *The department needs to make changes in terms of safe management of faecal sludge for onsite and offsite and ensure that it is aligned to the*

budget and appropriate technologies.

- *Water Services Act (108) of 1997 should be reviewed every five years in order to accommodate changing trends in terms of sanitation and politicians must address government sanitation policies.*
- *The current design of toilets in rural areas to be changed from single pit to double pit toilet and this will save government budget.*
- *The Department to ensure that sanitation policies clearly indicate that all municipalities should have operation and maintenance plan for sludge management and there must be enforcement for management of sludge".*

The majority of the responses revealed that there is no need to amend public policy because the National Sanitation Policy (2016) addresses the gaps and challenges which had been identified previously.

Question DB.10 ***What is needed to achieve improved access to sanitation services in South Africa?***

This question endeavoured to confirm whether the DWS officials are aware of the significance of improved access to sanitation services. The intention was to establish whether the respondents felt it is necessary to achieve improved access to sanitation services in South Africa. Chapter 3 of the study stipulates that South Africa is committed to ensure the provision of at least the basic level of sanitation to the populace and address the universal service obligation. The CTMM aligned the sanitation policy with the National Sanitation Policy, 2016. The following verbatim responses were received.

- *"The country has to meet the target set by government on National Development goal which is to ensure access to sustainable sanitation for all citizens by 2030. South Africa is a signatory to United National and has to meet Sustainable Development Goals target number 6.2.*
- *Sanitation is not only the infrastructure but also refers to health and hygiene. Sanitation refers to the principle and practices relating to the collection, removal and disposal of human excreta, household wastewater and refuse as they impact upon people and the environment.*

- *The enabling environment is in place in terms of legislation, policies, strategies, guidelines, sanitation tools and funding. The government must improve basic sanitation services to vulnerable people and unserved households.*
- *Provision of sanitation services must be recognised as a right, and consumers expectations and needs in planning must be considered and maximise benefits to the local economy through local job creation and use of local enterprises.*
- *South Africa needs cooperation within the water sector including the communities, community-based organisations and non-governmental organisations as well as funding to achieve improved access to sanitation services.*
- *The Municipality should start prioritising sanitation services in their areas of jurisdiction and they must ring-fence the sanitation allocations.*
- *The municipalities must explore other technological options that are cheaper and easy to operate".*

This question endeavoured to evaluate whether the DHSWS officials are fully cognisant of what is required to achieve improved access to sanitation services. Improving sanitation services is not about commanding hands to do the work, it is about providing more support to local level sanitation plans and strategies in the country, and to communicate the benefits of investing in sanitation to the communities. The management of the DHSWS should change the manner in which they influence sanitation policies and find a better way of implementing sanitation policies to improve such services. All sectors are responsible for service delivery in terms of the provision of water and sanitation including housing development which should ensure that there is proper alignment of service delivery from the planning phase to the implementation of projects.

Question DB.11 ***What are you tasks in terms of public policy, planning, implementation, monitoring and reporting sanitation services?***

This question was posed to determine the role of the officials in terms of

public policy planning, implementation, monitoring and reporting because government officials have a constitutional obligation to account to Parliament in terms thereof and ensure effectively. Chapter 2 of the study in Section 2.7 points out that the municipalities are required to develop strategies (IDPs) for participative planning to engage citizens, community groups and business on a continuous basis. The Water Services Development Plan is the primary planning instrument for municipal water services and all Water Services Authorities must develop a five-year Water Services Development Plan.

The following verbatim responses revealed that the officials:

- *"Identify water services planning and support the development of credible Water Services Development Plans and Integrated Development Plans to ensure public policy is effective.*
- *Monitor and report on progress made in terms of public policy projects funded by DHSWS grants and conduct projects verification.*
- *Oversee and manage special projects (donor funded projects) and monitor the provision of basic water and sanitation services in informal settlements.*
- *Sanitation advocacy which involves advocating for prioritisation of sanitation services and profiling it. This also includes advocating social facilitation and end user education and future awareness campaign.*
- *Provide policy guidance with regard to sanitation public policy in order to inform planning, implementation, monitoring and reporting of sanitation services to ensure evidence-based sanitation policies.*

  Recognises the pivotal role that the public and private institution plays in terms of provision of sanitation services and implementation of water services programmes and ensure that they are adequately planned for".

The majority of respondents posited that they are involved these phases. Certain respondents revealed that they are responsible for the formulation of policy and reviews, as well as water and sanitation services information management and reporting. Generally, public officials and political office bearers would become aware of limitations in public policy, especially during

the implementation process.

5.8 Responses: Provision of sanitation services by selected respondents from the City of Tshwane Metropolitan Municipality

This section focused on the respondent's demographic profile of the municipal officials who participated in the research as respondents in the CTMM. Ten (10) municipal officials and nine (9) selected respondents in CTMM responsible for the provision of sanitation services was the targeted sample. The CTMM is classified as a Category A by the Municipal Demarcation Board in terms of section 4 of the Local Government Municipal Structures Act, 1998 (Act 117 of 1998). The CTMM vision is to be the leading provider of affordable water and sanitation services in South Africa.

The profile of the municipal officials who participated in the study for statistical purposes according to: gender, home language, race group, age range and highest education was gathered. Furthermore, the following data was also gathered from the respondents: opinions, experience, planning instruments, criteria to select project beneficiaries, regulation measures, policies, choice of sanitation technologies as well as alternative sanitation services.

5.8.1 CTMM gender

The purpose of this question was to establish the percentage of males and females who responded to the questionnaire in the CTMM. Gender played a critical role in this study as it offers updated empirical knowledge about gendered practices, norms, and discourses in the provision of sanitation services. The issue of gender was highlighted so that both perspectives could be utilised to provide recommendations after the assessment. Chapter 2 of the study reflects that gender played a major role of the provision of sanitation and the researcher had to know the gender of the respondents participated in the study. A summary of the responses is presented below:

Gender	N=9	CTMM Gender

Male	3
Female	6

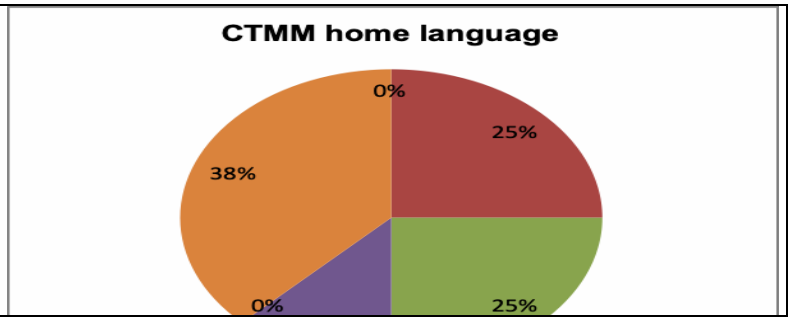
Table 30: CTMM officials' gender

The responses revealed that more males participated than females because most project managers are males in the CTMM. Furthermore, officials responsible for the provision of sanitation services were selected randomly. It was considered important that opportunities be created for women in the CTMM, to effect changes to water services. Women will only be able to contribute extensively if the CTMM addresses the underlying reasons for gender inequality by creating an enabling environment. Women empowerment in government is an intrinsic element of the transformative development agenda.

5.8.2 CTMM officials home language

The purpose of this question was to establish the selected CTMM respondents home language who participated on the study. Home language is considered a medium for communication therefore it naturally becomes a research resource during data collection. The following responses were gathered:

Home Language	N=9
English	0
Afrikaans	2
Tsonga	2
Tswana	2



Xhosa	0
Other	3

Table 31: CTMM officials home language

The gathered data revealed that the majority (38%) fell under other languages. A total of 25% of the respondents are Tsonga-speaking, while the other 25% are Afrikaans-speaking but no Xhosa and English-speaking officials participated in the study. Certain selected officials speak TshiVenda while the results revealed no isiNdebele, siSwati and Sesotho-speaking persons. The study acknowledges the omission of the following languages: isiZulu, TshiVenda, Sepedi, isiNdebele and Sesotho.

5.8.3 Race group

This question was posed to establish the respondents race group to gather such statistical data. The following responses were received:

Race group	N=9
African	6
White	3
Indian	0
Coloured	0
Other	0

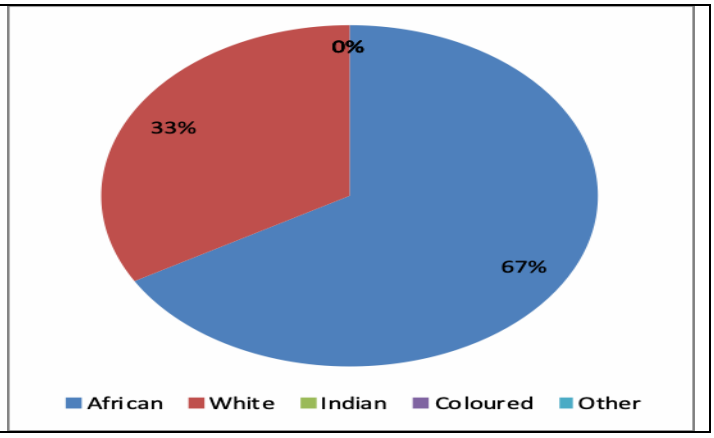


Table 32: CTMM official's race group

The majority (67%) of the respondents who participated in the study were African whilst 33% were Whites. The findings revealed that the CTMM comprises of other racial groups, however, the majority the officials are African.

5.8.4 Age Range

The purpose of this question was to determine the number of municipal officials per age group in order to identify the age demographic of the officials in the CTMM who responded to the study, the researcher potentially gained a lot of valuable detail information during analysis of their responses. The following responses were gathered:

Age Range	N=9
18-24	0
25-35	0
36-45	5
46-60	3
Over 60	1

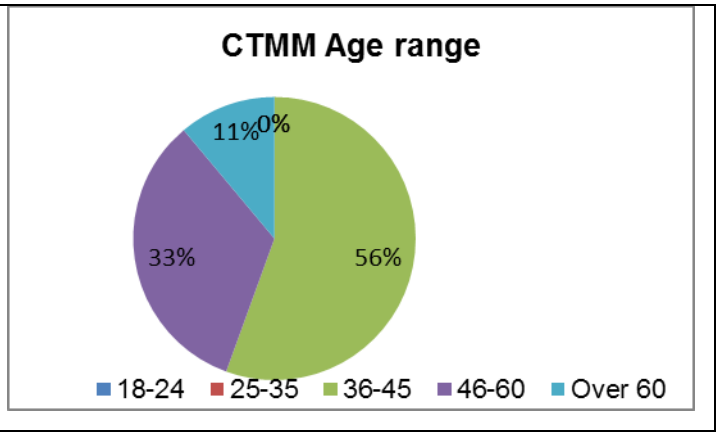


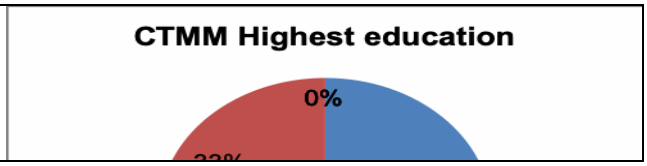
Table 33: CTMM officials age range

The gathered data revealed that the majority of the respondents (56%) were between 36 and 45 years of age. This age group revealed greater concern with regard to the provision of sanitation services in the CTMM. The findings revealed that 33% were between 46 and 60 years of age and 11% over the age of 60.

5.8.5 Highest level of educational

This question was posed to establish the selected respondent's highest education qualification as well as determine whether they understood the CTMM strategies and policies. The level of education of the respondents in the CTMM played a significant role to indicate if the respondents is on the strategic or functional level in the CTMM. The following responses were gathered.

Highest education	N=9
Postgraduate	6
Degree / Diploma	3



Matric	0
Up to grade 8	0
No schooling	0

Table 34: CTMM officials' gender

Many respondents are in possession of a Postgraduate qualification (67%) while 33% have a Degree / Diploma. The study revealed that the respondents have the capacity and skills to manage the sanitation programmes. The sampled group is directly responsible for the provision of sanitation at the CTMM.

Question MB.1 ***What are the roles and responsibilities of the municipal officials in terms of planning, implementing, monitoring and reporting on the provision of basic sanitation services to beneficiaries?***

This question was posed to evaluate whether the municipal officials employed at the CTMM are fully cognisant with the provision of basic sanitation services to its communities. Furthermore, the study points out that the national sanitation framework clearly stipulates roles and responsibilities of the DHSWS, service providers and outlines the outputs and outcomes of the projects in line with the standards set. The framework makes provision on how sanitation infrastructure projects should be rolled out by municipalities including the CTMM. Theoretically, the municipal planning processes must be aligned with the provincial and national planning processes, especially with regard to processes that determine key national and provincial budget priorities and strategic programmes and interventions. The provision of sanitation services is not about commanding hands and feet to execute tasks but rather proper planning, implementation, monitoring and reporting. The following verbatim responses were revealed.

- *"The role of the municipal officials is to identify the community basic infrastructure needs and then plan for the provision of those basic*

services such as sanitation services through the IDP process and report on progress made through community public meetings that are led by political heads.

- *The municipal officials are responsible for implementing the key mandate of providing services to the citizens. The officials manage resources provided to put services on the ground and ensure compliance to the Water Services Act.*
- *Oversee project implementation by motivating to obtain budget and facilitate technical inputs and report on progress made on the sanitation project*
- *The officials involve communities and councilors during planning stage and identify community needs and implement specific projects. The officials are responsible for project implementation throughout project cycle as prescribed in the Project Management Body of Knowledge (PMBOK)".*

The provision of sanitation entails adhering to the requirements of water-related policies and legislative stipulations, including constitutional requirements. The officials must formulate plans, implement strategies, monitor and report on the progress made. The researcher holds that all municipal officials employed in the Sanitation Division must be well-trained and fully informed about the sanitation value chain so that they are able to interact and cooperate effectively and efficiently with other stakeholders. The majority of the officials confirmed that they use the Tshwane Capital Project Planning System as a project management tool to plan, implement, monitor and report on the provision of basic sanitation services. The tool is linked to the IDP and the officials upload sanitation projects on the systems and thereafter monitor and report on the progress made. The findings revealed that the officials secure a budget for the projects, monitor performance and report on expenditure and progress.

Question MB.2 ***Does the Municipality engage its communities during the planning and implementation of sanitation services?***

The purpose of this question was to identify whether the Municipality engages

its communities during the planning and implementation phase of the sanitation projects in their jurisdiction. Planning for service delivery is no longer perceived as a top-down approach but rather regarded as an inclusive process. The directive has been deliberately shifted from national departments to the municipal sphere of government. During the planning phase, the communities are perceived as key stakeholders. Chapter 2 of the study on Section 2.9 stipulates that public participation goes hand in hand with transparency, and in the developed world, citizens are no longer willing to merely trust - they wish to have a say in water and wastewater developments that affect their lives and the environment. For most people it is important that they have an opportunity to participate, even though this implies that those who do not are not necessarily representative of the majority of the population. The verbatim following responses were revealed:

- *"The Municipality engages with the communities during planning and implementation of sanitation services as part of the IDP process.*

- *The Municipality uses the annual IDP engagement process to engage communities at ward level on required basic services. The Municipality uses IDPs and Ward level consultation process to prioritise sanitation projects.*
- *Through the political office the communities are aware of the projects that are planned for implementation and projects comes from community consultation and before project implementation commences there is stakeholder forum whereby a project steering committee is established".*

The Municipality consults the communities during the planning and implementation phase of the sanitation projects through the IDP; public consultation meetings; and through quarterly meeting which are led by ward councillors. In this sense, community participation is perceived as having a major impact to ensure that service delivery is a democratic process. Furthermore, it is beyond representative government but locating communities and users as central role players in the process. Community participation

offers greater control of the underprivileged over their own situation while communities participate in decisions which affects them directly.

Question MB.3 ***What criterion is utilised to select sanitation project beneficiaries?***

The purpose of this question was to examine the criteria utilised by the Municipality to select sanitation project beneficiaries. Furthermore, also establish whether the Municipality has an indigent register of households which receives free basic services such as water, sanitation and electricity or at substantially subsidised rates when projects are implemented. The study in Chapter 3 in Section 3.4.9 highlights that the provision of the Free Basic Services through the implementation of the municipal indigent policy has been undermined. The implemented indigent policies are faced with problems of deciding on how to target beneficiaries' and which benefits should be handed to which beneficiaries. The following verbatim responses revealed that:

- *"All South African citizens are entitled to basic sanitation services the Municipality selects project beneficiaries who are without basic sanitation and indigents list is prioritised to receive basic sanitation.*
- *The Municipality considers the following elements .i.e. the availability of bulk infrastructure and budget, as well as formalisation status of the area.*
- *The Municipality checks the availability of water services, availability of bulk sanitation infrastructure, affordability of services, sustainability of services and availability of funding".*

The findings revealed that this question was not well understood by the respondents. The purpose was to determine the criteria utilised in terms of prioritisation of those who require basic services, while the respondents focused is on the resources allocated by the Municipality before they implement the sanitation programmes.

Question MB.4 ***What regulatory measures have been implemented in the Municipality to ensure affordable access to sanitation services for persons who are economically disadvantaged and in a vulnerable situation?***

The purpose of this question was to determine whether the management of the CTMM is aware which population groups are economically disadvantaged and in a vulnerable situation. Chapter 2 of the study stipulates that free basic sanitation provides affordable ongoing services on the basic level for indigent households to ensure affordable access to sanitation services. The following verbatim responses revealed that:

- *"The Municipality has indigent policy and it is used as the regulatory measure to ensure that economically disadvantaged individuals in vulnerable situations are afforded access to sanitation services.*
- *The indigent households receive free basic services including sanitation as per government free basic services policy. The Municipality provides indigent households with 12kl of free basic water whereby 6kl is for waterborne sanitation".*

The majority of the respondents revealed that the Municipality had implemented the indigent policy to cater for the economically disadvantaged population groups. The indigent programme introduced by the CTMM enables persons who qualify to receive free basic municipal services. The ultimate goal of the CTMM is to ensure that the poor also have an opportunity to climb the ladder of prosperity and become self-sufficient. Anyone who does not have access to these goods and services is considered indigent within municipal boundaries.

Question MB.5 ***Does the sanitation framework(s) utilised by the Municipality contribute towards the implementation of sanitation, namely: standards of availability, acceptability, affordability, privacy and dignity?***

The purpose of this question was to establish whether the respondents shared the sentiment that sanitation frameworks are beneficial for the implementation of sanitation services. This, *inter alia*, requires that a systematic approach be followed in terms of using sanitation frameworks in order to contribute towards the implementation of sanitation which is sustainable. The study in Chapter 3 reflects that the legislative and policy frameworks are frequently formulated at the national level and municipalities are incumbent to implement these. They often lack financial and human resources, as well as technical skills to

discharge their duties effectively. Where institutional frameworks assign responsibilities to municipalities, states must ensure that local authorities have the necessary human-, financial- and other resources to discharge their duties effectively. The findings revealed that:

The majority of the respondents agreed that the Municipality has implemented sanitation framework(s) which prescribe standards of provision of sanitation which conform with the prescripts of the country's constitution. The primary objective of sanitation frameworks is to strengthen, regulate and provide guidance in the South African sanitation sector.

Question MB.6 ***How does the level of water services impact on the choice of sanitation technologies both in rural and urban areas?***

The purpose of this question was to determine whether the Municipality conducts feasibility studies before selecting sanitation technologies for both rural and urban areas. The Municipality is expected to conduct a feasibility study assessment to ensure that the practicability of a specific project within a specific selected context, especially for dry sanitation, the technology for implementation does not impact or contaminate the ground water. The feasibility will help the Municipality to decide whether a sanitation project should be initiated, or which parameters should be changed to implement a certain sanitation technology. The following verbatim responses revealed:

- *"In the areas where there is no water or bulk water network the Municipality implement dry sanitation in rural areas and in urban areas where there is network installed the Municipality implement waterborne sanitation.*
- *The Municipality does not implement waterborne sanitation in the area where there is no sewer network, pump station and treatment plants".*

Question MB.7 ***What is the municipal legislation stipulation regarding the provision of sanitation technologies?***

The purpose of this question was to comprehend which municipal legislation related to sanitation technologies be provided to communities. The study

points out that in many urban towns the bucket toilet system was installed as an alternative sanitation technology while limited attention was paid to provide rural areas with sanitation. The CTMM provided rural areas with the ventilated improved pit latrines. The following verbatim responses were gathered:

- *The municipal by-laws clearly indicate that the Municipality may specify the type of the sanitation to be installed. The Municipality installs sanitation services that are safe, affordable and not harmful to the environment.*
- *The Municipality legislation on sanitation technology option is aligned with the national legislation".*

The majority of the respondent responses highlighted that municipal legislation regarding sanitation technologies is aligned to the existing policies including the country's national legislation.

Question MB.8 ***Which resources have been availed by the Municipality for the provision of sanitation services and promotion of hygiene in its areas of jurisdiction?***

This question endeavoured to establish whether the Municipality prioritises the promotion of sanitation services, health and hygiene as well as the municipal officials understand that the aforementioned three elements are inseparable. The promotion of health plays a major role in understanding and addressing the prevention of chronic illness such are cholera and other sanitation related diseases. The following verbatim responses revealed that:

- *"The Municipality ensures that there is budget for sanitation services and hygiene promotion in the areas of its jurisdiction.*
- *The Education Awareness Unit within CTMM is responsible for promoting and enhancing awareness on water conservation and demand management as well as health and hygiene promotion.*
- *The Municipality has a dedicated section that deals with hygiene promotion and it has an allocated budget on an annual basis.*
- *The Municipality appoints service providers for the implementation of sanitation services, and health and hygiene tools and material for*

hygiene education and awareness campaign".

The majority of the responses revealed that the Municipality prioritises sanitation services, health and hygiene as well as appoints service providers to promote health and provide end user education to the beneficiaries.

Question MB.9 ***What alternative service delivery options are available to accelerate the provision of sanitation services?***

The purpose of this question was to confirm whether the CTMM has alternative service delivery options to accelerate the provision of sanitation services to decrease the backlogs. There are various alternative service delivery options which are available for the CTMM to enhance service delivery to the communities they serve.

The study in Chapter 2 in Section 2.11 points out clearly that alternative sanitation can substantially lower the cost of provision and maintenance, as well as the impact on the natural environment. Improved sanitation can vary significantly and is defined as a ventilated improved pit latrine, pour flush latrine, connection to public sewer and to septic tank open pit latrine. Effective delivery of water and sanitation services is usually best done at a local level. The strength and accountability of the CTMM will therefore be a key determinant of the coverage and sustainability of those services, both in villages and in more urban settings in Ga-Rankuwa, Mabopane, Temba and Winterveld.

The following verbatim responses revealed:

- *"Community based project are alternative where Municipality provides only construction material*
- *The Municipality prioritised formalisation or proclamation of townships to enable the roll out of basic services*
- *Municipalities partner with private sectors by signing contracts / agreements where there is a lack of human resources in order to accelerate provision of sanitation services.*

- *The Municipality outsource services and obtain funding from government departments*
- *The Municipality obtained funding for installation of bulk sewer services and on-site sanitation as well as funding for the upgrading of existing bulk services, these funding assist the Municipality to accelerate provision of sanitation".*

The majority of respondents revealed that the Municipality partners with the private sector by appointing implementing agents to implement sanitation projects. Funding plays a major role to accelerate the provision of sanitation in the Municipality. In the past few years the Public Private Partnerships (PPP) has emerged and gained popularity in government to accelerate service delivery. The CTMM signed partnership contracts with private organisations as an alternative service delivery option to accelerate the delivery of sanitation.

Question MB.10 ***What challenges are experienced when implementing sanitation programmes in rural areas?***

This open-ended question endeavoured to determine the challenges experienced when implementing sanitation programmes, especially in the CTMM Municipal rural areas. The researcher is aware that water and sanitation issues vary from one community to another, especially in rural areas and the concept of one-size-fits-all solutions have proven unsuccessful in most instances because the dynamics vary extensively. The following verbatim responses revealed that:

- *"The challenges are related to tribal land not owned by the Municipality. There is no relationship between the Municipality and tribal communities and it is not easy for the Municipality to implement government services.*
- *Communicating with communities in some instances is difficult, there is interference of ward councilors on project level.*
- *Most areas that are not formalised had a challenge for the implementation of waterborne sanitation due to lack of water supply*

network.

- *Constant stoppages by community leaders and business forums and vandalism of infrastructure delay the completion of projects*
- *Implementing VIP toilets in rural areas is often where there is hard rock or high-water level".*

The majority of the respondents revealed that implementing government services for communities which reside on tribal land is a major challenge. The implementation of sanitation services in rural areas also impacts on the performance of municipal services to the communities due to political interference and constant interruptions during implementation by community leaders and business forums. The responses to the question revealed that sanitation infrastructure vandalism and theft is rife in the Municipality during these interruptions. The Municipality has no security measures or plans to safeguard its infrastructure during these interruptions and community members appear to be the primary culprits of vandalism.

Question MB.11 ***What challenges are experienced when implementing sanitation programmes in urban areas?***

This question was posed to determine the challenges experienced by the Municipality in urban areas during the implementation phase of sanitation services. The Municipality must consider that South Africa is rated a water scarce country and the available source is becoming depleted. Moreover, this problem is aggravated by the rate at which individuals migrate from rural to urban areas. The following verbatim responses revealed that:

- *"Political interference and community unrest during project implementation.*
- *Informal settlements poses a big challenge to the Municipality due to lack of bulk infrastructure and water scarcity.*
- *There is insufficient bulk services in most areas within the jurisdiction of the CTMM.*
- *Dense population and illegal structures in the municipal area affect implementation of sanitation services.*

- *Funding constraints to implement bulk infrastructure such as sewer networks".*

It can be inferred from the aforementioned that numerous challenges are experienced when implementing sanitation programmes in urban areas. The residents are aware that perceived problems need to be addressed, namely: the management of potable water supply and bulk infrastructure in the Municipality.

Question MB.12 ***What lessons are learnt from utilising implementing agents to implement sanitation services?***

This statement intended to establish whether lessons had been learnt from appointing implementing agents and public private partnerships. The following verbatim responses revealed that:

- *Additional human resources are a benefit to under resourced Municipality to fast track the implementation of sanitation projects.*
- *Delayed procurement processes timeframe are similar in most cases when using internal and external implementing agents.*
- *High labour costs in projects due to escalation prices of the material.*
- *Lack of skills transfer in most urban projects by the implementing agents.*
- *Communities are capable of installing sanitation services such as VIPs and UDS systems in rural areas.*
- *Implementing agents need close monitoring, sometimes they deviate from the scope of the project or provide infrastructure of lesser quality that needs immediate attention after project handover".*

The respondents highlighted that there is a delay in the procurement process as a result of appointing service providers. The Municipality adheres to the supply chain management processes which in most instances is time consuming. The implementing agents must be closely monitored to ensure that they do not deviate from the approved project implementation plans.

Question MB.13 ***What would you recommend to government to***

improve the provision of sanitation services?

The respondents were asked to suggest how government can improve the provision of sanitation services in the country. The following verbatim comments revealed that:

- *"The provision of sanitation is dependent on the availability of budget and thus government needs to encourage communities to pay for the services.*
- *Government to allocate more funding towards water and sanitation programmes to enable more citizens to be provided with the basic sanitation services.*
- *Qualified personnel to be appointed in strategic positions to ensure adequate planning and accountability in the Municipality.*
- *The Municipality has to upgrade the existing infrastructure and install new bulk infrastructure and this will assist in reducing sanitation backlogs".*

The responses to the question revealed that the implementation of sanitation infrastructure is dependent on the availability of funding. The Municipality must appoint qualified personnel in strategic positions to ensure adequate planning; and the municipal officials do not mismanage state funds because the officials would take advantage of the system if they are not held accountable for illegal actions.

5.9 Conclusion

In this chapter, the empirical findings of the study regarding the provision of sanitation by the CTMM was discussed and analysed. The data was acquired through a questionnaire and semi-structured interviews. The use of a structured questionnaires is in line with the grounded theory as it allowed officials from the DHSWS, the officials from the CTMM and household members in the northern fringes in Ga-Rankuwa, Mabopane, Temba and Winterveld to respond to similar questions. Relevant role-players (officials)

and stakeholders (household members) were targeted to participate in the research in the northern fringes of the CTMM. Non-probability sampling was utilised. A total of fifty of the identified 118 respondents participated in the research. All the statements in the questionnaire were based on certain facts and knowledge related to the provision of sanitation, regulation frameworks, challenges experienced during project implementation as well as lessons learnt when implementing these services in the municipal area.

The focus was to establish the resident's perceptions and experiences relating to the provision of sanitation services by the CTMM. The resident's perceptions and responses revealed by the officials of the DHSWS and the CTMM officials contributed towards the research questions and identified numerous issues regarding the provision of sanitation services. In the next chapter, recommendations and conclusions will be summarised, that is, draw logical conclusions and provide recommendations in terms of the provision of sanitation services.

CHAPTER 6

RECOMMENDATIONS AND CONCLUSION

6.1 Introduction

The purpose of this study was to analyse the provision of sanitation services in the northern fringes of the CTMM with specific reference to Ga-Rankuwa, Mabopane, Temba and Winterveld townships. The sub-objective of this study was to examine quantitative and qualitative approaches, including outputs and inputs model and theories in terms of the provision of sanitation services.

This chapter presents a number of critical evaluations of the key findings relating to sanitation services in the northern fringes of the CTMM, followed by recommendations and conclusions to establish a more effective, efficient and cost-effective provision of sanitation services in the northern fringes of CTMM such as Ga-Rankuwa, Mabopane, Temba and Winterveld. Apart from revealing basic information based on local empirical data acquired during the study, recommendations to conduct further research is also provided. The qualitative research model was conducted to investigate how to ensure efficient, effective, equitable, economic and sustainable provision of sanitation services in the CTMM northern fringe and uses the social model of the provision of sanitation.

In order to understand, describe, explore and examine the factors that influence the various aspects of the provision of sanitation services, the beneficiaries and officials from the DHSWS and the CTMM perceptions were collected through a standardised questionnaire, follow-up interviews, data analyses, and an extensive in-depth literature review. The gathered research data was cross - referenced and examined with the relevant interdisciplinary literature on the provision of sanitation in South Africa and internationally (refer to: Chapters 2 to 5 of the thesis).

The objective of this study was to investigate the provision of sanitation in

South Africa and particularly on the northern fringe of the CTMM in Ga-Rankuwa, Mabopane, Temba and Winterveld townships. Furthermore, the study aimed at assessing the degree of satisfaction among the residents related to the quality of sanitation services provided to the Ga-Rankuwa, Mabopane, Temba and Winterveld townships residents. This study examined the approach to provide sanitation services in Ga-Rankuwa, Mabopane, Temba and Winterveld townships within the CTMM. The objectives of the study are linked to Chapter 5 findings and are as follows:

i. Explore the planning instrument(s) utilised by the sector to promote planning and budgeting for sanitation services.
ii. Assess and interpret the regulatory framework including the application of the provision of sanitation holistically in South Africa.
iii. Identify and analyse key challenges faced by the CTMM in the provision of sanitation services in rural and urban areas under its jurisdiction including the northern fringe of its responsibility area with specific reference to Ga-Rankuwa, Mabopane, Temba and Winterveld townships.
iv. Assess the alternative service delivery mechanisms or technologies utilised in South Africa to provide sanitation services to enhance service delivery.
v. Provide guidelines and recommendations to the CTMM to improve sanitation service delivery.

The key exploratory questions of the study focused on the provision of sanitation services and aligned to the following objectives of the study:

i. Which planning instrument(s) are utilised by the sector to promote planning and budgeting for sanitation services?
ii. What is the sanitation regulatory framework in the country?
iii. What are the key challenges faced by the CTMM in the provision of sanitation services in areas under its jurisdiction including the northern fringe of its responsibility area with specific reference to Ga-Rankuwa, Mabopane, Temba and Winterveld townships?
iv. What are the alternative service delivery mechanisms or technologies

utilised in the provision of sanitation services in South Africa to enhance basic service delivery?

v. What strategies and guidelines are utilised in South Africa and in the CTMM to improve the basic delivery of sanitation services?

Overarching research question: what is the current status of the provision of sanitation services within the northern fringe of the CTMM with specific reference to Ga-Rankuwa, Mabopane, Temba and Winterveld townships?

In responding to this question, the study argued that the provision of sanitation is not a standalone function performed by the CTMM. It is undertaken by the national, provincial, and local spheres of government and implementing agencies which operate at different levels for various purposes. To achieve the primary objective discussed above, an extensive literature review (Chapter 2) in section 2.3 on overview of access to sanitation in South Africa was conducted as well as relevant regulations, legislation, principles and practices which govern the provision of sanitation was researched.

This chapter presents the critical evaluations of the key findings, general conclusions and recommendations of the study. The conclusive aspect of the study emanates from the literature review, key objectives, research questions, followed by the findings and results. The recommendations are categorised into 3 sections, namely: recommendations for the beneficiaries; DHSWS; and the CTMM. The scope for future research regarding provision of sanitation is also discussed.

6.2 Critical evaluation of key findings

The key findings of the study demonstrate that the provision of basic sanitation services to households in the northern fringes of the CTMM is both a key developmental and human rights issue.

The research questionnaires used to gather data in Chapter 5 explored the effectiveness and efficiency of the provision of sanitation in the northern

fringes of the CTMM in Ga-Rankuwa, Mabopane, Temba and Winterveld. The research questionnaire was designed such that it gathered data based on the experiences of the respondents involved in the provision of sanitation in the DHSWS, the CTMM and households benefitted from government sanitation programme. A case study approach in qualitative research methodology was adopted for this study. A lack of both human rights and developmental issues in terms of provision of sanitation in the northern fringes in Ga-Rankuwa, Mabopane, Temba and Winterveld would result in the spread of diseases and poverty.

Failure to serve households with basic sanitation has an extreme negative impact on the social and health status of communities, as well as economic and environmental implications. A total of 4,1 million households did not have access to improved sanitation in 2016 (StatsSA, 2016:38). Looking at the sanitation backlogs in the CTMM on the number of households without a hygienic toilet over time, in 2006 the number of households without a hygienic toilet in the City was 158 000. This increased annually at a rate of 0.62% to 168 000 in 2016 (Cogta: Online).

The DHSWS has been fingered as a contributor to the untreated raw sewage discharged from the wastewater treatment works into the rivers across the CTMM (Iol: online). Progress has been made under the Millennium Development Goals and South Africa has met its sanitation target to halve the number of households without sustainable access to sanitation. However, millions of people remain without adequate sanitation. The study also critiqued the approach utilised in section 5.2.2 by the CTMM during the planning and implementation phase of sanitation services based on the premise that local government must engage with the communities during these phases. Furthermore, section 5.7 of the study recommends that communities must participate in public decision-making of, for example, selection of sanitation technology option before implementation takes place. The Municipality confirmed that planning basic service delivery in its area of jurisdiction is regarded as an inclusive process and it is no longer a top-down approach.

To preserve the citizenry's health, it is imperative to provide proper access to sanitation in the northern fringe of the CTMM. Consequently, the national government aims to increase the number of households with access to a functional sanitation service to 90% by 2019 as well as eradicate the bucket sanitation system in the formal areas (StatsSA, 2016:35). The CTMM has a target of meeting 90% households with access to sanitation in line with government target. In light hereof, the expanded definition of sanitation refers to the provision of toilet facilities and services for the safe management of human excreta, that is, containment, storage and on-site treatment or conveyance, and eventual safe end-use or disposal (WHO, 2018). Inadequate sanitation is a major cause of, *inter alia*, global infectious diseases, for example, cholera, typhoid and dysentery. It also contributes towards stunting and impairing cognitive abilities; well-being and school attendance; as well as anxiety and safety with lifelong consequences, especially for young girls and women.

The national and provincial DHSWS and the CTMM each has its own roles and responsibilities to fulfil with regard to the provision of sanitation services. The key role players in the provision of sanitation services includes the DHSWS, the CTMM and household members benefitted from the programme.

6.2.1 Water and sanitation governance in South Africa

The study on the provision of sanitation in and by the CTMM in the northern fringes with specific reference to Ga-Rankuwa, Mabopane, Temba and Winterveld townships also drew on the principles of good governance, that is, ongoing interaction between the government and the local communities. The CTMM has faced a number of administrative and political challenges in terms of its administration including the delivery of basic services such as water and sanitation. During December 2019, the CTMM was placed under administration where the Gauteng Provincial government evoked Section 139 read with Section 154 of the Constitution to take over the administration of the City (Cogta: Online).

The study revealed that the provision of sanitation services in the northern fringes is largely the responsibility of the DHSWS both national and provincial offices, and the CTMM. The national government set a sanitation target to eradicate basic services backlogs including sanitation services in 2014 and the CTMM aligned their targets with the national targets. The South African government prioritised sanitation backlogs by placing both social and political pressure to eradicate sanitation backlogs. Subsequently, good governance led to the successful provision of sanitation to local communities in, for example, the provision of sanitation services in the northern fringes of the CTMM in Ga-Rankuwa, Mabopane, Temba and Winterveld. Although the delivery of sanitation services increased over time, it was provided at a high cost. The Municipality outsourced services to address the supply side of services. In response to these pressures, the private sector was utilised as implementing agents for the provision of sanitation. Similarly, strong joint departmental efforts by municipal officials to identify community basic infrastructure needs was realised.

The Planning and Development Division within the CTMM is responsible for the capital projects and infrastructure planning and this is done in conjunction with the city planning and the division aligns its projects with the development growth in the city. The City outsource sanitation services during the implementation of sanitation services in the areas under its jurisdictions (CTMM, 2020: Online). The officials stated that the provision of sanitation is not about commanding hands and feet to do things, but requires proper planning to develop and budget implementation plans, monitoring and evaluation including reporting.

This study highlighted that there were major challenges in the provision of sanitation services since 1994. Business activities and schooling in some parts of Ga-Rankuwa, Mabopane and Winterveld were brought to standstill as residents embarked on protest against service delivery in the areas (iol: Online). The South African government established a DHSWS to focus on

sanitation in order to resolve these challenges identified as a matter of urgency since 1994. According to the Water Services Act of 108 of 1997, regulated then by the Department of Water Affairs and Forestry (DWAF), was mandated to deliver water supply and sanitation services in the country. The sanitation function was not given special attention but fragmented amongst sector departments and within the so-called DWAF where it was also implemented in various chief directorates.

Currently, the DHSWS has a Chief Directorate that is responsible for the provision of sanitation services in the country, named National Sanitation Services and all provinces are allocated sanitation personnel's. The fragmentation of the sanitation function led to poor service delivery in terms of sanitation the focus was on the delivery of water. In September 2001, the Cabinet approved a White Paper on Basic Household Sanitation (2001) and resolved that one department leads the delivery of sanitation services. Therefore, in 2002 a dedicated unit to ensure delivery of Basic Sanitation Services in an aligned manner was created and the National Sanitation Programme Unit (NSPU) was established. The CTMM also has established a dedicated division to address both bulk water and sanitation, named Water and Sanitation Planning Infrastructure and Implementation to address both water and sanitation challenges on the northern fringes and other parts of the municipal area.

6.2.2 Planning and budgeting for sanitation services

Montesano (2016:10) also postulates that politicians at national, international and local government spheres must place sanitation firmly at the top of their agenda, and include it in the national planning and budgeting processes. The DHSWS has implemented planning instruments to promote both planning and budgeting. The Department utilises WSDPs as planning instruments and the officials are encouraged to participate in IDP's at the local sphere of government. Furthermore, the CTMM also make use of the WSDPs and IDPs as the planning tools. The study conducted in the northern fringes of the

CTMM revealed that officials of the DHSWS are encouraged to participate in the Integrated Development Planning processes.

Sanitation challenges highlighted in Chapter 2 in section 2.11 included: non-alignment of sector plans and problems with informal settlements; and process of emptying ventilated improved toilet pits in rural areas because of the lack of operation and maintenance plans in most municipalities. The toilet pits were filling-up rapidly in rural areas and the municipalities such as the CTMM had neither operation nor maintenance plans to manage this challenge facing their area of jurisdiction. Most municipalities such as the CTMM conducted operations and maintenance on an *ad-hoc* basis in the areas under its jurisdiction including the northern fringes of the City in Ga-Rankuwa, Mabopane, Temba and Winterveld. The current practice of using a rake to remove faeces appeared inappropriate. Scholars should investigate the circumstances and methods adopted to empty toilet pits. The disposal of and management of faecal sludge in Ga-Rankuwa, Mabopane and Temba also proved a serious challenge.

Chinedu *et al*. (2013:3), assert that the MDGs identified sanitation services as the key factor in lifting people out of poverty. However, despite all efforts in terms of material, financial and human, the African continent remains off-track. The majority of the respondents (42%) are satisfied with the provision of sanitation services in their areas whilst (20%) are extremely satisfied with the sanitation services received from the CTMM. Municipalities such as the CTMM are tasked with maintaining and developing water and sanitation infrastructure to ensure that these services, amongst other, is delivered effectively and efficiently. However, certain municipalities experience financial and capacity constraints, which has led to a serious backlog in the maintenance and rehabilitation of infrastructure necessary for the provision of potable water and sanitation services.

Nationally, the historical delivery rate had been insufficient to meet the 2014 sanitation target which was not met. Therefore, a continued acceleration of the provision of sanitation services was required to ensure universal access.

The Accelerated Infrastructure Development and Maintenance Programme was adopted to accelerate basic water and sanitation roll out (CTMM,n.d. Online). The sources of funding available to municipalities in South Africa includes the Equitable Share Infrastructure Grant, for example, MIG and the revenue a municipality collects. The government introduced the Equitable Share subsidy to contribute towards the municipality's operating account it fail to recover costs from the poor. The subsidy also enables it to overcome service delivery challenges for the poorer communities.

The Municipal Infrastructure Grant is allocated to a municipality to enable it to drive development and ensure effective control of its resources. A municipality's own revenue is generated from taxes of immovable property, fines and service charges. The funding is utilised to sustain the services it delivers and payments received to ensure sustainability. Furthermore, the importance of accelerating the collection of unpaid bills by private and corporate users was emphasised in the CTMM (CTMM: Online).

The DHSWS admits that access to adequate sanitation services is a basic human right. It has established two sanitation grants as a funding injection for the provision of sanitation services, namely: Bucket Eradication Grant and Rural Household Infrastructure Grant. The grants have been consolidated into one, namely: Water Services Infrastructure Grant. The CTMM addressed water and sanitation backlogs with the water services infrastructure grant. Moreover, sanitation programme implemented in the northern fringes of the CTMM utilised this grant (CTMM, Online). The Rural Household Infrastructure Programme (RHIP) was funding to support municipalities to address rural basic sanitation (and water supply) backlogs. The grant contributes towards rural development and improves the quality of life in rural communities. Furthermore, the grant contributes towards meeting water supply and sanitation MDG targets as well as create jobs and promote Local Economic Development. The objective of the Bucket Eradication Programme was to eradicate all pre-1994 bucket toilets in formal areas throughout the country.

6.2.3 Lack of skills versus budget to provide sanitation services

Municipalities such as the CTMM are faced with challenges such as institutional capacity, lack of technical skills to manage water and waste water infrastructure assets properly. These resulted in certain municipalities failing to provide reliable water and sanitation services. Like other numerous cities, the CTMM is bound to plunge into water scarcity problems that are most likely to be a consequence of population growth, climate change and other factors that can potentially contribute. The CTMM indicated liveability as one of its objective through its Tshwane Vision 2055 (CTMM, Online). Municipalities are allocated with limited budgets for operations and maintenance compared to that allocated towards new capital works. Municipalities are unable to employ appropriately qualified technical staff and poor revenue management are major contributors towards the poor management and facilitation of a reliable water and sanitation service.

Furthermore, the national infrastructure grant funding mechanisms do not prioritise maintenance of existing infrastructure but incentivises building new infrastructure. Tshwane's settlement pattern is characterised by the inequitable placement of low-income residential areas removed from economic opportunities and vital social amenities. Low income, government assisted development occurs on the periphery of the urban areas, and is most dominant in the North followed by the West. The northern areas include Ga-Rankuwa, Temba, Hammanskraal, while the western areas include Atteridgeville, Lotus Gardens and Olievenhoutbosch (CTMM, Online). Sanitation managers are unable to respond effectively to the needs to provide reliable water supply and sanitation services due to the nature of internal public decision-making systems and procedures in and by municipalities. These internal systems and procedures are informed, *inter alia*, by the Local Government: Municipal Systems Act (MSA) and the Local Government: Municipal Financial Management Act (MFMA) (DWS, 2018:20).

6.2.4 Regulatory measures and frameworks to ensure affordable access to sanitation services

The findings revealed that the sanitation sector in South Africa is regulated by three policy documents, namely: White Paper on Water Supply and Sanitation (1994); Water Services Act (1998); and White Paper on Basic Household Sanitation (2001). Sanitation is a multi-faceted sector and complex with a wide range of approaches, technologies and service providers intertwined with distinct institutional, cultural and sectoral environments. The Constitution of South Africa, 1996 entrenches the right of all people to dignity and an environment that is not harmful to their health and wellbeing.

The study revealed that the CTMM has implemented frameworks to regulate sanitation services in the country. The study reveals that the national sanitation framework has 33 policy statements across the whole value chain and it sets clear norms and standards for basic sanitation. The framework clearly stipulates roles and responsibilities of the Department, service providers and outlines the outputs and outcomes of the projects in line with the standards set. The framework makes provision on how sanitation infrastructure projects should be rolled out by municipalities including the CTMM and determines the appropriate technologies applicable for implementation. Furthermore, the overall objective of the Water Services Act (1997) is to assist municipalities to undertake their role as water services authorities and pay attention to the needs of the consumers. The Department formulated the National Water Services Regulation Strategy (NWSRS) and the Green Drop System to ensure that waste water treatment works progressively to improve its operations so as not to impact negatively on water bodies to which they discharge their product. The Department promotes incentive-based regulations by supporting and encouraging local government institutions to perform their function to, *inter alia,* provide hygienic, efficient, effective, cost- effective and sustainable sanitation services.

Furthermore, the DHSWS is responsible for the regulation and utilisation of raw water across the country. The Department is responsible to authorise water abstraction, dam safety, waste discharge and set charges for raw water and the discharge of effluent. The future sewer requirement in the CTMM

shows the sewer master plan for the entire horizon. The total capital requirement for the CTMM is R22 billion. Assuming that this is carried out over the planning horizon of 45 years by the CTMM, this equates to an annual spend of R489 million per annum (CTMM, Online). Moreover, the Department sets standards for water and sanitation services provision and associated tariffs, which are also governed by the Local Government: Municipal Systems Act and the Local Government: Municipal Finance Management Act. Water Services Authorities are responsible for formulating by-laws. There are significant challenges to ensure that water services authorities set appropriate tariffs to cover the cost of operations and maintenance, including the promotion of efficient water utilisation to regulate water supply, provision of sanitation and use within its area of jurisdiction (DHSWS, 2018:26).

The DHSWS as a sector leader has incorporated core norms and standards for sanitation services. Norms and standards set by the Department stipulate that a water services authority must ensure that human excreta is consistently contained safely throughout the service chain. This implies that each household must have regular access to an appropriate, and adequate sanitation facility and take responsibility for the proper utilisation of the service, including but not limited to the toilet facility. A water services authority must ensure that sanitation services is metered and tariffed properly. Each household pays timeously for the service provided with reasonable debtor control steps so that the economic value thereof is realised as well as ensure a sustainable service. All users should realise the greatest possible health and well-being benefits from the sanitation service and promote hygiene (DHSWS, 2017:49). The CTMM states that all domestic consumers who are provided with a full water supply service should be charged stepped tariffs and the consumer must pay for municipal water services supplied by the CTMM for drinking, ablution and culinary purposes. Moreover, sanitation charges should be based on the volume of water consumed (CTMM,2020: Online).

Furthermore, the study revealed that the country's sanitation framework comprises of 33 policy statements across the entire value chain and sets clear norms and standards for basic sanitation. The framework clearly stipulates the

roles and responsibilities of the DHSWS, service providers as well as outlines the outputs and outcomes of the projects to conform with the standards set by the DHSWS. The framework makes provision of how sanitation infrastructure projects should be rolled out by municipalities and determine the appropriate technologies applicable for implementation. The CTMM has developed a document titled Standard Specification for Municipal Civil Engineering Works that stipulates that all material used for water and sewerage networks and pipelines must conform to the specifications set out in this guidelines (CTMM, 2021: Online). The Standard Specification for Municipal Civil Engineering Works was used as a guideline by the service providers appointed for the provision of sanitation services in the northern fringes of the CTMM in Ga-Rankuwa, Mabopane, Temba and Winterveld township. According to the findings, Chapter 2 of the study in Section 2.3 stipulates that the CTMM has an indigent policy which conforms with the national government's call to alleviate poverty throughout the country. The Municipality utilises its indigent policy as a regulatory measure to ensure that economically disadvantaged individuals in vulnerable situations are afforded access to sanitation services. Furthermore, the households benefit from the indigent policy once registered on the municipal system. The Finance Department in the CTMM activates a clearance for the household debt from its municipal accounts and notifies the Department of Services Infrastructure to apply technical assistance to the registered household.

South Africa adopted a free basic water and sanitation policy to supply all poor households with a basic water supply of 25 litres at no cost including free basic sanitation to promote affordable access thereto. Water Services Authorities are required to have a free basic water and sanitation implementation strategy in its areas of jurisdiction (DWS, 2017:43). Unfortunately, the unintended consequence of this policy is the household’s expectation to receive free water and sanitation services. Consequently, municipalities collect limited revenue from households in rural areas, even if the service provided is a connection in the backyard or toilet facility. This situation creates high dependence on government grants to sustain basic services. Furthermore, free basic water and sanitation policies are closely

linked to those for the provision of infrastructure. The municipalities are required per the national policy to provide the poor with free basic water and sanitation, which is impeded by limited funding. The CTMM has developed indigent programme as part of poverty alleviation which is implemented in line with the national government's call to alleviate poverty. The City's indigent programme aimed at including those currently excluded from access to basic services, through the provision of a social safety net. The common need of poor people in South Africa is to have access to basic services that will facilitate their productive and healthy engagement in society (CTMM, Online).

Furthermore, the findings in chapter 5 in section 5.7 revealed that the DHSWS is anticipating formulating the National Sanitation Integrated Plan (NSIP) which aligns to the National Development Plan (NDP) 2030 and the current National Water and Sanitation Master Plan. Moreover, the NSIP will provide the sanitation sector with a roadmap to implement sanitation policies to address essential sanitation service delivery in the country. The NSIP will be developed together with a monitoring tool to monitor the implementation of the sanitation plan to achieve sustainability for all paying households, as well as special attention to the needs of the vulnerable. South Africa as a member state of the United Nations has committed and signed the *Sustainable Development Goals* (SDGs).

One of its targets, 6.2, reads: "By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations". The SDG target for sanitation coincides with the South African NDP which also sets a sanitation target for the provision of improved sanitation for all by 2030. The CTMM has conducted a thorough analysis of the City's status and what other cities have done to achieve sustainable growth, Tshwane's Sustainable and Inclusive Growth Strategy (SIGS) stipulates that the City has the potential to double the size of its economy and its workforce over the next 15 years. If the SIGS is implemented successfully, the City will be much closer to achieving NDP and Gauteng Vision 2055

targets (CTMM, 2016:112).

6.2.5 Monitoring regulations and enforcement thereof in the sanitation sector

Chapter 5 in Section 5.7 revealed that the DHSWS had implemented monitoring systems to ensure that a municipality complies with the regulations set by the Department as well as encourage them to execute their tasks correctly and collectively. The Department monitors sanitation projects through different structures established for this purpose such as the Provincial Sanitation Task Team (PSTT). A meeting is held quarterly with the municipalities to report progress on sanitation delivery while most municipalities throughout the country call monthly district meetings. The findings also revealed that the Department conducts a verification process during the implementation phase of the projects in provinces to check compliance with norms and standards as well as ensure remedial action for non-compliance.

Chapter 5 in Section 5.7 of the study revealed that the DHSWS conducts assessments and monitors the performance of Water Services Institutions through the Regulatory Performance Measurement System (RPMS), Green Drop to measure sanitation while Blue Drop for water compliance. The Green Drop programme is used to implement punitive measures and acknowledge compliance. It includes wastewater quality monitoring, reporting and compliance certification, which has improved the quality of municipal wastewater discharge. Furthermore, the Department issues non-compliance letters to non-complying municipalities. If the municipality fails to comply within a stipulated period, it is handed over to the courts by the Department. Moreover, the Department has appointed staff to monitor compliance and enforcement. The DHSWS planned to tighten enforcement and compliance measures against the CTMM to ensure it complies with obligation to deal with low effluent. In 2008, the DHSWS noted that residents and businesses are not aware of the quality of drinking water within their municipal area of jurisdiction. The Department introduced the *Blue Drop Certification* programme to improve, recognise and encourage a municipality's performance and

uninterrupted enhancement through an incentive based programme, that is, regular audits of the municipal water supply systems.

The finding revealed that the Water and Sanitation Infrastructure and Planning Division has made sound progress in providing its communities with sanitation services and had implemented large scale sanitation backlog eradication programmes. However, it did not reach the majority of the people of Winterveld township who reside on privately-owned land and the growing population in the northern fringes of the CTMM. Furthermore, the role of the municipal officials in terms of monitoring is to identify the community basic infrastructure needs and then plan for the provision of those basic services such as sanitation through the IDP process and report on progress made at community public meetings which are led by political heads.

This finding suggests that the CTMM must implement monitoring tools to accelerate sanitation backlogs (bulk sewer lines) to the townships under investigation which could result in meeting the new sanitation demands and universal access by 2030.

6.2.6 Impact of water services on the choice of sanitation technology

The previous National Party-led government's spatial planning had led to large proportions of former homelands and rural areas without water and sanitation infrastructure (SAhistory, 2018: Online). The CTMM prioritised the provision of sanitation services in the northern fringe of its jurisdiction in Ga-Rankuwa, Mabopane, Winterveld and Temba townships. Sanitation challenges highlighted in Chapter 2 in section 2.11 included: non-alignment of sector plans and problems with informal settlements; and process of emptying ventilated improved toilet pits in rural areas because of the lack of operation and maintenance plans in most municipalities. However, maintenance expenditure is inadequate coupled with insufficient resources gathered from subsidies and tariffs to sustain the service properly. Due to water scarcity, its rural areas such as the Winterveld township is served with on-site sanitation.

The challenge of on-site sanitation served to communities is sustainability of the toilet facilities because neither operation nor maintenance is in place.

Globally, the drive for the sanitation technology option to improve access and eradication of open defecation is considered as a remedy to the people who live without access to basic sanitation. The responses in Chapter 5 section 5.7 revealed that the beneficiaries in the CTMM clearly understood the type of sanitation facility implemented in their townships. However, the choice of sanitation technology is based on the permanence of the settlement, affordability, financial costs, technical aspects of each technology, design life, preferences, expectations, potential for job creation, institutional capacity, and environmental considerations. However, joint planning between the Municipality and the community promises greater success for the implementation of the sanitation technology option.

According to the research findings, the Municipality is expected to conduct a feasibility study assessment as a criterion to ensure the practicability of a specific project within a specific selected context, especially for urban and rural areas. The Urine Diversion toilets implemented by the CTMM in Winterveld township yielded greater success to address and enhance access to sanitation. The community members considered it to be a better and safer technology option which had proved to be viable for large scale utilisation within the South African context. The CTMM by-laws clearly indicate that the municipality must install affordable sanitation services which are safe and not harmful to the environment (randwater, Online).

The CTMM does not implement waterborne sanitation in an area where there is no sewer network. The study revealed that Winterveld is rural area and the CTMM implemented Ventilated Improved Pit Latrines which is the sanitation technologies which do not impact on ground water. The feasibility enabled the Municipality to take decisions relating to the sanitation technology option which is strongly recommended as well as investigate and adapt parameters to implement a certain sanitation technology.

6.2.7 Resources available for the promotion of health and hygiene

Scholars such as Wilkinson et al, hold that reviews of and research related to sanitation programmes have revealed that health and hygiene user education throughout the country is poor and frequently non-existent. In certain instances hygiene education is often executed with limited focus or planning or haphazardly. The CTMM has embarked in a drive to alleviate poverty through its indigent programme which is considered for individuals to survive in terms of basic necessities such as sufficient water, basic sanitation, refuse removal, environmental health, basic energy, health care, housing, food and clothing (CTMM: Online). Municipalities do not include health and hygiene education as a component of free basic sanitation and provide hygiene awareness programmes as a once-off intervention during the implementation of basic sanitation infrastructure. The once-off hygiene visit or event to an individual in the household is not an effective means of achieving the end-goal of behavioural change of poor sanitation practices (DHSWS, 2016:30). The responses from the respondents revealed that the participants understand the meaning of suitable sanitation and its link to health and hygiene.

The National Sanitation policy (2016) is clear that health and hygiene promotion is the key component for the provision of sanitation services. Chapter 5 revealed that the household members benefitted from sanitation services in Ga-Rankuwa, Mabopane, Temba and Winterveld clearly understand the importance of washing hands after using a toilet. The CTMM prioritises health and hygiene user education and the municipal officials understand that education and sanitation services are inseparable. Moreover, Chapter 5 in Section 5.7 revealed that the CTMM has an Education Awareness Unit which is responsible for the promotion and enhancement of awareness of water conversation, demand management, health and hygiene. Furthermore, the study revealed that the Municipality prioritises health and hygiene user education and allocates a budget to a section that manages and promotes hygiene annually as well as appoints a service provider for the

implementation of health and hygiene tools and material.

There is an increased acknowledgement of interconnectedness between sanitation, water and hygiene (WaSH) because building and counting toilets and water pumps was the norm as well as of the overlapping goals of human and environmental health. A more integrated approach is still required to increase access to sustainable sanitation (Tilly *et al*., 2014:9965).

According to the findings, the CTMM prioritises, promotes and budgets for the health and hygiene end-user education programme. During data collection phase, it was observed that the toilets built in the Winterveld township displayed health and hygiene user education posters. In Ga-Rankuwa, Mabopane and Temba townships, toilets are built inside the houses. Although several toilets did not display a health and hygiene end user posters on the doors, the beneficiaries are aware of the significance of washing one hands after using the toilet.

6.2.8 Impact of climate change on water and sanitation

South Africa is facing increasing water demands to meet the needs of a rapidly growing and urbanising population, changing lifestyles, and economic growth. Moreover, climate change is driving the country towards a warmer and drier future, and longer and more extreme droughts, including intense floods are predicated. Climate change implies less water to meet the ever-increasing demand (DWS, 2018:8). The CTMM conducted the climate change vulnerability study and it confirms that water scarcity is a reality for the CTMM (CTMM, 2018:12). Furthermore, shortage of water impacts on sanitation delivery in the CTMM and it affect areas such as Ga-Rankuwa, Mabopane and Temba as they are connected to the sewer network and all households are using flush toilets.

This study revealed that municipalities in South Africa are affected by climate change. Most municipalities experience water shortages which is evidence that climate change has a direct impact on sanitation services. Duncker

(2019:2) posits that climate change is already a major pressure on waste water infrastructure. Drought and excess rain can result in threats for sanitation ranging from the lack of adequate water flow for sewage, flood-related damage to physical assets and increased concentration of pollutants with negative health consequences. Furthermore, the findings also revealed that Temba township residents occasionally experience water shortages and are unable to flush the waterborne toilets, especially when the temperatures are extremely high. The residents in this instance utilise grey water to flush their toilets.

Dube et al (2016:16) assert that the presence or absence of water boards in municipalities plays a noticeable role in the sensitivity and vulnerability of different municipalities to climate change. The CTMM and the UMgungundlovu District Municipality are clients of the Rand Water Board and Umgeni Water Board respectively. The presence of a water board in the CTMM and Umgugundlovhu improves the skill, capacity, and partnerships of a municipality. This translates to higher research quality outputs, improvement of treatment infrastructure and conveyance systems, attraction of highly skilled and knowledgeable personnel, as well as the ability to focus on, and address matters arising such as climate change. The presence of Rand Water and Umgeni Water in the Tshwane metropolitan area and the UMgungundlovu district respectively increases the resilience of these two regions to climate change.

6.3 Experiences and perceptions: Northern fringe of the City of Tshwane Metropolitan Municipality townships

The findings revealed that communities in the northern fringes of the CTMM in Ga-Rankuwa, Mabopane, Temba and Winterveld townships had inadequate access to sanitation for many years. Since democracy, areas in the northern fringes of the CTMM were provided with basic services. Furthermore, the study confirms that since 1994, sanitation has changed significantly both in South Africa and globally and it has become increasingly evident to revise the current sanitation policy to accommodate aspects of the transformed service

delivery environment including priorities to address gaps identified by the sector. *National Sanitation Policy 2012 review provides policy positions an opportunity to address these gaps and challenges, as well as to focus on the new national and global development imperatives.*

The impact of South Africa's post-apartheid spatial planning on land use systems, inequality and poverty was investigated broadly in this study. It was revealed that communities in the northern fringes of the CTMM still experience sanitation challenges. The infrastructure in the townships is ageing, numerous seepages in the area, and overflow of sewerage. Furthermore, the study revealed that the majority of the respondents (84%) had experienced recent blockages or overflow of sewerage near their properties. There is also a lack of bulk sewer lines and water in certain areas. In most instances, communities report leakages and overflowing sewer networks in the area but the Municipality's turnaround time is not prioritised. Since 1994, the large scale provision of waterborne sanitation was delivered to Ga-Rankuwa, Mabopane, and Temba townships while Winterveld was provided with dry sanitation due to the lack of water in the area. The townships are still affected by poor spatial planning inherited from the apartheid-era because the townships were neither considered for human settlements nor sustainable development.

Most residents in Winterveld township reside on privately-owned land which comprises of communities on smallholdings zoned for agricultural purposes. The study revealed that the landlords in Winterveld have rejected government services on their smallholdings with a fear to lose their properties. Certain community members defecate in the open rather than utilise unhygienic toilets which poses a serious health hazard to the communities. Children under 5 defecate in the open veld and it is left unattended.

The findings revealed that more than 6 people live in one home. The communities who reside on privately-owned land in Winterveld township share sanitation facilities which are unhygienic and poorly maintained. Only 12% of the households in Winterveld township residing on a privately-owned land share toilet with their neighbours. Sharing a toilet allows communities who do not have such in their individual homes to access toilets their

neighbours. However, sharing toilets is not considered as an improved level of sanitation. The residents who reside on privately-owned land are frustrated for having to share the toilets due to the landlord does not allow them to dig their own toilets. The corrugated iron pit latrines which were built by the government in Winterveld township between 1994 and 2004 were no longer utilised because these toilets were not considered an improvement due to poor maintenance and the faeces was removed irregularly. The government had to reinstall toilets for the same beneficiaries which resulted in a duplication of funding. Some of the waterborne toilets which were installed in Ga-Rankuwa, Mabopane and Temba townships between 1994 and 2004 are dysfunctional due to ageing infrastructure, lack of bulk infrastructure and poor sewer network.

Communities on Winterveld township privately-owned land utilise open toilets (refer to picture in Chapter 5 in section 5.5.1), leaving communities with no option but either utilise the toilets or resort to open defecation. The study revealed the sanitation challenges in the northern fringe of the CTMM can be summarised as follows:

i. The Municipality did not plan proactively for waterborne sanitation by considering population growth.
ii. Ageing infrastructure prohibits adequate access to sanitation due to lack of funding to replace or rehabilitate ageing infrastructure.
iii. Lack of bulk infrastructure led to overflowing sewerage between households and seepages from the manholes.
iv. Lack of service providers to attend to sanitation emergencies and turnaround time to attend to overflowing sewers take more than 7 days and occasionally exceeds a month.
v. In most instances, vulnerable groups such as children, aged, women and physically disabled suffer enormously due to inadequate sanitation services and exposure to faecal matter in Winterveld township. Those who settled on the privately-owned land contributed towards the already poor environmental and health conditions.

In 2017, the DHSWS announced that the capital replacement value of the existing water and sanitation infrastructure in South Africa was estimated at R1 362 billion. The existing assets, however, also depreciated and required a further R584 billion for capital replacement costs which resulted in a current book value of the infrastructure. The reality is that there is significant underinvestment in infrastructure maintenance which has been “stretched”. Furthermore, R59 billion is required due to the delays in renewal of aged infrastructure which has resulted in an accumulated backlog in refurbishment. The national guidelines target revealed that 8% of asset replacement value be set aside for maintenance (DHSWS, 2018:48).

The study revealed that the CTMM posits that 2021/22 budget will be geared towards stabilising the finances of the municipality and driving quality service delivery, at the same time ensuring that the rates and tariff increases as low as possible despite the steep increases from Rand Water and Eskom. The tariff increases for the 2021/22 financial year are as follows i.e. sanitation is 10% and water is 8% (CTMM, 2021: Online). Moreover, the CTMM Council has approved the City’s budget for the financial year 2021/22 with the total budget of R43 billion i.e. operating budget of R39 billion and the capital budget of almost R4 billion.

The empirical evidence in this research revealed that there is an overall dissatisfaction among communities benefitted sanitation in the northern fringe of the CTMM. Most of the sewer network sections are overloaded due to the increasing households connected to the existing sewer line built pre-1994. Furthermore, the study revealed that the majority of the respondents (84%) had experienced recent blockages or overflow of sewerage near their properties. The DHSWS planned to tighten enforcement and compliance measures against the CTMM to ensure that it complies with its obligation to deal with low effluent standards. The manholes are overflowing in the streets. Communities in Winterveld township residing on privately owned land complain that shared toilets facilities are unhygienic and are not safe to be used by children, aged, women and the physically disabled. Beneficiaries are resisting raking their faeces when the toilet is full as this is against their

cultural belief.

6.4 Recommendations

The recommendations focus on the role of government in advancing the provision of sanitation and universal coverage in South Africa. The government should strengthen monitoring, evaluation and reporting in all spheres of government to circumvent non-adherence to regulations, norms and standards set by the DHSWS as the sector leader. The CTMM has implemented monitoring systems and by-laws in relation to the provision of sanitation services at the area of its jurisdiction. However, close monitoring during project implementation is critical and should also be executed in its municipal areas and involve a range of role-players including its water services providers namely: Magalies Water, Rand Water, Department of Cooperative Governance and Traditional Affairs, South Africa Local Government Association, Water Research Council and Catchment Management Areas.

Institutional issues must be resolved as a matter of urgency to mobilise resources to address the funding shortfall experienced by municipalities including the CTMM. It is imperative to build the official's respective capacity so that the municipalities can fulfil and achieve its envisaged obligations optimally as stipulated in the Constitution of the Republic of South Africa, 1996 including other national policies. Capacity building is one of the most essential tools available to local government including bridging the gaps in what is expected of municipal officials and what they are able to deliver.

The CTMM must endorse the National Sanitation Policy of 2016 to ensure that the entire population including those who reside in privately- owned land within their jurisdiction has access to safe sanitation services. The delivery of sanitation in the northern fringes of the CTMM can be achieved by setting targets for incremental improvements. Furthermore, the municipality has to amend policies formulated by the DHSWS because a policy that addresses

water services for the communities residing on privately owned land will guide the municipality to discuss the terms of provision of sanitation services with the landlords. Most residents in Winterveld township reside on privately-owned land which comprises of communities on smallholdings zoned for agricultural purposes. The study revealed that the landlords in Winterveld have rejected government services on their smallholdings with a fear to lose their properties.

The existing sanitation policies, legislation and municipal regulation should be reviewed regularly, that is, every five (5) years to ensure that the provisions to improve sanitation and communities are provided with adequate such service is not impeded. This will assist the CTMM to align its functions to meet the Sustainable Development Goals of, for example, terminate open defecation by 2030. The 2030 Agenda for Sustainable Development, WASH is at the centre of this development agenda and the world has a historic opportunity to set a course for the next era of human development that is transformational for their families and their children (UNICEF, 2016:1). The CTMM has adopted its national development plan in order to design a roadmap to 2030 that addresses 2030 Agenda for Sustainable Development by creating an environment of the development agenda.

The CTMM must ensure that funding for operations and maintenance is ring-fenced, especially for areas which were established pre-1994, because the population growth in those areas impacts on the existing bulk sewer network. Moreover, when pit latrines are provided in rural areas where municipal services do not empty the pits, it should consider appointing a service provider to undertake this task and thereby ensure sustainable usage.

The CTMM has a dedicated section which budgets for sanitation and the promotion of hygiene on an annual basis. The CTMM comprises of a Water and Sanitation Infrastructure and Planning Division which is responsible for sanitation services, bulk water supply and water and sanitation planning and implementation for capital projects i.e. new developments. Furthermore, the study revealed that the municipality appoints service providers to implement

sanitation services and promote health and hygiene user education (i.e. health and hygiene tools and awareness campaigns). However, the Municipality lacks capacity to perform all sanitation-related functions.

The study recommends that building municipal officials' capacity to implement water and sanitation programmes in the CTMM be considered crucial to accomplish and achieve optimum results including the stipulations of the Constitution and in other national policies. Capacity building in terms of the implementation of water and sanitation programmes for municipal officials is critical because it lays the foundation for a more people-oriented local government system and is one of the most crucial tools available to bridge the gaps in what is expected of municipal officials and what they can deliver.

6.5 Dissemination of findings to stakeholders

The findings of this study should be disseminated to government departments responsible for sanitation services at all spheres government; private sector; and the communities for increased awareness of the research and, therefore, maximize the impact that the research can have in improving the provision of sanitation services. The provision of sanitation services involves multi-disciplinary and multi-stakeholder engagement in the CTMM. It requires commitment from all stakeholders at all levels to advance the delivery of sanitation, i.e. government departments, municipalities, non-government organisations, councillors, and the private sector to effect change.

Sharing research results at government level will assist sector partners to consider issues raised by the communities during planning and in future consider sanitation innovations preferred by communities. At community level, the research results will promote community participation and responsibility to ensure their role post implementation of the toilet facility. This will inform the communities in Ga-Rankuwa, Mabopane, Temba and Winterveld to not become dependent on the government but take responsibility. The private sector should provide social corporate responsibility and provide financial support towards government programmes.

6.6 Recommendations for further research

The role and functions of the municipal officials in the CTMM responsible for the provision of sanitation requires detailed information, clarity and a sound understanding of their role in terms of the sanitation master plan, regulations and promotion of health and hygiene end-user education to ensure the sustainable implementation of projects.

Further research in the local sphere is recommended to attend to the following gaps identified in this study:

i. Compliance in terms of sanitation services norms and standards, regulations and national policies.
ii. Align sanitation planning in all spheres of government (Integrated Spatial Planning).
iii. Improve imbalances of spatial planning since the apartheid era to integrate rural and urban spaces.
iv. The psychosocial effects of poor sanitation of vulnerable groups including elders, women, children and the disabled.

6.7 Conclusion

This study confirmed that since 1994, the CTMM prioritised the eradication of sanitation backlogs in Ga-Rankuwa, Mabopane, Temba and Winterveld townships even though universal access to sanitation has not been achieved and the community's experiences in the townships, especially at Winterveld on privately-owned land had not improved. The lack of an integrated demand-responsive approach, poor planning, and weak participatory governance regarding service delivery in the northern fringe of the CTMM has impeded sustainability and an improved living environment for communities.

The overall findings of the study in the northern fringe of the CTMM further highlighted the limitations of the Municipality's spatial planning which impacts

adversely on the lives of the people. The study concludes that sanitation service delivery in the northern fringes of the CTMM, especially in Ga-Rankuwa, Mabopane, Temba and Winterveld townships. The provision of sanitation entails adhering to the requirements of water- related policies and legislative stipulations, including constitutional requirements. The officials from the DHSWS and the CTMM must formulate plans, implement strategies, monitor and report on the progress made.

REFERENCE LIST

Albuquerque, C. 2014. Legislative, regulatory and policy frameworks: realizing the human rights to water and sanitation: A handbook by the UN Special Rapporteur. Portugal.

Adams, J., Khan, H.T.A. & Raeside, R. 2014. Research methods for business and social science students. 2nd edition. SAGE Publications: London.

Armitage, N., Fisher-Jeffes, L., Carden, K., Winter, K., Naidoo, V., Spiegel, A., Mauck, B. & Coulson, D. 2014. Water sensitive urban design for South Africa: Framework and guidelines. Water Research Commission. Pretoria.

Atkinsete, A., Bhagwan, J., Hicks, C., Knezovich, A., Naidoo, V. & Pillay, S. 2019. The sanitation opportunity for South Africa: Sustainable solutions for water security and sanitation. A business perspective. Water Research Commission. Pretoria.

Barnes, B.K. 2018. Politics and activism in the water and sanitation wars in South Africa: Special thematic section on “Rethinking health and social justice activisms in changing times”. *Journal of Social and Political Psychology* (2): 543-555.

Baumgarten, M. 2012. Paradigm wars validity and reliability in qualitative research. Grin.

Beail-Farkas, L. 2013. The Human Right to water and sanitation: Context, Contours and Enforcement Prospects. *Wisconsin International Law Journal*, 30(4): 761-801. (Online) Available at: http://hosted.law.wisc.edu/wordpress/wilj/files/2014/04/Beail-Farkas_print.pdf Date of access: 23 Jun. 2018

Bernstein, L. 2012. Freshwater and human population: a global perspective. United Nations Populations Fund: Yale Bulletin.

Bhattacherjee, A. 2012. Social science research: Principles, methods and practices. 2nd edition. Florida. United States of America.

Bhutta, Z.A., Das, J.K., Rizvi, A., Gaffey, M.F., Walker, N. & Horton, S. 2013. Maternal and Child Nutrition Study Group. Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost? *The Lancet,* 382(9890): 452-477.

Bonthuys, J. 2017. Radical shift needed to reduce risks during pit emptying for workers, households and hygiene. *Water Wheel,* (6): 18-21.

Brits, J. 2014. South Africa after apartheid, 1994-2004. A history of South Africa: From the distant past to the present day. Pretoria: Protea Book House.

Bryman, A. 2016. Social research methods. 5th edition. Oxford. United Kingdom.

Bulawa, P,. 2014. Adapting grounded theory in qualitative research: Reflections from personal experience. Online. Date of access. 29 August. 2021.

Charman, A., Tonkin, C., Denoon-Stevens, S. & Demeestere, R. 2017. Post-Apartheid spatial inequality: Obstacles of land use management on township micro-enterprise formalisation: A Report by the Sustainable Livelihoods Foundation. Sustainable Livelihood Foundation. Cape Town.

Chinedu, U.O., Yofe, JM., Henry, L., Wethe, J., Djagoun, G., Doucoure, I. & Ali, M. 2013. Faecal sludge management in Africa: Developments, Research & Innovations. Sanitation matters (4). A magazine of Southern Africa. Pretoria.

City of Tshwane Metropolitan Municipality. 2016. Service delivery and budget implementation plan. Pretoria: (CTMM).

City of Tshwane Metropolitan Municipality. 2017. Integrated Development Plan 2017 - 2021. Pretoria: (CTMM).

City of Tshwane Metropolitan Municipality. 2017. 2017/18 Integrated Development Plan Review. Pretoria: (CTMM).

City of Tshwane Metropolitan Municipality. 2017. 2017 – 2021 Water Services Development Plan. Pretoria: (CTMM).

City of Tshwane Metropolitan Municipality. 2018. Climate response strategy for a prosperous capital city through freedom, fairness and opportunities. Pretoria. (CTMM). Date of Access: 16 August 2021.

City of Tshwane Metropolitan Municipality. 2020. Revision for 2020/21 and service delivery and budget implementation (SDBIP) scorecard. Pretoria: (CTMM).

City of Tshwane Metropolitan Municipality. 2021. Indigent programme as part of poverty alleviation. Online. Accessed 29 August 2021.

City of Tshwane Metropolitan Municipality. 2021. Migration and urbanisation in South Africa: A Tshwane Perspective. Online. Date of Access 29 July 2021.

City of Tshwane Metropolitan Municipality. 2021. 2021 – 2026 Integrated Development Plan Review. Pretoria: (CTMM).

City of Tshwane Metropolitan Municipality. n.d. Framework for a green economy transition: Towards low carbon, climate, resilient and resource efficient city. Online.

City of Tshwane Metropolitan Municipality. n.d. Situational analysis: Major features and priority development's needs: Online. https://www.tshwane.gov.za/sites/Council/Ofiice-Of-The-Executive-Mayor/Climate%20Action/001-Green-Economy-Framework.pdf. Date of access 28 July 2021.

Clark, R.M., Zhiwei, L.I. & Buchberger, S.G. 2011. Adapting water treatment design and operations to the impacts of global climate change. *Frontiers of Earth Science*, (5): 363–370 (2011) doi:10.1007/s11707-011-0197-7.

Chuene, T.B. 2012. What are the challenges facing municipalities in financing their water services infrastructure? A case study of water services authorities in the North West Province. Stellenbosch: Stellenbosch University.

Colvin, C., Muruven, D., Lindley, D., Gordon, H. & Schatschneider, K. 2016. Rethinking South Africa's water future. Water: facts and future. WWF-SA. Cape Town.

Creswell, J.W. 2014. Research design: Qualitative, Quantitative and mixed methods approaches. 4th edition. SAGE: London.

Cross, P. & Coombes, Y. 2013. Sanitation and hygiene in Africa: Where do we stand: Analysis from the AfricaSan Conference, Kigali, Rwanda.

Cross, X. 2015. Management of faecal sludge in developing countries. (Online). Available at: http://www.susana.org/en/forum/96-shit-flow-diagrams. Date of access: 18 Oct. 2018.

Department of Cooperative Governance and Traditional Affairs (CoGTA). 2020. Profile: City of Tshwane. Pretoria: (CoGTA). Available from: https://www.cogta.gov.za/ddm/wp-content/uploads/2020/11/Tshwane-October-2020.pdf .Accessed on: 26 August 2021.

Department of Human Settlements (DHS). 2012(a). Ministerial Sanitation Task Team Report. Review, investigation and evaluation of the National Sanitation Programme – Towards continuous improvement. Pretoria: (DHS).

Department of Human Settlements (DHS). 2012(b). Report on the status of sanitation in South Africa. Sanitation Services - Quality of sanitation in South Africa. Pretoria: (DHS).

Department of Human Settlements Water and Sanitation (DWS). 2014. 2014 Blue Drop Report. Pretoria: (DWS).

Department of Human Settlements Water and Sanitation (DWS). 2016. National Sanitation Policy. Pretoria: (DWS).

Department of Human Settlements Water and Sanitation. 2017. Annual Performance Plan. Vote 36 for the fiscal year 2017-18 to 2019-20. Pretoria: (DWS).

Department of Human Settlements Water and Sanitation. 2018(a). Strategic overview of the water sector in South Africa. Pretoria. (Online) Available at: www.dwaf.gov.za/Downloads/WS/Macro_Planning_Products/STRATEGIC/2018_May_A6_SOWSSA_HQ.pdf Date of access: 30 Sept. 2019.

Department of Human Settlements Water and Sanitation. 2018(b). National Water and Sanitation Master Plan. Pretoria: (DWS).

Department of Planning Monitoring and Evaluation (DPME). 2019. Towards a 25-year review 1994- 2019. Pretoria: (DPME).

DePoy, E. & Gitlin, L.N. 2013. Introduction to research: Understanding and applying multiple strategies. 4th edition. Elsevier: Washington.

Dube, R.A., Maphosa, B. & Fayemiwo, O.M. 2016. Adaptive Climate Change Technologies and approaches for Local Governments: Water Sector Response. WRC Report No. TT 663/16: Water Research Commission. Pretoria.

Dugard, J. 2013. Socio economic rights: The right to sanitation in South Africa. Foundation for Human Rights: Johannesburg.

Ekane, N., Nyvist, B., Kjellen, M., Noel, C. & Weitz, N. 2014. Multi-level

sanitation governance: Understanding and overcoming challenges in the sanitation sector in Sub-Saharan Africa. *Waterlines*, 33 (3): 241-249.

Ensor, C. 2016. Basic water and sanitation: Informal settlements pose unique challenges, and locals fills the gaps. Humanosphere. (Online) Available at: http://www.humanosphere.org/basics/2016/03/water-and-sanitation-informal-settlements-pose-unique-challenges-and-locals-fill-the-gaps/ Date of access: 23 May. 2019.

Ferrell, O., Lukas, B.A., Scrembi, S. & Niininen, O. 2015. Marketing principles. 2nd edition. CENGAGE.

Fink, A. 2013. Conducting research literature reviews: From the internet to paper. 4th edition. SAGE Publications: London.

Fuo, O.N. 2013. Constitutional basis for the enforcement of executive policies that give effect to socio-economic rights in South Africa. Potchefstroom's Elektroniese Regsblad. 16 (4). 01-45. (Online) Available at: http://www.scielo.org.za/scielo.php?script=sciarttext&pid=S1727-37812013000400002&lng=en. Date of access: 27 Feb. 2019.

Go, A., Moyer, J., Rafa, M. & Schunemann, J. 2013. Population futures: Revisiting South Africa's National Development Plan 2030. South Africa. Sabinet.

Goodwin, J. 2012. SAGE secondary data analysis. SAGE Publications. (Online) Available at: DOI:https://dx.doi.org.10.4135/9781473963702

Hakin, C. 2012. Research design: Successful designs for social and economic research. 2nd edition. Routledge. London.

Hale, J. 2016. The three basic types of descriptive research methods. (Online). Available at: http://www.psychcentral.com/blog/archives/doi//2011/09/27/the-

three-basic- types-of-descriptive-revised. Date accessed: 22 Jul. 2019.
Hedden, S. & Cilliers, J. 2014. Parched prospects: The emerging water crisis in South Africa. *Institute for Security Studies Papers*, (11): 16-16.

Hoossein, S., Whittington-Jones, K. & Tandlich, R. 2014. Sanitation policy and prevention of environmental contamination in South Africa. *Environmental Engineering and Management Journal*, 13 (6): 1335-1340.

Hemson, D. 2016. Water, sanitation and health: South Africa's remaining and existing issues. *South African Health Review*, (1): 25-34.

Howard, G., Calow, R., Macdonald, A. & Bartram, J. 2016. Climate Change and Water and Sanitation: Likely Impacts and Emerging Trends for Action. *Annual Review of Environment and Resources*, 41(1): 253-276.

Infrastructure Dialogues. 2015. Water and Sanitation: Municipal Water and Sanitation. (Online) Available at: http://www.sacities.net/wp-content/uploads/2015/05/Report-Municipal-Water-and-Sanitation-Infrastructure_final.pdf Date of access: 30 Jun. 2019.

Iol. 2018. Watch: Mabopane, Winterveld and Ga-Rankuwa residents stranded by protest. (Online) Available at: https://www.iol.co.za/pretoria-news/watch-mabopane-winterveld-and-ga-rankuwa-residents-stranded-by-protests-15217748. Date of access: 13 July 2021.

IPCC. 2014. (Intergovernmental Panel on Climate Change) Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press: Cambridge.

Jacobs, I., Du Plessis, M., Trollip, K. & Van Vuuren, L. 2014. South Africa's 20-year journey in water and sanitation research. Water Research Commission. Pretoria.

Khanna, P., Kimmel, Z. & Karkara, R. 2016. Convention on the elimination of all forms of discrimination against women (CEDAW) for youth. Planet 50-50 by 2030: Step it up for gender equality. UN Women. (Online) Available at: https://iknowpolitics.org/sites/default/files/cedaw-for-youth.pdf Access date: 13 Mar. 2019.

Kamga, S.D. 2013. The right to basic sanitation: A human right in need of constitutional guarantee in Africa. *South African Journal on Human Rights*, 29. (3). 615-650.

Kasala, S.E., Burra, M.M. & Mwankenja, T.S. 2016. Access to improved sanitation in informal settlements: The case of Dares Salaam City, Tanzania. *Current Urban Studies*, 4:23-25.http://dx.doi.org/10.4236/cus.2016.41003.

Khan, S.N. 2014. Qualitative research method: Grounded Theory. International Journal of Business Management. Vol (9) (11). Online. Date of Access 28 August 2021.

Kobena, T.H., Korbla, P.P. & Timothy, M.S. 2017. From Millennium Development Goals to Sustainable Development Goals: Rethinking African challenges and prospects. Abingdon, UK: Routledge Publishers.

Kopung, S., Meyer, J., Lubbe, S. & Klopper, R. 2016. Operational framework for municipal infrastructure grant spending in the North-West. *Journal of Public Administration,* 51(1): 115-135.

Kumar, R. 2014. Research methodology. Kalpaz Publications: India.

Kumar, R. 2019. Research methodology: A step by step guide for beginners. 5th edition. Sage Publications: London.

Kuada, J. 2012. Research methodology: A project guide for university student. 1st edition. Frederiksberg. Denmark.

Kvarnstrom, E,. & McConville, J. n.d. Sanitation planning – A tool to achieve sustainable sanitation. Online. Date of Access 18 July 2021.

Kwarteng, A.B., Agyemang-Duah, W., Arthur, F. & Agyemang, E. 2015. Assessing sanitation conditions and its impacts on the health. *Research on Humanities and Social Sciences*, 5(17): 2224-5766.

Largardien, A. & Muanda, C. 2014. An approach towards developing technical sanitation solutions for informal settlements. Water Research Commission: Pretoria.

Leary, M.E. & McCarthy, J. 2013. The Routledge companion to urban regeneration. New York: Routledge.

Ledger, T. & Rampedi, M. 2020. The end of the road: Acritical review of the local government fiscal framework. Public Affairs Research Institute. Johannesburg.

Lorentz, S., Wickham, B. & Still, D. 2015. Investigation into Pollution from On-Site Dry Sanitation Systems. Water Research Council: Pretoria.

Loubser, E. & Underhill, E. 2017. Smart water and sanitation management - municipal focus – Tshwane. *IMIESA*, 42(11): 19-19. Pretoria.

Louton, B, & Still, D. 2016. Guidelines for school sanitation: Building and managing school toilets that protect learners' rights to safety, health and dignity. Water Research Commission: Pretoria.

Mackey, A. & Gass, S.M. 2016. Second language research: Methodology and design. Abingdon, UK: Routledge.

Magadimisha, H.H. & Chipungu, L. 2019. Spatial planning in service delivery: Towards distributive justice in South Africa. Palgrave Macmillan: South Africa.

Makaudze, E., Du Preez, M. & Potgieter, N. 2015. How does the HIV and AIDS epidemic in South Africa impact on Water, Sanitation and Hygiene Sectors? Water Research Commission: Pretoria.

Maree, K. 2012. First steps in research. Revised edition. Pretoria: Van Schaik Publishers.

Masindi, V. & Duncker, L. 2016. State of water and sanitation on South Africa. CSIR Built Environment. Pretoria.

Masuku, M.M., & Jili, N.N,. 2019. Public Service Delivery in South Africa. The political influence at local government. Online. https://doi.org/10.1002/pa.1935

McDonald, D.A. & Ruiters, G. 2012. The age of commodity: Water privatization in Southern Africa. London: Earthscan.

McNamara, A., Manuel, F., Ragbhubir, S. & Naidoo, D. 2015. Water and sanitation: Municipal water and sanitation infrastructure. Infrastructure dialogues. (Online) Available at: https://www.infastructuredialogue.co.za/wp-content/uploads/2015/07/SANC-Infrastructure-Dialogues-2014-15 WEB-2.pdf. Date of access: 13 Mar.2019.

Mdlongwa, E.T. 2014. Local government at the heart of poor service delivery: 20 years of democracy. *Rhodes Journalism Review,* (34): 39.

Mills, J.E. & Cumming, O. 2016. The impact of water, sanitation and hygiene on key health and social outcome: *Review of Evidence*. UNICEF.

Mjoli, N.P. 2015. A framework for sanitation governance in South African municipalities. Water Research Commission: Pretoria.

Mjoli, N.P. 2016. Evaluation of sanitation upgrading programmes: The case of

the Bucket Eradication Programmes. Water Research Commission: Pretoria.

Molepo, J.N., Maleka, C.M. & Khalo, T. 2015. Public participation and service delivery: The case of City of Tshwane . *Journal of Public Administration*, 50(2). Tshwane University of Technology: Pretoria.

Moodley, S. 2011. Providing sanitation for the nation. Transformation technologies. South Africa: Cape Town.

Montesano, J. 2016. The true cost of poor sanitation: Link to good living. WaterAid: Japan.

Montmasson-Clair, G. 2018. Global water and sanitation market dynamics: Implications for South Africa's industrial development. South Africa: Pretoria.

Mosala, S.J., Venter, J.C.M. & Bain, E.G. 2017. South Africa's economic transformation since 1994: What Influence has the National Democratic Revolution (NDR) Had? *The Review of Black Political Economy*, (44): 327-340. https://doi.org/10.1007/s12114-017-9260-2.

Mpehle, Z. 2012. Are service delivery protests justifiable in the democratic South Africa? *Journal of Public Administration,* (1): 213-227.

Muller, H. 2014. The South African Experience on Legal, Institutional and Operational Aspects of the Rights to Water and Sanitation. *Aquatic Procedia,* (2): 35-41.

Municipal Institute of Learning, 2016. eThekwini Municipality water and sanitation master class. (Online) Available at: http://www.mile.org.za/Come_Learn/Knowledge_Management/Multimedia%20Library/learning%20Notes%20-%20water%20and%20sanitation.pdf Date of access: 10 Apr.2019.

Mutamba. J. & Busari, O. 2014. Strategic Coordination for sustainable Investment in Critical Infrastructure. Trans-Caledon Tunnel Authority. South Africa: Pretoria.

Mutyambizi, C,. Mokhele, T,. Ndinda, C,. & Hongoro, C,. 2000. Access to and satisfaction with basic services in informal settlements: Results from baseline assessment survey. International journal of Enviromental Research and Public Health (3): 49 -74.

Naidoo, N., Pearce, D., Visser, W., Crafford, J., Maila, D. & Harris, K. 2016. Setting effective wastewater charges: A guide for municipalities. Water Research Commission: Pretoria.

National Council of Educational Research and Training. 2017. Sanitation and Hygiene supplementary material for the upper primary stage. New Delhi

National Treasury. (NT). 2014. Budget Review. South Africa. Government Printer: Pretoria.

National Treasury. (NT). 2018. Budget Estimates of National Expenditure. Government Printer: Pretoria.

Naughton, C. & Mihelcic, J. 2017. Introduction to the Importance of Sanitation: Global Water Pathogen Project: The health hazards of excreta. Theory and Control. United States. http://www.waterpathogens.org/book/introduction.

Ndida, C., Uzodike, U.O. & Winaar, L. 2013. Equality of access to sanitation in South Africa. *Africanus*, 43(1): 96-114.

Neumeyer, H. & Van de Lande, L. 2014. The importance of words: Why equality should key in water and sanitation service provision. *Waterlines*, 33(4):295-304.

Njoh, A.J. 2016. Urban Planning and public health in Africa: Historical, theoretical and practical dimensions of a continents water and sanitation problematic. Abingdon, UK: Routledge.

Noga, J. & Wolbring, G. 2012. The economic and social Benefits and the barriers of providing people with disabilities accessible clean water and sanitation. *Sustainability*, (4): 3023-3041. doi:10.3390/su4113023.

Nomarwayi, T. 2017. Violence in the Post-Apartheid South Africa: A Critical Reflection on Violent Service Delivery Protests (2012-2015). 7th Annual International Conference Port Elizabeth, South Africa.

Ntema, J. & Van Rooyen, D. 2016. Redressing spatial inequalities and underdevelopment in a former R293 town: The case of Winterveld South Africa. *Journal of Public Administration*, 51(1): 136-153.

Ntombela, C., Funke, N., Meissner, R,. Steyn, M. & Masangane, W. 2016. A critical look at South Africa's Green Drop Programme. *Water South Africa*, (4). http://dx.doi.org/10.4314/wsa.v42i4.21

Oates, N., Ross, I., Calow, R., Carter, R. & Doczi, J. 2014. Adaptation to climate change in water, sanitation and hygiene. Assessing risks and appraising options in Africa. Overseas Development Institute report. London

OECD. 2015. Stakeholder engagement for inclusive water governance. OECD studies on water. OECD Publishing: Paris. http://dx.doi.10.1787.9789264231122-en

Ovens, W. & Associates. 2015. 15 years review of local government: Celebrating achievements whilst acknowledging the challenges. South African Local Government Association. Pretoria.

Palmer, I., Graham, N., Swilling, M., Robinson, B., Eales, K., Fisher-Jeffes, L., Kasner, S. & Skeen, J. 2014. South Africa’s urban infrastructure challenge: Contribution to the integrated urban development framework. Department of

Cooperative Governance and Traditional Affairs. Pretoria.

Palmer, I., Paladh, R., Kaplan, J. & Walsh K. 2017. Developing innovative approaches to national allocations and transfers to Local Government and its use. Water Research Council: Pretoria.

Patten, M.L. 2017. Questionnaire Research: A practical guide. 4th edition. New York: Pyrczak Publishing

Petterson, D. 2019. Reinventing sanitation. *Water & Sanitation Africa,* 14(1): 30-31.

Pillay, S. & Mwale, J. 2014. The sanitation research fund for Africa. Water Research Commission: Pretoria.

Presidency. 2014. National Development Plan - 2030. Our future makes it work. National Planning Commission: Pretoria.

Prüss-Üstün, A., Bartram, J., Clasen, T., Colford, J.M., Cumming, O., Curtis, V., Bonjour, S., Dangour, A.D., De France, J., Fewtrell, L., Freeman, M.C., Gordon, B., Hunter, P.R., Johnston, R.B., Mathers, C., Mäusezahl, D., Medlicott, K., Neira, M., Stocks, M., Wolf, J. & Cairncross, S. 2014. Burden of disease from inadequate water, sanitation and hygiene in low-and middle-income settings: A retrospective analysis of data from 145 countries. *Tropical Medicine & International Health,* (8): 894-905.

Prüss-Üstün, A., Wolf, J., Bartram, J., Clasen, T., Cumming, O., Freeman, M.C., Paul, B.G., Hunter, R., Medlicott, K. & Johnston, R. 2019. Burden of disease from inadequate water, sanitation and hygiene for selected adverse health outcomes: An updated analysis with a focus on low- and middle-income countries. *International Journal of Hygiene and Environmental Health*, 222(5): 765-777.

Ramokoka, T. 2013. Building safer human settlements in South Africa: A case of the National Development Plan 2030. *Journal of Public Administration,* (48): 321 – 333.

Rand Water. n.d. Winterveld community project. (Online) https://www.randwater.co.za/CorporateResponsibility/Pages/WetlandsRehabilitation.aspx. Accessed on 23 July 2019. Date accessed: 12 March 2019.

Rao, K.C., Kvarnstrom, E., Di Mario, L. & Drechsel, P. 2016. Business models for fecal sludge management: Resource Recovery & Reuse Series 6. Sri Lanka. doi:10.5337/2016.213.

Reddy, P.S. 2016. The politics of service delivery in South Africa: The local government sphere in context: original research. *The Journal for Transdisciplinary Research in Southern Africa*, 12(1): 1-8.

Rhodes, B. & McKenzie, T. 2018. To what extent does socio economic status still affect household access to water and sanitation services in South Africa? *Journal of Economic and Financial Sciences*, 11 (1):1-9.

Republic of South Africa (RSA). 1994. White Paper on Water Supply and Sanitation. Pretoria: Government Printer.

Republic of South Africa (RSA). 1996. Constitution of the Republic of South Africa. 1996. Pretoria: Government Printer.

Republic of South Africa (RSA). 1997. Water Services Act 108 of 1997. Pretoria: Government Printer.

Republic of South Africa (RSA). 1997. White Paper on National Water Policy of South Africa. Pretoria: Government Printer.

Republic of South Africa (RSA). 1998. National Water Act. Pretoria: Government Printer.

Republic of South Africa (RSA). 2001. Free Basic Sanitation Policy. Pretoria: Government Printer.

Republic of South Africa (RSA). 2001. White Paper on Basic Household Sanitation. Pretoria: Government Printer.

Republic of South Africa (RSA). 2003. Strategic Framework for Water Services. Pretoria: Government Printer.

Republic of South Africa (RSA). 2005. National Sanitation Strategy. Pretoria: Government Printer.

Ringwood, F. 2015. Local alternative sanitation successes: Sanitation. *Water and Sanitation Africa*, 10(5): 45-46.

Rhodes, B. & McKenzie, T. 2018. To what extent does socio-economic status still affect household access to water and sanitation services in South Africa. *Journal of Economic and Financial Services*, 11(1): 1-9.

Rouse, M.J. 2013. Institutional governance and regulation of water services: services: The essential elements. 2nd edition. IWA Publishing: London.

Rowley, J. 2014. Designing and using research questionnaires. Management Research Review, Volume 37. Number 3. Pretoria: Emerald Group Publishing Limited

Sachs, J.D. 2012. From Millennium Development Goals to Sustainable Development Goals. *Lancet, Earth Institute,* (379): 2206-2211.

Sansom, K. 2011. Complementary roles, NGO – Government relations for community-based sanitation in South Asia. Public Administration and Development. United Kingdom.

SAHRC. 2014. (South Africa Human Rights Commission). Report on the right to access sufficient water and decent sanitation in South Africa. Braamfontein.

SAHRC. 2018. (South Africa Human Rights Commission). Water and sanitation research brief: Monitoring the implementation of the commission's

recommendations from its 2014 report on access to water and sanitation. Braamfontein.

Saul, B., Kinley, D. & Mowbray, J. 2014. The International Covenant on Economic, Social and Cultural Rights: Commentary, Cases and Material. Oxford University Press. (Online) Available at: doi:10.1093/law/9780199640300.001.0001.

Sebake, K. & Mukonza, R.M. 2020. Integrated Development Plan, Monitoring and Evaluation in the City of Tshwane: A Confluence Question for Optimising Service Delivery *Journal of Public Administration* (Vol. 55) (3). Sabinet Online. Date of Access 02 July 2021.

Silveti, D. & Andersson, K. 2019. Challenges of governing off-grid "Productive" sanitation in Peri-Urban Areas: Comparison of case studies in Bolivia and South Africa. Stockholm.

South African History. 2018. The Reconstruction and Development Programme. (Online). Available at: www.sahistory.org.za › sites › default › files › the_reconstruction_and_dev... Date Accessed 19 July 2021.

Steiner-Asiedu, M., Van-Ess, S.E., Papoe, M., Setorglo, J., Asiedu, D.K. & Anderson, A.K. 2011. Hand Washing Practices among School Children in Ghana. *Journal of Social Science*, 3 (4): 293-300.

Still, D. & O'Riordan, M. 2012. Tackling the challenges of full pit latrines: The development of pit emptying technologies. Vol 3. Water Research Commission: Pretoria.

South African Cities Network. 2016. Synthesis Report: State of water in cities. Analysis of water resource and its management in cities. Johannesburg.

Statistics South. 2015. Millennium Development Goals: Country Report 2015.

South Africa. Pretoria. Government Printer. (Online) Available at: www.statssa.gov./MDG/MDG_Country%20Report_Final30Sep2015.pdf Date of access: 23 Jun. 2019.

Stats, S.A. 2016. Statistics South Africa. The state of basic service delivery in South Africa: In-depth analysis of the Community Survey 2016 data. South Africa. Pretoria: Government Printer.

Stats, S.A. 2017. Statistics South Africa. Sustainable development goals: Indicator baseline report 2017. South Africa. Pretoria: Government Printer.

Stone, T. 2016. Municipal infrastructure for human settlements: Human settlements. *IMIESA*, 41(4): 36-39.

Strande, L. & Brdjanovic, D. 2014. Faecal Sludge Management: Systems Approach for Implementation and Operation. IWA Publishing: London.

Tilley, E., Strande, L., Lüthi, C., Mosler, H.J., Undert, K.M., Gebauer, H. & Hering, J.G. 2014. Looking beyond technology: An integrated approach to Water, Sanitation and Hygiene in low income countries. *Environmental Science & Technology,* 48. (17).

Tissington, K. 2011. Basic Sanitation in South Africa: A guide legislation, Policy and Practice. Socio-Economic Rights Institute of South Africa. HSRC: Pretoria.

Tissington, K. 2013. Targeting the poor? An analysis of Free Basic Services (FBS) and Municipal Indigent Policies in South Africa. Socio Economic Rights Institute of South Africa. HSRC: Pretoria.

Toxopeüs, M. 2019. Understanding water issues and challenges (II): Municipalities and the delivery of water services. Politics web. (Online) Available at: https://www.politicsweb.co.za/opinion/understanding-water-issues-and-challenges-ii. Date of access: 29 Nov. 2019.

Thomas, E., Andres, L,A., Borja-Verga, C. & Sturzenegger, G. 2018. Innovations in WASH impact measures. Water and sanitation measurement technologies and practices to inform the Sustainable Development Goals. The World Bank. Washington, DC.

Trollip, K. & Van Vuuren, L. 2016. Knowledge for impact: research for successful service delivery at the local government level. Water Research Council: Pretoria.

Twala, C. 2014. The Causes and Socio-political Impact of the Service Delivery Protests to the South African Citizenry: A Real Public Discourse. *Journal of Social Sciences*, 39(2): 159-167.

UN-Habitat. 2013. Water and Sanitation in the World's cities: Local action for global goals. United Nations Human Settlements for programmes. London: Routledge Publications.

UN-Habitat. 2020. Financing for resilient and green urban solutions in Tshwane, South Africa. London. Routledge Publications.

UNICEF. 2012. (United Nations Children's Fund). Water, Sanitation and Hygiene in schools. New York: Routledge.

UNICEF. 2016. (United Nations Children's Fund). Strategy for Water, Sanitation and Hygiene 2016 – 2030. New York: Routledge.

United Nations. 2015. The Millennium Development Goals 2015: Time for global action for people and planet. United Nations, New York: Routledge.

United Nations. 2016. Global sustainable development report. United Nations. New York: Routledge.

United Nations. 2017. Progress on drinking Water, Sanitation and Hygiene:

2017 Updates and SDG baseline. New York: WHO Library Cataloguing.

United Nations. 2018. Sustainable Development Goal 6: Synthesis report on Water and Sanitation. United Nations, New York.

Van Schalkwyk, C. 2013. Advanced processes applied - Roodeplaat WTW: Water & wastewater. *IMIESA*, 38 (9): 36-39.

Van Vuuren, L. 2014. No flash in the pan: How pour flush toilets are driving away SA's sanitation backlog. *Water Wheel*, 13(4): 16-20.

Van Vuuren, S.J. & Van Dijk, M. 2011. Waterborne Sanitation Design Guide. Water Research Commission: Pretoria.

Walsh, K., Shai, L. & Mbangata, T. 2019. Assessing the affordability of water services for residential consumers in South African municipalities. Water Research Commission: Pretoria.

Wienecke, A. Atkinson, D. & Botes, L. 2017. Sanitation as a human right? Practical and policy considerations in providing sanitation in arid regions – part b. *Journal for New Generation Sciences*, 15(1): 402-416.

Wilkinson, M.J., Dlamini, X.L., Magagula, T.K. & Muller, H. 2019. A framework for monitoring and reporting hygiene goals and targets (2016-2030). Water Research Commission Council: Pretoria.

Wilkinson, M., Du Toit, A. & Mashimbye, D. 2012. Development of a Framework for Hand Hygiene Assessment Report to the Water Research Commission: Pretoria.

Wilkinson, M., Magagula, T., Dlamini, X., Muller, H. & Dlamini, T. 2018. Benchmarking South Africa's National Water Policy and legislation and the development of a framework for monitoring the progress of current and future water policy and legislation: Review of South Africa's water policy and legislation. Water Research Council: Pretoria.

Wilkinson, M., Pearce, D., Sharaunga, S., Flanagan, J. & Magagula, T. 2014. Sanitation subsidies in perspective: How to increase the effectiveness of sanitation subsidies in South Africa. WRC Report No. 2136/1/14. Pretoria.

Win-SA (Water Information Network South Africa). 2013. A costing framework for municipalities serving communities in both urban and rural contexts: Making knowledge work for both of us. Water Research Commission. Pretoria.

Winterveld Community Sanitation Project. n.d. https://www.randwater.co.za/corporateresponsibility/pages/wetlands rehabilitation.asxp. Date of access 04 July. 2021.

Whitley, L., Hutchings, P., Cooper, S., Parker, A., Kebede, A., Joseph, S., Butterworth, J., Van Koppen, B. & Mulejaa, A. 2019. A framework for targeting water, sanitation and hygiene interventions in pastoralist populations in the Afar region of Ethiopia. *International Journal of Hygiene and Environmental Health,* 222: 1133-1144.

World Health Organization (WHO) / UNICEF. 2014. Progress on sanitation and drinking water: 2015 update and MDG assessment. Joint water supply and sanitation monitoring programme. United Nations: New York.

World Health Organization (WHO) / UNICEF. 2015. Progress on sanitation and drinking water: 2015 update and MDG assessment. Joint water supply and sanitation monitoring programme. United Nations: New York.

World Health Organization (WHO). 2018. Guidelines on sanitation and health. United Nations: New York.

Yin, R.K. 2018. Case study research and applications: Designs and methods. Sixth edition. Sage Publication: United States.

Ziervogel, G., New, M., Van Garderen, E,A., Midgley, G., Taylor, A., Hamann,

R., Stuart-Hill, S., Myers, J. & Warburton, M. 2014. Climate change impacts and adaptation in South Africa. 605-620. DOI: 10.1002/wcc.295. Wiley Online Library.

Zimmer, A., Winkler, I.T. & Albuquerque, C. 2014. Governing wastewater, curbing pollution, and improving water quality for the realization of human rights. *Waterlines*, 33(4).

ANNEXURE A: HOUSEHOLD QUESTIONNAIRE

6657 Pearl Acacia Street
2253 Villa Lantana Estate
AMANDASIG
0182
6 June 2019

Dear Prospective Participant

I am a registered PhD student in the Department of Public Administration and Management at the University of South Africa (UNISA) under the supervision of Professor EJ Nealer. You are kindly requested to assist in providing a sincere opinion or response to the questions in this questionnaire.

The research topic is “Sanitation services in the Northern fringe of the City of Tshwane Metropolitan Municipality: The case study of Ga-Rankuwa, Mabopane, Temba and Winterveld”. The purpose of this study is solely for academic purposes as well as gather relevant information which can contribute towards water supply and sanitation facilities. All information provided will be treated as strictly confidential.

You have been selected to participate in this research phase because you are a relevant person who can provide a response on this topic. You are, however, under no obligation to complete the questionnaire and can withdraw from the research at any time prior to submitting the survey.

You will not receive any incentives or be reimbursed for your participation in the research. Should you wish to contact the researcher about any aspect of this study, please contact Ms Martha Pekane Ngobeni (researcher) at 072 123 5868; email 32057776@mylife.unisa.ac.za / mashianep@dws.gov.za.

All your responses will be kept strictly confidential.

Signature …….
Ms MP Mashiane

Date: ……

SECTION A: DEMOGRAPHIC INFORMATION

1. What is your gender?

1.1	Male	
1.2	Female	

2. What is your home language?

2.1	English	
2.2	Afrikaans	
2.3	Tsonga	
2.4	Tswana	
2.5	Xhosa	
2.6	Other	

3. What is your race group (for statistical purposes only)?

3.1	African	
3.2	White	
3.3	Indian	
3.4	Coloured	
3.5	Other	

4. What is your age range?

4.1	18 – 24	
4.2	25 – 35	
4.3	36 – 45	
4.4	46 – 60	
4.5	Over 60	

5. What is your highest education?

5.1	No schooling	
5.2	Up to grade 8	
5.3	Matric	
5.4	Diploma/Degree	
5.5	Other (Specify)	

SECTION B: HOUSEHOLD MEMBER

HB.1 Have you benefitted from your Municipality's sanitation facility?

HB1.1	Yes	
HB1.2	No	

HB.2 What type of a sanitation facility did the Municipality install at your home?

HB2.1	Flush toilet connected to a public sewerage system	
HB2.2	Flush toilet connected to a septic tank	
HB2.3	Ventilated Improved Pit toilet	
HB2.4	Bucket toilet	
HB2.5	Other	

HB.3 Do you share this facility with other households?

HB3.1	Yes	
HB3.2	No	

HB.4 In your opinion, how satisfied are you with the sanitation services provided by the Municipality?

HB4.1	Extremely dissatisfied	
HB4.2	Poor service with room for improvement	
HB4.3	Neutral – No opinion	
HB4.4	Satisfied, but room for improvement	
HB4.5	Extremely satisfied	

HB.5 If in an area with waterborne toilets, have you experienced recent blockages or overflow of sewerage near your property/ street?

HB5.1	Yes	
HB5.2	No	

HB.6 Have you had a complaint in the last 3 months regarding the provision of sanitation or your sewerage system?

HB6.1	Yes	
HB6.2	No	

HB.7 If your response is yes to the previous question, do you have any suggestion of how to improve sanitation services at your household?

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HB.8 Where do children below the age of five years defecate?

HB8.1	Latrine	
HB8.2	Potty	
HB8.3	Veld/ outside a toilet	
HB8.4	Not applicable	

HB.9 What is your understanding of good sanitation, health and hygiene user education?

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HB.10 General remarks about sanitation services provided by the Municipality in your area.

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THANK YOU

ANNEXURE B: DEPARTMENT OF HUMAN SETTLEMENTS WATER AND SANITATION QUESTIONNAIRE

6657 Pearl Acacia Street
2253 Villa Lantana Estate
AMANDASIG
0182
31 July 2019

Dear Prospective Participant

I am a registered PhD student in the Department of Public Administration and Management at the University of South Africa (UNISA) under the supervision of Professor EJ Nealer. You are kindly requested to assist in providing a sincere opinion or response to the questions in this questionnaire.

The research topic is “Sanitation services in the Northern fringe of the City of Tshwane Metropolitan Municipality: The case study of Ga-Rankuwa, Mabopane, Temba and Winterveld”. The purpose of this study is solely for academic purposes as well as gather relevant information which can contribute towards water supply and sanitation facilities. All information provided will be treated as strictly confidential.

You have been selected to participate in this research phase because you are a relevant person who can provide a response on this topic. You are, however, under no obligation to complete the questionnaire and can withdraw from the research at any time prior to submitting the survey.

You will not receive any incentives or be reimbursed for your participation in the research. Should you wish to contact the researcher about any aspect of this study, please contact Ms Martha Pekane Ngobeni (researcher) at 072 123 5868; email 32057776@mylife.unisa.ac.za / mashianep@dws.gov.za.

All your responses will be kept strictly confidential.

Signature …….
Ms MP Ngobeni

Date: ……

SECTION A: DEMOGRAPHIC INFORMATION

Instructions: Please mark with an "X" in the appropriate box

4. What is your gender?

1.1	Male	
1.2	Female	

5. What is your home language?

2.1	English	
2.2	Afrikaans	
2.3	Tsonga	
2.4	Tswana	
2.5	Xhosa	
2.6	Other	

6. What is your race group (for statistical purposes only)?

3.1	African	
3.2	White	
3.3	Indian	
3.4	Coloured	
3.5	Other	

7. What is your age range?

4.1	18 – 24	
4.2	25 – 35	
4.3	36 – 45	
4.4	46 – 60	
4.5	Over 60	

6. What is your highest education?

5.1	Postgraduate	
5.2	Diploma / Degree	
5.3	Matric	
5.4	Up to Grade 8	
5.5	No schooling	
5.6	Other (Specify)	

SECTION B: DEPARTMENT OF WATER AND SANITATION OFFICIALS

The questions below are to be answered by the officials of the Department of Water and Sanitation responsible for the planning, construction, regulations and implementation of the sanitation policy in South Africa.

DB.1 What planning instrument(s) is utilised by the Department to promote planning and budgeting for sanitation services?

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DB.2 What framework does your Department implemented to regulate sanitation services? Please provide detailed information of the relevant policies, legislation and mechanisms.

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DB.3 How does the sanitation framework contribute towards the implementation of sanitation, namely: standards of availability, acceptability and affordability?

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DB.4 What regulatory measures have been implemented in the Department to ensure affordable access to sanitation services for citizens and municipal residents who are economically disadvantaged and in a vulnerable situation?

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DB.5 How does the Department ensure that sanitation regulation(s) measures is applied properly by the municipalities?

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DB.6 Please provide examples of how your Department monitors and enforces regulations in the sanitation sector.

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DB.7 What does the current legislation and regulation in your Department state regarding sanitation technologies provided by municipalities?

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DB.8 Has the Department reviewed sanitation legislation and guidelines gazetted since 1994? If yes, what was the reason for reviewing the sanitation legislation?

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DB.9 Which amendments should the Department of Water and Sanitation should effect to the sanitation services public policies?

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DB.10 Which measures should be implemented to achieve improved access to sanitation services in South Africa?

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DB.11 Which functions and duties have been assigned to you in terms of public policy, planning, implementation, monitoring and reporting of sanitation services?

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THANK YOU

ANNEXURE C: CITY OF TSHWANE METROPOLITAN MUNICIPALITY QUESTIONNAIRE

6657 Pearl Acacia Street
2253 Villa Lantana Estate
AMANDASIG
0182
6 June 2019

Dear Prospective Participant

I am a registered PhD student in the Department of Public Administration and Management at the University of South Africa (UNISA) under the supervision of Professor EJ Nealer. You are kindly requested to assist in providing a sincere opinion or response to the questions in this questionnaire.

The research topic is “Sanitation services in the Northern fringe of the City of Tshwane Metropolitan Municipality: The case study of Ga-Rankuwa, Mabopane, Temba and Winterveld”. The purpose of this study is solely for academic purposes as well as gather relevant information which can contribute towards water supply and sanitation facilities. All information provided will be treated as strictly confidential.

You have been selected to participate in this research phase because you are a relevant person who can provide a response on this topic. You are, however, under no obligation to complete the questionnaire and can withdraw from the research at any time prior to submitting the survey.

You will not receive any incentives or be reimbursed for your participation in the research. Should you wish to contact the researcher about any aspect of this study, please contact Ms Martha Pekane Ngobeni (researcher) at 072 123 5868; email 32057776@mylife.unisa.ac.za / mashianep@dws.gov.za.

All your responses will be kept strictly confidential.

Signature …….
Ms MP Mashiane

Date: ……

SECTION A: DEMOGRAPHIC INFORMATION

Instructions: Please mark with an "X" in the appropriate box

8. What is your gender?

1.1	Male	
1.2	Female	

9. What is your home language?

2.1	English	
2.2	Afrikaans	
2.3	Tsonga	
2.4	Tswana	
2.5	Xhosa	
2.6	Other	

10. What is your race group (for statistical purposes only)?

3.1	African	
3.2	White	
3.3	Indian	
3.4	Coloured	
3.5	Other	

11. What is your age range?

4.1	18 – 24	
4.2	25 – 35	
4.3	36 – 45	
4.4	46 – 60	
4.5	Over 60	

7. What is your highest education?

5.1	Postgraduate	
5.2	Diploma / Degree	
5.3	Matric	
5.4	Up to Grade 8	
5.5	No schooling	
5.6	Other (Specify)	

SECTION B: QUESTIONNAIRE: TSHWANE METROPOLITAN MUNICIPALITY

The questions below are to be answered by officials at the City of Tshwane Metropolitan Municipality:

MB.1 What are the roles and responsibilities of the municipal officials in terms of planning, implementing, monitoring and reporting in the provision of basic sanitation services to beneficiaries?

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MB.2 Does the Municipality engage with its communities during planning and implementation of sanitation services?

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MB.3 What criterion is utilised to select sanitation project beneficiaries?

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MB.4 What are the regulatory measures have been implemented in the Municipality to ensure affordable access to sanitation services for communities who are economically disadvantaged and in a vulnerable situation?

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MB.5 Does the sanitation framework(s) utilised by the Municipality contribute towards the implementation of sanitation, namely: standards of availability, acceptability, affordability, privacy and dignity?

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MB.6 How does the level of water services impact on the choice of sanitation technologies in both rural and urban areas?

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MB.7 What does the municipal legislation stipulate regarding the provision of sanitation technologies?

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MB.8 What resources are availed by the Municipality for sanitation services and the promotion of hygiene in its areas of jurisdiction?

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MB.9 What alternative service delivery options are available to accelerate the provision of sanitation services?

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MB.10 What challenges are experienced when implementing sanitation programmes in rural areas?

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MB.11 What challenges are experienced when implementing sanitation programmes in urban areas?

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MB.12 What lessons have been learnt from appointing agents to implement sanitation services?

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MB.13 What would you recommend to the government to improve the provision of sanitation services for the country?

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THANK YOU

ANNEXURE D: ETHICAL CLEARANCE APPROVAL

UNISA university of south africa

DEPARTMENT: PUBLIC ADMINISTRATION AND MANAGEMENT
RESEARCH ETHICS REVIEW COMMITTEE

Date: 14 February 2017

Ref #: PAM/2017/001 (Ngobeni)
Name of applicant: Ms MP Ngobeni
Student #: 32057776

Dear Ms Ngobeni

Decision: Ethics Clearance Approval

Name: Ms MP Ngobeni, Pikane.ngobeni@gmail.com, tel: 072 123 5868
[Supervisor: Dr LL Luvuno, 012 429-4360, luvunll@unisa.ac.za]

Research project: The provision of sanitation services in South Africa's rural areas: A case study of Tshwane Metropolitan Municipality **Qualification:** PhD (Public Administration)

Thank you for the application for **research ethics clearance** by the Department: Public Administration and Management: Research Ethics Review Committee, for the above mentioned research. Final approval is granted for the duration of the project.

The decision will be tabled at the next College RERC meeting for notification/ratification.

For full approval: The application was **expedited and reviewed** in compliance with the Unisa Policy on Research Ethics by the RERC on 10 February 2017. The proposed research may now commence with the proviso that:

1) The researcher will ensure that the research project adheres to the values and principles expressed in the Unisa Policy on Research Ethics.
2) Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study, as well as changes in the methodology, should be communicated in writing to this Ethics Review Committee. An amended application could be requested if there are substantial changes from the existing proposal, especially if those changes affect any of the study-related risks for the research participants.
3) The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study.

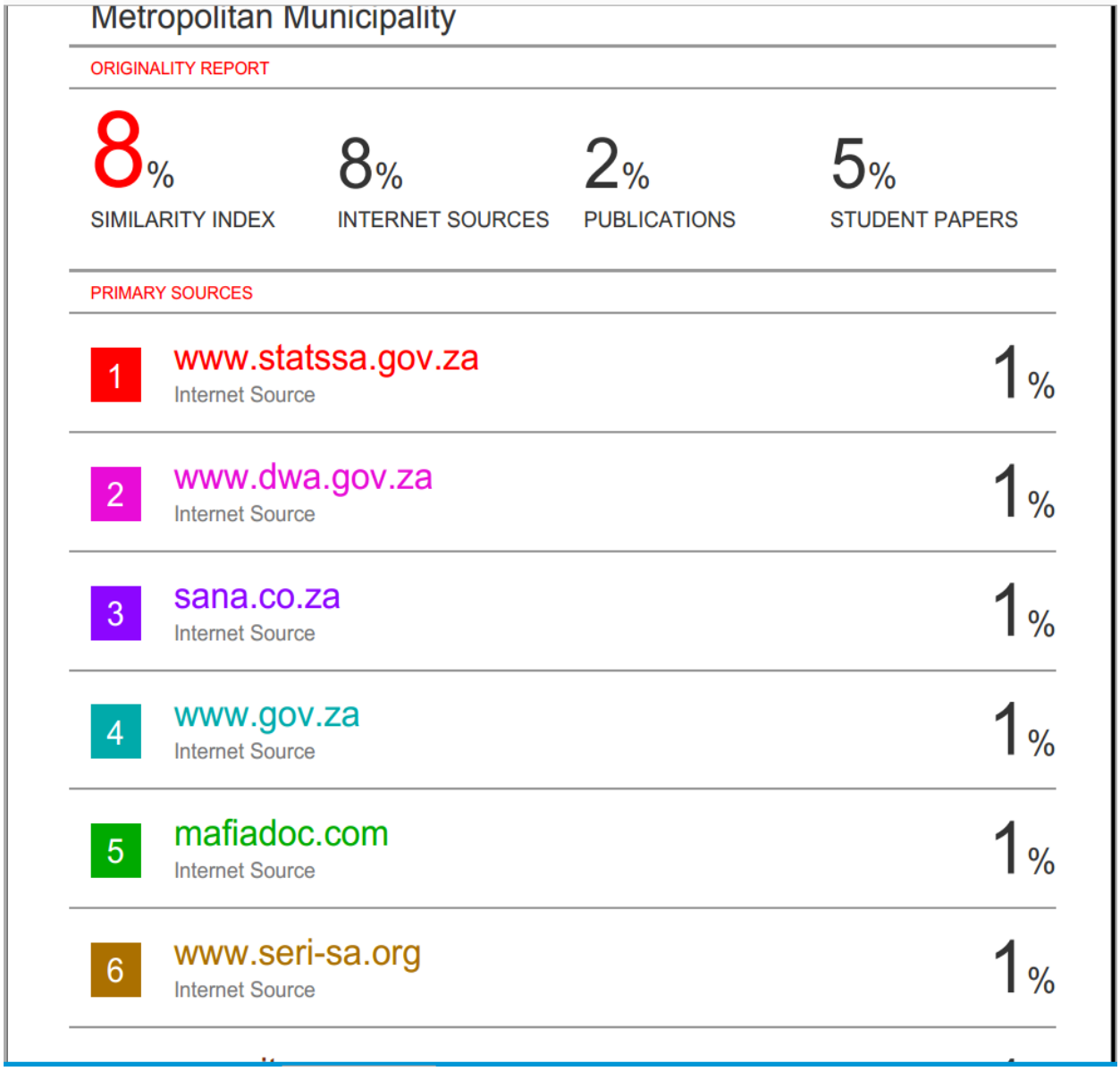
Kind regards

Prof Mike van Heerden
Chairperson:
Research Ethics Review Committee
vheerm@unisa.ac.za

Prof MT Mogale
Executive Dean: CEMS

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

ANNEXURE E: TURNITIN REPORT



Metropolitan Municipality

ORIGINALITY REPORT

8%	8%	2%	5%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	www.statssa.gov.za Internet Source	1%
2	www.dwa.gov.za Internet Source	1%
3	sana.co.za Internet Source	1%
4	www.gov.za Internet Source	1%
5	mafiadoc.com Internet Source	1%
6	www.seri-sa.org Internet Source	1%

ANNEXURE F: PERMISSION LETTER TO CONDUCT RESEARCH AT THE CITY OF TSHWANE METROPOLITAN MUNICIPALITY

P O Box 59499
KARENPARK
0118
11 July 2016

Strategic Executive Director: Water and Sanitation Division
City of Tshwane Metropolitan Municipality
PRETORIA
0001

Attention: Mr S Notoane

SUBJECT: REQUEST APPROVAL FROM THE STRATEGIC EXECUTIVE DIRECTOR WATER AND SANITATION TO CONDUCT RESEARCH ON PROVISION OF SANITATION SERVICES IN RURAL AREAS OF SOUTH AFRICA: A CASE STUDY OF CITY OF TSHWANE METROPOLITAN MUNICIPALITY

I would like to seek approval from the Strategic Executive Director Water and Sanitation to conduct a research at City of Tshwane Metropolitan Municipality. My name is Martha Pekane Ngobeni, I am conducting a research under the supervision of Professor SR Malefane in the Department of Public Administration and Management, towards a PhD in Public Administration at the University of South Africa (UNISA). The research is on provision of sanitation services in rural areas of South Africa: A case study of City of Tshwane Metropolitan Municipality with specific reference to Winterveldt area.

The study seeks to find out on how sanitation services were implemented in rural areas of South Africa with specific reference in the City of Tshwane Metropolitan Municipality at Winterveldt area. I would like to obtain an access to information in the City of Tshwane Metropolitan Municipality documents and to conduct interviews with the relevant officials those are involved in the provision of sanitation services. Findings and recommendations from the study will be shared with the City of Tshwane Metropolitan Municipality.

Yours sincerely

MS MP NGOBENI
EMAIL:NWASAMUEL@GMAIL.COM
PhD STUDENT: UNIVERSITY OF SOUTH AFRICA
CELL: 072 123 5868

Approved / ~~Not Approved~~

APPROVED!

MR STEPHENS NOTOANE

STRATEGIC EXECUTIVE DIRECTOR: WATER AND SANITATION DIVISION

DATE: 2016/07/14

ANNEXURE G: DEPARTMENT OF HUMAN SETTLEMENTS WATER AND SANITATION APPROVAL TO CONDUCT A RESEARCH

water & sanitation
Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Tracking no

ROUTE FORM

BRANCH: PLANNING AND INFORMATION

Reference No: Cellphone: 072 123 5868

REQUEST AN APPROVAL FOR THE PROVISION OF SANITATION SERVICES IN RURAL AREAS OF SOUTH AFRICA: A CASESTUDY OF CITY OF TSHWANE METROPOLITAN MUNICIPALITY

DRAFTING OFFICIALS		SUPERVISOR	
Name : N. MPOTULO Extension: 7016 Office No.: 827WB		Name: D. MOCHOTLHI Extension: 7255 Office No.: 952 SEDIBENG	
Rank: CD	Date:	Rank: DDG	Date:

Rank	Date	Initials	Office No		Rank	Date	Initials	Office No	
DD: M&E	18/08/16	Pikane	821	▼	DD: M&E				▲
CD: Sanitation Macro Planning	2016/08/18	Tamie MM	821 WB	▼	CD: Sanitation Macro Planning				▲
D:SS	19/08/16	[illegible]	6d941	▼	D:SS				▲
DDG:P&I	19/08/16	[illegible]	5952	▼	DDG:P&I				▲
DDG: NATIONAL W/R INFRASTRUCTURE				▼	DDG: NATIONAL W/R INFRASTRUCTURE				▲
DDG:PMU				▼	DDG:PMU				▲
*CFO/CD:LS				▼	*CFO/CD:LS				▲
LP					LP				▲
D:ES					D:ES				▲

**In the case of financial/legal issues*

RECEIVED
[illegible] 18
DDG: P&I

DG

DEPUTY MINISTER

MINISTER

INSTRUCTIONS/REMARKS BY DIRECTOR-GENERAL: WATER AND SANITATION

water & sanitation
Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Enquiries: Pikane Mashiane
Cellphone: 072 123 5868

INTERNAL MEMO

DEPUTY DIRECTOR-GENERAL: PLANNING AND INFORMATION

THE PROVISION OF SANITATION SERVICES IN RURAL AREAS OF SOUTH AFRICA: A CASESTUDY OF CITY OF TSHWANE METROPOLITAN MUNICIPALITY

1. PURPOSE

1.1 To seek approval from the Deputy Director-General (DDG) to conduct research at the Department of Water and Sanitation.

2. BACKGROUND AND DISCUSSION

2.1 I am conducting a research supervised by Professor SR Malefane in the Department of Public Administration and Management towards a PhD in Public Administration degree at the University of South Africa. The research study is on provision of sanitation services in rural areas of South Africa: A case study of City of Tshwane Metropolitan Municipality.

2.2 The study seeks to find out on how sanitation services were implemented in rural areas of South Africa with specific reference in City of Tshwane Metropolitan Municipality at Winterveldt area. Findings and recommendations from the study will be shared with the department.

2.3 The qualification was registered whilst National Sanitation Services was still reporting under the Department of Human Settlements (DHS), an approval to conduct a research in the department was granted. Due to the workload unfortunately I didn't manage to conduct a research whilst National Sanitation Services was still reporting in the Department of Human Settlements.

3. IMPLICATIONS

3.1 Personnel

None

3.2 Financial implications

None

3.3 Legal

None

3.4 Communication

None

THE PROVISION OF SANITATION SERVICES IN RURAL AREAS OF SOUTH AFRICA: A CASESTUDY OF CITY OF TSHWANE METROPOLITAN MUNICIPALITY

4. OTHER COMPONENTS CONSULTED

Sanitation Macro Planning & Information Management and National Sanitation Services

4.1 RESEARCH SCHEDULE

It is envisaged that the study will be conducted and concluded this financial year.

5. RECOMMENDATIONS

It is recommended that the DDG approve the request to conduct research at the Department of Water and Sanitation.

MS. MP MASHIANE
DEPUTY DIRECTOR: SANITATION M&E
DATE: 16-08-2016

Recommended / Not recommended

CHIEF DIRECTOR: SANITATION MACRO PLANNING&INFORMATION MANAGEMENT
DATE: 17/08/2016

Recommended / Not recommended

DEPUTY DIRECTOR-GENERAL: PLANNING AND INFORMATION
DATE: 19/08/2016