

CHAPTER 4

EMPIRICAL STUDY

This chapter encompasses the empirical study undertaken to address the three specific aims of the research as identified in terms of an empirical approach namely (1) to quantitatively evaluate job stress, (2) to qualitatively evaluate family stress and (3) to quantitatively and qualitatively evaluate the relationship between job and family stress amongst firefighters in the South African context.

This chapter focuses on the analyses and biographical characteristics of the sample and the selection of the measuring instruments. A differentiation is made between *quantitative* measuring instruments and *qualitative* measuring instruments. The quantitative measuring instruments are a Biographical questionnaire, an Experience of work and life circumstances questionnaire and a stress questionnaire. The qualitative measuring instrument is the interview.

The quantitative collection of data focus on obtaining approval for conducting the empirical study of the research and contact with the firefighters, as well as the administration of the questionnaires. The statistical processing of the data involve the quantitative procedures and techniques and qualitative procedures. The qualitative collection of data and the specific hypotheses are described. The chapter is concluded with a summary.

4.1 ANALYSES AND BIOGRAPHICAL CHARACTERISTICS OF THE SAMPLE

The analyses and details regarding the biographical characteristics of the sample as the

first step of the empirical study will now be discussed.

4.1.1 Analyses of the sample

The sample consisted of 241 firefighters attached to the Metropolitan Municipality. The firefighters were recruited from the different fire brigades to participate in the empirical investigation after a motivational speech was delivered at a meeting of the District Commanders.

4.1.2 Biographical characteristics of the sample

The biographical characteristics of the sample as obtained from the biographical questionnaire are indicated in Tables 4.1 - 4.8

4.1.2.1 Age

| Table 4.1 | | |
|----------------------------|------------|------------|
| <i>Age characteristics</i> | | |
| Age | N | % |
| 19 - 25 | 33 | 13.69 |
| 26 - 30 | 56 | 23.24 |
| 31 - 35 | 87 | 36.10 |
| 36 - 40 | 32 | 13.28 |
| 41 - 45 | 17 | 7.05 |
| 46 - 50 | 9 | 3.73 |
| 51 + | 1 | 0.41 |
| Not indicated | 6 | 2.49 |
| Total | 241 | 100 |

The above information indicates that most of the firefighters involved (36.10%) were in the age category 31 - 35 years. Only a few firefighters (4.14%) were in the age category 46 - 51+ years.

4.1.2.2 Gender

| Gender | N | % |
|---------------|------------|------------|
| Male | 224 | 92.95 |
| Female | 11 | 4.56 |
| Not indicated | 6 | 2.49 |
| Total | 241 | 100 |

Table 4.2 indicates that the available firefighter population consists mainly of men (92.95%), with only a few women (4.56%).

4.1.2.3 Number of dependants

| Number of dependants | N | % |
|------------------------|----|-------|
| No dependants | 32 | 13.28 |
| 1 Dependant | 45 | 18.67 |
| 2 Dependants | 52 | 21.58 |
| 3 Dependants | 62 | 25.73 |
| 4 Dependants | 23 | 9.54 |
| 5 Dependants | 8 | 3.32 |
| More than 5 dependants | 5 | 2.07 |

Table 4.3*Number of dependants characteristics*

| Number of dependants | <i>N</i> | % |
|----------------------|----------|------|
| Not indicated | 14 | 5.81 |
| Total | 241 | 100 |

It must be noted that the number of dependants includes the marriage partner of the firefighter. The results indicate that 62 (25.73%) of the firefighters have 3 dependants. Only 5 (2.07%) of the firefighters have more than 5 dependants and 14 (5.81%) did not indicate any dependants.

4.1.2.4 Marital status

Table 4.4*Marital status characteristics*

| Marital status | <i>N</i> | % |
|----------------|----------|-------|
| Married | 152 | 63.07 |
| Unmarried | 63 | 26.14 |
| Divorced | 20 | 8.30 |
| Widower | 1 | 0.41 |
| Widow | 0 | 0 |
| Not indicated | 5 | 2.07 |
| Total | 241 | 100 |

The above information indicates that most of the firefighters (63.07%) are married and that a relatively small number (8.30%) are divorced.

4.1.2.5 Language context

Table 4.5*Language context characteristics*

| Language context | N | % |
|-------------------|------------|------------|
| Afrikaans | 127 | 52.70 |
| English | 2 | 0.83 |
| African languages | 108 | 44.81 |
| Not indicated | 4 | 1.66 |
| Total | 241 | 100 |

Table 4.5 indicates that the majority of firefighters 127 (52.70%) are Afrikaans speaking while, 108 (44.81%) firefighters speak African languages.

4.1.2.6 Years experience in occupation

Table 4.6*Years experience in occupation characteristics*

| Years experience | N | % |
|--------------------|------------|------------|
| Less than 2 years | 30 | 12.45 |
| 2- 5 years | 34 | 14.12 |
| 6- 10 years | 36 | 14.94 |
| More than 10 years | 131 | 54.36 |
| Not indicated | 10 | 4.15 |
| Total | 241 | 100 |

The above information indicates that 131 (54.36%) of the firefighters have more than 10 years' experience in their occupation. Only 30 (12.45%) of the firefighters have less than two years' experience in their occupation.

4.1.2.7 Qualifications

Table 4.7*Qualifications characteristics*

| Qualifications | <i>N</i> | % |
|----------------------|------------|------------|
| Grade 10 - 11 | 41 | 17.01 |
| Grade 12 + 1-2 years | 105 | 43.57 |
| Grade 12 + 3 years | 77 | 31.95 |
| Not indicated | 18 | 7.47 |
| Total | 241 | 100 |

Table 4.7 indicates that 105 (43.57%) of the firefighters obtained Grade 12 and a tertiary qualification of 1 to 2 years. The information further indicates that 41 (17.01%) of the firefighters completed either Grade 10 or Grade 11.

4.1.2.8 Number of subordinates

Table 4.8*Number of subordinates characteristics*

| Number of subordinates | <i>N</i> | % |
|------------------------|------------|------------|
| None | 162 | 67.22 |
| 1 - 10 | 70 | 29.05 |
| 11 - 20 | 4 | 1.66 |
| 21 - 30 | 2 | 0.83 |
| 31 - 40 | 3 | 1.24 |
| Total | 241 | 100 |

Table 4.8 indicates that 162 (67.22%) of the firefighters have no subordinates, while 3 (1.24%) of the firefighters have 31 - 40 subordinates each.

The selection of the measuring instruments will now be discussed.

4.2 SELECTING THE MEASURING INSTRUMENTS

The process of the selecting of the quantitative and qualitative measuring instruments will be presented next.

4.2.1 Quantitative measuring instruments

The following measuring instruments were analysed as an option to measure job stress:

- A General Health Questionnaire.
- An Impact of Events Scale Revised.

4.2.1.1 The General Health Questionnaire

The General Health Questionnaire can be utilised for the collection of information about participants' general psychological distress with a 28-item version. The General Health Questionnaire is scored using the General Health Questionnaire method (0-0-1-1) to both index the 'caseness' of psychological distress and to be consistent with its usage with previous Australian populations (www.qolid.org/public/GHQ.html). Following the suggested default threshold scores, *no distress* is indicated by a score of 3 or less, *mild distress* is indicated by scores from 4 to 6, and *severe distress* indicated by scores greater than 6 (Gao, Luo, Jhumboo, Fones, Li & Cheung, 2004). The General Health Questionnaire will not be included in the research because the questionnaire is not specific enough in the measurement of distress. The dimensions of the General Health Questionnaire is too vague and do not provide indications of what causes the distress reactions (Hobbs, Ballinger, Greenwood, Martin & McClure, 1984; Okulate, Olayinka

& Jones, 2004).

4.2.1.2 The Impact of Events Scale Revised

The Impact of Events Scale Revised can be utilised for the collection of information about participants' symptomatic responses to traumatic stressors. The revised version, with the hyperarousal subscale added to the intrusion and avoidance subscales, related more accurately to the diagnostic criteria for posttraumatic stress disorder in the DSM-IV. The original Impact of Events Scale demonstrated its validity through a number of studies (Briere, 1997) and is widely used in studying the effects of traumatic events (Horowitz, Wilner & Alvarez, 1979).

In order to maintain comparability with the original version of the measure, the Impact of Events Scale Revised maintained the one week time frame in the instruction for measuring symptomatic response and is scored with the original values of 0, 1, 3, and 5 for the responses *not at all*, *rarely*, *sometimes*, and *often*. Previous Australian research (Weiss & Marmar, 1997) used scores of greater than 19 and greater than 29 as indicative of significant and extreme posttraumatic stress, respectively, on the 15-item version of the Impact of Events Scale. As this categorisation do not represent a clinical diagnosis and are arbitrary (Briere, 1997), threshold scores, proportionally extrapolated from those of the Impact of Events Scale, greater than 28 and greater than 43 is used to indicate significant and extreme posttraumatic stress respectively, as measured by the 22-item version of the Impact of Events Scale Revised. The Impact of Events Scale Revised will not be included in the research because the questionnaire measures posttraumatic stress, and not job and family related stress.

The following measuring instruments were selected to measure job stress:

- A Biographical questionnaire.
- An Experience of work and life circumstances questionnaire.
- A Stress questionnaire.

4.2.1.3 The Biographical questionnaire

A Biographical questionnaire (attached hereto as Appendix A) was compiled to obtain the following information: Age, gender, dependants (number), marital status, home language, post (level), years experience in service, qualification, number of subordinates, the nature of shift work, frequency of attending to emergency calls and experience of the job as stressful. The Biographical questionnaire will provide a general profile of the firefighters in terms of the dimensions mentioned above. Information will also be obtained in terms of how the firefighters perceive their experience of stress.

4.2.1.4 The Experience of work and life circumstances questionnaire

The Experience of work and life circumstances questionnaire will be discussed in terms of the development, rationale, aim, dimensions, administration and interpretation, reliability and validity, and justification for the inclusion of the questionnaire in the research.

(a) Development of the Experience of work and life circumstances questionnaire

The Experience of work and life circumstances questionnaire was introduced in 1991. The questionnaire is obtainable from the Human Sciences Research Council, therefore it will not be attached hereto as an appendix. The questionnaire was developed to

include different stress reactions and not anxiety only. Van Graan (1981) states that stress is a subjective emotional experience which consist of different reactions and not anxiety only (Van Zyl & Van der Walt, 1991).

(b) Rationale of the Experience of work and life circumstances questionnaire

The questionnaire is based on the experience and causes of job stress. The rationale of the questionnaire is that a person with a high score on the items indicates a high level of stress experience, which relates to problems from the environment (Van Zyl & Van der Walt, 1991).

(c) Aim of the Experience of work and life circumstances questionnaire

The questionnaire can be utilised for the measurement of the stress levels experienced as well as the nature of the important causes of stress of employees that are at a grade 10 level. The results can be utilised to identify employees that are functioning under high levels of stress and to determine the main stressors in their environments (Van Zyl & Van der Walt, 1991).

(d) Dimensions, administration and interpretation of the Experience of work and life circumstances questionnaire

This self-assessment questionnaire consists of two dimensions, namely: *experience of the job* and *circumstances and expectations of the job*. The first dimension of the

questionnaire, which measures the way the job is experienced, indicates the level of stress of the employee, and whether an employee experiences stress at a normal, high or very high level. Measurement is conducted through the assessment of 40 questions on a five-point scale (Scale A), which indicate how often certain stress emotions (for example depression, anxiety and frustration) occur. A high score indicates a high level of stress (Van Zyl & Van der Walt, 1991).

The second dimension of the questionnaire measures the circumstances and expectations of the job and indicates the level of stress experienced by the employee. Questions are answered on a five-point scale (Scale B in the case of circumstances and Scale C in the case of expectations) to indicate how often specific emotions occur. There is a total of 76 questions pertaining to persons circumstances and unfulfilled expectations (Van Zyl & Van der Walt, 1991).

The questionnaire can be administered in an individual and/or a group context. The test material consists of a questionnaire booklet, which is available in Afrikaans and English. The answers are indicated on a separate answer sheet. Three categories are distinguished and scores reflect the levels as well as the causes of stress, as normal, high or very high. To facilitate interpretation, guidelines are provided for interpreting scores as normal, high and very high.

(e) Reliability and validity of the Experience of work and life circumstances questionnaire

Face validity and logical validity are regarded as indications of content validity. Face validity does not refer to what the questionnaire actually measures, but to what the items apparently measure (Raftery, Tanner & Wells, 2002). Since the items were developed according to a theoretical model and evaluated by a panel of experts, the

questionnaire is assumed to have face validity. Logical validity *firstly* requires a careful definition in behavioural terms of the traits or the aspects of behaviour dealt with in the questionnaire (Raftery et al, 2002).

Secondly, it requires the analysis of that behavioural aspect in the parts which it represents, and *thirdly*, an evaluation of the question whether the item have adequate discrimination value. In the course of its development, the questionnaire was subjected to the above steps, and according to the results that were obtained, it can be assumed that the questionnaire has logical validity (Van Zyl & Van der Walt, 1991).

Construct validity concerns the extent to which a test/questionnaire measures a theoretical construct or trait. Information in this regard can be obtained in various ways (Raftery et al, 2002). The intratest method is aimed at a study of the internal structure of the test/questionnaire. The results reflected a fairly significant relation between the different fields/scales of the questionnaire, which supports the construct validity of the questionnaire. The intertest method implies the simultaneous evaluation of the correlations between a large number of tests/questionnaires (Van Zyl & Van der Walt, 1991).

The construct validity of the questionnaire is indicated with the relationship of the appropriate factors of the 16PF-questionnaire (Forms A and E), the PHSF-Relationships-questionnaire and the cognitive and behavioural symptoms. The construct validity of the questionnaire is further supported with the moderate relationship with the different fields of the Experience of work and life circumstances questionnaire (Van Zyl & Van der Walt, 1991).

The reliability of a test/questionnaire can be regarded as the consistency with which it

measures on different occasions (Bless & Higson-Smith, 2000). Reliability can be determined *inter alia* by means of the test-retest and internal consistency methods (e.g., Kuder-Richardson formulae). Test-retest methods concentrate on the correspondence between a first and second measurement, whereas the Kuder-Richardson formulae measure internal consistency (Raftery et al, 2002).

Reliability coefficients, as measured by the Kuder-Richardson Formula 8 range from 0.83 to 0.92, and test-retesting, which vary from 0,62 to 0,80 correlates favourably with reliability coefficients which is reported for similar questionnaires. Table 4.9 shows the reliability of the different fields of the questionnaire (Van Zyl & Van der Walt, 1991).

| Scale | KR 8 | Test-retest |
|--|------------|-------------|
| Level of stress | 0.92 | 0.79 |
| Causes arising outside the work situation | 0.85 | 0.8 |
| Causes originating within the work situation: | | |
| Organisational functioning | 0.83 | 0.72 |
| Task characteristics | 0.83 | 0.65 |
| Physical working conditions and job equipment | 0.84 | 0.62 |
| Career matters | 0.84 | 0.72 |
| Social matters | 0.84 | 0.69 |
| Remuneration, fringe benefits and personnel policy | 0.86 | 0.65 |
| N | 731 | 178 |

Based on the results as depicted in Table 4.9, the reliability of the questionnaire is regarded as satisfactory. It also compares favourably with the reliability coefficients for the 16PF Questionnaire reported by Catell, Eber and Tatsuoka (1970). These

coefficients range from 0.35 to 0.92. The reliability and validity of the instrument for this specific sample will be discussed in Chapter 5 (Van Zyl & Van der Walt, 1991).

(f) Justification for the inclusion of the Experience of work and life circumstances questionnaire in the research

The Experience of work and life circumstances questionnaire is, as far as known, the only available South-African standardised stress questionnaire. The levels and causes of stress can be measured by administering the questionnaire (Van Zyl & Van der Walt, 1991).

4.2.1.5 The Stress questionnaire

The Stress questionnaire will be discussed in terms of the development, rationale, aim, dimensions, administration and interpretation, reliability and validity, and justification for the inclusion of the questionnaire in the research.

(a) Development of the Stress questionnaire

This self-report symptom inventory (stress questionnaire attached hereto as Appendix B) is known as the Hopkins Symptom Checklist (HSCL), developed for individuals to give them an understanding of possible psychological symptoms currently being experienced (Derogatis, Lipman, Rickles, Uhlenhuth & Covi, 1974). The HSCL provides you with information normally not available where others observe your behavioural or verbal responses. Gmelch (1982) states that stress symptoms manifest at five different levels, namely somatisation, obsessive-compulsive behaviour,

interpersonal sensitivity, depression and anxiety.

Somatisation (soma meaning body) reflects distress from perceptions of bodily dysfunctions such as headaches, pains, soreness, and discomfort.

Obsessive-compulsive reflects irresistible thoughts, impulses, and actions not connected to ego drives. Examples are forgetfulness, worry about carelessness, indecisiveness, and difficulty concentrating.

Interpersonal sensitivity reflects feelings of personal inadequacy and inferiority as compared to others, such as being annoyed, critical of others, hot tempered, and socially insecure.

Depression reflects being low in spirits and dejected. This shows up in loss of sexual interest, wanting life to end, poor appetite, crying easily, and feeling hopeless.

Anxiety, reflects apprehension, distress, and uneasiness manifested in shakiness, trembling, and being afraid (Gmelch, 1982).

(b) Rationale of the Stress questionnaire

Stress increase the chances of developing many illnesses. However, the debate centred around psychosomatic illness, or the degree to which the mind contributes to physical ill health. Beyond the purely physiological illnesses, such as botulism, where physical factors are extreme and psychological factors nil, a vast range of diseases related to stress have been identified by physicians and researchers (Derogatis et al, 1974). Illnesses can be arranged on a continuum from purely physiological to purely psychological. Research has shown, however, that stressful events have a deleterious effect on a person's body, using up energy and making the person susceptible to common disorders. The rationale of the questionnaire is that since it measures the occurrence of a particular stress experience of an individual, it can be utilised to

measure high intensities of stress symptoms (Gmelch, 1982).

(c) Aim of the Stress questionnaire

The psychological and physiological consequences of excessive stress can be explained by considering that the same degree of stress may produce different problems in different people. Each person has a different threshold to seemingly similar stressful situations. Some, by nature, will survive stress longer (Derogatis et al, 1974). Others have a low stress threshold and will succumb sooner. The aim of the questionnaire is to determine whether individuals, who are regularly subjected to crisis situations, will display symptoms of stress or not, and to determine the intensity of the stress symptoms they experience (Gmelch, 1982).

(d) Dimensions, administration and interpretation of the Stress questionnaire

The questionnaire consists of five dimensions, namely somatic, obsessive-compulsive behaviour, interpersonal sensitivity, depression, and anxiety and also provides a total score for stress. The questionnaire can be administered in an individual and/or a group context. The questionnaire consist of 45 items, which focus on the measurement of the occurrence of a particular stress experience (Derogatis et al, 1974). The respondent is requested to complete each item on a “how often” basis. The occurrence is measured through the selection by the respondent of one of the following alternatives: 1 = never; 2 = seldom; 3 = often and 4 = almost always. There is no time limit for the completion of the questionnaire. The questionnaire is scored and interpreted in terms of the separate scores for each of the five dimensions (Gmelch, 1982).

(e) Reliability and validity of the Stress questionnaire

With regard to content, the questionnaire seems to be suitable for determining whether individuals who are regularly subjected to crisis situations, will display symptoms of stress or not, and to determine the intensity of the stress symptoms experienced (Derogatis et al, 1974). Literature does not provide any reliability and validity indexes for the questionnaire. The reliability and validity of the instrument for this specific sample will be discussed in Chapter 5 (Gmelch, 1982).

(f) Justification for the inclusion of the Stress questionnaire in the research

The motivation for the inclusion of the questionnaire in the research is that more comprehensive information will be obtained with this questionnaire in conjunction with the other instruments used to measure the experience of stress of firefighters.

The selection of the qualitative measuring instrument will be discussed in the following section.

4.2.2 Qualitative measuring instrument

The interview was chosen in this research design as a qualitative measuring instrument. A detailed qualitative investigation will be conducted of the specific job and family stress amongst firefighters. This will enable the researcher to obtain a deeper understanding of job and family stress reactions of this specific sample of firefighters. The impact of job and family stress on each other will also be investigated.

4.2.2.1 Interview

(a) Development of the interview

The development of the non-directive interview consisted of the following aspects: An interview schedule was compiled consisting of the structural questions that would be asked during the interview. Non-directive interview techniques were used. An introductory response was formulated (Kerlinger, 1970). The time and venue of the interview was planned to ensure the privacy and confidentiality of the respondents. This method of data collection was developed so that the responses of the respondents could be recorded and analysed (Rothmann, 1996).

(b) Rationale of the interview

Jones, Moore and Snyders (1988) describe the phenomenological method of interviewing as an inductive descriptive research method which can be used to study the totality of human experience. The rationale of the interview as scientific measuring instrument was as follows: to identify variables and relationships, to formulate hypotheses and to serve as a directional factor for other phases in the research process; to be used as the basic instrument in the research and to supplement other methods (Kerlinger, 1970).

(c) Aim of the interview

The phenomenological methods of data collecting represent the studying of conscious experiences as perceived from a subjective reference framework (Kerlinger, 1986). The interview as a phenomenological method has a definite aim, namely to determine how people feel, what they experience and what they remember, what their emotions and motives are, and the reasons for acting as they do (Rothmann, 1996).

(d) Dimensions, administration and interpretation of the interview

The interviewer will structure the interview as follows: information about both the subject and the interviewer will be supplied at the beginning of the interview; an opening question will be asked; non-directive rapport techniques will be used to assist the respondent to articulate experiences, and ethical guidelines will be strictly applied at all times (Kerlinger, 1970).

The following steps were followed during the interview:

Step 1: The introduction of the interview received special attention. The recording of the interview on cassette and the confidentiality of the information were clarified by the interviewer with the interviewee during the introduction of the interview. This was done to make the respondents feel comfortable and to establish rapport with the interviewer. The purpose of the interview and the role of the interviewer were also explained. The monomorphism of the introduction served to increase the reliability of the research (Kerlinger, 1970).

Thank you (*respondent's name*) for the opportunity to have this conversation with you. I am currently conducting research for my doctoral studies on job and family stress amongst firefighters. I will be interviewing a number of firefighters to establish how they experience family stress (Kerlinger, 1970). I will be using a tape recorder to record the interview as it will not be possible for me to capture all the information by writing it down. The interview will then be transcribed, which will facilitate the processing of the results. Your name will not be linked to the interview. It will thus not be possible for anyone to identify you from the interview information. You are therefore invited to be

comfortable and to participate freely in the discussion. Although I use the term interview, it will be a conversation during which you will have the opportunity to share your feelings and experiences of family stress with me. During the interview I shall write brief notes on aspects that we could discuss at a later stage. Do you have any questions at this point? (*Answer any questions*) (Kerlinger, 1986; Rothmann, 1996).

Step 2: The following structured introductory questions were asked:

- ! Which tasks and functions do you perform as a firefighter?
- ! Which task, function or responsibility of your job would you regard as stressful?
- ! Let's talk about your family life. Describe your family to me.
- ! Do you think that your stressful working conditions have an impact on your family life?
- ! How do you react differently at home when you experience job stress? (Kerlinger, 1986; Rothmann, 1996).

Step 3: The following microskills were utilised:

- ! Concentration on the content
- ! Concentration on emotions, feelings, perception and experiences
- ! Reflection of emotions and feelings
- ! Ask open-ended questions (*only* if the respondent is unwilling or is unable to share experiences from his significant world)

- ! Use of minimal encouragement such as silences, uhm
- ! Use, for example, the following to reflect or to indirectly obtain data not shared voluntarily:
 - “I can think ...”
 - “I hear ...”
 - “It sounds to me as if we are talking of ...”
 - “Did I hear correctly that you said ...”(Kerlinger, 1986; Rothmann, 1996).

The researcher also strived to avoid the following:

- ! Concentration on *own* emotions, feelings, perceptions and experiences
- ! The use of sentences such as “I know exactly how you feel”, which shift the focus of the respondent to the researcher (Kerlinger, 1986; Rothmann, 1996).

Step 4: Notes were taken on a continuous basis to record the behaviour of the respondent for example calmness, aggression, anxiety and frustration (Kerlinger, 1986; Rothmann, 1996).

Step 5: The interview was closed by thanking the respondent for his time with the interview once all the information pertaining to the subject has been obtained (Kerlinger, 1986; Rothmann, 1996).

Content analysis was used to analyse the research data which is obtained through the communications of the respondents. This was done in a systematic, objective and

quantitative manner (Kerlinger, 1986; Rothmann, 1996).

(e) Reliability and validity of the interview

The reliability of the interview was ensured through: a practical description of the method of data collection, analysis and interpretation, tape recordings of the interviews, complete descriptions of the experiences and emotions of the respondents, description of the role and status of the researcher in the research process, and the verification of the coded data (Miles & Huberman, 1994).

The validity of the interview was ensured through: the identification of changes that are repetitive and cyclical by nature as sources of change, especially if the information is obtained over an extended period, the use of substantive and theoretical coding to analyse responses; the comparison of the research data with theories and analytical models that are reflected in the literature; a constant comparative analysis and validity testing with the respondents; the recruitment of respondents who comply with the sample criteria, the questioning of general meanings, the use of discrepancy analysis and the comparison of data of different sample categories, the encouragement of the respondents as masters on the subject, and research and the supply of feedback to the respondents on the progress of the research (Miles & Huberman, 1994).

(f) Justification for inclusion of the interview in the research

It appears from the above discussion that qualitative measurement was a reliable and valid measure to determine job stress and family stress amongst firefighters, provided that the correct procedures are followed. The interview intercepts the total experience of the respondent and ensures that the respondent is not reduced to an

object consisting of small quantitative units (Rothmann, 1996).

Other advantages of the inclusion of the interview with other measuring instruments were that it will enable the researcher to determine job and family stress amongst firefighters without any preconceived expectations and categories, and to determine the data from the reference framework of the respondents. The interview can also provide insight into areas that were previously only determined by quantitative methods, especially the meaning of the relationship between job and family stress of firefighters, as seen from the respondents' perspective (Rothmann, 1996).

The quantitative and qualitative data collection will be discussed in the following section.

4.3 QUANTITATIVE AND QUALITATIVE DATA COLLECTION

The quantitative data collection will now be discussed.

4.3.1 Quantitative data collection

Quantitative data collection will be described in terms of obtaining approval for conducting the empirical study of the research and contact with the respondents.

4.3.1.1 Obtaining approval for conducting the empirical study of the research and contact with the firefighters

A letter was directed to the General Manager: Emergency Services of the Metropolitan Municipality, in which approval was sought to conduct the empirical study for the

research. The request was directed to the Acting Fire Chief who prepared a document that was subsequently submitted to the Council for approval. The researcher was informed by the Municipal Manager that permission has been granted by the Council to conduct the empirical study for the research, subject to the following conditions:

- No disruption of personnel and services may occur.
- Ethical consideration such as confidentiality and anonymity should be shown.
- That the Metropolitan Municipality be furnished with a copy of the final script.

A meeting of the District Commanders was attended, which served as motivation for the firefighters to participate in the empirical study of the research. The firefighters were informed at this meeting of the purpose of the research and the assurance was given of the confidentiality of results.

The administration of the questionnaires will be presented in the following section.

4.3.1.2 Administration of the questionnaires

The questionnaires were administered in 12 sessions. The firefighters of the Northern and Southern regions were divided into three shifts. The respondents participating in each shift in the various regions were welcomed at the sessions and set at ease with the commencement of the administration of the questionnaires. They were asked to answer the questions truthfully and accurately. Respondents were given verbal instructions regarding the completion of the questionnaires and were assured of the confidentiality of the research.

It was explained to the respondents that they would be asked to complete different

questionnaires designed to measure the effect of stress, and that the completion of the questionnaires depend on their individual response rate. The results were discussed with the respondents where such a need was expressed.

The qualitative data collection will now be described.

4.3.2 Qualitative data collection

Five firefighters that obtained high stress scores and five that obtained low stress scores on the questionnaires, as determined through the quantitative procedures and statistical techniques (refer to section 4.4.1), were selected in order to participate in the interviews. The most suitable firefighters in the high and low stress score categories were selected to obtain the best rapport during the interviews.

The District Commanders of the ten selected firefighters were contacted to arrange the interviews with the firefighters at the various fire brigades in the Northern and Southern regions of the Metropolitan Municipality. The interviewer selected quiet venues to ensure minimal disturbance. The interviewer attempted to make provision for disturbance variables. If there was an emergency call during the interview, the tape recorder was turned off and the firefighter attended to the emergency call. The interviewer made some notes on what was last discussed to ensure that the conversation could be continued and that no important data was lost.

Considering the limitations of the venue where the interviews were conducted, the interviewer attempted to use the measuring instrument during the physical data collection, as described in section 4.2.2.1. The individual firefighters' communication skills and level of experience in the area of the research had a significant influence on

the duration of the interviews. In determining the duration of the interview, the interviewer was guided by the respondent. The interviews therefore differed in duration. The data were of a qualitative nature, due to the fact that it was collected in the form of words.

The statistical processing of the data will be subsequently discussed.

4.4 STATISTICAL PROCESSING OF DATA

The statistical processing of data will be presented in terms of quantitative procedures and statistical techniques, as well as qualitative procedures. The integrated quantitative and qualitative procedures will also receive attention.

4.4.1 Quantitative procedures and statistical techniques

The quantitative procedures involved the following steps:

Step 1: The two questionnaires were marked separately and the scores obtained by the firefighters were calculated.

Step 2: The percentiles (P5 and P95) were computed to determine the 10% of the firefighters that obtained a low stress score and the 10% of the firefighters that obtained a high stress score. The most suitable five firefighters from each of these groups were selected to obtain the best possible rapport during the interviewing.

The statistical package (SAS computer program) for the Social Sciences (1999) and

Amos (Jöreskog, 1989) were used for the statistical calculations. The following steps were followed:

- Step 1: The means were used to describe the results. The mean is the sum of all the scores in the distribution divided by the number of scores in the distribution. This mean will be used to compute the average scores that are obtained for the different components of the questionnaires (Bless & Higson-Smith, 2000).
- Step 2: The standard deviation and the minimum and maximum values were used to describe the results. The standard deviation is the (positive) squared root of the variance. The value of the standard deviation indicates how much the scores vary. The larger the value of the standard deviation, the more the scores vary. The more the scores vary, the more heterogeneous the sample of firefighters will be. If the value of the standard deviation is small, the sample of firefighters is more homogeneous (Bless & Higson-Smith, 2000).
- Step 3: Scatter correlations as well as linear correlations were computed. The Pearson product-moment correlation (Pearson's r) indicates the linear correlation between two variables. It is a value between -1 and +1. A calculated r of 0.86 indicates a strong positive relationship, whereas a calculated r of -0.12 indicates a weak negative relationship (Bless & Higson-Smith, 2000).
- Step 4: The reliability and validity of the questionnaires were determined respectively by the computation of Cronbach Alpha Coefficients and

Factor analysis.

Step 5: The covariances of the dimensions of job and family stress were computed using Amos (Jöreskog, 1989).

The statistical processing of the data will now be clarified in terms of the qualitative procedures.

4.4.2 Qualitative procedures

The recorded interviews were transcribed to facilitate the processing of the results. The transcribed interviews enhance the classification of the respondents responses in meaningful categories. Content analysis will be used to analyse the research data obtained through the communications of the respondents in a systematic, objective and quantitative manner.

Content analysis consist of the following steps:

Step 1: Transcribe the tape recording of the entire interview.

The tape-recorded interviews were transcribed verbatim in order to facilitate the assimilation of the data. The transcribed interviews enhanced the classification of the firefighters' responses into significant categories.

Step 2: Define and categorise the universe of the content which must be analysed.

The protocol was defined and categorised to promote familiarity with the total experience, as well as to obtain a holistic view of the description. The researcher was thus preparing himself for the further phases of the investigation.

Step 3: Determine the units of analysis, namely the words and themes.

The interview content was demarcated and numbered in the natural significant units, according to the respondent's order, and in the respondent's words. The protocol was thus again analysed by the researcher, with the specific aim to identify themes from a psychological perspective. Themes can be identified that are self-defining and self-demarcating of an aspect of the respondent's experience. Themes were distinguished from each other where a transition from one theme to the other occurs.

Step 4: Eliminate unnecessary data and determine the meaning of the remaining units by linking them with the complete view.

The unnecessary interview data was eliminated. The meaning of the remaining units was determined by linking them with the complete view. A holistic awareness of the protocol was thus established.

Step 5: Translate the concrete language of the respondents to scientific language and concepts.

The themes were transformed into psychological language by the researcher, with the emphasis on the phenomenon under investigation. The transformation occurs through a process of reflection and imaginative variation, where the language of common sense is utilised, together with a phenomenological perspective. The transformed theme was

thus an expression of the psychological role of that specific theme in the context of the experience-in-the-totality. This procedure anticipate the following analysis, which will be aimed at thematising the whole or parts of the descriptions.

Step 6: Situated structures

The researcher realigns the transformed themes according to their intertwined significance. The integration thereof depicts the researcher's experience over time. The process of integration and synthesis describes the respondent's structure of experience.

Step 7: Categorise the repeating themes.

Although the themes can be conceptually differentiated from each other, a correlation can be identified between these themes and natural psychological themes. The themes are not developed beforehand, but eventuate from the protocols of the respondents. Each central theme was thus supported by a number of other significant themes. The situated structures and central themes are repeatedly analysed until repeating themes unfold.

Step 8: Compare the non-verbal behaviour of the respondents with the categorised repeating themes.

The respondent's non-verbal behaviour during the interviews for example calmness, aggression, tension or frustration, is compared with the categorised repeating themes. This enables the researcher to obtain an in-depth holistic view of the experience of the respondent.

Step 9: Interpret the results.

The inductive step from individuality to generalisation occurs in this phase of the procedure. All the protocols were interpreted in terms of their contribution to a general concept of the psychological structure of the phenomenon. The aim was to establish what is typical of the phenomenon, and to describe the perception of the typology in an integrated manner (Marais, 1997; Rothmann, 1996).

Step 10: Formulation of hypotheses

The final step consist of the formulation of hypotheses for the qualitative study in respect of the relationship between job and family stress amongst firefighters in the South African context.

The hypotheses for the empirical study of the research are indicated in the following section.

4.5 HYPOTHESES

The hypotheses will now be discussed in terms of the Biographical questionnaire, the Experience of work and life circumstances questionnaire and the Stress questionnaire.

4.5.1 Hypothesis 1

There is no significant correlation between the biographical characteristics (*inter alia*: age, gender, marital status, job experience, qualifications) and the experience of work and life stress (*inter alia*: causes arising outside the work situation, organisational functioning, task characteristics, physical working conditions and job equipment, career

and social matters, and remuneration, fringe benefits and personnel policy).

4.5.2 Hypothesis 2

There is no correlation between the subscales of the Experience of work and life circumstances questionnaire (*inter alia*: causes arising outside the work situation, organisational functioning, task characteristics, physical working conditions and job equipment, career and social matters, and remuneration, fringe benefits and personnel policy).

4.5.3 Hypothesis 3

There is no correlation between the subscales of the Stress questionnaire (*inter alia*: somatisation, obsessive-compulsive behaviour, interpersonal sensitivity, depression and anxiety).

4.5.4 Hypothesis 4

There is no significant covariance between the dimensions of job and family stress.

The chapter summary will now be provided .

4.6 CHAPTER SUMMARY

This chapter described the empirical study, commencing with the determination of the sample population. The description of the sample population focused on age, gender, number of dependants, marital status, language context, years of experience in

occupation, qualifications, number of subordinates, emergency calls, experience of job stress and job stress factors.

The selection of the measuring instruments was discussed in terms of quantitative and qualitative measuring instruments. The quantitative measuring instruments consisted of the Biographical questionnaire, the Experience of work and life circumstances questionnaire and the Stress questionnaire. The interview was the qualitative measuring instrument.

The quantitative and qualitative data collection procedures was also explained. The quantitative data collection was described in terms of the approval that was obtained for conducting the empirical study for the research and making contact with the firefighters. The administration of the questionnaires also received attention. A detailed description was provided of the qualitative data collection process.

The quantitative procedures and statistical techniques, and the qualitative procedures were presented as the statistical processing of the data. The specific hypotheses were discussed in respect of the Biographical questionnaire, the Experience of work and life circumstances questionnaire and the Stress questionnaire. The results will be discussed in **Chapter 5**.