THE SOCIO - EMOTIONAL IMPACT OF MALNUTRITION: A COMPARISON OF INFANTS HOSPITALISED FOR MALNUTRITION AND INFANTS HOSPITALISED FOR SURGICAL REASONS.

BY

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Submitted in partial fulfilment of the requirements for the degree of

Masters of Arts (Clinical Psychology)

at the Department of Psychology,

University of Natal

Pietermaritzburg

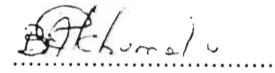
1998

ABSTRACT

The present study looks at the socio-emotional impact of malnutrition. This is done by comparing infants who are hospitalised for malnutrition, and infants hospitalised for surgical reasons. Twenty infants were selected from the medical ward (malnutrition ward), and twenty from the surgical ward were selected as a control group. Observation was used as a method of collecting data on socio-emotional behaviour. The results of analysis of variance indicated that there was a significant difference between the two groups of children in social and emotional responsiveness. Malnourished children showed less responsiveness, which was suggested by less activity, less affect, and low reactions to situations compared to the control group. The results also indicated that females are more sensitive than males. The results of this study invite possibilities for further investigations.

DECLARATION

The author hereby declares that the whole thesis, unless specifically indicated to the contrary, is his own original work.



BHEKI KHUMALO

ACKNOWLEDGEMENTS

The author wishes to express his gratitude to the following individuals and institutions for their kind and valued assistance in making this research project possible.

My Supervisor, Prof L. Lachenicht, of the Department of Psychology, University of Natal, Pietermaritzburg, for his invaluable suggestions, constructive criticisms, and support throughout the study.

My Co- Supervisor, Dr J. Kvalsvig, of the Child Development Programme (HSRC) for her suggestions, endless patience and support.

Lillian, Matilda, Patricia of the Child Development Programme (HSRC) for their assistance in the collection of data.

Management of Hlabisa hospital for granting me access to the experimental and control groups used.

The Human Science Research Council for financial assistance.

To all those who participated as subjects and without whose cooperation this project would not have been possible.

The individuals mentioned above are, however, in no way responsible for any flaws that this work may contain, or for comments and opinions expressed therein by the writer.

B. KHUMALO

1998

TABLE OF CONTENTS

TABLES

CHAPTER 1

INTRODUCTION

1.1 General overview

This study investigates the socio-emotional impact of malnutrition. Researchers have become more interested in the effects of malnutrition on the infants' social and emotional development. Recently there has been a shift in emphasis from the impact of malnutrition on cognitive development, to the effects of malnutrition on social and emotional development (Barrett, 1984).

Researchers have begun to re-examine their decision to focus on the cognitive sequelae of human malnutrition to the exclusion of the social and emotional aspect in the light of empirical data on the effects of malnutrition on animals (Ricciuti, 1981; Barrett, Radke-Yarrow & Klein, 1982). The literature on malnourished animals identifies an array of behavioural characteristics, which are affected by malnutrition. Some of these behaviour dimensions (described in detail in the next chapter) are activity levels, emotional control, attention to novel stimuli and social responsiveness. The animal research leads us to consider the consequences of malnutrition in human beings with respect to social and emotional functioning.

There is literature which suggests that social and emotional capacities may be more vulnerable to chronic environmental insult than cognitive capacities (Rutter, 1979). Hence this seems to be an important area to focus on.

The issue of social and emotional consequences of malnutrition has assumed an increased importance with the shift on the part of educators and psychologists from cognitive to social competence as major criterion for evaluating the psychological functioning of infants and children (Scarr & McCarteney, 1983) and, in particular, as the criterion for studying effective intervention programs.

1.2 Studies in South Africa

Research has been conducted in this area in South Africa. The most important researchers include Cowley, Griesel, Richter, Gilbey, Hansen, Walker, Tshabalala, Bac, Stoch, Smythe and others. The works of these researchers will be reviewed in the next chapter.

1.3 Rationale of the present study

Research by Rutter (1979), Barrett (1984) and Ricciuti, (1981) suggests that the social and emotional effects of malnutrition is an important area of study. It was suggested by one of the researchers that emotional and social insults may lead to chronic disturbances (Barrett, 1984). This is supported by the theories that have been advanced in the area, inter alia, the theory of functional isolation which was developed by Levitsky (1979). This theory will be described in detail in Chapter 2 (literature review). However, it was used by Levitsky and Barnes (1972) to refer to the long-term effects of early malnutrition in animals. It refers to the idea that early malnutrition causes long-term effects on behaviour, not by altering the gross physical structures of the brain such as total brain DNA or myelin content, but rather by changing the kinds of information the young

animal acquires about its environment. This theory of functional isolation was transferred to humans. A Minnesota study (Keys, Brozek, Henschel, Mickelsen, Taylor, 1950) carried out among 32 young adult volunteers, with their food intake reduced from about 3500 kcal in the control period to less than 50% of the control, has suggested findings that link functional isolation in animals to the human response to malnutrition. In this study humans showed the same characteristics exhibited by malnourished animals. Hence a clear understanding of this aspect (social and emotional functioning) at this stage of development (birth to two years) might help in the design of intervention programs, to prevent chronic disturbances.

The theory of attachment (which draws from ethology and psychoanalysis) (Bowlby, 1988) as developed by Hinde and Stevenson-Hinde (1982) suggests that emotional and social development between birth and two years is an important stage for the infant's later emotional development. This theory will be discussed in depth in Chapter 2 (literature review), and it will be adopted as a theoretical framework for this study. Thus the present researcher felt infancy is an important stage to focus on, especially in relation to the phenomenon of malnutrition.

The theory of psychosocial development advanced by Erikson (1980) (which draws from psychoanalysis and anthropology) is also an important one to look at, when one looks at the study of malnutrition in this stage of development (birth to two years). According to Erikson (1980), individuals cross eight different crisis points over the course of their lives. At each crisis people are vulnerable to developing negative feelings like guilt,

inferiority, or isolation (Clarke-Stewart & Friedman, 1987). Erikson further suggested that in crossing these crisis points, individuals stand a chance to enlarge and deepen their personalities to encompass positive feelings like basic trust, intimacy, generativity and integrity. According to Erikson, between birth and two years infants go through the oral and the anal stage. The oral stage is characterised by trust versus mistrust, where infants learn to trust, or mistrust, that their needs will be met by the world, especially by the mother. From this stage of development it becomes increasingly clear that the inability of the mother to provide, because she might be malnourished herself or because of environmental factors associated with malnutrition, may lead to fixation (a concept from psychoanalysis); that is, the child will be emotionally arrested in this stage of development. The same applies to the anal stage, which is characterised by autonomy versus doubt and shame, where the child learns to exercise will, to make choices, to control themselves, or they become uncertain and doubtful that they can do things themselves. Thus, the behavioural effects of malnutrition can complicate this stage of development. This stage of development is therefore an important area to focus on especially in terms of the potentially damaging effects of malnutrition.

This research is aimed at addressing the following questions:

1. Are there any differences in the social and emotional functioning of infants hospitalised for malnutrition and those hospitalised for surgical reasons?

In exploring the socio-emotional impact of malnutrition the following hypotheses will be tested:

a) Protein-energy malnutrition will reduce the infant's levels of activity or exploration.

b) Protein-energy malnutrition will reduce the infant's levels of emotional expression.

The second question that will be adressed by this study is as follows:

2) Are there any gender differences in the social and the emotional functioning of infants hospitalised for malnutrition and those hospitalised for surgical reasons?

To provide answers to these questions and hypotheses, a study of forty infants at Hlabisa Hospital (in Northern KwaZulu/Natal) was conducted. Twenty infants from the malnutrition ward (experimental group) and twenty infants from the surgical ward (control group) were observed (direct observation of the infants' behaviour). The methods used in the study are described in Chapter 3 (Research methodology). The second chapter is a literature review, which will involve defining the phenomenon under study. The fourth chapter sets out the techniques used to reduce the excessive number of variables, and the fifth chapter looks at the comparison between the two wards, while the sixth chapter offers a discussion of the results and conclusion.

CHAPTER 2

LITERATURE REVIEW

This chapter reviews literature on the socio-emotional impact of malnutrition. It will look at what malnutrition is, how it has previously been defined, and how it is currently defined. It will also look at the theoretical and the empirical advances in the study of the effects of malnutrition, the isolation hypotheses, and the relationship between animal and human studies. It will also look at theories of social development and the theories that provide a framework for the present study.

Malnutrition is an important phenomenon. It has been explored world-wide because of its devastating effects. Obviously it can lead to mortality, but from the literature reviewed it is suggested that it can also lead to psychological, emotional, social and neurological damage. The many different studies that have been conducted in different areas and for different types of malnutrition are testimony to the previous statement. It is worth defining malnutrition before one looks at studies conducted in the field.

2.1 Definition of malnutrition

The study of malnutrition in man is long, and there are various definitions that have been given to malnutrition. Richter and Griesel (1994) assert that in the past a distinction was made between two types of malnutrition, that is, "marasmus" and "kwashiorkor". According to these authors marasmus was assumed to be due to a reduction in total food supply and to be characterised by poor growth from birth, whereas kwashiorkor was assumed to be due to a high starch, low protein diet and to be characterised by normal

growth for the first 6-8 months.

McLaren (1984) noted that malnutrition manifests itself in energy-protein deficits. This description dates back to the sixteenth century. McLaren (1984) further noted that in 1906 Czerny and Keller introduced the term "Mehlnehrscheder" for infantile malnutrition resulting from unbalanced food intake where starch constituted the main food item. This new clinical syndrome remained neglected until Cecily Williams reported her now classical description in 1933 and used the term "kwashiorkor", given to it by the people of Ghana, meaning the disease of the child displaced when the next one is born.

According to McLaren (1984), early attempts to define differing degrees of energy-protein deficits were made by the use of the terms "hypotrepsy" or hypotrophy, that is, a defective assimilation of nourishment (for milder nutritional disorders), and combined "atrepsy" or "trophy", that is, a condition of general malnutrition from whatever cause, the signs of which are wasting (for the severe case).

Various classifications have been proposed to describe different kinds and levels of severity of malnutrition. Gomez, Galvan, Frenk, Munoz, Chavez and Vasquez (1956) were the first to give a sound basis for the classification of cases according to severity by percentage weight for age in diagnosing first, second and third degree malnutrition. These were based on international standards. A weight of 76-90% WFA (Weight For Age) is called first degree malnutrition, 61-75% WFA is called second degree malnutrition, and third degree malnutrition occurs when weight falls below 60%. Another system that has

been used is the Wellcome classification (1970), which looked at the term marasmus, and contended that the term marasmus applied to children who are less than 60% WFA with no oedema ("oedema" is the presence of excessive amounts of fluids in intercellular tissue spaces of the body, due to increased transudation of fluid from the capillaries), while the diagnosis of "marasmic-kwashiorkor" is applied to children who are less than 60% of WFA with oedema. They asserted that the term kwashiorkor is applied to children who have oedema and are between 60% and 80% WFA. They asserted that children who are between 60% and 80% with no oedema are "undernourished".

Richter and Griesel (1994) contend that a substantial part of the literature has been concerned with what appropriate measures and standards should be used and the implications of such measures on assessing malnutrition. There have been various debates around this issue, locally and internationally. Richardson (1973) has claimed that it is unjustifiable and unrealistic to inflate estimates of the degree of malnutrition in South Africa by using North American standards. There are South African researchers. Coovadia, Adhikari and Mthethwa (1977), who claimed that analysis of multiple growth measures (height, weight, head circumference) indicate that the Harvard international standards are appropriate for South African children. Other researchers pointed out that there need to be a classification of nutritional status that can be related to mental development (McLaren & Kawanati, 1972).

It was noted by Richter and Griesel, (1994) that, at a symposium in 1979, a group of professionals agreed to use the National Center for Health Statistics (NCHS) growth

standards for South African children (Hamill, Drizd, Johnson, Reed, & Roche, 1977). These are the standards that have been used in the present project to assess the severity of malnutrition. It should be noted that there is controversy around the acceptance of these standards, because other researchers have argued that the growth of children may not only be affected by malnutrition. There might be genetic predisposition to be affected by or resistant to malnutrition. Walker, Jones, Walker and Tshabalala (1983) have argued that slower growth of children in South Africa is not necessarily related to the health of the child, and thus it is difficult to ascertain the point at which the child is unhealthy.

The classifications described above seem to be the yardsticks for defining protein-energy malnutrition. The criticisms levelled against these classifications seem to point to the need for the development of more adequate classifications of protein energy malnutrition, that is, the ones that look at all aspects of development, that is, cognitive, emotional and physical development.

Before looking at the literature on the socio-emotional impact of malnutrition, it is worth looking at the theories of child development, and the background theories for the present project.

2.2 Developmental context of infancy

This section looks at infancy as a stage of development and various facets of child development.

2.2.1 Brain development

According to Winick (1989) the first four years of life correspond to those during which the most rapid increase in nerve cell mass and cellular differentiation take place. According to Stock and Smythe (1963), 70 per cent of the adult brain mass is attained by the end of first year of life. At the end of third year, 80 per cent is attained. According to Winick (1989), by four years of age, the child's brain is 90 per cent of the adult brain mass. Lazarus (1985) noted that malnutrition might interfere with staging and timing of the development of the brain, and of developing behaviour.

2.2.2 Cognitive development

The cognitive developmental approach emphasises thinking processes, and how they change as people develop through a series of stages. The cognitive developmental approach attempts to describe and explain how people gradually build an understanding of their world, how their skills for acting on things and interacting with people change systematically with development (Kohlberg 1969, 1981; Piaget, 1952). According to cognitive developmental theorists, this capacity develops through four stages as the individual matures from new-born to young adult (Fischer & Lazerson, 1984). These theorists noted that the first stage is the sensorimotor stage when the infant can learn how to grasp, look and walk. During the second stage (preoperational stage), the pre-school

child begins to be able to think about objects and people independently of his own actions. According to the cognitive developmental approach, it is in the third year that the child organises these thought systematically enough to begin to think logically. Adolescence brings with it the beginnings of the fourth stage (the formal operational stage) which is marked by hypothetical thinking. Cognitive developmental theorists look at the infant's thinking abilities as a progression.

2.2.3 Social and emotional development

This study investigates the impact of malnutrition on the social and emotional development in infancy. Several researchers and theorists have noted that infancy is an important stage of social and emotional development.

Watson (1924) and many theorists since noted that infants are capable of emotional responses from birth, and he also argued that children could be taught emotional and social responses. He asserted that children's environmental conditioning brings about the child's learning and development.

2.2.3.1 Basic trust

Eriksons' (1980) theory of psychosocial development discussed in the introduction is another theory, which tried to look at socio-emotional development. This theory looked at eight stages of development, but this section will concentrate on the stage of the sample age, that is, the development of basic trust. Erik Erikson suggested that this stage is the cornerstone of a vital personality. For Erikson, a developmental crisis is a period of

encounter between an individual's developing potential and the people and the institutions that make up the individual's social environment. These crises occur throughout the lifespan from infancy to old age. As the child's physical and cognitive abilities develop, the child is able to deal with the world in new ways, and other people must deal with the child from a new perspective. According to Erikson, if this stage is successfully resolved, the infant should develop a sense of **basic trust**, Eriksons' term for an essential confidence in the reliability of others, as well as a fundamental sense that the self is worthy of self-confidence. According to Fischer and Lazerson (1984), parents are particularly important in directing the outcome of this first developmental crisis, that is, by taking the caretaking role, and also by providing the child with sensitive care.

There are many more theories of social and emotional development, but this project will use Bowlby's (1979) theory of attachment as its theoretical base.

2.2.3.2 Theory of attachment

According to Lefranchois (1989) attachment is an emotional bond, not easily defined, but of tremendous importance. Bowlby (1979) developed the theory of attachment. He also explored the question of whether human children become attached to their mothers or other people during a "critical period" in infancy. Bowlby (1979) analysed the process through which infants develop deep and loving relationships with their mothers to survive. He argued that the forms of behaviour that infants are born with, like crying, grasping and clinging, help them to stay close to their mothers. He argued that from this physical closeness, children developed emotional bonds to their mothers or primary

caretakers. Ainsworth (1978) asserted that infants show three different patterns of attachment to their parents. There is **secure attachment**, where infants use the mother as a secure base, exploring the environment when they are not afraid or upset. Ainsworth regards this as the healthiest form of attachment. There is also **anxious, ambivalent attachment**, where children are more likely to act anxious or distressed even when their mother is present, and they seem to be ambivalent about using the mother as a secure base. The third pattern is **avoidant attachment** where infants seem to ignore their mother much of the time instead of using her as a secure base.

Interestingly there is a study carried out by Valenzuela (1990) looking at attachment in chronically underweight young children. This study, conducted in Chile with a low-income population was designed to assess the quality of mother -infant attachment (in a "strange situation", that is an experimental procedure) in 17-21 month-old infants of different nutritional status. An avoidant/clinging (a/c) pattern of anxious attachment was found to be frequent among infants who consistently fail to gain adequate weight for age. Results showed a greater proportion (93%) of anxious attachments in the underweight group as compared to the group of infants without a history of nutritional deficits (50%). Infants classified as a/c presented the most serious weight deficits within the underweight group, indicating an association between severity of nutritional deficits and insecure/ disorganised attachments. Clearly the behaviour of the underweight infants in Valenzuela's study is consistent with the descriptions of the undernourished infant as passive, withdrawn, maintaining close contact with the mother, and lacking in exploratory and play activity. Valenzuela (1990) describes this form of adaptation as an

energy saving strategy and adaptation to low activity levels resulting from prolonged restricted protein-energy intake.

Valenzuela (1990) asserts that current findings show that there is more than one pattern of behaviour presented by the chronically underweight infant. The patterns of an infant's behavioural organisation observed in the strange situation, rather than being the direct outcome of low energy levels, are more likely to reflect the history of mother-infant relationship over the first year of life. Consistent with predictions from attachment theory, there are clear differences in the manner in which the underweight infant organises attachment/exploration behaviours in relation to the caregiver. Seven percent of secure infants were able to combine exploration with proximity to their mothers, while those classified as avoidant (32%) and avoidant/resistant (32%) spent most of the time exploring and playing by themselves disengaged from their mothers. The resistant group seemed to display behaviours that are described in the literature as those of undernourished infants. They frequently maintained proximity to their mothers, and their exploration was poor. From Valenzuela's study it is clear that malnutrition is associated with different forms of behaviours. Richter, Bac and Hay (1990) showed in an 18- month follow up study of 26 malnourished children and their matched controls in South Africa, that attachment status was significantly related to the rate of catch-up growth displayed by malnourished infants after discharge from a treatment unit.

It should be pointed out that Bowlby (1979) noted that attachment is bi-directional, that is, it is not only from infant to mother, but it is also from mother to infant. The mother

and the infant are involved in a reciprocal relationship. Hinde (1982) talks about the attachment behaviour system, in which attachment is seen as serving a particular interpersonal relationship, that is, a relationship between two or more individuals. It looks at the mother being fully engaged in the attachment process. This concept is further supported by Bruner (1987) who looks at attachment as an interaction process, that is, a process whereby two or more individuals are engaged in an attachment process. This study will only look at infant-mother relationship, and not at mother-infant relationship.

It should be made clear that this study will look at one side of the relationship from a general perspective, with no specific reference to a certain type of attachment. It will look at the infant's levels of expressing emotions, that is, emotions of showing distress and the child's responsiveness to the environment, particularly to primary care-givers.

Animal and human studies have been conducted to look at the behavioural effects of malnutrition. The next section looks at these studies.

2.3 Direct studies of malnutrition.

According to Barrett (1984) research on the socio-emotional impact of malnutrition has been influenced by animal studies that have been conducted on malnutrition, and also human studies that have been conducted to determine the socio-emotional effects of malnutrition. It should however be noted that there have been criticisms about the animal studies, because some of the researchers argue that one cannot generalize from animals to humans. Although there are important reasons why one cannot extrapolate hastily from

animals to humans (including issues relating to type and severity of nutritional deprivation, differences in the social contexts of the nutritional insult), the findings from the animal research link malnutrition to important functional disorders, and the relationships allow us to generate hypotheses about the possible effects on humans (Barrett, 1984). Studies that have been conducted on human infants provide us with information about the effects of malnutrition on social and emotional functioning. Studies by Barrett (1984); Pollitt (1984, 1987, 1988); Barrett, Radke-Yarrow and Klein (1982); Griesel and Richter (1987) also provide evidence about the effects of malnutrition on social and emotional functioning of infants. These researchers, and others, have conducted research which includes both non-experimental, comparative studies of adequately nourished and malnourished infants and experimental studies of the effects of malnutrition on infants, and their research provides us with further evidence that malnutrition may disrupt the social and emotional development of the child. All these studies will be reviewed in the following sections. There are also other researchers who have not been listed whose studies will be reviewed in the following sections.

2.3. 1 Human Studies

Studies on infants have shown that malnutrition results in behavioural impairments. Some of the behavioural characteristics displayed by malnourished infants are attention impairments, reduced social responsiveness and poor stimulus control. Researchers have seen infants with malnutrition as having difficulty tolerating frustration, and having low activity levels. There is altered affect, diminished involvement and difficulty in stimulus regulation (Pollitt, 1988; Pollitt & Thomson, 1977). Pollitt (1988) further noted that

malnutrition leads to apathy, irritability and withdrawal. Richter and Griesel (1985) established that infants were more likely to be perceived by their mothers as temperamentally difficult. Gilbey (1963) used short time period observations to study the behavioural effects of kwashiorkor in young African children, who were compared with children without the history of kwashiorkor and malnutrition from the same neighbourhood. She found the experimental group to be "shy, silent and passive" (p. 100).

These findings are supported by a study that was conducted by Barrett, Radke-Yarrow and Klein (1982) on the behavioural effects of malnutrition. This study compared malnourished infants with infants whose nutrition was supplemented, and structured observation was used as the technique of collecting data. According to this study, better-supplemented infants sought attention from others in the environment, had moderate activity levels, had greater numbers of recorded happy affect as well as greater numbers of angry expressions. This study suggests that malnutrition result in the disturbance of social functioning.

Similar results were gathered by Grantham-McGregor (1993), where she observed the behaviour of 18 children with severe malnutrition between the ages of six and 24 months. They were compared with 21 age-matched adequately nourished children in hospital with other diseases and were given regular developmental assessments with the Griffiths test. On admission to hospital the malnourished children were less active and more apathetic than the controls when alone in their cots, while the controls were more distressed. When

given toys they explored less, using fewer play actions and touching fewer toys. Interestingly these differences were not present on recovery.

Lester (1975) conducted an experiment in which he tested twelve-month-old infants diagnosed as having malnutrition. He administered a pure tone stimulus to the infants and used heart deceleration as a measure of orienting response. Results of this experiment support the above findings because it indicated that malnourished infants are less responsive to environmental stimuli than infants of normal weight and, as a result, process less information. This study was further supported by Read's (1977) study of infants which suggested that malnourished infants lag behind their well-nourished counterparts in terms of behaviour development.

Chavez and Martinez (1981) used direct observation to measure mother-child interaction of supplemented children and non-supplemented children. They found that supplemented infants were more demanding than non supplemented infants and were more successful at eliciting both maternal and paternal responses, qualities which resulted in their being fed more. The supplemented children exhibited important differences from 24 weeks of age. For example they slept less during the day, and did not want to remain in the cradle. After 24 weeks of age, they refused to be carried on their mother's back, or to be rolled up in a blanket, and preferred to be free. The study noted that after 72 weeks there was a change in the proximity to their mothers. There were also differences in infants' activity levels. At one year of age, the supplemented child was 3 times as active, and at 2 years as much as 6 times as active.

From the above-cited studies it is clear that malnutrition results in behaviour alterations in infants. It affects the infant's levels of activity and exploration, and also it disturbs the infant's affect. A summary of the behaviour manifested by malnourished infants will be given at the end of this chapter.

2.3.2 Animal studies

Another equally compelling theoretical basis for this study is the research on the behavioural characteristics of severely malnourished animals. Experimentally malnourished rats compared to well nourished rats have been seen by researchers (Frankova & Barnes, 1968) as having behaviour that is characterised by apathy, passivity and inability to sustain attention. Direct observation was used as a technique of collecting data. They showed reduced exploration and curiosity, fearfulness, avoidance of stimuli and failure to respond normally to social situations in comparison to other animals. All this behaviour characterises functional avoidance and functional deprivation of new situations and stimuli. Cowley and Griesel (1964) noted in their study of rats that malnourished rats showed behavioural signs of being timid, more emotional, and had lighter adrenal glands than control animals. Observation was used as one of the techniques.

Strobel and Zimmerman (1971) observed malnourished monkeys and compared them to well nourished monkeys. They noted that malnourished animals are characterised by non-purposive behaviour and unpredictable aggression. A study that was conducted by Frankova (1973) showed that rats that were malnourished were more negative in their

reponses than control rats and they also showed inhibition in exploration. Although we cannot easily extrapolate from animals to humans, the above findings on animal research link malnutrition to some of the findings articulated in human studies. For example, lack of responsiveness, emotionality, avoidance of new stimuli and poor behavioural organisation comprise a critical complex of behaviour characteristic of malnourished infants, and they are likely to be associated with impaired emotional responding and poor interpersonal skills (Barrett, 1984).

Given the complex of behavioural characteristics noted in the above studies, theories that have been formulated to explain these findings are, for example, Levitsky's theory of functional isolation, which seems to be an important theory in the study of the behavioural effects of malnutrition in infants, and theories around neurological damage.

2.3.3 Hypotheses of functional isolation

The theory of functional isolation was put forth by Levitsky and Barnes (1972). This concept is well described by a quotation from an article by Massaro, Levitsky and Barnes (1974).

> 'The results of the present study support the hypotheses that early malnutrition may produce its long lasting effects on adult behaviour by functionally isolating the organism from its environment during the period of malnutrition. The most impressive feature of the normal development of pup behaviour is the increase in behaviour associated with environmental exploration. This process is severely

altered in the malnourished pup. Feeding the dam a low-protein does not only affects the physiological growth of the pup but produces interactive behaviours between the pup and the dam, the functional consequence of which is a decrease in exploration of the environment by the pup." (p.78)

According to Massaro (1984) this hypothesis can be found in early accounts by Rosenthal, one of I.P. Pavlov's associates. When he was working with starved animals he noted an impairment in the ability of the starved animal to perceive, fixate, and associate specific environmental cues. According to Massaro (1984) Rosenthal also noted that such an animal failed to discriminate between useful and indifferent signals necessary to obtain reinforcement. Throughout the period 1930-1960 numerous studies were conducted to examine whether or not malnutrition could influence the learning ability of the experimentally malnourished animal. The Minnesota study by Keys et al (1950) quoted in the first chapter produced the same results as the animal studies surveyed above on the hypothesis on functional isolation. It is quite evident that the hypotheses of functional isolation made a contribution in the study of the behavioural effects of malnutrition.

2.3.4 Hypotheses of neurological damage.

Stock (1980) and Stock and Smythe (1980) conducted a follow-up study on children who had had marasmus as infants. They reported a permanent reduction in brain size, even though somatic growth tended to reach normal levels. They further found deficits regarding non-verbal activities, synthetic-analytic skills and spacial relations.

Olowookere (1987) noted that PEM (Protein energy malnutrition) impairs learning ability, memory and behaviour.

Psychophysiological and EEG studies have revealed that two years after being malnourished, children still show some autonomic nervous system imbalance (Griesel, 1984). The above-cited studies suggest that malnutrition can result in neurological damage.

From the above theories, it is worth looking at the studies that deal mainly with the relation between social interactions and malnutrition.

2.4 Malnutrition and social interaction

In a study by Brazelton, Tronick, Lechtig, Lasky and Klein (1977) carried out in Boston and Gautemala, investigations found that malnourished infants were under-demanding and poor elicitors of maternal responses compared to the control group.

Chavez and Martinez (1979) have been innovative in exploring the relationship between malnutrition and parent-infant interaction. They presented another perspective of looking at the relationship of mothers and infants who are malnourished. They studied seventeen newborn infants' social interaction especially with reference to their mothers living under low socio-economic conditions in the Mexican community. The control was a supplemented group in which both mothers and infants were supplemented. In their observations they noted that supplemented infants were better off in terms of physical

activity. Unsupplemented infants spent more time in their cribs or bed, less time exploring, were kept or chose to stay in the house for most of the time and were helped most of the time. Supplemented infants were more exploratory, active and expressive. They received more attention from parents.

Richter, Bac and Hay (1990) noted that low birth weight which is primarily associated with undernutrition affects interaction with caregivers. She contends that erratic movements and unstable behaviour states make it difficult for caregivers to predict infant behaviour and to establish healthy interactions. According to Cravioto and Dilacardie (1976 as cited by Richter et al, 1990) low birth weight infants tend to be less well cared for because they do not contribute much in the interaction. In their study they described mothers as less sensitive to their infants' needs and less emotionally involved with their infants. It should be noted that this study deals with the infant's behaviour rather the primary caretaker's behaviour. However these studies seem to caution us that an infant's behaviour cannot just be seen in a vacuum. There are other factors in the environment that might exacerbate the infants' behaviour.

Rossetti-Feirreira (1978 as cited by Richter et al 1990) articulated the view that behavioural features of malnutritioned infants, together with depleting effects of grinding poverty create circumstances in which normal mothering is difficult to maintain. According to Richter et al (1990), Rossetti-Feirreira suggested that a cycle of interactional deprivation is created through both the unavailability of the caregiver and the undernourished infants' loss of interest in the social environment.

In another study by Scheper-Hughes (1985), she has noted that quieter and slower infants tended to be handled less by primary caretakers. It is understandable that this study deals with the behaviour of infants who are malnourished. However it is quite important to note that studies conducted on mothers of malnourished infants showed that most mothers were depressed and socially isolated, had low self-esteem and low energy levels. These results might suggest that the mothers could have been malnourished themselves.

South African studies on mothers of malnourished infants noted depression (Richter & Mphelo, 1991), low morale (Hansen, 1980). These studies seem to caution us that infant behaviour should be viewed with caution because it is dependent on the social environment, that is, the mother's responsiveness too. It should however be stressed that this study is confined to the socio-emotional impact of malnutrition in infants. There are researchers who have argued that cognitive functioning and socio-emotional functioning are inseparable. The next section of this chapter looks at the relationship between the two.

2.5 Relationship between cognitive and behavioural effects of malnutrition

It should be understood that this research looks at social and emotional consequences of malnutrition on infants. However Zigler and Butterfield (1968) argue that a complex separation of social and emotional functioning is not possible. This argument is supported by Sroufe and Waters (1977) who contend that social and affective characteristics intertwine with, rather than run parallel to cognitive development. He argues that it is impossible to conceive such affective development as a one-year-old demandingness and

temper tantrums as well as independence if the child has not developed self awareness. Thus the researchers seem to argue that there is a relationship between cognitive and behavioural effects of malnutrition.

2.6 A comparison of the effects of malnutrition in adults and children.

Turnbull (1972) has reported on the effects of malnutrition on adults- with reference to its effects on the social structure and culture. He conducted a study with nomadic people in Uganda. He noted that before malnutrition began, relationships among people in the community were close. It was characterised by a spirit of companionship. In his findings he noted that as they were attacked by famine the close knit structure disintegrated, and altruism, love and social attachment disappeared. Turnbull puts it (Turnbull. 1972, p.228): " They were each one, simply one, seeming content to be alone". It is noted in this study that malnutrition in adults dispelled companionship. Severe malnutrition led to envy, suspicion and dispassionate callousness towards other humans. In this study there seem to be similarities between findings by Turnbull and findings reported above by researchers examining the effects of malnutrition on infant behaviour. There seem to be emotional disturbances associated with malnutrition, that is, social unresponsiveness. This seems to be associated with the emotions of withdrawal, irritability and unpredictable aggression associated with malnourished infants.

2.7 Gender differences in the effects of malnutrition.

Barrett (1984) has noted sex differences in terms of certain behaviours. It should be noted that Barrett's study was conducted with school age children. It will be the task of the

present project to look at sex differences in infants. Barrett (1984) noted that both sexes sought help, were involved in group activity, had moderate activity levels, and were happy and anxious. Boys showed greater levels of angry affect compared to girls. There was a great deal of peer association in boys when compared to girls. There was no significant association in girls. In boys there was more physical aggression, rough and tumble play than displayed by girls. It should be noted that in this study by Barrett there seem to be higher activity levels in boys than in girls.

The next section of this study looks at the repercussions of malnutrition in adult behaviour.

2.8 Implications of effects of malnutrition in adult behaviour

From the studies that have been reviewed above one can look at the categories of behaviour that have been identified, that is, social responsiveness, activity levels, affect and general interest in the environment. Barrett (1984) articulated that an infant who has impairments in all these areas that have been mentioned above becomes a different type of stimulus to other people in the environment. This argument is supported by Brazelton, Tronick, Lechtig, Lasky and Klein (1977) who articulate that an infant who does not successfully elicit responses from others would learn to withdraw from social interaction situations and would learn skills which are not normal for infants. From this assertion by these researchers it is clear that malnutrition may have far reaching effects on the infant's development. Barrett (1984) further contends that an infant who is not successful in the earliest social interaction is likely to fail in interpersonal relations. He further articulated

that the cumulative effects of such interactive failure would lower self esteem, lead to avoidance of both new personal contacts and new situations later in the infant's development. These findings seem to raise the great need for malnutrition intervention/prevention programs in the earliest stages of the infant's development.

The next section of this chapter will look at the summary of all the findings as presented above.

2. 9 Summary

The following table gives a summary of different behaviours displayed by malnourished infants and animals in the above-cited studies.

Table 2.1 Behaviours of malnourished infants

Author	Behaviour
Barrett (1984)	Apathy, poor attention, reduced social responsiveness
Barrett, Radke-Yarrow & Klein (1982)	Reduced activity
Chavez and Martinez (1981)	Under demanding
Cowley & Griesel (1964)	Timid, more emotional
Cravioto & Delacardie (1976)	Less responsiveness
Frankova (1973)	Negative
Frankova & Barnes (1968)	Passivity, inability to sustain attention

Gilbey (1963)	Shy, silent, passive
Grantham-McGregor (1993)	Less exploratory, apathetic
Lester (1975)	Less responsiveness
Levitsky & Barnes (1972)	Functional isolation
Pollitt & Thomson (1977)	Irritability, withdrawal
Read (1977)	Lag behind
Richter, Bac & Hay (1990)	Erratic movements, unstable behaviour
Richter & Griesel (1994)	Temperamentally difficult
Scheper-Hughes (1985)	Slower, quiet
Stock & Smythe (1980)	Impaired non-verbal abilities
Strobel & Zimmerman (1971)	Non-purposive behaviour, unpredictable aggression
Valenzuala (1990)	Avoidance/clinging attachment

CHAPTER 3

RESEARCH METHODOLOGY

This research was aimed at looking at the socio-emotional impact of malnutrition. This was done by observing infant's behaviours in two different wards, that is, the medical (experimental group- for malnourished infants) and the surgical (control group- for infants hospitalised for surgical reasons) ward at Hlabisa Hospital. This chapter describes the method used in conducting this study to test the following hypotheses.

1) Deficits in energy protein malnutrition reduces levels of exploration and activity

2) Deficits in energy protein malnutrition reduces an infant's levels of expressing emotions.

And to answer the following question:

3) Are there any gender differences in the social and emotional functioning of infants hospitalised for malnutrition and those hospitalised for surgical reasons?

This chapter looks at the sample and the operational definition of malnutrition that was used in the study to classify malnutrition, and the reasons behind using observation as a method of collecting data. It also looks at the different phases that were undergone in the preparation of the observation instrument, data collection and analysis.

3. Design

A comparison of infants hospitalised for malnutrition (experimental group) and those hospitalised for surgical ward (control group) was conducted. Observation was used as a technique of collecting data to look at infant's activity levels and emotions to test the

above hypotheses.

3.1 Selection of subjects

Subjects were selected from Hlabisa Hospital that is on the northern coast of KwaZulu Natal. Forty infants were identified for the purpose of this study. Permission was requested from the primary caretakers of the infants who participated in the study. Infants were selected from two different wards, namely, medical (experimental group) and the surgical ward (control group). The medical ward was for infants who were malnourished, and the surgical ward was for infants who were in the hospital for surgical reasons. It should be noted that mutual exclusivity could not be guaranteed, because some of the surgical patients may have been malnourished. Infants who were a target for the study were between birth and two years, had been in the hospital for approximately one week, and were in the recovery process. In the selection process gender had to be balanced. The researcher was helped by the nursing staff to select infants from the medical ward. Out of twenty seven infants who were in the medical ward at the time of the study twenty infants met the criteria (age, date of admission, and gender (ten males and ten females)). The twenty infants from the medical ward were equated (as a group, rather than on a pair-wise basis) with the infants from the surgical ward according to date of admission, age, and gender. Out of thirty infants who were in the surgical ward, twenty three infants met the criteria described above. Three infants were eliminated from the study because they were going to be discharged before the observers finished their observations. Infants from the medical ward were compared with infants from the surgical ward to test the above mentioned hypotheses. These infants met the criteria of energy protein malnutrition.

3.2 Operational definition of malnutrition in the study

The experimental group of this study was a group of infants who were described by the hospital personnel as having energy protein malnutrition. It was a group of infants with marasmus and kwashiorkor, and they fit the criteria of first-degree malnutrition according to NCHS standards. These infants were admitted in the medical ward because of marasmus and kwashiorkor according to personnel. The following section looks at the age (by months) versus weight of both the experimental and the control group. This is based on NCHS standards (WHO, 1983), which gives the expected median for age and weight. The categorization of the infants into wards was, of course, undertaken by the hospital staff and not the researcher.

Table 3.1 Age vs Weight - NCHS standards- Medical ward

					(NCHS expected)	
ID	WARD	SEX	AGE(mths)	WEIGHT (kg)	MEDIAN	S.D
1	MEDICAL	F	6	3	7.2	-3S.D
2	"	M	6	3.6	7.8	-3S.D
3	"	F	6	3	7.2	-3S.D
4	"	F	8	4	8.2	-3S.D
5	"	M	10	4.5	9.5	-3S.D
6	"	M	13	7.5	10.4	-3S.D
7	"	M	14	7.5	10.7	-3S.D

8	"	M	14	6.5	10.7	-3S.D
9	"	F	15	7.8	10.2	-2S.D
10	"	F	16	7	10.4	-3S.D
11	"	F	19	4.8	11.0	-3S.D
12	"	M	19	4.3	11.7	-3S.D
13	"	F	21	6.5	11.4	-3S.D
14	"	F	21	8.5	11.4	-3S.D
15	"	M	22	8.7	12.2	-2S.D
16	"	F	24	8.9	11.9	-3S.D
17	"	M	22	9.6	12.5	-2S.D
18	"	F	20	10	11.2	-1S.D
19	"	M	23	11	12.4	-1S.D
20	"	M	24	11.5	12.6	-1S.D

Table 3.2 Age vs weight - NCHS standards- surgical ward

					(NCHS)	
ID	WARD	SEX	AGE (mths)	WEIGHT (kgs)	MEDIAN	S.D
1	SURGICAL	F	7	9	7.7	+1S.D
2	"	F	11	9.5	9.2	0.00
3	"	M	10	10	9.5	+1S.D
4	"	F	12	10	9.5	+1S.D
5	"	F	10	8	8.9	-1S.D

6	"	F	15	10	10.2	0.00
7	"	F	18	9.1	10.8	-1S.D
8	"	F	17	8.9	10.6	-1S.D
9	"	F	16	9.2	10.4	-1SD
10	"	M	18	9.4	11.5	-2S.D
11	"	M	21	9.6	12.0	-2S.D
12	"	M	23	10.3	12.4	-1S.D
13	"	F	24	11.7	11.9	0.00
14	"	M	20	11	11.8	+1S.D
15	"	M	19	10.9	11.7	-1S.D
16	"	M	24	12	12.6	0.00
17	"	M	23	12.2	12.4	0.00
18	"	F	21	11.9	11.4	0.00
19	"	M	24	12.5	12.6	0.00
20	"	M	23	12	12.4	0.00

From the above tables, the medians and the standard deviations suggest that infants from the malnourished ward were severely malnourished, whereas in the surgical ward some infants were slightly below average and others were in the median. The difference between wards in average standard deviations was tested for significance (independent samples t-test assuming unequal variance, $t = -8.41762$, $N = 20$, $P<0.00001$).

The length of stay for malnourished infants was a week, and in the surgical ward, the

length of stay at the hospital varied from a week to four weeks. Some of the infants who were in the surgical ward had burns and fractures.

3.3 Description of methods

3.3.1 Preparation of an observation instrument

The observation instrument was designed with assistance from the Child Development Programme (HSRC) in Durban. It was intended to be an empirically derived instrument based on actual behaviour rather than on any prior categorisation of relevant behaviours. This has the advantage of permitting previously unnoticed behaviour to be included in the scale and contributing to the findings. However it also has the disadvantage of possibly including behaviours which turn out to be irrelevant to the aims of the study. We began with an exploratory phase of using ethological methods, i.e, behaviour of infants was observed unsystematically over a period of time. Fassnacht (1982) contends that the exploratory phase helps with the construction of units, developing hypotheses and examining these hypotheses in a preliminary way. It should be noted that the hypotheses were empirically derived. The preliminary observations helped the researcher to come up with broad categories like distress, whole body movement, responsiveness, facial expressions, object manipulation and unoccupied. The researcher had to formulate hypotheses around these broad categories, because it was noted by other researchers that malnutrition affected activity levels and affect. These broad categories were combined with the preliminary observations that were made in the context where data was going to be collected, i.e, the hospital setting. These categories will be described in section 3.2.11, and the behavioural descriptions under those categories.

Three research assistants were involved in the construction of a checklist of behaviour. The research instrument was designed over a period of two weeks. It was designed using a sample of infants at King Edward V111 Hospital in Durban. Four observers, including the principal investigator obtained permission from the superintendent to observe fifteen infants from the medical ward and fifteen from the surgical ward. Each infant was observed by four different observers at different times at fifteen minute intervals for an hour. Each observer wrote descriptions of the infants' behaviour on his or her observation sheet. The following is an example of the descriptive notes made by the observers at this stage.

Child 1 (F) Age- 13 months Weight- 8kg Ward- Medical

Research assistant 1

"She cries continuously. She stops and just looks at her mother. The mother leaves her. She then cries again. She stops and looks as the person passes by. She just keeps quiet. She looks at the nurses chatting to each other. She moves her toes slowly and sometimes toes only. She moves her legs. She turns her legs and look around. She cries and then stops immediately. She stretches her hand and then yawn. She moves her mouth sideways and yawns."

During these observations the researchers noted frequently occurring behaviour patterns, and from these patterns categories of behaviour were formulated bearing in mind the hypotheses to be tested, i.e., malnourished infants activity levels and exploration and their level of expressing emotions.

3.3.1.1 Criteria for choosing categories

The following categories of behaviour were derived from the preliminary observations. Crying, Posture, Whole Body Movement, Responsiveness, Facial Expression, Small Movements, and Maintenance. These observations were derived from the preliminary observations described above. In developing the above mentioned broad categories the researcher used Martin and Bateson's (1986) guidelines of developing broad categories and behavioural descriptions, i.e, the researcher tried to have enough categories to describe behaviour in sufficient detail, each containing category precisely defined behaviours. It should be emphasised that the researcher used information obtained from the preliminary observations. The first five broad categories were independent from one another, but Small movements and Maintenance were linked to the five broad categories. The manner in which they were linked will be described in the next section where categories are defined. Categories were homogenous, i.e, all the behaviours included shared the same properties.

The instrument was progressively refined utilising additional observations, until the final form of the observation instrument was produced (See Appendix A- Observation instrument). The following section looks at how categories were derived.

3.3.1.2 Descriptions of categories

This section looks at the procedures that were followed in creating the observation categories to answer the main question of this research project, i.e., the socio-emotional impact of malnutrition. The actual descriptions of measures will be done in the next section (definition of terms). The preliminary observation carried out earlier helps the researcher to "understand and describe both subjects and the behaviour" (Martin & Bateson, 1986, pp.26). This phase as described in **preparation of an observation instrument** (3.3.1) provides the researcher with raw material for choosing the measures to answer the research question. Some of the categories were defined in terms of their **structure** and some in terms of **consequence**. According to Martin & Bateson (1986) describing behaviour in terms of structure, is whereby behaviour is described in terms of its appearance, physical form or temporal patterning, or behaviour may be described in terms of subjects' posture or movements. Description in terms of consequences is whereby behaviour has been triggered by a certain stimulus in the environment. A list of main categories follows.

DISTRESS as a category was defined in terms of its structure. It should however be noted that the infant might have been crying angrily because of certain stimulus in the environment. This meant that the observers recorded what they observed, but the interpretation might be at a different level, i.e., consequence.

POSTURE as a category was defined in terms of its structure, i.e., the observers were helped by the physical form or patterning of behaviour at that particular time, for example, lying.

WHOLE BODY MOVEMENT as a category was defined in terms of its structure. This

behaviour was described in terms of the subjects' movements, for example, rolling over.

RESPONSIVENESS as a category was defined in terms of both its structure and consequence. For example this category was recorded when the infant was turning his head in response to what was happening in the environment.

FACIAL EXPRESSION was recorded in terms of its structure and consequence. For example, facial expression was recorded looking at the reflexes of the facial muscles, and those facial muscles might have been triggered by a stimulus in the environment.

SMALL MOVEMENTS and **MAINTENANCE** were described in terms of their structure, however some of the subcategories like medication, changing nappies/bed linen/wiping, feeding were described in terms of their consequence.

OBJECT MANIPULATION and **UNOCCUPIED** expression was recorded when the infant was not doing any of the above.

All these categories were trying to answer to answer the main question of this research, the socio-emotional impact of malnutrition. The following section looks at the descriptions of each measure in respective categories, and how they were linked to socio-emotional functioning.

3.3.2 Definitions of terms

1. DISTRESS CATEGORY

This category looks at the emotional effects of malnutrition.

Crying angrily- This subcategory was recorded when the child wept plus vocalisation, i.e., high and scream-like vocalisations.

Crying monotonously- This subcategory was recorded when the child wept with a pitch

that was constant, i.e. it was neither high nor low.

Crying (Non- serious) - This subcategory was recorded when the child cried without tears, i.e., the child vocalised and he was playing with objects at the same time.

Crying (Non Classified)- Crying which could not be classified in the crying angrily, monotonously, crying non seriously or crying eyes closed.

Crying (Eyes closed)- When the child cried with his eyes closed, but did not weep. The observers only picked up through vocalisation that the infant was crying.

2. POSTURE

This category was looking at the posture of infants.

Lying- This subcategory was recorded when the infant laid more or less horizontally across any horizontal surface.

Sitting- This subcategory was recorded when the infant was supported on the primary caretaker's lap or any horizontal surface with the infant's back at about 90% to his legs.

Standing- This subcategory was recorded when the child was standing on his cot, on the floor or any other place.

Supported- This subcategory was recorded when the infant was held more or less horizontally across the primary caretaker's body, supported by her arms.

3. WHOLE BODY MOVEMENT

This category was also looking at the activity levels of the infants.

Rolling over- This subcategory was recorded when the infant transferred his weight from one foot to the other in an oscillatory motion. The motion may be sideways, forwards and

backwards.

Waving arms/legs- This subcategory was recorded when the infant raised hands and legs to about shoulders height and moves them to and fro and the legs are waved towards thighs.

Crawling- This subcategory was recorded when the child moved with his lower limbs and hands in the room.

Walking- This subcategory was recorded when the infant's body is moved forwards with the foot placed alternatively in front.

Turning head- This subcategory was recorded when the infant moved his head sideways.

4. RESPONSIVENESS

This category was designed to determine the infants' activity levels and exploration. Definitions in this categories follows common usage of the below written words. Descriptions was in terms of muscle contractions.

Eyes open- This subcategory was recorded when there was neither gross movement nor crying. It was recorded when the observer judged that the child opened his eyes in response to what was happening in the environment.

Uses hands- When the child uses hands to touch, eat, play with object, or do any other activity with hands.

Uses legs- This subcategory was recorded when the infant used his lower limbs in walking, jumping, crawling or turning.

Head and body turning- This subcategory referred to the swift turning of a body and

head.

Vocalisation- This refers to any sound or speech produced by the child.

5. FACIAL EXPRESSION

This category determined the infants' emotional expression. This category helped the researcher to determine the emotional effects of malnutrition.

Smile-This term was used to cover a range of behaviours which includes slight raising of mouth corners with lips closed, 2) wide open mouth with mouth corners retracted horizontally and both rows of teeth visible 3) mouth wide open with mouth corners up and the teeth covered by lips or only poorly visible.

Laugh- It was recorded when the sound was variable, but produced by a series of short repeated expirations and long inspiration of breath, accompanied by some characteristic noise; hee, hee, hee etc (Blurton-Jones, 1972).

Frowns-Brows were at the centre making vertical creases in the forehead. Eyes usually well open.

Pout- Lower lips or both lips pushed forward, the lower lip curling down, mouth slight open or closed and mouth corners pulled down.

No expression- When the child did not give any expression.

Other- referring to any other expression not listed. The last two subcategories were mutually exclusive.

6. SMALL MOVEMENTS

This category was linked to other categories. For example, the facial expressions of

infants were considered when the behaviour was recorded. For example, when the child frowned whilst scratching that behaviour was not recorded under facial expression, but under Small Movements because the child might have been scratching because of physical discomfort, and thus frowning. Thus it was linked to other broad categories like distress, posture, whole body movement, responsiveness and facial expression.

Scratching- This subcategory was recorded when the infant used fingernails on some part of the body.

Picking- This subcategory was recorded when the infant was using fingers in the nose.

Sucking fingers- This subcategory was recorded when the infant took a finger to his mouth.

Rubbing- This may include rubbing with his hands on the face or any other part of the body.

Other movement fingers- Any movement not listed in the above category.

7. MAINTENANCE

This category was also linked to the other five main categories that have been listed above. It was quite helpful to look at the situation when the infant displayed a particular kind of behaviour. For example, it was useful to know that the child frowned when he was taking medication. That behaviour was not recorded under facial expression because the frowning might have been related to taking medication.

Medication- When the child is given medication by hospital staff or primary caretaker.

Changing nappies, bed linen or wiping- This subcategory was recorded when there the action was from the mother to the infant or the hospital staff was changing linen, nappies

or wiping.

Feeding- When the child is fed by primary caretaker. This refers to breastfeeding, bottle-feeding and food.

Yawns- The child opens the mouth wide open, and breathes out or in.

Coughing- The child makes a sound that comes from the oesophagus.

Breathing difficulties- When the child is gasping or showing difficulties in body parts that helps with breath.

OBJECT MANIPULATION

This category helped the researcher to know how much the infant is engaged by his/her environment, which in turn determined the infants' responsiveness.

Definition-This subcategory was recorded when the infant fiddled with plastics, cups or any other object.

UNOCCUPIED

This category was recorded when the child did not manifest any of the behaviours described above.

3.3.3 Progressive refinement of the instrument

The instrument was progressively refined utilising additional observations until the final form of the observation instrument was produced. This period helped the four observers to avoid what Martin and Bateson (1986) call **observer drift**, i.e., the inadequacy of the definition of a measure or the changing of definitions by observers. The observers had to

agree on the definitions of measures.

3.4 Training in the use of the observation instrument and recording

After the observation sheet (See Appendix C) had been refined the three research assistants and the investigator underwent training in using the instrument on a sample of infants who were not part of the study. The researchers carried an electronic beeper, pencils and observation checklist. Each observation lasted for fifteen minutes and recording was made after each thirty seconds. The observers used what Martin and Bateson (1986) called "focal sampling" (p.40), where each observer observed an infant for thirty seconds and used the other thirty seconds for recording the observed behaviour. Observed behaviours were recorded in different categories in the final behaviour checklist. After the observers had been trained to use the instrument, the researchers tested interobserver reliability.

3.5 Interobserver reliability

The three research assistants and the principal investigator did interobserver reliability on a group of infants who were not part of the sample, but who met the criteria of the present project (two different wards, gender and age). Thirty children were observed for and hour (made up of 4 x 15 min. intervals). Every alternate 30 seconds were observation periods. The observers had to agree on their recordings and definitions. Each research assistant did interobserver reliability with the principal investigator. The researchers had an interobserver reliability of over 95% (See Appendix A- how the interobserver reliability was calculated). Calculating Cohen Kappa would have been better than calculating

percentage agreement, but the researcher did not collect enough information to calculate Cohen Kappa. The interobserver reliability was calculated by using the percentage agreement between the principal investigator and the three observers.

3.6 Criticisms levelled against observation as a technique

One criticism raised by Richards (1974) is that this kind of data collection and analysis tend to be concerned with very fine details and that it misses the broad patterns and high level characteristics of behaviour. Another criticism raised by Neale and Liebert (1980) is that the fine details that are observed are derived from pre-existing theoretical frameworks and then rating scales or observation checklist are derived from these theoretical frameworks. He further argues that researchers might fit aspects of behaviour that do not precisely fall under that category or theoretical framework. Ethologists counter this argument by asserting that there is an exploratory phase of observation, whereby behaviour is observed unsystematically over a considerable period of time. The data derived from these unsystematic observations help researchers to generate hypotheses. Fassnacht (1982) contends that exploratory observation helps with the construction of units and development of hypotheses supports this argument. It is on the basis of these hypotheses and units that theoretical frameworks can be formulated.

Another criticism that has been levelled against observation as a technique is that the presence of the observer might disturb the natural flow of behaviour interaction. It is thus important to establish rapport with research participants before embarking on data collection.

3.7 Data collection

The four observers gathered data on the two wards. On the first few days the researchers established a rapport with the staff and the research participants, and they became accustomed to the environment where they were going to gather data. Data was collected over a period of five days. Each child was given a chance of being observed for an hour (made up of 4 x 15 min. intervals, every alternate 30 seconds were observation periods, for a total of 60 observations) on different days, different situations and the time of observation was random using the kind of recording system discussed in **Training in the use of an observation instrument (3.4)**.

3.8 Data entry

ID(number), Name, Gender, Age, Ward, Date of admission and the total number of observation in each of the categories were entered into a computerised database.

3.9 Data analysis

There were forty three variables (measures) in this project, excluding gender, age, date of admission and ward. The number of variables, which exceeded the number of subjects made it difficult for the researcher to analyse this data. The researcher tried to simplify the data. Chapter 4 looks at the methods that were used to reduce this data.

CHAPTER 4

DATA REDUCTION

Most statistical procedures require more subjects than variables. In the present investigation we had more variables than subjects. The number of variables had to be reduced. There were two strategies that were available: collapsing categories into combined categories and multivariate statistical procedures such as factor analysis. Arguments against the strategy of collapsing categories included the fact that most of the categories were not hierarchically organised and often were only loosely related in a logical sense. Arguments for the strategy of collapsing categories turned on its essential simplicity and ability to exploit logical relations in the data. Arguments for multivariate reduction included the ability to demonstrate data relatedness empirically and the ability to show strength of relatedness. Arguments against the multivariate strategy included the complexity of the techniques and the difficulty sometimes arising from interpreting factors. In this investigation we decided to combine the two possible procedures: to factor analyse scores within each major category. This chapter begins however, by reviewing the descriptive statistics for each of the categories. We decided to look at combined samples (experimental plus control group) to effect data reduction valid for both groups, before applying statistical procedures to compare the experimental and the control group.

4.1 Descriptions of variables and statistics

Age - Children who were part of the study were between birth and two years of age, some of them could walk, and some of them communicated with "one word".

Gender- There were ten females and ten males from the medical ward, and a comparable sample with the same number and gender from the surgical ward was selected.

Admission-Children who participated in the study were those who had been in the hospital for a week.

The following tables illustrate descriptive statistics for each research variables (measures). **Note: Appendix B provides statistics for each ward seperately after data reduction.**

Table 4.1 Descriptive statistics for Distress category

(Units- 30 sec. observation intervals for one hour (4 x 15 min))

CATEGORY	PATTERN	MEAN	STANDARD DEVIATION	RANGE
DISTRESS	Crying angrily	6.2	11.3	46
	Crying monotonously	1.7	4.3	18
	Crying non serious	.8	1.6	6
	Non classified	2.6	5.6	26
	Eyes Closed	1.7	3.9	18

The above table reveals that the 40 infants in this study spent 48% of the "distress" time crying angrily, 13% of the "distress" time crying monotonously, 6% of the "distress"

time crying non seriously, 20 % of the "distress" time Crying (non-classified), and 13% of the "distress" time crying with eyes closed. It is evident that an average infant spent most of the "distress" time was spent crying angrily. Each child was observed for an hour (made up of 4 x 15 min. intervals). Every alternate 30 seconds were observation periods.

Table 4.2 Posture

(Units -30 sec. observations interval for one hour (4 x 15 min))

CATEGORY	PATTERN	MEAN	STANDARD DEVIATION	RANGE
POSTURE	Lying	1.7	32.7	120
	Sitting	40	35.4	116
	Standing	12.6	22.4	84
	Supported	22.85	28.66	90

The above table reveals that in this study 40 infants spent 1.4% of the time in the posture category lying, 33% of the time in the posture category sitting, 11% of the time in the posture category standing and 19% of time in the posture category supported. The above table reveals that there is missing time. This was related to observer problems. The observers had problems with electronic beepers which were sorted out as the observation continued. Missing time was evenly distributed across wards.

Table 4.3 Whole Body Movement

(Units- 30 sec. observation intervals for one hour (4 x 15 min.))

CATEGORY	PATTERN	MEAN	STANDARD DEVIATION	RANGE
WHOLE BODY MOVEMENT	Rolling	.95	3.3	20
	Waving arms	5.5	8.97	49
	Waving legs	4.4	8.3	42
	Crawling	.5	1.7	8
	Walking	2.6	6.6	26
	Turning	4.2	7.2	33

The above table reveals that in this category infants spent 0.79% of the time rolling, 5% of the time waving arms, 4% of the time waving legs 0.04% of the time crawling, 2.2% of the time walking and 4% of the time turning. It should be noted that there is missing time. This was related to the fact that there was no subcategory which accommodated "doing nothing" in this category. The infants seem to have spent less time crawling and rolling over because it accounted for less than 1%.

Table 4.4 Responsiveness

(Units- 30 sec. observation intervals for one hour (4 x 15 min.)

CATEGORY	PATTERN	MEAN	STANDARD DEVIATION	RANGE
RESPONSIVENESS	Eyes open	114.97	19.08	120
	Uses hands	61.78	41.91	119
	Uses legs	6.8	12.9	65
	H/body turning	4.5	7.9	32
	Vocalization	4.3	7.4	28

The above table reveals that in this category infants spent 59% of the time with their eyes open, 32% of the time using hands, 4% of the time using legs, 2% of the time with head and body turning and 2% of the time vocalising.

Table 4.5 Facial expression

(Units- 30 sec.observation intervals for one hour (4 x 15 min.))

CATEGORY	PATTERN	MEAN	STANDARD DEVIATION	RANGE
FACIAL EXPRESSION	Smile	2.4	2.98	10
	Laughs	.43	1.3	6
	Frowns	.33	.997	5

Pout	1.3	3.2	13
No expression	101.2	20.85	72

The above table reveals that in this category infants spent 2% of the time smiling, 0.4% of the time laughing, 0.33% of the time frowning, 1% of the time pouting, and 84% of the time with no expression. The table reveals that there is missing time. This was related to observer problems which were overcome as the observations continued. The infants spent less time laughing and frowning because it accounted for less than 1%.

Table 4.6 Small Movements

(Units- 30 sec. observation interval for one hour (4 x 15 min.))

CATEGORY	PATTERN	MEAN	STANDARD DEVIATION	RANGE
SMALL MOVEMENTS	Scratching	1.5	2.8	13
	Picking	.35	1.18	7
	Sucking fingers	7.85	18.4	17
	Rubbing face	3	4.3	17
	Other movement fingers	5.15	6.8	24

The above table reveals that in this category infants were scratching for 8.4% of the time,

2% of the time was spent picking, 44% of the time sucking fingers, 17% of the time rubbing face, 29% of the time having other movement fingers.

Table 4.7 Maintenance

(Units- 30 sec. observation interval for one hour (4 x 15 min.))

CATEGORY	PATTERN	MEAN	STANDARD DEVIATION	RANGE
MAINTENANCE	Medication	6.7	3.9	22
	Changing nappies	1.8	3.9	22
	Feeding	24.7	17.8	62
	Yawning	1.5	1.7	11
	Coughing	.3	1.7	11
	Breathing difficulties	1.0	2.3	10

The above table reveals that in this category infants spent 6% of the time being given medication, 2% of the time changing nappies, 21% of the time feeding, 1.2% of the time yawning, 0.3% of the time coughing, 0.8% of the time having breathing difficulties. From this table it is clear that there is missing times. This is related to the fact that the "do nothing" subcategory was not included in the category. Furthermore, this category was mainly dependent on the external stimuli, e.g., mother changing nappies.

Table 4. 8 Object manipulation

(Units- 30 sec. observation intervals for one hour (4 x 15 min.))

CATEGORY	PATTERN	MEAN	STANDARD DEVIATION	RANGE
OBJECT MANIPULATION	Plastics	.05	.3	2
	Cups	0.05	.3	2
	Other	19.8	24.5	87

The above table reveals that in this category infants spent 0.3% of the time in this category manipulating plastics, 0.3% of the time manipulating cups, and 99.4% of the time manipulating other things which could not be classified.

Table 4.9 Unoccupied

(Units- 30 sec. observation intervals for one hour (4 x 15 min.))

CATEGORY	PATTERN	MEAN	STANDARD DEVIATION	RANGE
UNOCCUPIED	UNOCCUPIED	6.07	16.06	90

The above table reveals that in this category infants spent 5% of the time unoccupied.

The following section looks at how categories were reduced using factor analysis.

4.2 Factor analysis

According to Kerlinger (1986) factor analysis reduces the multiplicity of tests and measures to greater simplicity. He further contends that it tells the researcher what tests and measures belong together, i.e., which ones virtually measure the same thing, and how much they do so. It helps to reduce the variables with which the researcher must cope. It also helps reveal the underlying structure of the variables, i.e., which variables are pulled together or apart. Factor analysis was preferred because it could be used to reduce variables in each category. This made it easier for the researcher to analyse data.

A varimax factor analysis was used to reduce forty three variables in this research project. Loadings for each child on all of the factors extracted in this chapter were saved and were used in the further analysis reported in Chapter 5. The following section looks at the structure of factor analysis in each category.

4.1.1 Distress variables

There were five subcategories, i.e, Crying angrily, crying monotonously, crying non seriously, crying (non classified) and crying with eyes closed. Only two factors were drawn out of the five subcategories. The first factor accounted for 57.25% of the variance and the second factor accounted for 42.81% of the variance. This suggest that most of the data was drawn from factor one and two. Factor three, four and five accounted for less than one percent of the variance.

The researcher looked at factor loadings (i.e., how the five variables were loaded in each factor or "saturated with the factor"(Kerlinger, 1986, p.572) of the two factors. The following table illustrates how the variables were loaded in each factor. This is followed by factor structure summary.

Table 4.10 Factor loadings for Distress

Variables	Factor 1	Factor 2
Crying angrily	-0.359685	-0.814409
Crying monotonously	0.018120	-0.709436
Crying non seriously	-0.670708	0.091600
Non classified	-0.850754	-0.285197
Eyes closed	-0.698396	-0.288328

Table 4.11 Factor structure summary

Factor 1	Factor 2
Non classified	Crying angrily
Eyes closed	Crying monotonously
Crying non seriously	

According to these factor loadings and factor summary structure 'crying - non - classified', 'crying - eyes closed' and 'crying non seriously' have been loaded in factor 1. Crying-non classified seems to have most data in this factor. It was stated in Chapter 3 that crying (non classified) is crying which the observers could not classify under crying angrily and crying monotonously, and crying non-seriously is crying with little emotion and the third variable- crying (eyes closed) is whereby the infants cried whilst their eyes were closed, but not weeping. The observers gathered that the child was crying through vocalisations. From these descriptions it appears that there is minor distress that is suggested in these variables. The researcher decided to call this factor "minor crying" (factor 1).

Factor 2 has the variables 'crying angrily' and 'Crying monotonously'. If one looks at the descriptions of these variables in Chapter 3, one can rename factor 2 "distress crying".

4.1.2 Posture variables

Posture had four subcategories, i.e., lying, sitting, standing and supported. Two factors were drawn from these variables. The first one accounting for 54.25% and factor 2 accounting for 42.14% of the variance. Factor 3 and 4 accounted for less than four percent of the variables.

The researcher looked at the loadings in each factor. The following table illustrates loadings in each factor. This is followed by a factor structure summary.

Table 4.12 Factor loadings for posture variables

Variables	Factor 1	Factor 2
Lying	1.016517	-0.153224
Sitting	-0.644611	-0.493686
Standing	-0.310861	-0.155408
Supported	0.058814	0.954847

Table 4.13 Factor structure summary- Posture

Factor 1	Factor 2
Lying	Supported
Sitting	Sitting

In factor 1 'lying' and 'sitting' had the highest factor loadings. The correlation in these two variables led to the formation of a new variable factor one "solitary posture", because the infant was on his own. In factor 2 'supported' had the highest loadings. Factor 1 and 2 are sharing sitting, however the variance in factor 2 is less than in factor one. Factor 2 was renamed as " inactive position" (factor two). The reason why this factor was seen as having an inactive position is because 'supported' seem to be dominating in factor 2. 'Standing' had such a small variance that it failed to contribute to any of the factors.

4.1.3 Whole Body Movement

Whole Body Movement was reduced as a category using factor analysis. There were two factors that were drawn from this data. Factor 1 accounted for 82.37% of the variance and factor 2 accounted for 17.80% of the variance.

The researcher looked at factor loadings of each factor and the factor structure summary.

Table 4.14 Factor Loadings- Whole Body Movements

Variables	Factor 1	Factor 2
Rolling over	0.411055	-0.132967
Waving arms	0.647597	-0.09655
Waving legs	0.621270	0.002754
Crawling	0.116979	0.238004
Walking	-0.005812	-0.567014
Turning	-0.109351	-0.771258

Table 4.15 Factor structure summary- Whole Body Movement

Factor 1	Factor 2
Waving arms	Turning
Waving legs	
Rolling over	

According to the factor loadings and the structure summary waving arms, waving legs and rolling over are loaded in factor one. All these variables seem to have active body movement. Thus they were renamed as to "active". Turning formed factor 2. It became a factor on its own, i.e., turning. It was renamed as reactive (factor 2) because the child was turning in response to what was happening in the environment. Walking and crawling were not drawn into the factors because of their low variance.

4.1.4 Responsiveness

There were five subcategories in this category, i.e., eyes open, uses hands, uses legs, head and body turning and vocalisation. Only two factors were drawn from this category. Factor 1 accounted for 63.91% of the variance and factor 2 accounted for 36.90% of the variance.

The following section looks at how these factors were loaded and the structure summary.

Table 4.16 Factor loadings - Responsiveness

Variables	Factor 1	Factor 2
Eyes open	0.034926	0.523693
Uses hands	-0.371563	0.605453
Uses legs	-0.840789	-0.018719
H/ body turning	-0.477461	0.155924
Vocalisation	-0.284489	0.038596

Table 4.17 Factor structure summary

Factor 1	Factor 2
Uses legs	Uses hands
H/ B turning	Eyes open

According to these loadings and the structure, factor 1 relates to 'uses legs' and 'head and body turning'. Turning form part of one factor. The correlation in these two variables led to the formation of a new variable "gross responding", because in these variables infants used gross movements. Factor 2 was formed by uses hands and eyes open. It appears that infants used fine movements in response to the environment, hence the new variable was renamed fine responding (factor 2). Vocalisation was not caught in the structure summary. It should be noted that it had low variance.

4.1.5 Facial Expression

Facial expression as a broad category was divided into five categories, i.e., Smile, laughs, pout, no facial expression and other facial expression. Only two factors were drawn from these categories. Factor 1 accounted for 58.81% of the variance and factor 2 accounted for 41.52% of the variance.

The following section looks at these factors were loaded and the summary of the factor structure.

Table 4.18 Factor loading - Facial expression

Variables	Factor 1	Factor 2
Smile	-0.158655	0.590790
Laughs	-0.004768	0.392958
Pout	-0.215800	0.067870
No facial expression	-0.563117	-0.089621
Other facial expression	0.636809	-0.211512

Table 4.19 Factor structure summary- Facial expression

Factor 1	Factor 2
Other facial expression	Smile
No facial expression	

According to these factor loadings and the summary structure Other- Facial expression and No facial expression formed part of factor 1. These two variables were renamed as "expressiveness". The reason is that this factor is contrasting the two variables creating a bi-polar variable with no expression at one end and other expressions at the other end. This seem to be a variety of expressions, hence expressiveness (factor one). (Smile) factor 1 was renamed and it was called "happy expression". Laughs and Pout were not caught in the above structure because of their low variance.

4.1.6 Small Movements

Small Movements was reduced as a category. It had five subcategories, i.e., scratching, picking, sucking fingers, rubbing and other movement fingers. There were only 2 factors that were drawn from these categories. Factor 1 accounted for 56.75% of the variance and factor 2 accounted for 44.50% of the variance.

The following section looks at how the factors were loaded and factor structure summary of small movements as a category.

Table 4. 20 Factor loadings for Small movements variables

Variable	Factor 1	Factor 2
Scratching	0.377632	0.326500
Picking	-0.178299	-0.005009
Sucking fingers	0.114892	0.011455
Rubbing	-0.056879	0.468822
Other movement fingres	-0.526686	0.201402

Table 4.21 Factor structure summary for Small movements

Factor 1	Factor 2
Other movement fingers	Rubbing

According to these factor loadings and the summary "Other movement fingers" formed factor 1. It remained as "movement fingers". Rubbing was the only variable in factor 2. It remained as rubbing. Scratching, picking and sucking fingers were not caught in the above structure because of their small variance.

4.1.7 Maintenance

Maintenance as a category was reduced using factor analysis. It had six subcategories,

i.e., medication, changing nappies, feeding, breathing difficulties, yawning and coughing. Only 2 factors were drawn from these variables. Factor 1 accounted for 70.88% of the variance and factor 2 accounted for 29.59% of the variance.

The following section looks at factor loadings and the factor structure summary of maintenance variables.

Table 4. 22 Factor loadings for maintenance variables

Variables	Factor 1	Factor 2
Medication	0.545308	-0.032884
Changing nappy	-0.043133	0.205430
Feeding	-0.108573	-0.306459
Breath difficulties	-0.023631	0.027977
Yawning	-0.000677	0.436598
Coughing	0.699535	0.075558

Table 4.23 Factor structure summary for maintenance variables

Factor 1	Factor 2
Coughing	Yawning
Medication	

According to these loadings coughing and medication formed part of factor 1. It was renamed as "throat irritation". Factor 2 (Yawning) was not renamed, it remained as yawning. Changing nappies, Feeding and Breathing difficulties were not caught by the structure because of their small variance.

4.1.8 Object Manipulation

This category had three variables, i.e., Obj. 1, 2 and 3. Only 1 factor was drawn from this category. It accounted for 99.97% of the variables. There was no variable that was above 0.4, thus the category was not considered.

The following section gives a summary of all the reduced categories:

4.1.9 Summary

4.1 Distress

Factor 1- "minor crying"

Factor 2- "Distress crying"

4.2 Posture

Factor 1- " solitary posture"

Factor 2- "inactive position"

4.3 Whole Body Movement

Factor 1- "active"

Factor 2- "Reactive"

4.4 Responsiveness

Factor 1- "Gross responding"

Factor 2- "fine responding"

4.5 Facial expression

Factor 1- "expressiveness"

Factor 2- "Happy expression"

4.6 Small movements

Factor 1- "movement fingers"

Factor 2- "Rubbing "

4.7 Maintenance

Factor 1- Throat irritation

Factor 2- Yawning

4.8 Object Manipulation

This variable remained as object manipulation.

All these variables were stored and a number of two-way ANOVAs were run on them to interpret results. The following chapter looks at the results of this research project.

CHAPTER 5

WARD AND SEX COMPARISONS

This chapter presents the results of the testing of the following hypotheses:

1) Deficits in protein energy malnutrition (PEM) may reduce the infants levels of activity or exploration

2) Deficits in protein energy malnutrition may reduce the infants levels of expressing emotions.

This chapter addresses the following question:

3) Are there any gender differences in the social and emotional functioning of infants hospitalised for malnutrition and those hospitalised for surgical reasons?

To test our hypotheses a significant difference (based on the factor analysis reported in chapter 4) in the following measures will be tested, distress crying, minor crying, solitary posture, inactive posture, active, reactive, gross responding, fine responding, expressiveness, happy expression, rubbing, movement fingers, irritation, yawning and object manipulation. (Note: the factor loadings of the factor analysis reported in chapter 4 were saved and used as dependent measures in this chapter).

Secondly these results will also test if there are sex differences in the socio-emotional effects of malnutrition. The above measures will be used to measure these hypotheses. It should be noted that the results of these hypotheses will be presented in the second section of this chapter. However, the tables for both ward and sex will be combined in the

first section. When this part is discussed reference to the tables in the first section will be made. Two - way ANOVAS (hospital ward x sex) were used to analyse these results. Since 15 analyses were done, and this may lower the actual alpha level by chance, results that are significant at 0.05 level should be treated with caution. The results will be presented in this section, and a discussion will be in the following section.

5.1 Results by ward

5.1.1 Distress crying

A two-way ANOVA (ward x sex) with "distress crying" (factor 1, table 4.2) as a dependent measure was done. The following table illustrates the results:

5.1.1 Analysis of Variance- Distress Crying

Source term	DF	Sum of Squares	Mean of Squares	F-Ratio	Prob Level
A (Sex)	1	2.237888	2.237888	0.14	0.706535
B (Ward)	1	23.02394	23.02394	1.48	0.231407
AB	1	4.905598	4.905598	0.00	0.955501

Term significant at alpha= 0.05

The analysis of variance indicates that there is no significant differences in this measure.

5.1.2 Minor crying

An analysis of variance with minor distress (factor 2, table 4.2) as a dependent measure was done. The following table illustrates the results:

Table 5.1.2 Analysis of variance-Minor crying

Sum of term	DF	Sum of Squares	Mean of Squares	F-Ratio	Prob Level
A (Sex)	1	24.03572	24.03572	2.33	0.135546
B (Ward)	1	36.47687	36.47687	3.54	0.068093
AB	1	2.111569	2.111569	0.20	0.653593

Term significant at alpha = 0.05

The results of the analysis of variance indicate that there is no significant differences in this measure.

5.1.3 Solitary Posture

Analysis of variance with solitary posture (factor 1, table 4.4) as a dependent measure was done. The following table illustrates the results:

Table 5.1.3 Analysis of variance- Solitary Posture

Source term	DF	Sum of Squares	Mean of Squares	F- Ratio	Prob Level
A (Sex)	1	0.4540128	0.4540128	0.40	0.533024
B (Ward)	1	3.36793	3.36793	2.94	0.095052
AB	1	0.1434774	0.1434774	0.13	0.725512

Term significant at alpha = 0.05

The results of the analysis of variance indicate that there is no significant difference in this measure.

5.1.4 Inactive posture

An analysis of variance with inactive position (factor 2, table 4.4) as a dependent measure was done. The following table illustrates these results.

Table 5.1. 4 Analysis of variance-inactive position

Source term	DF	Sum of Squares	Mean of Squares	F-Ratio	Prob. Level
A (Sex)	1	3.373294	3.373294	2.99	0.374694
B (Ward)	1	6.801384	6.801384	6.03	0.019061*
AB	1	0.4929479	0.49294479	0.44	0.512902

*Term significant at alpha= 0.05

The analysis of variance indicates that results by ward in this measure are significant at less than the five percent level. Our hypotheses are supported, that there is a difference in the activity levels between the medical and the surgical ward. The probability level for this variable is 0.019061, which is less than five percent. The factor loadings scores indicate a mean of 0.543109 for the medical ward and a mean of -0.2815961 for the surgical ward. The original variables for inactive position before factor analysis was sitting and supported. The medical ward had a mean of 31.75 (30 sec. observation intervals) for sitting as a variable which was less than a mean of 64.3 for the surgical ward in the same variable. The medical ward had a mean of 32.75 for supported as a variable which is more 12.95 for the surgical ward. The implications of these differences will be discussed in the next chapter.

5.1.5 Active

Analysis of variance with active (factor 1, table 4.6) as a dependent measure was done. The following table illustrates the results:

Table 5.1.5 Analysis of variance- Activity

Source Term	DF	Sum of Squares	Mean of Squares	F- Ratio	Prob Level
A (Sex)	1	15.69935	14.69935	1.43	0.238939
B (Ward)	1	20.6176	20.6176	1.88	0.255837
AB	1	22.87012	22.87012	2.09	0.157014

Term significant at alpha = 0.05

The results of the analysis of variance indicate that there is no significant difference in this measure.

5.1. 6 Reactive

An analysis of variance with "reactive" (factor 2, table 4.6) as a dependent measure was done. The following table illustrates the results:

Table 5.1.6 Analysis of variance-Reactive

Source term	DF	Sum of Squares	Mean of Squares	F-Ratio	Prob. Level
A (Sex)	1	9.443492	9.443492	0.72	0.126416
B (Ward)	1	57.48031	57.48031	4.35	0.044066*

AB	1	1.337173	1.337173	0.10	0.752129

*Term significant at alpha= 0.05

The analysis of variance indicates that the ward difference in this measure is significant. The probability level for ward in this measure is 0.044066, which is less than 0.05. Thus the hypotheses is supported. The factor loadings scores indicate a mean of 0.4946737 for the medical ward and a mean of 1.909831 for the surgical ward. The original variable (30 sec observation intervals) for reactive was turning. The original mean for the medical ward in this variable was 2.6, which is less than 5.85 for the surgical ward (Implications for the results to follow in the next chapter).

5.1.7 Gross Responding

An analysis of variance with "gross responding" (factor one, 4.8) as a dependent measure was done. The following table illustrates the results:

Table 5.1.7 Analysis of Variance- Gross Responding

Source Term	DF	Sum of Squares	Mean of Squares	F- Ratio	Prob Level
A (Sex)	1	0.4667393	0.4667393	0.06	0.807605
B (Ward)	1	7.072416	7.072416	0.91	0.345981
AB	1	22.89507	22.89507	2.95	0.094362

Term of significance at alpha = 0.05

The results of the analysis of variance indicate that there is no significant difference in this measure.

5.1.8 Fine Responding

Analysis of variance with fine responding (factor 2, table 4.8) as a dependent measure was done. The following table illustrates the results:

Table 5.1.8 Analysis of variance - Fine Responding

Source Term	DF	Sum of Squares	Mean of Squares	F- Ratio	Prob Level
A (Sex)	1	20.70804	20.70804	0.97	0.154866
B (Ward)	1	3.401107	3.401107	0.16	0.691614
AB	1	43.31621	43.31621	2.04	0.272701

Term significant at alpha = 0.05

The results of the analysis of variance indicate that there is no significant difference in this measure.

5.1.9 Expressiveness

An analysis of variance using expressiveness (factor 1, table 4.10) as a dependent measure was done. The following table illustrates the results:

Table 5.1.9 Analysis of variance - Expressiveness

Source term	DF	Sum of Squares	Mean of Squares	F-Ratio	Prob. Level
A (Sex)	1	12.15828	12.15828	1.64	0.2089443
B (Ward)	1	42.09375	42.09375	5.67	0.022702*
AB	1	1.37888	1.37888	0.19	0.069360

*Term significant at alpha= 0.05

The analysis of variance indicates that this measure is significant. The probability level is 0.022702 which is less than 0.05. The factor loadings scores indicate a mean of 2.0076356 for the medical ward and a mean of 0.0246799. The original variables (30 sec. observation intervals) for expressiveness was "no expression" and "other expressions". In "no expression" as a variable the medical ward had a mean of 2.45, which is more than 0.1 for the surgical ward. In "Other expressions" the medical ward had a mean of 97.3, which is less than 106.1 for the surgical ward (Implications for these results will be discussed in the next chapter).

5.1.10 Happy expression

Test of significance for happy expression (factor 2, table 4.10) as a dependent measure was done using the analysis of variance.

Table 5.1.10 Analysis of variance- happy expression

Source term	DF	Sum of Squares	Mean of Square	F-Ratio	Prob. Level
A (Sex)	1	4.339655	4.339655	0.65	0.425522
B (Ward)	1	43.50653	43.50653	6.51	0.015096*
AB	1	1.388119	1.388119	0.21	0.071699

*Term significant at alpha= 0.05

The analysis of variance indicates that ward is significant in this measure. The probability level is 0.015096, which is less than 0.05. The factor loadings scores indicate a mean of -0.5825336 for the medical ward and a mean of 1.503288 for the surgical ward. The original variable in factor 2 was smiling. The original mean (30 sec. observation intervals) for smiling before factor analysis was 1.8 for the medical ward, which is less than 2.9 for the surgical ward.

5.1.11 Rubbing

An analysis of variance using "rubbing" (factor 1, table 4.12) as a dependent measure was done. The following table illustrates the results:

Table 5.1.11 Analysis of variance - Rubbing

Source Term	DF	Sum of Squares	Mean of Squares	F- Ratio	Prob Level
A (Sex)	1	1.016105	1.016105	0.18	0.670209
B (Ward)	1	0.9508945	0.9508945	0.17	0.680337
AB	1	15.15715	15.15715	2.75	0.105936

Term significant at alpha = 0.05

The results of the analysis of variance indicate that there is no significant difference in this measure.

5.1.12 Sucking fingers

Analysis of variance with sucking fingers (factor 2, table 4.12) as a dependent measure was done. The following table illustrates the results:

Table 5.1.12 Analysis of Variance- Sucking fingers

Source Term	DF	Sum of Squares	Mean of Squares	F- Ratio	Prob Level
A (Sex)	1	0.2608424	0.2608424	0.05	0.828701
B (Ward)	1	1.918167	1.918167	0.00	0.985192

AB	1	6.507895	6.507895	1.19	0.283550

Term significant at alpha = 0.05

The results of the analysis of variance indicate that there is no significant difference in this measure.

5.1.13 Throat irritation

Test of significance throat irritation (factor 1, table 4.14) was done using the analysis of variance. The following table illustrates the results:

Table 5.1.13 Analysis of variance- Irritation

Source term	DF	Sum of Squares	Mean of Squares	F-Ratio	Prob. Level
A (Sex)	1	82.21862	82.21862	6.64	0.014207*
B (Ward)	1	12.09986	12.09986	0.98	0.329438
AB	1	24.71218	24.71218	2.00	0.166281

*Term significant at alpha= 0.05

The results on the analysis of variance indicate that there is no significant difference in terms of ward in this measure, however there is an indication that sex if significant, but it will be discussed in the next section of this chapter.

5.1.14 Yawning

An analysis of variance with yawning (factor 2, table 4.14) as a dependent measure was done. The following table illustrates the results:

Table 5.1.14 Analysis of variance - Yawning

Source Term	DF	Sum of Squares	Mean of Squares	F- Ratio	Prob Level
A (Sex)	1	154.2721	154.2721	0.83	0.368332
B (Ward)	1	133.1924	133.1924	0.72	0.402856
AB	1	221.6799	221.6799	1.19	0.282048

Term significance at alpha = 0.05

The results of the analysis of variance indicate that there is no significant difference in this measure.

5.1.15 Object manipulation

An analysis of variance with object manipulation as a measure was done. The following table illustrates the results:

Table 5.1.15 Analysis of variance- Object Manipulation

Source Term	DF	Sum of Squares	Mean of Squares	F- Ratio	Prob Level
A (Sex)	1	7485.668	7485.668	1.23	0.275166
B (Ward)	1	4106.338	4106.338	0.67	0.121845
AB	1	6641.753	6641.753	1.09	0.303549

Term significant at alpha = 0.05

The results of the analysis of variance indicate that there is no significant difference in this measure.

A summary of these results will be presented in the next chapter.

5.2 Results by gender

All the measures were not significant as it is indicated in the analysis of variance, except for irritation. The table for the analysis of variance for throat irritation is presented in table 5.1.13. The probability level is 0.014207, which is less than 0.05. The factor loadings scores indicate a mean of 2.380494 for females and a mean of 0.4868847. The original variables for throat irritation was coughing and medication. In "medication" females had a mean of 13.25 which is more than 0.05 for males. In "coughing" females had a mean of 1.8, which is more than 0.25 for males (implications of these results will

be discussed in the next chapter).

5.3 Summary

The results indicate that there are four measures in results by ward that are significant, i.e., Inactive position, reactive, expressiveness and happy expression. Throat irritation is the only significant variable in throat irritation. The following chapter discusses these findings.

CHAPTER 6

DISCUSSION

This chapter will first look at the criticisms of the study and the results thereafter.

6.1 Criticisms of the study

6.1.1 Definition of malnutrition

The researcher depended on the definition of malnutrition that was given by the hospital staff. According to hospital staff and records children who were in the medical ward were malnourished. They suffered from marasmus and kwashiorkor, and those that were in the surgical ward were admitted for surgical reasons. It should however be mentioned that there were infants who were malnourished in the surgical ward, but the researcher made use of the definition that was given by the hospital staff. According to NCHS standards, it is clear that there are infants who were malnourished in the surgical ward. Nevertheless there was a significant difference in the average standard deviations from NCHS standards between the two wards.

6.1.2 Research variables

Some of the variables were too infrequent to be of interest in the analysis. In the section on descriptive statistics (chapter 4, 4.9, 30sec. observation interval) there are variables, which accounted for only one percent or less of the time. Those variables could not be captured because of their small variance. Factor analysis further revealed that there are some variables, which could not be caught in the structure. When the researcher was

constructing the scale he recorded all the observed behaviour at the time. The researcher ended up with too many variables for the subjects of the study. The sample was smaller than the number of variables. Hence there was low variance in some variables. Future research would be better if a larger sample is used with better controlled comparison groups (Neale & Liebert, 1980). Alternatively the infant could be observed for longer periods: Low variance (i.e., comparatively rare events for short periods of time) also leads to loss of power in the ward comparisons (Kraemer & Thiemann, 1987). This means that many more of the comparisons might have been significant if larger samples and longer observation periods had been used.

6.1.3 Definition of terms and training of observers

The present researcher tried to come up with accurate description of terms for the observed variables. There was an agreement with research assistants about the definition of terms. This helped with consistency in the observed and recorded behaviour. Moreover, the researcher did interobserver reliability, which accounted for more than 90%. It should however be mentioned that Cohen Kappa could not be used to calculate interobserver reliability because certain information was not gathered to calculate Cohen Kappa.

6.1.4 Selection of subjects

The subjects were selected according to hospital staff and records that differentiated between medical (malnourished) and the surgical (control group). Subjects were matched proportionately, and not by pairs. This was due to the available sample. Had subjects

been matched by pairs many of the variables might have been significant, because each infant was going to be compared with an infant of her own exact age.

6.1.5 Observation time

During the observation there was missing time, which could not be accounted for. This was related to observer problems, for example electronic beepers that were out of order at the time. Interestingly enough, missing time was evenly distributed across ward.

It was mentioned in the methodology chapter that infants were observed 4 times for fifteen minutes. An infant was observed for thirty seconds and the second thirty seconds was used for recording. One may argue that important information could have been missed during the thirty seconds of recording. Others may argue that the infants behaviour could have been prolonged for longer that a minute, which could make it difficult for the observer to record.

It should also be mentioned that observation periods were random, i.e., children were observed at different times and in different situations. In the future it might be worthwhile studying time of the day and its relation to social and emotional behaviours of malnourished infants.

6.1.6 Data reduction versus collapsing categories

Factor analysis was used to reduce data because of its power. According to Kraemer and Thiamine (1987) the smaller the sample the smaller the power. The sample for the

present study was small. Thus the researcher needed statistical procedures that have power, i.e., factor analysis and ANOVA. Using the strategy of collapsing variables would require the use of Chi- square analysis, which is a procedure that is very much less powerful than ANOVA and factor analysis.

6.1.7 Practical difficulties

Observation as a technique was useful in this investigation. It has been used by many researchers as indicated in the literature review. For example Barrett, Radke-Yarrow and Klein (1982); Chavez and Martinez (1979, 1981); Cowley and Griesel (1964), Frankova and Barnes (1968), Gilbey, (1963), Grantham-McGregor, (1993), Pollitt and Thomson (1977) and other researchers mentioned in the literature review have used this technique. It seemed to be a useful technique with infants, especially because of their linguistic inadequacy. However there were some technical problems with the technique, for example the electronic beepers that we were using gave us some problems, and it nearly interfered with the collection of data.

Notwithstanding the above mentioned limitations there were significant variables in the study that were used to test the following hypotheses: 1) Protein energy malnutrition (PEM) is associated with a reduction in exploration. 2) Protein energy malnutrition is associated with the infant's levels of expressing emotions.

And to answer the following question:

Are there any gender differences in the social and emotional functioning of infants hospitalised for malnutrition and those hospitalised for surgical reasons?

The following section looks at significant variables in relation to hypotheses and the theories of social and emotional development.

6.2 Inactive position

Our hypotheses, that deficits in protein energy protein malnutrition will reduce the infant's levels of activity or exploration was supported. The analysis of variance indicates that the children in the medical ward were less active than those from the surgical ward. The factor loading scores indicated a mean of 0.543109 for the medical ward and a mean of -0.2815961 for the surgical ward. Infants who were in the medical ward were supported (mean of 32.75) more than infants who were in the surgical ward (mean of 12.95). The mean for sitting as a variable is more in the surgical ward (64.3) than in the medical ward (31.75). From these results it appears that infants who were in the surgical ward were more active than infants who were in the medical ward were. This finding is supported by studies reviewed in the literature. Barrett, Radke-Yarrow and Klein (1982) noted that malnutrition results in reduced activity. It was also noted by Grantham-McGregor (1993) that malnourished infants are less active and less interactive. There seem to be a difference between malnourished infants and infants hospitalised for surgical reasons. Malnourished infants are less active than the control group.

6.3 Reactive

Our hypotheses, that deficits in protein energy malnutrition will reduce the infant's levels of activity or exploration was supported. There is an indication from the analysis of variance that this measure is significant. The analysis of variance showed that infants

hospitalised for surgical reasons are more reactive than infants hospitalised for malnutrition. The factor loadings scores indicate a mean of 0.4946737 for the medical ward and a mean of 1.909831 for the surgical ward. The original variable (turning) (30 sec. Observation intervals) had a mean of 2.6 for the medical ward and a mean of 5.85 for the surgical ward. This finding is supported by studies done by Lester (1975) and Frankova and Barnes (1968) who noted that malnourished infants were less responsive and passive than their control group in their studies. Thus this study indicates that there is a difference between malnourished infants and infants hospitalised for surgical reasons in their reactions to stimuli in the environment. The controls were more reactive than malnourished infants were.

6.4 Expressiveness

Our hypotheses, that deficits in protein energy malnutrition will reduce the infant's levels of expressing emotions was supported. The analysis of variance indicated that this measure is significant. It was indicated that infants from the surgical ward have a variety of expressions compared to infants from the medical ward. The surgical ward had a mean of 106.1 and the medical ward had a mean of 97.3 for "other expressions". "No expression" seems to be high with malnourished infants than the control group. The medical ward had a mean of 2.45, which is less than 0.1 for the surgical ward. This suggests that malnourished infants are less expressive. This finding is supported by studies by Barrett (1984) and Cravioto and Delacardie (1976) who noted less responsiveness in malnourished infants. They noted infants who were malnourished did not show their affect compared to the control groups.

6.5 Happy expression

Our hypotheses, that deficits in protein energy malnutrition will reduce the infant's levels of expressing emotions was supported. The analysis of variance indicated that infants hospitalised for surgical reasons show more happy expression than infants hospitalised for malnutrition. The factor loadings scores indicate a mean of 0.5825336 for the medical ward which is less than a mean of 1.503288 for the surgical ward. The mean for the original variable (30 sec. observation intervals) (smiling) was 1.8 for the medical ward which is less than 2.9 for the surgical ward. This finding is supported by a study that was done by (Barrett, Radke-Yarrow & Klein, 1982) where they find that better supplemented infants showed more affect than infants who were malnourished. They showed angry expression and happy expression.

6.6 Relationship between malnutrition and activity

According to Chavez and Martinez (1979) physical activity prompts the mother to closer contact with the child. The authors noted that mothers noticed that from a very early age, they did not fall from their cradle. Thus the mother did not worry herself about the child's falling because of his inactivity. They also asserted that it is the physical activity of the infant that induces a response from the primary caretaker in the environment. It is evident from these findings that the childs' physical activity may interfere with the child's attachment with primary caretakers. In the present study infants who are malnourished have been seen to be less physically active, thus affecting levels of attachment. According to Hinde (1982), in attachment the infant seeks proximity and contact with a

specific figure. The results in the present study seem to suggest that the infant is unable to seek proximity and contact because he is less physically active and less reactive. There is another argument that is raised by child developmentalists (Bruner, 1987) that measures of behaviour within an ongoing relationship are likely to reflect the characteristics of both partners. i.e., frequency of crying depends on the mother as well as the baby, and latency to pick up depends on the baby's past behaviour as well as on the mother. It is obvious that these theorists look at attachment behaviour as dyadic. In the present study it will be impossible to say the results reveal certain characteristics about the mother because the emphasis was on the infant. However, one cannot deny the argument advanced by the above mentioned theorists. This seems to open areas for future research, i.e., an observation of both the mother-infant relationship.

Kegan (1982) sees attachment as an important stage in the development of interpersonal skills, that is, the very attachment which gets disturbed in the malnourished infant. According to Kegan (1982) attachment is a prerequisite for individuation. He sees attachment as a set of skills developed in interaction with particular others, investing those with special meaning and thereby helping to define self. He further argues that the question "who I am" only has meaning in relation to the family of significant persons who define the self both by contrast (Where is Sihle, Where is mommy) and by similarity (Where is Sihle's car, Where is mommy's car). It is evident that a malnourished infant might have difficulties individuating, affected mostly by his physical activity.

6.7 Relationship between malnutrition and levels of expressing emotions.

It is quite evident in the study that levels of expressing emotions are linked to malnutrition. Infants from the surgical ward have been found to be more expressive than the malnourished infants. This can also be linked to the theory of attachment. Bowlby (1988) talks about bidirectionality, whereby attachment is from both infant and mother, i.e, the infant induces bonding from the mother.

This may also be linked to Erikson's (1980) theory of psychosocial development, where he talks about trust versus mistrust at this stage of development. It should be noted that the infant expects the world to provide. If it cannot provide the infant develops feelings of mistrust. In the case of the mother of a malnourished infant, the infant develops feelings of mistrust because of her inability to provide. The second stage according to Erikson (1980) is characterised by autonomy versus doubt. In this stage the child learns to exercise control, to make choices, or they become uncertain and doubt that they can do things themselves. In the case of a malnourished child the results suggests that a malnourished infant is less reactive and less expressive. Low reactivity and expression may be a characteristic of self-doubt. It should be emphasised that these feelings may result in severe pathology later in the child's life.

6.8 Results by sex - Throat irritation

The results of the analysis of variance indicated that throat irritation as a measure is significant in this study. According to the results females show more throat irritation than males. The factor loading scores indicate a mean of 2.380494 for females and a mean of

0.4868847 for males. In medication females had a mean of 13.25 which is more than 0.05 for males. In coughing females had a mean of 1.8, which is more than 0.25 for males. This finding suggest that girls were more sensitive than boys were.

CONCLUSION

In summary, the statistical analysis of results largely supported the research hypotheses and achieved the aims of the study. Malnourished infants demonstrated that malnutrition impact on their social and emotional responsiveness. This was demonstrated by inactivity, low reactiveness, and low expressiveness. This hypotheses seem to have confirmed existing hypotheses about socio-emotional effects of malnutrition. However what the researcher noted is that it might be interesting not to focus on the infant behaviour only, because the infants' behaviour might be influenced by the stimulus in his environment. There seem to be a big research question: Despite malnutrition, does the infant learn to be less responsive, less expressive from his less responsive mother?

What also seemed to be highlighted by these results is that there is no gender difference, except that females tend to show a high range of responses in showing emotions of sensitivity.

Notwithstanding these limitations results have largely confirmed the stated hypotheses and have supported the rationale espoused in this project. The shortcomings of this research provide exciting possibilities for future research. Some of the areas are comparison of from different hospitals, a comparison of different settings, urban and

rural, and the influence of the environment in the infants' behaviour.

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APPENDIX A

INTEROBSERVER RELIABILITY

Interobserver reliability was calculated by measuring the percentage agreement between the principal investigator and each of the other observers. It was based on the scores that were calculated by the principal investigator compared to other observers. "A" stand for agreements and the number and "D" after the slash stands for disagreements. DIST stands for Distress, POST= Posture, W/B/M= Whole Body Movement, RESP= Responsiveness, F/E= Facial expression, S/M= Small Movement, MAIT= Maintenence, and OBJ/M stands for Object manipulation.

Principal investigator vs Observer one

CHI/NAME	DIST	POST	W/B/M	RESP.	F/E	S/M	MAINT.	OBJ/M	TOTAL
A	75/A	15/A	90/A	15/A	15/A	39/A 6D	120/A	45/A	399/405
B	75/A	14/A/1D	90/A	26/A/4D	15/A	15/A	14/A/1D	27/A/3D	276/285
C	75/A	15/A	12/A 3D	30/A	29/A 1D	75/A	15/A	45/A	296/300
D	14/A/1D	29/A/1D	15/A	60/A	29/A 1D	28/A 2D	120/A	12/A 3D	307/315
E	75/A	15/A	15/A	60/A	15/A	60/A	120/A	15/A	375/375
F	75/A	15/A	90/A	45/A	15/A	75/A	15/A	45/A	365/365
TOTAL (% of A)	389/390 99.7	103/105 98	312/315 99	236/240 98.3	118/120 98.3	297/305 97.7	404/405 99.7	99/105 96.9	98.4

Principal investigator vs Observer two

CHI/NAME	DIST.	POST	W/B/M	RESP	F/E	S/M	MAINT	OBJ/M	TOTAL
A	75A	15A	14A/1D	15A	15A	38A/7D	120A	45A	327/345
B	75A	15A	90A	22A/8D	15A	14A/16D	13A/2D	28A/2D	272/300
C	75A	13A/2D	26A/4D	30A	15A	75A	15A	45A	294/330
D	75A	29A/1D	14A/1D	43A/2D	14A/1D	15A	120A	45A	325/330
E	75A	15A	15A	60A	15A	60A	120A	15A	375/375
F	75A	15A	90A	45A	15A	75A	15A	45A	365/365
TOTAL	450/450	102/105	199/255	215/225	89/90	277/300	403/405	223/225	97.5
(% of A)	100	97.1	97.6	95.5	98.8	92.3	99.5	99.1	

Principal investigator vs Observer three

CHI/NAME	DIST	POST	W/B/M	RESP	F/E	S/M	MAINT	OBJ/M	TOTAL
A	75A	15A	90A	15A	15A	41A/4D	120A	15A	386/390
B	75A	14A/1D	90A	30A	15A	14A/1D	15A	26A/4D	270/285
C	75A	15A	90A	44A/1D	15A	15A	45A	45A	344/345
D	75A	29A/1D	14A/1D	45A	14A/1D	28A/2D	120A	15A	341/345
E	75A	15A	15A	60A	15A	60A	120A	15A	375/375
F	75A	15A	90A	45A	15A	75A	15A	45A	365/365
TOTAL	450/450	103/105	389/390	239/240	89/90	258/265	435/435	161/165	98.9
(% of A)	100	98	99.7	99.5	98.8	97.7	100	97.5	

APPENDIX B

DESCRIPTIVE STATISTICS OF VARIABLES FOR THE MEDICAL WARD AND THE CONTROL GROUP.

The following tables represents the represent the means, standard error and the effect of the two groups.

A. 1. Distress crying

	Mean	Standard error	Effect
MED	-2.114669	0.8814034	-0.7586821
SURG	-0.5973043	0.8814034	0.7586821

A.2. Minor Crying

	Mean	Standard error	Effect
MED	-2.090505	0.7180052	-0.9549459
SURG	0.1806132	0.7180052	0.9549459

A.3 Solitary posture

	Mean	Standard error	Effect
MED	0.316254	0.2393602	0.2901694
SURG	-0.2640847	0.2393602	-0.2901694

A.4 Inactive posture

	Mean	Standard error	Effect
MED	0.543109	0.2375574	0.4123525
SURG	-0.2815961	0.2375574	-0.4123525

A. 5 Active

	Mean	Standard error	Effect
MED	-0.7685866	0.6227255	0.4204883
SURG	-1.609563	0.6227255	-0.4204883

A.6. Reactive

	Mean	Standard error	Effect
MED	-0.721482	1.031277	0.2915951
SURG	-1.304672	1.031277	-0.2915951

A.7 Gross responding

	Mean	Standard error	Effect
MED	0.4139809	0.7398633	-0.7179414
SURG	1.849864	0.7398633	0.7179414

A. 8 Fine responding

	Mean	Standard error	Effect
MED	0.4946737	0.8124564	1.198753
SURG	-1.902831	0.8124564	-1.198753

A. 9 Expressiveness

	Mean	Standard error	Effect
MED	-2.076356	0.6094194	-1.025838
SURG	-2.467991E-02	0.6094194	1.025838

A. 10 Happy Expression

	Mean	Standard error	Effect
MED	-0.5825336	0.5779164	-1.042911
SURG	1.503288	0.5779164	1.042911

A. 11 Rubbing

	Mean	Standard error	Effect

MED	-0.2360421	0.5249493	-0.1541829
SURG	7.232368E-02	0.5249493	0.1541829

A. 12 Sucking fingers

	Mean	Standard error	Effect
MED	0.6625633	0.5239906	-6.924896E-
SURG	0.6764131	0.5239906	6.924896E-

A. 13 Throat irritation

	Mean	Standard error	Effect
MED	1.496801	0.7867512	0.5499969
SURG	0.3968079	0.7867512	-0.5499969

A. 14. Yawning

	Mean	Standard error	Effect
MED	4.231311	3.048519	1.824777
SURG	0.5817568	3.048519	-1.824777

A. 15. Object manipulation

	Mean	Standard error	Effect
MED	2.059005	17.45905	10.13205
SURG	2.059005	17.45905	-10.13205

DISTRESS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Crying angrily																														
Monotonous (expressionless)																														
Non-seriously																														
Non –classified																														
Eyes closed																														
POSTURE																														
Lying																														
Sitting																														
Standing																														
Supported																														
WHOLE BODY MOVEMENT																														
Rolling over																														
Waving arms																														
Waving legs																														
Crawling																														
Walking																														
Turning head																														
RESPONSIVENESS																														
Eyes open																														
Uses hands																														
Head and body turning																														
Vocalization																														
FACIAL EXPRESSION																														
Smile																														
Laughs																														
Frowns																														
Pout																														
No expression																														
Other: Specify																														
SMALL MOVEMENTS																														
Scratching																														
Picking																														
Sucking fingers																														
Rubbing (face, any part of the body)																														
Other Movement (fingers)																														
MAINTANANCE																														
Medication																														
Changing																														
Feeding																														
Other																														
Yawning																														
Coughing																														
Breathing difficulties																														
Other																														
OBJECT MANIPULATION																														
Plastic																														
Cups																														
Other																														
UNOCCUPIED																														

Child's Name:_____ Age:_____ Body Weight:_____

Ward: Time: Date of Birth: