

Prevalence of post-traumatic stress disorder in the South African mining industry and outcomes of liability claims submitted to Rand Mutual Assurance Company

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ABSTRACT

Mine accidents are traumatic stressors with a potential to cause severe mental health problems like post-traumatic stress disorder (PTSD). The purpose of this study was to describe the characteristics of the mining population with PTSD due to mine accidents; and estimate the prevalence, sources and outcomes of PTSD claims reported by the South African mining sector to Rand Mutual Assurance (RMA) for compensation benefits.

An analysis of PTSD data reported over five years (2006-2010) to RMA injury claims database was conducted. Four hundred and fifty one PTSD claims were reported by the mines, (65.9%) were from the gold mines. The majority were for workers who were males (87.4%), Black (77.4%), operators (84.2%), and the victims of traumatic mine accidents (87.8%). Overall PTSD prevalence was 0.09%, with 0.085 among males and 0.143 among females. More than two-thirds (67.4%) of the claims were compensated by RMA. Promotion of workers' mental health is essential.

Key words: Post-traumatic stress disorder, mining, claims, outcomes, South Africa, Rand Mutual Assurance, compensation, COIDA

INTRODUCTION

Mining is a high risk occupation with an increasing number of traumatic accidents. Mine accidents are traumatic stressors with a potential to cause severe mental health problems like post-traumatic stress disorder (PTSD), even after attention has been paid to physical injuries sustained by the survivors of mine accidents, i.e. PTSD symptoms might persist for more than 30 days after exposure to traumatic mine accident or occur after a delay of months to years.¹ However, there is very limited research conducted on PTSD as a result of mining accidents, both in South Africa and internationally, hence the paucity of data on PTSD in mining.

Local literature has revealed that a relatively large number of mine workers are likely to experience some degree of PTSD due to the high incidence of injuries and deaths resulting from mining accidents.² The implications are that PTSD could impact negatively on the miners' psychosocial well-being and ultimately hinder their performance and productivity.

PTSD is the anxiety disorder that can occur in people who have experienced or witnessed life-threatening events such as natural disasters, serious accidents, terrorist incidents, war or violent personal assaults, etc.¹ PTSD is also described as a complex somatic, cognitive, affective and behavioural effect of psychological trauma.³ The World Health Organization (WHO) has estimated that there are 120 million occupational accidents/injuries with resulting 200 000 fatalities.⁴

Globally, it is acknowledged that traumatic incidents and

other life-threatening events are prevalent among industries involving hazardous work processes and work environments such as agriculture, mining, construction, transportation and manufacturing.⁵ A study conducted by WHO on the global burden of diseases estimated that 8% of stress-related conditions can be attributed to environmental and occupational risk factors.⁶ However, the lack of awareness of work-related stress and shortage of resources to deal with the disorder in the workplace was acknowledged.⁷

Epidemiological estimates suggest that in the general population the incidence and life-time prevalence of PTSD is 1 to 9%.⁸ PTSD is also associated with the increased likelihood of co-morbid psychiatric disorders; findings from a large scale South African study showed that 88% of men and 79% of women with PTSD met the criteria for another psychiatric disorder.⁹ Also, the severity, duration and proximity of the individual's exposure to traumatic event(s) is/are most important factor(s) affecting the likelihood of developing PTSD which might increase as the intensity of the physical proximity to the stressor increases.¹⁰

The South Africa mining sector is predominantly a metalliferous industry, with metallurgical processes making it prone to various occupational hazards and major accidents^{11,12}, such as falls of grounds acknowledged as the most common cause of traumatic accidents followed by transport and machinery accidents.¹³ Occurrence of such traumatic accidents could adversely impact on the mine workers'

psychosocial well-being and ultimately hinder their work performance and productivity.

The paucity of published studies relating to PTSD in the South African mining sector also makes it difficult to estimate the magnitude of the disorder; hence this study, using PTSD claims reported by the sector to RMA for compensation benefits, describes the characteristics of the mining population with PTSD due to mine accidents, and estimates the prevalence, sources and outcomes of PTSD.

In the mining sector compensation claims are submitted via RMA suggesting that data on PTSD claims used for this study represent the total number of PTSD claims for the mining sector. RMA is a mutual association licensed to administer and deliver compensation benefits in accordance with the Compensation for Occupational Injuries and Diseases Act No. 130 of 1993 (COIDA), as amended.¹⁴ Benefits administered by RMA include among others payments for reasonable initial and ongoing medical costs, award of compensation according to the impairments sustained, monthly pension to dependants in case of a fatality, etc.¹⁴ It is therefore estimated that the analysis of RMA data for PTSD claims provides an overall indication of the existence and extent of reported PTSD in the sector.

The South African legislative framework on PTSD

The Circular Instruction No. 172 was issued by the South African Department of Labour in July 2002 under COIDA No. 130 of 1993, as amended and it came into effect on 01 April 2003 to clarify the position with respect to compensation of claims for workers including mine workers who develop PTSD due to work-related accident(s).¹⁵ PTSD is classified as an occupational injury and not a disease of which the occupational accident is regarded as the traumatic event or stressor.¹⁵

METHODOLOGY

A retrospective quantitative study was conducted using the RMA database of all PTSD claims reported by the mining sector over five years (2006-2010) for compensation benefits as per Circular Instruction 172.¹⁵ PTSD claims from non-mining sectors were excluded.

Data analysis was conducted using the statistical package for social sciences (SPSS version 17.0). The demographics variables used to describe various characteristics of mine workers diagnosed with PTSD were summarised using descriptive measures and were expressed as means (standard deviations) for continuous variables; and percentages for categorical variables. Pearson chi-square tests of association examined categorical data and statistical significance was defined at $p < 0.05$. Ethical clearance approval was granted by Medunsa Campus Research & Ethics Committee, approval number: MCREC/PH/31/2008:CR.

RESULTS

A total of 671 claims for PTSD over 5 years (2006-2010) were reported to RMA for compensation benefits and of those 451 (66.9%) were from the mining sector. The remaining one third (32.7%) was from other sectors such as banking and others.

Demographic characteristics of PTSD claimants

As shown in Table 1 the mean age of mine workers with PTSD reported to RMA was 39.8 ± 9.1 years and slightly more than half (53.6%) were 40 years and older. Based on the claimants' racial classification 349 (77.4% with a mean age of 39.5 ± 9.1) were Blacks followed by Whites 99 (22.0%) with a mean age of 41.2 ± 8.9 years and Coloureds 3 (0.7%), with a mean age of 28.7 ± 3.2 years. The majority of the claims were for males 394 (87.4%) compared to females 57 (12.6%) and their job distribution mainly consisted of operators 362 (84.2%) compared to supervisors and managers 68 (15.8%).

Sources of PTSD

For this study the sources of PTSD for claims submitted to RMA were determined by the nature of exposure to traumatic mine accidents that led to the development of the disorder. The majority of the claims were for those mine workers who directly experienced traumatic mine accidents (87.8%) and sustained physical injuries compared to those who witnessed the events 55 (12.2%) as shown in Table 1.

Prevalence of PTSD in the mining sector

The overall PTSD prevalence was 0.09%, with 0.08% among males and 0.143% among females. For this study, employment figures for the mining sector (from 2006-2010) obtained from the Department of Minerals Resources (DMR) were used as the population base to determine the overall prevalence of PTSD among mine workers. The statistics from DMR also indicated that the majority of mine workers employed over the study period (2006–2011) were males (>90%) although the employment of females doubled from 4% in 2006 to 8.6% in 2011.¹⁶

Table 1. Socio-demographics and other variables of PTSD claimants (n=451)

Variables	Frequency	Percent
Age category (n=449)*		
20 – 29 years	71	15.8
30 – 39 years	137	30.6
40 – 49 years	172	38.3
50 – 59 years	67	14.9
60 years and over	2	0.4
Average age (SD) yrs	39.8 (9.1) yrs	
Gender (n=451)		
Male	394	87.4
Female	57	12.6
Race (n=451)		
Black	349	77.4
Caucasian	99	22.0
Coloured	3	0.7
Job grade level (n=430)*		
Operators	362	84.2
Supervisors and managers	68	15.8
Sources of PTSD		
Witnessed traumatic mine accidents	55	12.2
Experienced as victims	396	87.8

*Missing data

Table 2. Outcomes of PTSD claims per type of mine (n=451)

Variables	Frequency	Percent
Type of mine		
Gold	297	65.9
Platinum	89	19.7
Coal	22	4.9
Diamond	13	2.9
Iron	16	3.5
Uranium and others	14	3.1
Total	451	100.0
Outcomes		
Liability accepted	304	67.4
Liability undecided	99	22.0
Liability rejected	48	10.6
Total	451	100.0

Liability outcomes for PTSD claims

Table 2 shows the distribution of PTSD claims submitted to RMA per mining commodity and the results showed that the gold mines submitted the most claims (65.9%) followed by platinum (19.7%) and coal mines (4.9%). Given the fact that the size and number of workers in gold and platinum mines are higher than other types of mines, the over-representation shown by the results is consistent with the high number of mine workers employed in the two types of mines.¹⁶

With regards to outcome decisions on PTSD liability by RMA (acceptance, rejection, etc), about two-thirds (67.4%) of the claims were accepted for compensation benefits, while 48 (10.6%) were rejected as shown in Table 2. The findings also showed that 99 (22.0%) of the claims were undecided liabilities and the reason described related to incomplete supporting documentation received by RMA.

Associations between PTSD liability outcomes and other demographics

Table 3 shows that the outcomes of PTSD liability were significantly associated with the type of mines ($p=0.005$) and race ($p<0.001$) of the claimants. As further outlined in Table 3, all claims for PTSD liability were accepted for workers from the iron mines 16 (100.0%) in contrast to the gold mines 184 (62.0%) which also had the highest rates of PTSD claims undecided 20 (22.0%) and rejected 40 (13.5%).

Table 3. PTSD liability outcomes per mining commodity and race (n=451)

Type of mine	Outcomes of PTSD claims			P-value
	Accepted n (%)	Undecided n (%)	Rejected n (%)	
Gold	184 (62.0)	73 (24.6)	40 (13.5)	0.005
Platinum	65 (73.0)	20 (22.0)	4 (4.5)	
Diamond	12 (92.3)	0 (0.0)	1 (7.7)	
Coal	15 (68.2)	6 (27.3)	1 (4.5)	
Iron	16 (100.0)	0 (0.0)	0 (0.0)	
Uranium and others	12 (85.7)	0 (0.0)	2 (14.3)	
Race				
Black	219 (62.8)	95 (27.2)	35 (10.0)	<0.001
Caucasian	82 (82.8)	4 (4.0)	13 (13.1)	
Coloured	3 (100.0)	0 (0.0)	0 (0.0)	

Association between claimants' socio-demographics and age category

As shown in Table 4, a positive association ($p=0.000$) was revealed between the claimants' gender and age group. The results also revealed a higher number of PTSD claims reported for males older than 40 years 231 (93.9%) compared to females younger than 40 years 42 (20.7%) as shown in Table 4.

Further analysis showed that female mine workers reported for PTSD liability were significantly younger than males; the mean age was 34.1 years for females versus 40.7 years for males. Moreover, though not statistically significant ($p=0.057$), diamond mines employed younger workers; while coal mines had older workers compared with the other types of mines as shown in Table 4.

DISCUSSION

Prevalence of PTSD in the mining sector

The results showed that 66.9% claims for PTSD reported to RMA over a cycle of five years (2006-2010) for compensation benefits were from the mining sector, clearly indicating that PTSD is a reality in this sector. However, the overall prevalence of PTSD in the mining sector was only 0.09%, which appears low and could be attributed to the fact that the analysis was based on known cases from RMA only and arguably there could have been other diagnosed but unreported cases by the mines and also possibly undiagnosed or missed cases that were not screened according to the diagnostic criteria for PTSD as per COIDA, Circular Instruction 172.¹⁵ This is further supported by the high rate of mine accidents and resulting injuries and fatalities which are the major traumatic events or stressors with a potential to cause PTSD among the survivors.^{2,17} A Chinese study reported a PTSD prevalence of 50% among survivors of a coal mining accident; and 30.6% of the survivors still met the criteria for PTSD¹⁰ months after the mine accident.¹⁸ Significantly, several South African based studies have shown that the prevalence of PTSD in different groups of the general public varies between 6% and 56%.^{19,20-22}

Demographic characteristics of PTSD claimants

There were significant associations between the frequency of

Table 4. Association between demographic factors and age category (n=449)*

Variables	Under 40 years n (%)	40 years and older n (%)	P-value
Gender			
Male	161 (79.3)	231 (93.9)	0.000
Female	42 (20.7)	15 (6.1)	
Race			
Black	159 (78.3)	189 (76.8)	0.128
Caucasian	41 (20.2)	57 (23.2)	
Coloured	3 (1.5)	0	
Job grade level			
Operators	170 (87.2)	191 (82.0)	0.268
Supervisors-Managers	25 (12.8)	42 (18.0)	
Involvement in the accident			
Experienced as survivors	178 (87.7)	216 (87.8)	0.541
Witnessed the accident	25 (12.3)	30 (12.2)	
Type of mine			
Gold	134 (66.0)	163 (66.3)	0.057
Platinum	40 (19.7)	49 (19.9)	
Diamond	9 (4.4)	2 (0.8)	
Coal	5 (2.5)	17 (6.9)	
Iron	8 (3.9)	8 (3.3)	
Uranium and others	7 (3.4)	7 (2.8)	

*Missing data (n=2)

PTSD claims and certain claimant's demographic variables, for an example, being female and younger than 40 years old. This finding is consistent with other similar studies which reported that females in general are more vulnerable to mental diseases particularly depression, anxiety and stress disorders.^{23,24} Other studies have reported that the rates of PTSD in the general population are consistently higher among women (10%) than in men (5%), and also higher in trauma-exposed groups among women (20%) than in men (8%).^{8,17} Potential explanations for this gender difference include the higher prevalence of violent sexual trauma among women, as well as their greater vulnerability to depression and lower rates of serotonin synthesis.^{8,17}

Regarding the type of mines, gold and platinum mines reported the majority of PTSD claims compared to other mines and this could be attributed to the highest rates of traumatic mine accidents and fatalities occurring among these two mining groups, as reported in the DMR annual report for 2010/2011.¹³

Sources of PTSD

There was a higher proportion of workers whose claims reported that they were directly involved in traumatic mine accidents that led to the diagnosis of PTSD compared to those who developed the disorder from witnessing mine accidents. Similar studies have reported that the duration and proximity of survivors to exposure to traumatic incidents or stressors predicted the occurrence of PTSD.^{17,25} Another study reported similar findings which confirmed that witnessing a crime or a traumatic event could lead to developing PTSD.²⁶ Literature has indicated that a relatively large number of mine workers are likely to experience some degree of post-traumatic stress due to the high incidence of injuries and deaths resulting from previous mining accidents.²

Outcomes of PTSD claims

The majority of claims for PTSD were accepted by RMA for compensation benefits. However, the acceptance and rejection rates varied based on the mining commodity. For example, claims from the iron mines were all accepted in contrast to those from the platinum and gold mines that were rejected at 4.5% and 13.5% respectively. Although the rationale for rejected claims was not explored in this study, literature has indicated that claims frequently lack detailed information regarding the extent of the severity of body parts affected, particularly details of functional assessments, in order to ascertain the degree of impairment sustained as a result of mine accidents.¹⁴

Notably, undecided liability claims for PTSD (i.e. they were still being investigated) ranged between 20 to 25%, and these were from gold and platinum mines. It is possible that the non-completion of final medical reports and failure to report on the critical elements needed for the estimation of functional loss and conversion to permanent disability are among the reasons for undecided claims by RMA.¹⁴

Further arguments for undecided liabilities could be also attributed to the mandatory impairment criteria for submitting PTSD claims as per the Circular Instruction No. 172 of COIDA,¹⁵ which include among others the social and occupational functioning assessment (SOFA), the global assessment functioning scale (GAFS) and the second edition of the South African society of psychiatrists and management of disability claims on psychiatric ground (SASOP Guidelines).¹⁵ Thus PTSD claims that are not in line with the prescribed criteria are likely to be either rejected or not finalised by the RMA. Furthermore, previous studies have cited the lack of clear guidelines and criteria to establish the liability, the limitations imposed on compensable conditions, difficulty in establishing a diagnosis, delays in

obtaining payments as issues that affect the compensation process.²⁷

It is acknowledged that the results of the current study were obtained within the limitations relating to the design. The strengths of this study are that it utilised data that was based on pre-existing clinical evaluations conducted by psychiatrist rather than self-reported questionnaires, and there was very little missing data (only 2).

CONCLUSION AND RECOMMENDATIONS

PTSD is a chronic condition that can be associated with significant morbidity, disability and impairment of life-functions and it is evident that the disorder is a reality in the South African mining industry. A review of current accidents prevention strategies must be undertaken so that they can be updated in order to minimise the occurrence of accidents that are premonitory to PTSD. Outcomes of PTSD claims for the mining sector are fairly good but further studies are needed to establish the reasons and issues that affect the acceptance or rejection of liability claims by RMA. Provision of detailed information for reporting of PTSD following traumatic mine accidents as prescribed in the Circular Instruction No. 172 is crucial to ensure acceptance of liability by RMA. Significantly, the handling of liability claims from workers is an important issue that forms part of the relationship between employers and their mine workers. This practice could improve the mental health and well-being as well as boost the morale of mine workers who at a high risk of exposure to traumatic mine accidents.

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LESSONS LEARNED

- Mine accidents are major traumatic events with a potential to cause chronic mental health problems like PTSD.
- PTSD can occur long after mine accidents have occurred, i.e. from one month as acute PTSD and six months later as delayed PTSD.
- PTSD is a reality in the South African mining industry.

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