THE LINK BETWEEN ROUTINE DIET, ATTENTION SPAN AND SCHOLASTIC PERFORMANCE AMONG GRADE 2 SCHOLARS IN CIRCUIT ONE IN KHOMAS REGION

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ELSIE TJITURI
200302043

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Main supervisor: Dr. L. Haoses-Gorases
Co-supervisor: Dr. H.J. Amukugo

DECLARATION

I, Elsie Tjituri, declare hereby that this study is a true reflection of my own research, and that this work, or part thereof has not been submitted for a degree in any other institution of higher education.

……. ……

Elsie Tjituri Date

DEDICATION

This thesis is dedicated in memory of Uatirouje (1979-2008). Who lovingly supported my personal and professional development and his encouragement throughout the years has made me to reach the stars and chase my dreams.

My lovely son Vijanda, who sacrified his needs (the attention and care he deserves) for the sake of my study. The seeds were planted and the fruits have been reaped.

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"I have the strength to face all conditions by the power that Christ gives me" Philippians 4:13

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ABBREVIATIONS

ADA	American Dietician Association
ADHD	Attention-Deficit-Hyperactivity disorder
AIDS	Acquired Immune deficiency Syndrome
BMI	Body Mass Index
BMR	Basal Metabolic Rate
CASS	Continuous Assessment Marks
CDC	Centre for Disease Control
CTRS	Connor Teacher Rating Scale
CSO	Central Statistic Office
FAO	Food Agriculture Organization
FFFQ	Focused Food Frequency Questionnaire
HIV	Human Immuno-deficiency Virus
MoE	Ministry of Education
MOHSS	Ministry of Health and Social Services
MCV	Mean Corpuscular Volume
NAFIN	Namibia Alliance for Improved Nutrition
NDHS	Namibia Demographic Health Survey
NSAT	National Standardized Achievement Test

NRV	Nutrient Reference Values
PEM	Protein Energy Malnutrition
RDA	Recommended Daily Allowance
SPSS	Statistical Package for Social Sciences
TB	Tuberculosis
UK	United Kingdom
UNICEF	United Nations Children's Funds
USA	United State of America
USAID	United State Agency for International Development
WFH	Weight for Height
WHO	World Health Organization
ZDHS	Zambia Demographic Health Survey

ABSTRACT

In Namibia almost one out of every three children under the age of five is undernourished while one out of every 20 is obese. Thus, the concerns are nature and quality of Grade 2 scholars' routine diet; ability for sustained attention within a classroom setting should their routine diet fail to adequately provide sustained glucose and scholastic performance that may result from attention deficits due to presumed poor quality of routine diet. The purpose of this study was to determine and describe the link between routine diets, capacity for sustained attention span and scholastic performance among Grade 2 scholars in circuit one in Khomas region. The sampled population consisted of fifty seven (57) grade 2 scholars aged between 7-9 years from both MH Greef and Khomasdal Primary school. The results showed no significant correlation as well as weak positive linear correlation between BMI percentile and likelihood of scholars giving attention in class $r(N=57) = 0.116$ $p=0.389$. There was significant correlation as well as negative weak linear correlation between BMI percentile and arithmetic skill, $r(57) = -0.274$, $p=0.039$. Comparing scholars BMI percentile and reading skills showed no significant correlation as well as negative correlation between the scholars BMI percentile and reading skills, $r(57)=-0.025$, $p=0.851$. Comparing attention span and reading showed a significant and a moderate strong linear relationship between scholars' attention span and reading skills, $r(57) = 0.59$, $p<0.001$. Whilst, there is significant and positive linear relationship between the scholars attention span and arithmetic skills, $r(57)=0.34$, $p=0.009$. Most scholars who participated in the study academically performed poorly in reading, arithmetic and psychometric tests despite majority of them having normal nutritional status. In conclusion, impairment of attention during lessons in classroom significantly contributed to poor performance in class and another contributing factor to poor academic performance can be associated with the classroom didactic.

CHAPTER ONE
INTRODUCTION AND BACKGROUND OF THE STUDY

1.1 INTRODUCTION

This descriptive study is firmly embedded in Public Health, with a focus on nutrition and public mental health/behavioural sciences as constituents to Public Health, collectively within the Ministry of Health and Social Services (MoHSS) of Namibia. 'Routine diet' refers to the habitual food intake or meal pattern of scholars, synonymous with usual pattern of food intake, customary food intake or regular food intake. The study assesses and describes the scholars focused food frequencies, while considering the main food groupings that a balanced routine diet should contain, as recommended daily allowance (RDA) per food grouping, referenced as Nutrient Reference Values (NRVs) for individuals four (4) years and older.

The American Dietetic Association (ADA, 2008) concluded that diet can affect cognitive performance in children. Nutrient composition and meal pattern can exert immediate and long-term beneficial or adverse effects on cognitive performance (Bellisle, 2004). Beneficial effects mainly result from a balanced diet, or from the correction of poor nutrition. Despite biological mechanisms that protect brain activity from disruption, some cognitive functions appear sensitive to short-term variations of glucose availability in certain brain areas (Bellisle, 2004). Glucose derived from glycemic carbohydrates (e.g. sugars and starches), fats and proteins acutely facilitates mental performance involved in demanding cognitive tasks that require sustained attention (Anding, 2010). From this literature, it transpires that the quality of scholars' routine diet links to attention.

Muris (2006) found that an attention control scale for children, such as the Connors Scale, was suitable for assessing subject's ability for sustained attention. The premise is that the rate of glucose metabolism, the immediacy of glucose availability to the brain after a meal, or depletion of glucose availability on skipping a meal, or an upsurge of glucose availability on excess intake of high glycemic index foods, links with ability for sustained attention (Anding, 2010). This baseline will enable the researcher to compile specific sub-groups according to routine food intake, e.g. those scholars who routinely skip breakfast, those scholars showing excess intake of glycemic carbohydrates (sugars and starches) and fats and proteins, and those scholars showing depletion of glycemic carbohydrates, fats and proteins due to deficient food intake however the causes of excessive and restricted food intake are not areas of interest in this study.

Since Grade 2 scholars need to pay sustained attention within a formal setting the research interest further focuses on whether the Grade 2 scholars' routine diet supports the demand for sustained attention. Availability of glycemic carbohydrates (as glucose availability to the brain), is closely associated with ability for sustained attention, with relatively immediate effects following intake thereof, and subject to the source of glycemic carbohydrates, effects could be more gradual (Anding, 2010), pending the Glycemic Carbohydrate Index of the particular source of food (Foster-Powell, Holt, & Brand-Miller, 2002; Thomas, & Elliott, 2009). The glycemic index measures how quickly a person's blood sugar rises after ingestion of a particular carbohydrate food (Foster-Powell, Holt, & Brand-Miller, 2002). This literature study urged the researcher to determine the link between routine diet and grade 2-scholars' ability for sustained attention, with resultant satisfactory or unsatisfactory scholastic performance – whichever applies. Professor Anding of Rice University, Department of Kinesiology in 2010 recommended a choice of four basic approaches to be followed when investigating 'routine diet' and nutritional

planning, i.e. the anthropometric, the biochemical, the clinical and the dietary approaches (Anding, 2010).

The anthropometric approach involves taking body measurements of the subjects, i.e. measures of waist circumference, and measures of height and weight, with resultant computation of the subject's Body Mass Index (BMI), compared to ideal body weight indexes. The BMI greater than +1SD is considered overweight, greater than +2SD, and less than -2SD thinness, while less than -3SD is severe thinness, (World Health Organization (WHO), 2010). Since this approach is non-invasive in nature, it is highly suitable for the current study. Physicians usually follow the biochemical approach, which involves blood sampling and biochemical analyses of blood cholesterol levels, iron status, hematocrit, hemoglobin and ferritin counts to identify malnutrition and/or over nutrition. The biochemical approach also considers the subject's vitamin D status, as well as the Mean Corpuscular Volume (MCV), where small red blood cells indicate possible iron deficiency. Large red blood cells suggest Vitamin B12 or folic acid deficiency. Further to the biochemical approach, urinalysis results can identify glucose or ketones in the urine, as well as urine concentration. High urine specific gravity indicates dehydration (Anding, 2010). Since this approach requires blood sampling it is considered invasive in nature, requiring specific skills and knowledge not applicable to this current study.

The clinical approach is also not suitable for this current study, since it involves an assessment of the subject's chronic illnesses, medications (prescription and over the counter), and dietary supplements (vitamins, minerals, herbal therapy). Chronic illnesses often require dietary modifications, while certain medications and dietary supplements can cause significant interactions and alter nutritional status (Anding, 2010). The fourth approach, i.e. the dietary approach, involves consideration of the results of a food and exercise diary and comparison of

these results to an ideal caloric intake index (Anding, 2010). The dietary and anthropometric approaches are complimentary, therein that the subject's ideal body weight is multiplied by 10 to determine the subject's basal metabolic rate (BMR). The BMR gives an indication of what the subject's caloric intake is supposed to be, this index can identify whether the subject's caloric intake is too high or too low for daily maintenance of optimal functioning.

The dietary approach requires consideration of the child's growing status and activity level; hence children need more kilojoules than adults per kilogram of body weight because they are still growing, and when determining the BMR, 30% more kilojoules are added up if the subject is sedentary (inactive), 50% if moderately active and 100% if active. In the dietary approach, the mean food intake (i.e. carbohydrates, proteins, and fats) as well as the balance and quality of carbohydrates, proteins, and fats are compared against the preceding indexes to determine significant deviations (Anding, 2010). Doing so, specific patterns of malnutrition and/or over nutrition can be identified. Having studied research findings on the association between certain dietary patterns, sustained attention and cognitive performance (Muris, 2006; McArdle, Katch, & Katch, 2007), the further research interest focuses on Grade 2 scholastic performance, considering the findings published in the Namibia Alliance for Improved Nutrition report (NAFIN, 2010) that suggest malnutrition among Namibian children.

In Namibia, almost one out of every three children under the age of five was found undernourished, while one out of every twenty was found obese (NAFIN, 2010). By illustration, iron deficiency affects attention, learning ability, intellectual performance, stamina, and the mood of a child. According to the NAFIN report (2010), in some regions of Namibia iron deficiency affects one out of every two primary school children. Based on this report and other relevant literature, the researcher presumes that routine diet (via glycaemic carbohydrate intake)

will affect Grade 2 scholars' ability for sustained attention, with resultant effect on scholastic performance, as the impetus for this study.

1.2 STATEMENT OF THE PROBLEM

Having noted that a balanced routine diet can support sustained glucose availability for optimal functioning (Anding, 2010; DeBusk, 2009); sustained glucose availability is prerequisite for efficient cognition, mental performance and attention control (Arsianoglu, Mroro, & Schmitt, 2008) and attention deficit can result in impaired academic functioning (Afman & Muller, 2006; Brown, 2005; Bellisle, 2004). The concerns are the nature and quality of Grade 2 scholars' routine diet; ability for sustained attention within a classroom setting should their routine diet fail to adequately provide sustained glucose and scholastic performance that may result from attention deficits due to presumed poor quality of routine diet. Considering that in Namibia almost one out of every three children under the age of five was found undernourished, while one out of every 20 was found obese (NAFIN, 2010), and capacity for attention control is dependent on glucose availability derived from a balanced routine diet, this study investigates whether Grade 2 scholars might demonstrate poor capacity for sustained attention span and resultant poor academic performance.

1.3 PURPOSE OF THE STUDY

The purpose of this study was to determine and describe the link between routine diet, capacity for sustained attention span and scholastic performance among Grade 2 scholars in circuit one in Khomas region.

1.4 OBJECTIVES OF THE STUDY

The objectives of this study are as follows:

- Assess the routine diet of Grade 2 scholars in circuit one in Khomas region
- Assess Grade 2 scholars' ability for sustained attention in class in circuit one in Khomas region
- Determine the scholastic performance of Grade 2 scholars' in circuit one in Khomas region
- Describe the link between routine diet, attention span and scholastic performance among Grade 2 scholars' in circuit one in Khomas region

1.5 SIGNIFICANCE OF THE STUDY

The results of this study will contribute towards new knowledge, since no similar study was done before in Namibia. It may greatly contribute to the school feeding programs in Namibia and consequently inform the policy makers as well as the donors on where the funds should be directed. It will also provide the baseline data for the Namibia Alliance for Improved Nutrition (NAFIN), chaired by the honorable Prime Minister, and can inform relevant Ministries, Non-Governmental Organizations and development partners running school feeding programs. This study can also be replicated in other regions with a different population.

1.6 CONCEPTUAL DEFINITIONS

The central concepts to be defined in this study are derived for the title *"the link between routine diet, attention span and scholastic performance among grade two scholars in circuit one in Khomas region"* and all the major concepts in nutrition. The central concepts in this study constitute:

- **Routine diet:** refers to the habitual food intake or meal pattern of scholars, synonymous with usual pattern of food intake, customary food intake or regular food intake, (ADA 2005)

- **Attention Span:** the amount of time that a person can concentrate on a task without becoming distracted. Most educators and psychologists agree that the ability to focus one's attention on a task is crucial for the achievement of one's goals, (The free dictionary , 2013).

- **Grade:** a particular level of rank, quality, proficiency, intensity, or value. A level of academic development in an elementary, middle, or secondary school, (Google , 2013)

- **Link:** a relationship between two things or situations, especially where one thing affects the other, (Google , 2013).

- **Performance:** the accomplishment of a given task measured against pre-set known standards of accuracy, completeness, cost, and speed. In a contract, performance is deemed to be the fulfilment of an obligation, in a manner that releases the performer from all liabilities under the contract, (Business dictionary , 2013).

- **Scholar:** is someone who is in the process or still busy learning, (Vocabulary , 2013)

- **Circuit:** a numbered of schools in the region are geographically demarcated for example in Khomas region we have circuit one, circuit two etcetera.

- **Region:** an area or division, especially part of a country or the world having definable characteristics but not always fixed boundaries. Regional boundaries are determined by the homogeneity and cohesiveness of the section.

1.7 CHAPTER ARRANGEMENT

The report is presented under five chapters as follows:

Chapter 1: Introduction and background of the study

Chapter 2: Literature review

Chapter 3: Research Methodology

Chapter 4: Data analysis and Discussions

Chapter 5: Conclusion, limitations and recommendations

1.8 SUMMARY

In this chapter, the background to the problem, problem statement, the significance of the study, the purpose and the objectives of the study are outlined and discussed in length. Chapter 2 contains a comprehensive discussion of the literature review.

CHAPTER TWO
LITERATURE REVIEW

2.1 INTRODUCTION

The literature review involves finding, reading, understanding and forming conclusions about the published research and theory as well as presenting it in an organized manner (Brink 2006). Thus, it is crucial to review the literature to analyse the gaps, to identify the research problem, to obtain clues to the methodology and instruments, as well as to obtain clues on strategies and analysis of data. The literature review in this study is aimed at establishing the link between routine diet, attention span and scholastic performance among scholars.

2.2 SETTING OUT A CONCEPTUAL FRAMEWORK

It is crucial for every research study to be guided by concepts thus this study was guided by concepts discussed in length below:

2.2.1 WHAT IS NUTRITION?

“Nutrition is a fundamental pillar of human life, health and development across the entire life span. From the earliest stages of foetal development, at birth, through infancy, childhood, adolescence and into adulthood and old age, proper food and good nutrition are essential for survival, physical growth, mental development, performance and productivity, health and well-being. It is an essential foundation of human and national development” (WHO, 2000)

The level of nutrients in the body is influenced by the frequency and types of food the person consumes on a daily basis. The best anthropometric assessment of nutritional status and Protein Energy Malnutrition (PEM) is based on the measurement of weight and height or length and

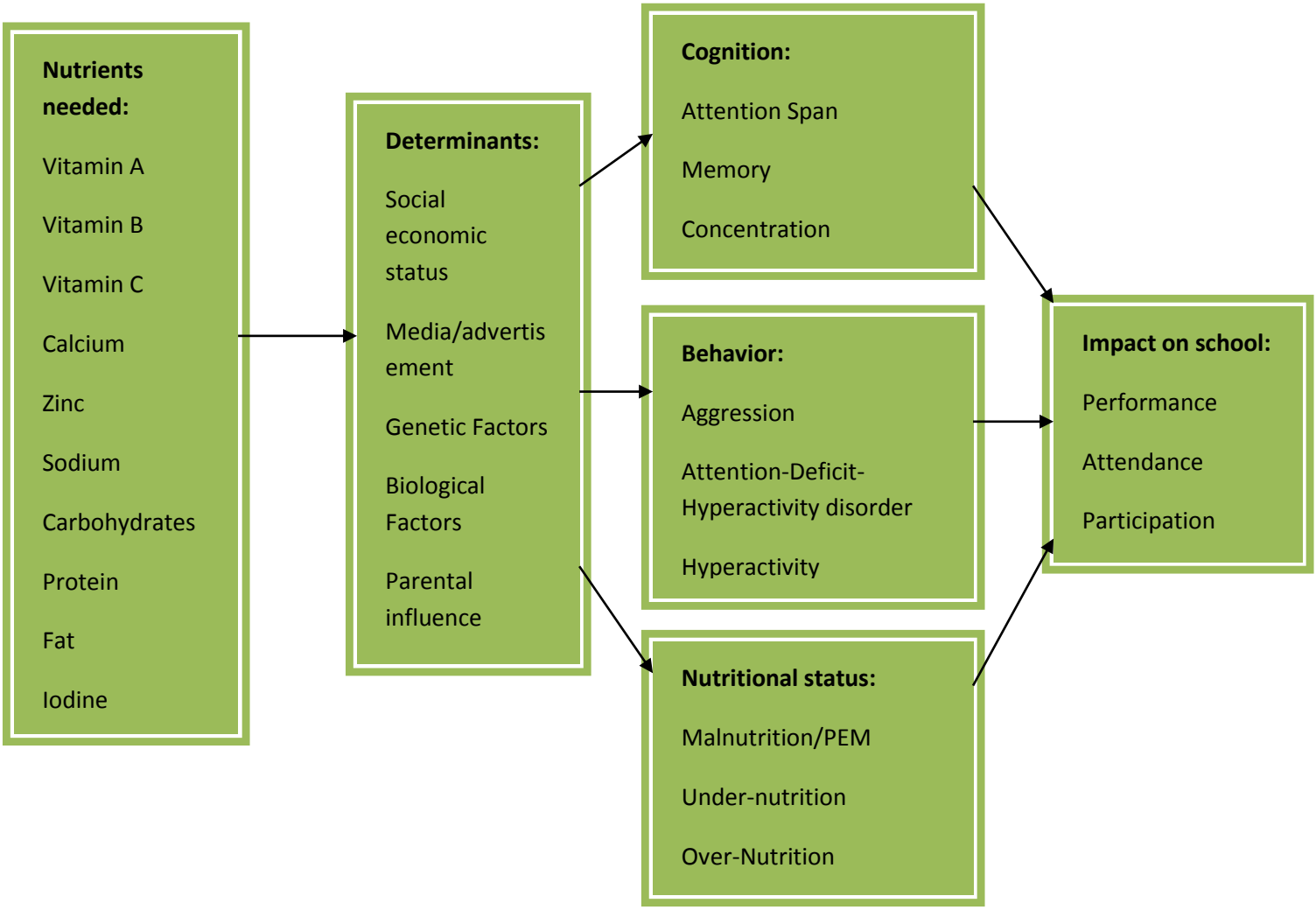
records of age to calculate two indexes: weight for height, as an index of current nutritional status and height for age as index of past nutritional history.

The World Health organization views nutrition as a fundamental human right that supports and influences every stage of life, at every level of being. It is within this broad context that the link between routine diet, attention span and scholastic performance among grade two scholars in circuit one in Khomas region is viewed.

In order to accomplish the objectives of this study as outlined in chapter one a wealth of literature produced information on the impact of specific nutritional deficiencies, or excesses on physical health, cognitive development and behaviour outcome. Some of the studies pointed out that the child's nutrition can be influenced by the parents, peers, advertisement in media, socio-economic status, genetic and biological factors as well as policies and guidelines. These factors determine what, when and how the child consumes the food, (Sorhaindo & Feinstein, 2006).

For the purpose of this study, the focus was only on limited literatures that yield information on children dietary patterns, the impact of nutrition on attention span (the ability to sit still and complete a task) and the performance of the child in schools thereof. In this view the following conceptual model was constructed as Sorhaindo & Feinstein, (2006) report that described the concepts as per title in length:

Conceptual model of the link between routine diet, attention span and scholastic performance among grade 2 scholars in circuit one in Khomas region.



2.2.2 Type of nutrients needed by children

There are several numbers of nutrients that each individual is required to consume particularly the young children as they are still in their development stage. While all nutrients are essential for good health, some are crucial for child development and learning. Proteins are needed for a child to grow at a healthy rate while Vitamins A and C support the immunity, keeping a child well enough to get to school every day. Iodine is one of the nutrients that many people do not think of, however not getting enough during the school years can reduce cognition among

children which hinders comprehension and performance in school. Iron is essential for healthy brain growth and lack of it can result in delayed development. Calcium is crucial for healthy bones growth, while fatty acids act as sources of energy for the child. Thus, a well-balanced diet ensures that children are getting adequate amounts of the nutrients they need to learn and develop. According to UNICEF (2013) and Sorhaindo & Feinstein, (2006) outlined below is the summary and description of nutrients considered essential for a healthy diet:

2.2.2.1 Macronutrients

Macronutrients are nutrients that provide calories or energy (UNICEF, 2013; Sorhaindo & Feinstein, 2006). Nutrients are substances needed for growth, metabolism, and for other body functions. Since "macro" means large, macronutrients are nutrients needed in large amounts. There are three macronutrients namely:

- **Carbohydrates:** are found in sugars and starch and are major sources of energy. Starch can be found in items such as potatoes, sweet potatoes, rice, wheat, maize and bread, while sugars can be found in items such as honey and jam.

- **Protein:** are essential for growth; repair of the body and to give energy to do work. The main sources of protein includes meat, fish, eggs, milk, cheese, cereals and cereal products, nuts and beans.

- **Fatty acid:** are crucial for absorbing vitamins and they are also a good source of energy. There are two categories of essential fatty acids: unsaturated fat found in oily fish, avocados, nuts and seeds, sunflowers and vegetable oils and saturated fat found in meat, cheese, butter and pastry.

Macronutrient recommendations for children: to reduce the risk of developing high blood cholesterol levels and subsequently heart disease children over the age of 3, fat intake should be around 25% to 35% of total energy (Grosvenor & Smolin, 2006; Thompson & Manore, 2010). A diet lower in fat is not recommended for healthy children of school age as they are still growing, developing and maturing. The average two year old needs about 1000 calories and 13 grams of protein per day and by age six that child will need about 1700 calories and 19 grams of protein per day, (Grosvenor & Smolin, 2006). The proportion of energy from carbohydrate recommended for children over the age of 2 is the same as that of adults 45% to 65% of energy.

2.2.2.2 Micronutrients

Unlike macro-nutrients which are needed in bigger amounts micro-nutrients only need a small amount in your diet, (UNICEF 2013; Sorhaindo & Feinstein, 2006). Since "micro" means small, micronutrients are nutrients needed in extremely small amounts but still very crucial nutrients that helps organs to grow and they are as follows:

- **Zinc:** is found in protein-rich foods such as meat, shellfish, dairy products, bread and cereals. It is found to help with the production of new cells and enzymes.
- **Iron:** is a very important mineral and is essential for making red blood cells in the body as well as to transport oxygen around the body. Food sources of iron include lean meat, fish, iron-fortified cereals, liver, poultry, beans, nuts, dried fruit, whole grains (brown rice), soybean flour and dark leafy vegetables.
- **Vitamin A:** is crucial for the function of the skin and mucous membranes. It is essential for vision, immune system as well as for growth and development. Vitamin A is normally found in liver, milk, cheese, butter, carrots and leafy vegetables.

- **Vitamin B:** is crucial to breaking down and releasing of energy from the food we eat as well as to maintain the nerves and muscles tissues. Vitamin B can be found in vegetables, milk, cheese, eggs, whole grain bread, pork, some breakfast cereals and fresh and dried fruits.

- **Vitamin C:** is mostly responsible for the formation of connective tissue found in skin, cartilage and bone and also part of the healing process for the injuries. Consequently, Vitamin C form part of the development of blood vessels and neurological function. Vitamin C can be found mostly in fruits and vegetables but can also be traced in milk and liver.

- **Calcium:** is mainly essential for development and maintenance of bones and teeth and can be obtained from the following items such as milk, cheese and other dairy products.

- **Iodine:** can be obtained from Iodized salt and seaweed. Iodine is a mineral that is essential for proper thyroid function. Iodine, when combined with the amino acid tyrosine, produces vital thyroid hormones that control our metabolism, enzyme and protein synthesis, and are essential in the development of the skeletal and central nervous systems of developing fetuses.

Micronutrients recommendations for children: in addition to serving fruits and vegetables to children it is crucial to serve food that are enrich in minerals (such as calcium, Iron and Zinc), (Thompson & Manore, 2010). This mineral can be obtained from fortified grains and breakfast cereals, raisins, eggs, lean meat, milk and cheese.

2.3 OVERVIEW OF NUTRITION SITUATION AT THE GLOBAL LEVEL

About one-third of children in the developing world are either underweight or stunted (low height for age) while more than 30 percent of the developing world's population suffers from micronutrient deficiencies, (MOHSS , 2012).

The study done in South Africa shows the differences in under-nutrition between rural and urban populations, between gender as well as between ethnic groups. Two examples, stunting in children and underweight in men, illustrate this statement, (Vorster, 2010). A recent national study showed that 26.5% of South African children in rural areas were stunted compared to 16.7% in urban areas (Vorster, 2010). The South African demographic and health survey (1998) showed that while only 5% of white men were underweight with a body mass index (BMI) of less than 18.5 kg/m^2, 12.1%, 12.9% and 16.9% of coloured, black and Indian men respectively could be classified as being underweight (Vorster, 2010).

While South Africa is one of the countries in Africa with food and nutrition security at the national level even at the extend of exporting some of its food, many South Africans go hungry and are food insecure because of various issues such as affordability, as well as the distribution and accessibility of nutritious foods to meet their needs and this have led to relatively high prevalence rate of stunting among children and underweight among adult men, (Vorster, 2010). According to Food and Agriculture Organization (FAO) 1997, 2001a food security can be defined as the human right to be able to access safe, affordable and sufficient food to be well-nourished and lead to productive lives. Thus, food insecurity exists when people are unsure where their next meal will be coming from.

In Zambia several studies were done on both pre-school and school aged children and these studies showed that malnutrition is a major problem in the country. During the last fifteen-years three national surveys documented the prevalence of malnutrition among preschool children: the 2007 Zambia Demographic Health Survey (ZDHS), the 2001-2002 ZDHS and the 1996 ZDHS (Central Statistics Office (CSO) et al., 2009, 2003, 1997 cited in Food Agriculture Organization (FAO), 2009). According to the most recent ZDHS conducted between April and October 2007, the prevalence of stunting among children under five years of age was 39%, the prevalence of wasting was 5% with 1% severely wasting and that of underweight was estimated at 19% (CSO et al., 2009 cited in FAO, 2009).

While at the national level, overall 39% of children under five were stunted and 16% were severely stunted. These studies showed that the prevalence of stunting increased rapidly with age. At age 0-6 months, 12% of the children were stunted, probably as a consequence of intrauterine growth retardation and/or prematurity. Prevalence increased during the first year of life and peaked at 49% in the age group 12-23 months. After 2 years of age, the prevalence of stunting remained very high (> 40%) (CSO et al., 2009 cited in FAO, 2009). Inadequate infant and young child feeding practices, coupled with high rates of infectious diseases and inadequate access to health care, are the principal proximate causes of the deterioration of the nutritional status after 6 months of age. The prevalence of stunting was significantly higher among children living in rural areas (42%) when compared to those living in urban areas (33%) while for wasting there was no significant difference between urban and rural areas; in urban area it was (4%) while rural area it was (5%). Regional variations in prevalence were substantial: prevalence was the highest in Luapula with (50%), and lowest in the Southern province with (30%) (CSO et al., 2009 cited in FAO, 2009).

Additionally, the Mother's education was found to be linked to nutritional status of children, although the magnitude of this effect was not large: the prevalence of stunting was 38% among children of mothers with no education while it was 32% among children of mothers with secondary or higher education. However, according to CSO et al., 2009 cited in (FAO, 2009) the educational level of the mother should not be interpreted as the direct link to stunting as there are confounding variables that can add the value to the nutritional status of the child.

According to (CSO and ORC Macro, 2003 cited in FAO, 2009) the 2002 Zambia DHS EdData Survey (ZDES), conducted between August and October 2002, was the first education survey of its kind in Zambia. This survey was representative at national level and the sample included all the 2001-2002 Zambia DHS households with children in the eligible child age range. The survey collected and analysed height and weight measurements for 2624 children age 7-9.99 years. This study indicated that overall 31% of school-age children (age 7-9.99) were stunted and 9% were severely stunted. Differentials in the prevalence of stunting by gender were significant: 35% of boys were stunted versus 26% of girls. As the case in South Africa children living in rural areas were twice as likely to be stunted as those living in urban areas. The prevalence of stunting was highest in Luapua (51%) and Northern (50%) provinces. Prevalence of stunting was considerably higher among children who had never attended school (49%) or who had attended only pre-primary school (43%) than among children who had attended primary school (23%). However, this information should not be interpreted as education has the direct link to stunting as the children who are attending schools are in the favourable socio-economic environment as most schools have feeding programmes.

The same study showed that the prevalence of underweight among school-age children was 17% in 2002. For boys living in rural areas and those living in Luapula and Northern provinces were

more likely to be underweight. The prevalence of underweight was also significantly higher among children who had never attended school when compared to those who had attended at least pre-primary school (CSO and ORC Macro, 2003 cited in FAO, 2009).

According to the study done in China rural area the prevalence of stunting among children in the surveillance sites was >40% over the study period, with a prevalence of severe stunting (below-3 Standard Deviation (SD)) from the international reference median value) of around 14%, (Chang Ying et al, 2003). This prevalence was considerably higher than the national average for China (32% below-2 SD of the international reference median value) and also higher than the national average for rural areas (36%), as estimated in the 1987 national grow survey. Consequently like in South Africa and Zambia the prevalence vary from one province to another in China the stunting prevalence was highest (>50%) in the study areas in Guizou, Hunan and Guangdong and lowest (23%) in Hubei.

While the prevalence of low weight-for-age among the surveyed children was 24-28% for all study years which is higher than the national average for China (21.3%) and also somewhat higher than the average for rural areas (23.7%) (25); also the prevalence of children <-3 SD of the median of the international reference population was about 4%, (Ying, Fengying, Wenjun, Keyou, Daxun, & Onis, 2003). Moreover, like for the stunting there was a significant difference of underweight across different provinces for example the Guizhou had the highest prevalence of underweight, followed by Hunan and Guangdong, with prevalence above 30%. While, the lowest prevalence underweight (12.7%) was in Hubei province.

The study done in Nigeria at Ekiti schools showed that children recorded to be malnourished were higher (49.4%) followed by normal children (45.5%) whereas overweight and obese were (13.7%) and (0.5%) respectively, (Adegun, Ajayi-Vincent, & Alebiosu, 2013).

Additionally, there was a significant difference between the nutritional status of pupil at the public school and private school in Ekiti. The pupils selected from the privately owned primary schools had higher nutritional status with a mean of 16.66 + 2.36kg compared to those in public primary schools with a mean of 15.46 + 3.10 kg. The calculated t-value of 3.919 was found to be higher and greater than the table t-value of 1.980 at 0.05 level of significance. This result shows that there is a significant difference in the nutritional status of children in public and private owned primary schools in Ekiti State, (Ying, Fengying, Wenjun, Keyou, Daxun, & Onis, 2003).

All the above mentioned studies in different countries showed a common trend of malnutrition, stunting or underweight. The nutritional status is influenced by long-term dietary inadequacy, recurrent illness and is notably associated with increasing chronic food insecurity, limited access to health care, and high poverty levels, high disease burden exacerbated by the HIV/AIDS pandemic, lack of sanitation and poor access to quality nutrition, (FAO, 2009; Adegun, Ajayi-Vincent, & Alebiosu, 2013; Vorster, 2010; Ying, Fengying, Wenjun, Keyou, Daxun, & Onis, 2003).

Additionally, as observed across all the studies done in different countries the high prevalence of stunting observed across school-age children can be related to the high prevalence of stunting observed among preschool children as the potential for catch-up growth among stunted children is thought to be limited after the age two years, particularly when the children remain in disadvantaged environments, (FAO, 2009; Adegun, Ajayi-Vincent, & Alebiosu, 2013; Vorster, 2010; Ying, Fengying, Wenjun, Keyou, Daxun, & Onis, 2003).

2.4 OVERVIEW OF NUTRITION SITUATION IN NAMIBIA

Malnutrition remains a public health problem in Namibia since almost one out of every three children under the age of five is malnourished, (NAFIN, 2010). Additionally, the percentage of underweight children (too thin for age) has declined in the last two decades stunting (too short for age) and wasting (too thin for height) has increased drastically despite the economic growth experienced by the country which led it to be classified as an upper middle income country. Nevertheless, despite the tremendous economic growth experienced by the country the wealth did not benefit the individuals on the ground.

According to (NAFIN, 2010) the geographical general pattern in Namibia indicates that the regions with high levels of poverty, low literacy rates, high HIV/AIDS prevalence rate and with predominantly rural populations have the highest levels of stunting ranging from 39% in Kavango, Hardap, Ohangwena to 22% in Khomas, Erongo and Omaheke to mention the few. Moreover, children born in the poorest and second poorest wealth quintile households have a three-fold risk of being stunted compared to those born in the richest quintile.

Consequently, approximately four percentages of the children were found to be overweight or obese. This over-nutrition was more persistent in urban settings compared to rural settings (7 percent compare to 3 percent in rural areas) and in wealthier households (NDHS 2006/7). In addition, another contributing factors to the obesity or overweight of the children is the mothers level of education and/or if the mother is obese or overweight herself.

In Namibia the contributing factors can be to lack of exclusive breastfeeding, poor hygiene, sanitation and caring practices as well as poor maternal health and nutrition status. Breast milk can meet the infant’s energy, protein, calcium, vitamin A, Vitamin C, iron folate and zinc

requirements up to 70% however, most of the Namibians are not aware of the benefits of exclusive breastfeeding (NAFIN, 2010). The infant is usually exclusively breastfed for the first two months and thereafter they are fed with bottle milk. Studies have shown that babies that are not breastfed have shown to be five times more likely to die of infectious diseases than those infants that are breastfed in the first two months of life and twice as likely to submit to infectious disease within the first half year of life.

Consequently, in some instances low sanitation coverage and sub-optimal hygiene practices such as infrequent or lack of hand washing with soap prior to feeding babies and food handling can lead to infectious diseases that can compromise the infant's nutrition. The nutrition of the child who grows up in the environment with low sanitation can be compromised due to competing with invading pathogens, (NAFIN, 2010). Although access to safe drinking water and sanitation facilities has increased considerably there are quite a number of schools with no access to safe water and sanitation systems, (MOHSS, 2008). Absence of these facilities contributes significantly to diarrhoea, schistomiasis and scabies among learners which in turn can contribute to the absence rate in school.

Additionally, a third critical factor in infant and childhood malnutrition in Namibia is the mothers' nutrition and health status and care during pregnancy, (NAFIN, 2010). This was proven in the Namibia Demographic Health Survey (NDHS) 2006/7 report shows that children born to underweight mothers were two to three times more likely to be severely stunted compared to children born to normal or overweight mothers. Hence, with 1 in 10 urban and 1 in 5 rural women who are underweight respectively, the potential for the ongoing cycle of inter-generation stunting to continue is very high.

Consequently, micronutrients deficiency (which is the deficiencies of vitamin A, Iodine and iron) also known as hidden hunger prevails among the under five years old. The current data available shows that Vitamin A is the most common deficiency in Namibia with 23.5% preschool children with plasma level of Vitamin A less than 0.70 µmol/l, (NAFIN, 2010). Consequently, available data shows that 1437 children less than five years of age had anaemia while 2419 children older than five years were anaemic. The study done by Chotard, et al., 2006 cited in (NAFIN, 2010) shows that among primary school learners in Caprivi region 43,9% of boys and 33% of girls had anaemia respectively. Iodine deficiency is another public health problem in Namibia with the national prevalence rate which was found to be 28.7% with the highest being 70% was found in Kavango region, of the population with urinary iodine of less than 100µg/L (WHO 2004 cited in (NAFIN, 2010).

The study done by the MOHSS 2004 on the health of the learner done in all the health directorates shows that 39.3% of students always eat and/or drink something in the morning before they go to school, while 18.8% never eat and/or drink something and 23% eating and/or drink only sometimes. Whereas male students are less likely (38.4%) than female students (40.1%) to eat and/or drink something in the morning before they go to school. The highest percentage of students (26.8%) who never eat/drink something in the morning before they go to school fall in the 12 years of age group category compared to the lowest percentage of 17.5% under the category 13 to 15 years.

The main reasons why the students do not eat and/or drink in the morning before they leave for school are amongst others, not having time for breakfast (23.4%), inability to eat in the morning (16.7%), lack of food at home (13.3%) and dislike of food at home (3.4%). Students who

reported that they do not eat and/or drink something in the morning are mostly in the age group of 12 years and younger because they didn't like the food at home while children 16 years and older (19.7%) reported that there is always no food at home. Although the majority of learners reported having eaten and /or drink something in the morning, there is a significant number of responded who indicated of not eating anything due to lack of food at home or having enough time to prepare the food and this should not be overestimated as it can impact on the academic performance of the students, (MOHSS , 2004).

The nutritional status of Namibians particularly the one of the children is affected by the lack of access to diverse diets rich in micronutrients and less consumption of fruits and vegetables by both the adults and children. People tend to eat the same kind of food year round hence the staple food in Namibia are based on the maize meal or millet which is prepared as porridge and served with either fish, red meat or spinach, (MOHSS , 2012).

There is limited literature that shows the current nutritional status of the school going learners in Namibia and the impact thereof. However, with the current nutritional status of the mothers and the under-five year's population and the dietary behaviours of learners it shows that the primary school learners' nutritional status could be compromised. This could result in reduction of resistance to diseases, impairment bone and muscle development and weakens eyesight and hearing, diminish wellbeing and activity and leads to poor concentration at school, (MOHSS , 2008; MOHSS , 2004). There is a great scarcity of local literature on school aged children, attention span in class, nutritional status of scholars and diet as well as the scholastic performance thus led to limited local literatures to be review.

2.5 CONTRIBUTING FACTORS AND DETERMINANTS OF HEALTHY EATING

The contributing factors and determinants of healthy eating are environmental and parental influence; media and advertisement as well as biological and genetics and they are described as follows:

2.5.1 Environmental and parental influence

According to (Sorhaindo & Feinstein, 2006) although there are innate taste preferences there are a number of learning processes that can modify these inclinations for example exposure to unknown foods increases the likelihood of acceptance of new tastes. There are additional things around the globe that can influence the child or adult's food preferences. Sorhaindo & Feinstein, (2006) identified five changes in the wider societal relationship with food that influence eating as illustrated below. Firstly, the abundance and availability of food in industrialized countries may have diminished its value in recent times. Secondly, advertising and marketing of food has added emotion to consumption similar to that associated with other non-food products. Thirdly, the development of food production has increased the distance between the origins of food and the product consumed, with consequent potential changes in the way we relate to food. Fourthly, development in transportation and distribution has meant that many foods are now available anywhere, all year round, whereby previously certain foods only used to be available in certain regions in particular seasons. Lastly, the societal context in which food is consumed has also changed. The society has shifted from community or group based to individualistic whereby you can literally find an individual eating without any company.

The parenting style is an additional aspect that can influence the development and the preference of the food the child will opt to eat. For example a study using the data from ALSPAC found that

the age at which young children are introduced to lumpy foods is related to their later eating practices, (Sorhaindo & Feinstein, 2006). This data revealed that mothers who reported that they introduced lumpy food to their children before six months were less likely to experience eating difficulties, such as not eating enough, refusing the right foods, being choosy with food, resisting to becoming part of a routine or developing clear likes and dislikes around food. In the same study the results showed that weaning was associated with more difficulty when it comes to eating.

It is very crucial to cultivate the food preference in children in their early life. The study done in 2003 among 564 London parents or caregiver of two to six years old children have proven this. The analysed data showed that there are food associations between demographic, individual child and parental feeding characteristics and fruit and vegetable consumption. The children of parents with more education and from families who held traditional family mealtimes and those once who were breastfed exclusively as infants had higher intake of fruits and vegetables compared to other groups, (Cooke et al., 2003). The parental behaviour such as eating pattern, type of food eaten at home, early initiation of feeding and introduction of both fruits and vegetables and any other food for that matter is great determinant of the food intake by the children.

2.5.2 Media and Advertisement

Advertising and marketing products through radio and television has a greater impact in influencing the kind of food both the adults and children will prefer to eat. For example, with every house with a radio and television the children are overwhelmed with messages encouraging them to purchase and consume foods that are largely high in calories, fat, sugar

and/or salt, (Sorhaindo & Feinstein, 2006). Additionally, these advertising agencies are trying all the means to ensure that their messages are heard across to all individuals including the children who in turn influence their parents' shopping decision. In fact, if the parents do not want to argue with their children they will prefer to buy whatever the child is requesting or wants to eat that time. This was proven by the research in developmental psychology that suggested that advertising stimulates materialism in children and may instigate parent-child conflict and unhappiness, Buijzen and Valkenburg, (2003).

According to Ashton (2004) there are no definitive conclusions that there is a relationship between advertising and the behaviour of food consumption among children due to limited studies and/or literature done in both the United Kingdom (UK) and United State of America (USA) and the worldwide in particular. Additionally, some argue that it is not a responsibility of the advertising agency nor of the media or the policy makers to ensure that children are eating healthy foods but for the parents, teachers or the guardians to enforce healthy eating style among their children's. The advertising agencies and the media for that matter are there to comply with their clients request as well as to make profit.

However, despite all these arguments different efforts are made by policy makers and the like to ban companies from advertising heavily sugary food products in an effort to reduce the demand for foods that compromised children's health, (Sorhaindo & Feinstein, 2006).

2.5.3 Biological and genetic factors

There are various ways in which children can acquire the food and taste preferences such as biological, genetic or innate inclinations. According to the study done by Benton (2004) genetic

similarity explains about 50 to 90 percent of variation in the adiposity of members of a family. Nevertheless the study highlighted that despite the genetic having influence in determining the taste and food preferences the lifestyles and the environment have the greater impact on the outcome.

Consequently, the study revealed that in case of the twins genetic similarity was related to the intake of macronutrients. In these studies, heritability accounted for the intake of macronutrients even when accounting for the environment, Benton 2004. Thus, although the foods differed the pattern of the macronutrient intake was similar. In this regard the heritability plays a big role in people's making choices about the nutrient intake.

Additionally, Benton (2004) on the same review of studies, further consideration was done on the genetic predisposing through the review of research on innate taste preferences. Whereby, he referred to the studies done in late 1970s and 1980s that found that the new-borns seemed to demonstrate preferences for sweets and salty flavours.

2.6 BENEFITS OF BREAKFAST

Breakfast of all the meals during the day is particularly important in meeting children's nutrient needs because it provides the first energy and nutrients of the day. Thus, as they grow and become more active their kilojoules and nutrient requirements grow with them hence nutrients need increases with the age. The brain is one of the crucial parts of the body that needs constant supply of the nutrients to function properly. Thus, eating breakfast is crucial to provide the children with energy for their brains to improve their learning skills.

However, in the rush of a busy morning, many parents may rely on fast or unhealthy frozen meals as breakfast for their children and many don't even eat a morning meal. A healthy breakfast filled with fibre and protein is the best way of getting the child off to the best start for a successful day at school. Students who eat breakfast before school were more likely to receive better test scores and grades compared to the students who did not have breakfast. They are also more likely to comprehend what was learned in the classroom.

Additionally, according to Janice and Melinda (2010), school attendance affects the child's nutrition in several ways. Firstly, in the morning between waking up and getting out of the door many children minimize or skip breakfast completely. Children who do not eat breakfast are more likely to do poorly on schoolwork, have decreased attention span, and have more behavioural problems than their peers who do eat breakfast. Secondly, during break time instead of eating the food they brought from home, some of them spend their time playing, skip certain foods or trade their food while some might not have eaten breakfast but still did not have any food they have brought along to eat during break time.

If the child has more than the 12 hour gap between dinner and breakfast it can cause a decline in blood glucose levels and lead to glucose deprivation, (AL-Oboudi, 2010). If this happens in sufficient degrees, it can result in a rapid disturbance in cerebral function. Usually missing breakfast can negatively affect cognitive performance. The gradual decline of insulin and glucose levels could cause a stress response, which interferes with different aspects of cognition function, such as attention and working memory. It is plausible that the decline in cerebral iron level, likely to result from the diet that is deficient in heme, intensifies the stress associated with

overnight and morning fast (AL-Oboudi, 2010). This is why breakfast is commonly referred to as the most important meal of the day.

Consequently, the young people who skip breakfast are more likely to be overweight than those who don't skip breakfast, skipping breakfast means probably feeling very hungry by morning tea time, (AL-Oboudi, 2010). Additionally, some studies have shown that children who skip breakfast are more likely to have a higher intake of sugar and fat in their diets. They are also more likely to be lacking essential vitamins and minerals in their diets such as calcium, iron and zinc, (AL-Oboudi, 2010). This theory was proven to be true when AL-Oboudi got the significant result in her study among girls in Saudi Arabia who turned out to be overweight or obese because they were skipping breakfast.

Several studies done indicated that verbal fluency, arithmetic, tests of attention, memory, creativity, physical endurance and general tests of academic achievement and cognitive function improved when breakfast was consumed, (Taras, 2005). According to Florence, Asbridge, & Veugelers, (2008) in different articles review done by Taras and Rampersaud concluded that the provision of a healthy breakfast through school breakfast programs is effective in improving cognitive functioning and academic performance, especially among undernourished population.

While the entire dietary pattern of children is important to cognitive function and school performance, breakfast is identified as a leverage point that schools can use to increase achievement.

2.7 EFFECTS OF POOR NUTRITION

The inconsistency of eating nutrient rich meals both individually and collectively, affects children's ability to learn through five major casual pathways: sensory perceptions, cognition, school connectedness and engagement, absenteeism and temporary or permanent dropping out. Nutrient deficiencies are linked to physical, mental and behavioural health problems as well as learning deficiencies, lower arithmetic grades and repeating grades. Additionally, nutritional deficiencies can contribute to other key health disparities such as vision, inattention and hyperactivity, (Sorhaindo & Feinstein, 2006) . These effects are cognitive and behavioural and are described as follows:

2.7.1 Cognition effects

According to Benton, (2011) it has been believed that with the normal dietary regime homeostatic mechanism maintain blood glucose levels in the range needed for the brain function. However, there are reports that stipulate that the nutritional composition of meals can influence cognitive functioning and one of the suggestion is that the speed at which glucose is released into the blood stream after eating influences brain functioning, (Benton, 2011). For example children who ate caloric meals on different days, memory, attention and the time on task in classroom were better if the breakfast released glucose more slowly, (Benton, 2011). Moreover, some studies have reported that consuming a glucose-containing drink, children aged nine to eleven years were found to have better memories and spent more time on task when working in class, although the ability to sustain attention was not influenced, (Benton, 2011).

On the other hand, according to (Sorhaindo & Feinstein, 2006) the type of food eaten can have an impact on children's ability to think in the short and long-term. The study review of research

on the effects of deficiencies in zinc, iodine, iron and folate on the cognitive development of school-aged children highlighted the significance of nutrition in the post-infancy period. For example, deficiencies in iron and zinc have been associated with impairment of neuropsychological function, retardation of growth and development, reduced immunity and increased vulnerability to infectious diseases, (Sorhaindo & Feinstein, 2006). Thus, children who do not consume enough iron may exhibit a shortened attention span and decreased alertness. Low iron or mild anaemia can also cause fatigue and decreased physical capacity, interfering with concentration and attention.

Whilst, according to Benton (2011) throughout the world an inadequate intake of iron occurs commonly, potentially resulting in iron-deficit anaemia that is associated with poor mood, tiredness and problems of memory and attention. Mostly, if iron deficiency occurs in the first year of life, problems of cognition continue into later life and the damage done cannot be reversed even if succeeding iron consumption is sufficient. Whereas, if iron deficiency occurs during adulthood can cause short-term problems, it can be reversed with sufficient consumption of iron, (Benton, 2011).

Whilst, the test done on animals suggested that zinc deficiency in late pregnancy impairs neuronal replication and synaptogenesis, and it also reduces the ability to learn, concentrate and memorize while during rapid growth in the early life of the child, zinc deficiency has been associated with increased emotional responses to stress and impaired motor activity (Benton, 2011; Bryan et al., 2004). Most studies done on older children showed less evidence on the impact of the zinc supplementations while the study done on the preterm human infants show significant impact of the zinc supplementation since it resulted in fast growth and better motor

development, (Benton 2011). While a study on zinc supplementation done in Canada among children aged five to seven years did not influence motor development of the children it however suggested that those with poor zinc status grew more quickly, (Benton, 2011). However, the study done in China on zinc supplementation among children aged six to nine years showed improvement on cognition but however it was in combination with other micronutrients, (Benton, 2011).

According to Sorhaindo & Feinstein (2006) iodine assist the body to synthesise thyroid hormones that are required for the brain development during foetal and early postnatal life. Iodine deficiencies leads to low visual-motor performances, motor skills and perceptual and neuromotor abilities and low development quotients on intelligence tests. Additionally, a study done in China shows that a 10 to 15 IQ point deficit has been reported in the areas of severe iodine deficiency even in those who appeared normal, (Benton, 2011) Moreover, according to Sorhaindo & Feinstein, (2006) iodine deficiency is considered one of the major preventable causes of brain damage and mental retardation.

Some studies done among adults and adolescence have shown that intake of sufficient vitamin B in their earlier lives was crucial for the development of the central nervous system as well as to their cognitive abilities. A clinical research has found that there was a connection between early life vitamin B12 deficiency and reduced scores on cognitive tests in adolescence, (Sorhaindo & Feinstein, 2006). In additionally, according to Benton, (2011) a review of the effects of vitamin B12 deficiency in infancy found a pattern of irritability, anorexia and development delay. While, another cross sectional study done among adults found a positive association between low folate intake or status and cognitive perfomance, especially memory, (Bryan et al., 2004).

2.7.2 Behavioural effects

Poor intakes of protein, zinc, iron and vitamin B and all nutrients linked to brain development can lead to anti-social behaviour. Students experiencing hunger are more likely to be hyperactive and suspended from school. According to Sorhaindo & Feinstein, (2006) children diagnosed with Attention-deficit-hyperactivity disorder (ADHD) suffer from difficulty in concentrating, sitting still and being quiet and tend to have short attention spans. This kind of behaviour can affect the scholars school performance and interaction with other peers as well as compromise self esteem. Lack of thiamin (vitamin B) in adolescence can lead to development of behavaioural problems such as irritabilty, aggressiveness and personality changes, (Bellisle, 2004) .

2.8 DIETARY PATTERNS AND NUTRITIONAL STATUS

A person needs nutritious diet for the well-being and good health, thus if the body receives all the nutrients in appropriate amounts to meet the requirements of the body thus the body is in the good state of good nutrition. Whereas, if there is a lack of or excess intake of one or more nutrients or faulty utilization of nutrients in the body it leads to the condition known as malnutrition. Malnutrition has two faces namely under-nutrition and over-nutrition and their impacts on the persons are discussed below.

2.8.1 Under-Nutrition

The person becomes undernourished when nutrients are depleted due to inadequate nutrients intake overtime (Dabone, Delisle, & Receveur, 2011). Intake of inadequate food that results inadequate nutrients can lead to PEM, iron, iodine and Vitamin A deficiency among others. The research done in Burkina Faso shows that micronutrients such as anaemia and vitamin A

deficiency were highly prevalent, 40.4% and 38.7% respectively, (Dabone, Delisle, & Receveur, 2011). The same study showed that thinness affected 13.7% of school children but however there were no significant differences between boys (14.2%) and girls (13.2%).

PEM is one of the deficiencies that can be caused because of inadequate nutrients that results when the body needs for protein, energy fuels or both cannot be satisfied by the diet and they occur simultaneously, (Grosvenor & Smolin, 2006)**.** It is severity ranges from weight loss or growth retardation to distinct clinical syndromes frequently associated with deficiencies of minerals and vitamins. The clinical syndromes can be kwashiorkor (predominant protein deficiency) or marasmus (mainly energy deficiency). Iron deficiency anaemia can lower a child's resistance to illness and slow recovery time, (Grosvenor & Smolin, 2006)**.** Additionally, it can also affect learning ability, intellectual performance, stamina and mood.

2.8.2 Over-Nutrition

The person is over nourished when they consume excessive nutrients with calories, fat; saturated fats and cholesterol overtime. The person who is over nourished is at risk for non-communicable diseases such as hypertension, heart disease, diabetes, and sleep apnea (Insel, Turner, & Ross, 2002)**.** The study done by Lazzeri, Pilato, & Giacchi, (2011) shows a positive relationship between the parents BMI and the children BMI. In the study it shows that the parents obesity was one of the most important factor that favoured an increase of the children's weight and obesity. The parents are responsible for the quality and the availability of food within the home and for this reason if the parent's food habits are incorrect those of their children will follow. Obese children are less well accepted by their peers and are frequently ridiculed and teased than normal weight children, (Grosvenor & Smolin, 2006). The ridiculed children perform poorly in school due to low self-esteem and sometimes not turning up to school in order to avoid the teasing.

2.9 IMPACT OF NUTRITION ON SCHOOL

There are various confounding variables that can have an impact on school performance, concentration and participation other than nutrition and they are recognized such as gender, absence or presence of both or one parent (s), level of parents, caretakers or guardian education, ethnicity, quality of school and school experience, child health, death in the family, migrating and socioeconomic status of the parents, caretakers or guardians. However, this research is focused on outlining the importance of quality diet in relation to concentration and participation in schools and most importantly academic performance.

2.9.1 Academic Performance

Undernourished children have been shown to have decreased attendance, attention and academic performance as well as experiencing more health problems compared to well-nourished children (Florence, Asbridge, & Veugelers, 2008).

In a study done among 5200 grade 5 students in Nova Scotia, Canada on diet quality and school performance demonstrated an association between various indicators of diet quality in relation to academic performance, (Florence, Asbridge, & Veugelers, 2008). Students reporting increased diet quality were significantly less likely to fail the literacy assessment, whereas students in second and third class 26% and 41% respectively were less likely to fail the literacy assessment. Whilst, students with an increased fruit and vegetable intake and lower caloric intake of fat were significantly less likely to fail the assessment; while boys were twice as likely to fail their literacy assessment compared to girls.

According to Sorhaindo & Feinstein, (2006) iron deficiency in infancy can cause developmental problems in central nervous system that can later impact upon cognition. This was proven by the research that was done in the United States among 5398 children aged between 6 and 16. The study revealed that children with iron deficiency obtained lower scores in mathematics test. The children with iron deficiency were twice as likely to score below average on mathematics tests even after allowing for potential confounders and this findings were more pronounced among girls, (Halterman et al., 2001).

2.9.2 Active Participation in school

In developed countries about one in three kids and teens are overweight or obese. The childhood obesity is now the number one health concern among parents in developed, topping drug abuse and smoking. Among children today, obesity is causing a broad range of health problems that previously were not seen until adulthood. These include high blood pressure; type 2 diabetes and elevated blood cholesterol levels, (Association, 2013). There are also psychological effects: obese children are more prone to low self-esteem, peer acceptance, negative body image and depression, thus they participate less in classroom and in school in general, (Association, 2013; Sorhaindo & Feinstein, 2006). Like adults, adolescents have negative attidutes and stigmatized against other children who are obese or overweight. This theory was proven by a study done with a cross-section of high school students (n=786) in the United States of America (USA) which found that only 12 percent of the students had dated someone who was overweight or obese. Consequently, the same study point out that overweight or obese children were unlikely to sit during breaktimes or study with other children who are not obese or overweight, (Sorhaindo & Feinstein, 2006).

2.10 HOW TO IMPROVE NUTRITION

Improving of the child nutrition should start with the mother throughout her life or particularly during pregnancy, because the human brain develops faster than other organs, particularly in the last third of pregnancy and the first two years of life, (Benton, 2011).

In the study done in Albania supplementation of iodine deficient children was reported to have improved measures of cognition and motor skill, (Benton 2011). It was found out that eighteen months old children who received iron supplements in a double-blind trial had a greater than expected psycho-motor development. Thus making sure the child has eaten a dense breakfast and lunch is one of the primary ways to prevent the negative cognitive effects that poor nutrition can have on school performance.

2.11 SUMMARY

Although common sense tells us that poor health, particularly malnutrition, contributes to poor school performance and although there is substantial body of literature backing up this common sense in Namibia there has not been adequate research of the subject nor adequate dissemination of the research that has been done nor adequate application of the research, in the sense of policies and programs to combat ill-health and malnutrition among school age children. In this regard, the research study is aiming to seek remedy for some of these inadequacies. Chapter 3 focuses on the research methodology applied to this study.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 INTRODUCTION

According to Brink (2006) methodologies are used by the researcher to obtain sources of information, such as subjects, elements and unit of analysis, to collect and analyse the data and to interpret the results as well as to make recommendations and conclusions. Thus, it is crucial for all the research studies to outline the methodologies used in order to guide other researchers as well as the readers. Hence, in this chapter the following have been outlined and discussed in length, the research design, strategies and methods employed, identification of the population study and sampling methods, instruments used for data collection, methods used for data analysis as well as the ethical considerations.

3.2 RESEARCH DESIGN

A research design is a set of guideline, plan and instructions to be followed in addressing the research problem. The research design enables the researcher to foresee what the appropriate research decision should be in order to minimise errors and maximise the validity of the research result, (Brink, 2006).

Thus, the study undertook the quantitative and descriptive research designs which are non-experimental in nature to determine and describe the link between routine diet, attention span and scholastic performance among grade 2 scholars in circuit one in Khomas region. Quantitative research designs emphasize measurement in the collection and analysis of numerical data, causality, generalization and replication. The epistemological basis for quantitative research is the positivism paradigm. Positivism advocates the application of the methods of the natural sciences to the study of social reality (Jupp, 2006). Instrumentation is

conducive to an objective, positivistic approach such as surveys, structure questionnaires, and standardized norms and standards (indexes).

In this study, data collected produced numerical values, i.e. non-numerical values from the two-week routine diet diary were converted to numbers as part of the analysis process (Jupp, 2006). Numerical data can be durations, scores, counts of incidents, ratings, or scales. Data in numerical form facilitates the measurement of variables and statistical analyses. Descriptive statistics are used to illustrate and summarize findings on key variables, and detect relationships between variables, as in correlation coefficient values. The advantage of quantitative research is that data obtained via these methods can be subject to considerable statistical analysis and can be generalized beyond the sample under investigation.

While, descriptive designs are used in the studies where more information is required in a particular field through the provision of a picture of the phenomenon as it occurs naturally, (Brink, 2006). Additionally, according to Brink (2006), descriptive designs are based on the following assumptions:

- The variables exist in the study population as a single variable that is amenable to description.
- There is insufficient existing literature describing the study population or the variable
- The study may commence without a theoretical framework but the researcher should provide the rational for the study based on the thorough literature review.
- Existing studies may provide the rational and theoretical framework for the study at hand in the case of a known concept
- In a study where the criteria for external validity cannot be met owing to the unknown population parameters.

Descriptive design are used to gather information from a representative sample of the population, hence the correct sample should be calculated for the study. Consequently, a descriptive design uses structured observations, questionnaires, interviews and/or survey studies to arrive at the final findings and conclusion of the research.

3.3 RESEARCH POPULATION

The target population for this study consisted of all the Grade 2 scholars within circuit one in Khomas region. Grade 2 scholars were chosen because at least they have gone through the first level of Primary school, which is grade 1. The schools in Namibia particularly in Khomas region are divided into circuits in order for the inspectors to be able to manage the schools accordingly. Hence, the schools in Khomas region are demarcated in four (4) circuits whereby circuit one was randomly selected for the study. It was essential to select the scholars within the same circuit because Grade 2 scholars within the same circuit are taught similar academic content, and because of uniform (similar) scholastic progress assessments done within the same circuit.

Consequently, another population of interest was the parents, guardian or caregivers of the grade 2 scholars who are schooling in circuit one in Khomas region. The parents, guardian or caregivers for the grade 2 scholars were selected because they have a better understanding on what type and quantity of the food their children have eaten during the course of the two (2) weeks, additionally they also know better on what happened in their child's lives.

According to the 15-days statistics of the Ministry of Education (MOE), there were 18 primary schools in circuit one in Khomas region with a total of number 2203 Grade 2 scholars (Ministry of Education, 2011; Ministry of Education, 2010). Thus, the sampled was calculated based on the

total number of grade 2 scholars in circuit one while the number of parents to be interviewed was determined based on the number of scholars selected.

3.4 SAMPLING METHOD AND SAMPLE

Since the study employed quantitative research methodology probability sampling methods were determined as the appropriate methods to be employed during the study. According to (Brink, 2006) probability sampling gives an equal opportunity for all the elements in the population to have an equal chance of being included in the sample. Consequently, it permits the researcher to estimate the sampling error, to reduce bias in the sample or sampling and it also makes it possible for the researcher to use inferential statistics correctly as well as to obtain the findings that can be generalized to the population.

Hence, the study employed stratified as well as the simple random sampling, (Jupp, 2006). According to (Brink, 2006) in simple random sampling the elements or subjects are drawn in a random way from the sampling frame whereas with the stratified random sampling the population is divided into subgroups or strata according to a variable or variables of importance to the study, so that each element belongs to one and only one stratum.

In this regard, firstly, the list of the primary schools in circuit one was obtained from the Ministry of Education. Thereafter, this eighteen primary schools listed in circuit one were stratified into two (2) groups based on the grade 5 scholars performance as per the 2011 National Standardized Achievement Test (NSAT) whereby each subgroup had nine schools one subgroup with highly performing schools and another subgroup with low performing schools respectively.

A simple random sampling was employed to select one primary school from each subgroup. Consequently, after one primary school was selected from each subgroup, simple random was

employed to select one class from each selected schools out of four grades two's from each selected school. The two schools selected from the subgroups were Khomasdal Primary school and MH Greef Primary school, each of these schools had 4 grades two's for example grade 2A, 2B, 2C and 2D. Out of these 4 grades two's from each school at least one grade was selected. Automatically, the parents, guardians and/or caregivers were selected based on the school and the grades selected for the study.

3.5 RESEARCH INSTRUMENTS

During the study five types of instruments were used for data collection, namely the structured food frequency questionnaire, a standardized Conner Teacher Rating Scale (CTRS-R), psychometric test, performance checklist as well as the Anthropometric checklist/calculator. The structured food frequency questionnaire contains the instructions, the demographic details of the scholars as well as the responses options under different type of food groups, for a example each type of food was categorized according to certain group of food whereby for example all types of vegetables were under one category and all types of beverages were under one category to mention a few. Additionally, every type of food mentioned in the questionnaire had the colourful picture next to it in order to make it easier for the respondent. The parent was required to checked by ticking (✓); the most suitable portion size of food.

Consequently, next to each type of food the measurements were shown in order to make it easier for the researcher to calculate the amount of food each selected scholar ate in that particular day. Although the questionnaire seems to be comprehensive with all type of foods in Namibia, the researcher acknowledges that there might be type of food that are not listed in the questionnaire,

thus provision was made under each category by leaving an open space to capture the response option others under each type of food.

The questionnaire also provides for reporting of the parents' pay-day(s) (date of payment), together with reporting of all unusual events experienced during the sample two-weeks that might have influenced the routine food-intake of the scholars, e.g., a birthday party, illness of the child, house guests, changed circumstances that might impact on the scholars' appetite, availability of pocket money for tuck shop purchases, reporting of specific purchases at the tuck shop, the contents of the scholars' lunch boxes (if applicable), etcetera.

Reporting of the pay-day and any unusual or additional events enables the researcher to detect unusual fluctuations in the sample routine food intake on an individual basis, e.g. any upward spiking or any downward tightening of routine food intake reported for a period of two weeks. In the event thereof that unusual fluctuations in the reported routine food intake of scholars can be attributed to specific factors, e.g., pay-day, illness, birthdays. Consequently, a response option, requiring reporting of the Grade 2-scholar's physical activity level on a daily basis was captured. The questionnaire was administered by the parents, guardian and/or caregivers of the scholars selected for the study.

The second instrument the standardized Conner Teacher Rating Scale (CTRS-R) was used to obtain data on the ability of the scholars to sustained attention and was administered by the class teacher of the selected class. The CTRS-R contains the instructions on how to complete it, the demographic details of the scholars as well as the responses options that are divided into three parts. Part one focuses mostly on the attention span of the learner while part two focuses on the behaviour of the scholars as well as the cognitive abilities, while part three focus was mostly on

the background, the experience of the scholars or activities in the scholar's life that can lead to the way he or she behaves. Question one to ninety nine in part one to two had the scale of responses from not at all to just a little, quite a bit as well as very much while part three responses for question 91 to 100 were as follows: no, yes and uncertain.

The third instrument that was utilized during the study was the Performance checklist that was used to capture the continuous assessment marks (CASS) as well as the final first term marks for each students for all the subjects taught at that particular school.

Additionally, the height and weight of each learner were measured by the trained fieldworkers. All scholars were weighed (in kg to the nearest 0.01 kg) without shoes and jerseys using a digital scale. Height was measured (in cm to the nearest 0.1cm) using a stadiometer, which was placed on an even surface. All scholars stood on its base without shoes, with heels together, looking straight ahead. Thereafter the data was entered into the anthropometric checklist and/or calculator which was utilized to capture the date of birth, the date of data collection, the gender and the weight and height of the scholars. The BMI as well as the BMI percentile was automatically calculated based on the information entered.

Finally, five types of psychometric checklists namely, auditory long-term memory, auditory short-term memory, auditory sequencing, one minute reading test, visual discrimination test were used to test performance, concentration as well as listening comprehension.

3.6 PILOT STUDY

According to Brink, (2006) a pilot study can be referred to as the preliminary study which is a small-scale study conducted prior to the main study on a limited number of subjects from the population at hand. The main purpose of the pilot study is to investigate the feasibility of the proposed study and to detect possible flaws in the data collection instruments, such as ambiguous instructions or wording, inadequate time limits as well as to check whether the variables defined by operational definitions are actually observable and measurable. In this regards, the instruments used for the data collection during the study were piloted before the main study commenced. The structured food frequency questionnaire was piloted with five (5) parents of Grade 2 scholars from Constantia Private school, (Brink, 2009), prior to commencement of the main study to assess if all the foods eaten in Namibia were captured in the instrument. Additionally, the copies of the food frequency questionnaire were given to experts in the Ministry of Health and Social Services to assess the content, the language, the format as well as the outline.

However, the Conners Teacher rating scale, the psychometric checklist as well as the anthropometric checklist and/or calculator were not piloted because they are standardized international instruments. Despite the Conners Teacher rating scale being a standardized instrument it was revised to accommodate the Namibian situation.

The aim of piloting was to identify potential deficits in the questionnaire and to modify this instrument prior to actual data collection. In addition, piloting of the instrument allowed the researcher to ensure measurement validity which refers to the instrument which measures what it intends to do (Jupp, 2006). If the researcher uses a faulty measure or one that fails to capture the full extent of the concept under consideration, the findings will be low in validity. Thus, two

methods were applied, i.e. face and content validity specifically to determine if all the common foods (staple and convenience foods) for Khomas region are included in the questionnaire. While, in order to ensure consistency and accuracy of instrumentation, the test-retest method was conducted.

3.7 VALIDITY AND RELIABILITY

Below is the description on how validity and reliability of the instruments was measured to ensure reliable and quality data was collected during the study:

3.7.1 Validity of the instrument

According to (Brink, 2006) instrument validity refers to the degree to which the instrument is accurately measuring what it was supposed to measure. In order to ensure that the instrument measured what it was supposed to measure two (2) aspects were scrutinized namely the face and content validity. The face validity means that the instrument appears to measure what it was supposed to measure while the content validity is the assessment of how well the instrument represents all the components of the variable to be measured.

Thus, both the content and face validity were established because the questionnaire was presented to a Nutrition Technical Advisor for Centre for Disease Control (CDC) in Namibia, Nutritionist at Ministry of Health and Social Services as well as the Medical Officer at the Tuberculosis (TB) subdivision within the Ministry of Health and Social Services. The reviewers looked at the ambiguity, language, wording, confusing statements, coherent and completeness of the instruments. Additionally, the content validity of the questionnaire and the checklist was established through extensive literature review. All the recommendations made were incorporated accordingly.

3.7.2 Reliability of the instrument

According to (Brink, 2006) reliability refers "to the degree to which the instrument can be depended upon to yield consistent results if used repeatedly over time on the same person or if used by two researchers". The instrument was tested during a pilot study whereby most of the respondents understood most of the questions the same way. Whilst for the few questions that the respondents did not understand the same way amendments were made accordingly so that when the same instrument is tested with the different respondents it can yield the same results. All the respondents were oriented on how to complete the instrument and for the Connor Teacher Rating scale the teachers were provided with the definition list to assist them to understand those terms that were identified as difficult or not commonly used on the daily base.

3.8 PROCEDURE FOR DATA COLLECTION

Described below are five data collections namely focus food frequency questionnaire, anthropometric checklist, academic performance checklist, Connor Teacher Rating Scale Connor as well as five psychometric tests. In addition, the process on how, when, by whom, what and where the data was collected are outlined below:

3.8.1 The Connor Teacher Rating Scale

During the first week of data collection the class teachers of 2 classes selected for the study from both schools completed the Connor Teacher Rating scale for all 57 scholars whose parents consented to participate in the study.

3.8.2 Anthropometric checklist

During the second week of the month all 57 scholars' height and weight were measured at both schools using stadiometer and digital scale respectively. Thereafter, the data was entered and analysed using BMI calculator in order to categorize scholars in 4 nutritional statuses (for example underweight, normal, overweight and obese). Thereafter, from each nutritional category 2 scholars were randomly selected for their parents to complete the FFFQ and for scholars to write the five psychometric tests.

3.8.3 Focus Food Frequency questionnaire

The Focus Food Frequency questionnaire was the only tool piloted before the initial data collection. It was piloted with five (5) parents from Constantia Primary school. After necessary amendments were made two research assistants were trained on all the data collection tools. While the two class teachers for both MH Greef and Khomasdal Primary schools were only trained on the Connor Teacher Rating Scale. The parents were trained on how to complete the Focus Food Frequency questionnaire for the period of two weeks. To limit variables emanating from 'pay-day' effects, i.e., availability of finances that might increase/decrease availability and intake of certain foods, the questionnaire was administered during the middle of the month, i.e., recording of routine food intake commences at the 2nd week of the month, and concluded at the end of the 3rd week of the month.

3.8.4 Psychometric tests

During the last week of completing the Focus Food Frequency questionnaire the same eight scholars whose parents completed the FFFQ went through five psychometric tests for 15 minutes within school setting. The five psychometric tests are discussed in length below, on what they entailed and how they were handled for all eight scholars:

Psychometric test 1: Auditory Long term memory

The auditory long term memory psychometric test was read slowly to the scholar with good pronunciation. Thereafter the scholar must have repeated the story to the test administrator in no particular order.

Psychometric test 2: Auditory Sequencing

Before the auditory sequencing the administrator did the practice example with scholars one at the time. Thereafter, the administrators read level one which comprised of first row consisting of number, second row consisting of letters and third row consisting of mixers of number and letters to the scholar at the slow pace. The scholar was to repeat each row in sequential order to the administrator and was to successfully complete each row before moving to the next level.

Psychometric test 3: Auditory Short term memory

Before the auditory short term memory the administrator did the practice example with scholars one at the time. All levels in auditory short term memory consisted of letters. The administrators read level one which comprised of first row, second row and third row to the scholar on the slow pace. The scholar was to repeat each row in sequential order to the administrator and was to successfully complete each row before moving to the next level.

Psychometric test 4: One Minute Reading Test

The scholar was requested to read as quickly and correctly the words horizontally as if reading from a book for a limited time of one minute but they were not informed of the time limit. At the

end of one minute the administrator indicated where the scholar ended but the scholar where allowed to continue reading so they cannot be suspicious.

Psychometric test 5: Visual Discrimination Test

There was no time limit for visual discrimination test but the scholar was to work as quickly as he or she can by comparing the word in the first column on the left side with those in the rest of the row and indicate by crossing out the words that differs from the stimulus word in the first column on the left side. No indication of wrong answers or fright was indicated during test-taking since this indication could have negative or positive reinforcement influencing the test results in one or another way.

3.8.5 Academic Performance checklist

The fifth instrument which is the Academic Performance checklist captured the performances of each selected scholars from both schools. Each subject CASS marks as well as the examination for the first term was captured. Thus, scholastic performance reports of Grade 2-scholars were analysed per subcategory. Thereafter, all the data was entered using Epi-info and Microsoft excel and all data was exported to Statistical Package for Social Sciences (SPSS) 20.0 in order to run different analysis as articulated in section 3.9 below.

3.9 DATA ANALYSIS

Anthropometric data was entered into the BMI group metric calculator which is the Microsoft Excel version. The BMI group metric calculator automatically calculates the BMI as well as the BMI percentile which is more appropriate to use for the children. Connor Teacher Rating Scale data was entered into the form created in the Epi-info while the school performance data was entered into the Microsoft Excel form. In order to analyse psychometric tests the researcher used

standardized norms to look for common patterns whereas with Focused Food Frequency Questionnaire the researcher assessed the type of food eaten, calculate the calories intake for the week divide by seven to get calories intake per day. Thereafter, all the data were exported to SPSS 20.0 program to be analysed accordingly. Descriptive statistics, i.e. one-variable (univariate) and multivariate techniques were used, e.g. the one-way and two-way ANOVA F-test. Multivariate analysis looks at the relationship between several variables simultaneously, often to construct causal models. By contrast, univariate analysis seeks to describe individuals or social groups using one variable at a time. This was done by frequency distribution counts of responses to the questionnaire and Connors Attention Scale.

The frequency in each category was converted to a percentage which provides a standardized basis for comparison between categories and also between subcategories. Frequency distributions are portrayed visually as bar charts or pie charts. Other descriptive statistics include measures of central tendency or average (means, medians and modes) and measures of dispersion (standard deviation and variance). The latter indicate how closely scores are bunched around an average and, therefore, tell the researcher about the overall shape of a frequency distribution for any given variable.

Descriptive statistics do not by itself provide an analysis in terms of relationships between two or more variables, as in a causal model or any form of multivariate analysis. In this study, univariate analysis is the first preliminary stage, followed by advanced multivariate analyses, referring to the set of statistical methods employed in the interpretation of data when more than one variable property is measured for each case in the sample, e.g. the Chi-Square Test for Independence.

The methods explore covariation among variables how the variables vary together either in order to establish relationships among variables or to allocate cases to categories. The researcher employed a numerical taxonomy procedures for data analysis, i.e. a set of methods using univariate information to allocate cases to pre-existing categories or to construct a system of categories from scratch and allocate cases to those categories, i.e. the use of quantitative information in sorting things 'into kinds', allowing for investigation of relationships that cannot be investigated through linear modelling (Jupp, 2006).

3.10 ETHICAL CONSIDERATIONS

It is crucial to consider ethical considerations when carrying out research in this regard four ethics where considered namely permission to conduct the study, Right to privacy, Confidentiality and anonymity as well as Informed consent as outlined below:

3.10.1 Permission to conduct the study

Permission was obtained from the relevant authorities prior to the pilot study as well as the actual data collection within Khomas region. The first letter requesting permission to conduct the survey within schools was addressed to Ministry of Education Khomas Regional Office whereby it was discussed at the research committee. Once the permission was granted a second and detailed letter was written and addressed to the respective school principals in circuit one. Thereafter, a third detailed letter and/or consent letter was addressed to the parents of the scholars selected for the study to inform them about the study accordingly and for them to voluntarily consent for their children to participate in the study.

3.10.2 Informed consent

The consent was written on the cover page of each questionnaire. The consent included the purpose of the study, objectives of the study, methods used, the duration of the study and lastly the identity and qualification of the researcher and or the assistant researcher. The participants were made aware that they had the right to withdraw at any time if by anyway they felt uncomfortable.

3.10.3 Confidentiality and anonymity

Although the instruments made provision for the name of the participants in order to ensure anonymity the questionnaires were numbered, thus in the database only identity numbers corresponding to that particular participant were entered. The master list with the participants' names and code number was kept separate from the data collected in order to protect the participants' identity. Additionally, the participant's information was not shared with other people other than those who were working on the study.

3.10.4 Right to privacy

The worth and dignity of the participants was maintained. The invasion of privacy was prevented by making sure no information was shared without the participants knowledge or against his or her wish will, because by invading an individual's privacy might cause loss of dignity, feeling of anxiety, guilty, embarrassment and shame. The instruments and methods used during the interview were known by the participants. During data collection, the researcher did not gather the information, for example by taping conversation or using hidden cameras and microphone without their knowledge. In this situation, all data collection methods were scrutinized to protect participant's privacy.

3.11 SUMMARY

This chapter addressed the way in which the study pertaining to the link between routine diet, attention span and scholastic performances among grade 2 scholars in circuit one in Khomas region was conducted. The research designs, methods, strategies employed in selecting the sample relevant to the study were addressed accordingly. Consequently, this chapter focused on the process of developing the data collection instruments, procedure of ensuring of managing data and ensuring quality data is collected, steps on how data was collected, the software used for data entry as well as the steps that were taken to analyse the data. In Chapter 4 the results of the data collected, entered, analysed and discussions thereof are outlined accordingly.

CHAPTER FOUR
DATA ANALYSIS AND DISCUSSIONS

4.1 INTRODUCTION

The previous Chapter focused on the research design and methodology used to guide the study. This chapter presents the analysis, presentation and interpretations of data as well as the discussion of the findings based on the information gathered from the Focused Food Questionnaire, Body Mass Index Checklist, Academic Performance Checklist, Teacher Rating Conner Scale as well as the five Psychometric tests.

Teacher Rating Conner Scale was completed by the Class Teachers of the classes that were randomly selected and it was completed on fifty seven (57) scholars whose parents consented. Whereas the Body Mass Index checklist and the Academic Performance Checklist was done and completed by the researcher and the research assistant on all scholars whose the Conner scale was fully completed. Whilst, the Focused Food Frequency Questionnaire and the five Psychometric tests were done only on eight (8) scholars who were randomly selected from the four categorized (underweight, normal, overweight and obese) BMI percentile results. Both descriptive statistics and methods to determine the relationship between the variables were used to present the findings.

4.2 PARTICIPATION RATE AMONG THE STUDY POPULATION

The total number of the sample population was 75 scholars, however only 57 scholars participated in the study as indicated in Chapter 3. Out of the 57 scholars who participated in the study, 28 scholars came from MH Greef Primary school while 29 scholars came from Khomasdal Primary school. For the scholars BMI, attention span and academic performances

were collected. The scholars were categorized into four nutritional statuses based on their BMI percentile (underweight, normal, overweight and obese) from which 2 scholars were randomly selected from each category to make up the subgroup of 8 scholars. Thereafter, the five types of psychometric tests and FFFQ was only collected from 8 scholars. The 8 scholars' subgroup was selected based on the assumption that the findings can be generalized to the rest of the group.

4.3 DATA ANALYSIS AND RESULTS

In this section data was analysed using SPSS 20.0 and results and discussions are presented below as per above mentioned (see section 3.5) five data collection tools:

4.3.1 Demographics data

Two schools from circuit one in Khomas region participated in the study, namely Khomasdal Primary school and MH Greef Primary school. Out of the 41 scholars from Khomasdal Primary school selected class 50.9 % (n=29) scholars participated in the study while from MH Greef Primary school out of the 34 scholars from the selected class 49.1% (n=28) scholars participated in the study (Figure 4-1 below). The participants were below the age of consent which is 21 years as stipulated in (Hubbard, 1997), thus they needed their parents or guardians to consent for them in order to participate in the study.

Thus, the percentage of the participants reduced drastically from both schools because the study was voluntary (meaning that the parents or guardian can choose for their child to or not to participate in the study and they could withdraw their child from the study anytime). However, for all scholars who did not partake in this study their parents or guardians refused to participate from the onset of the study.

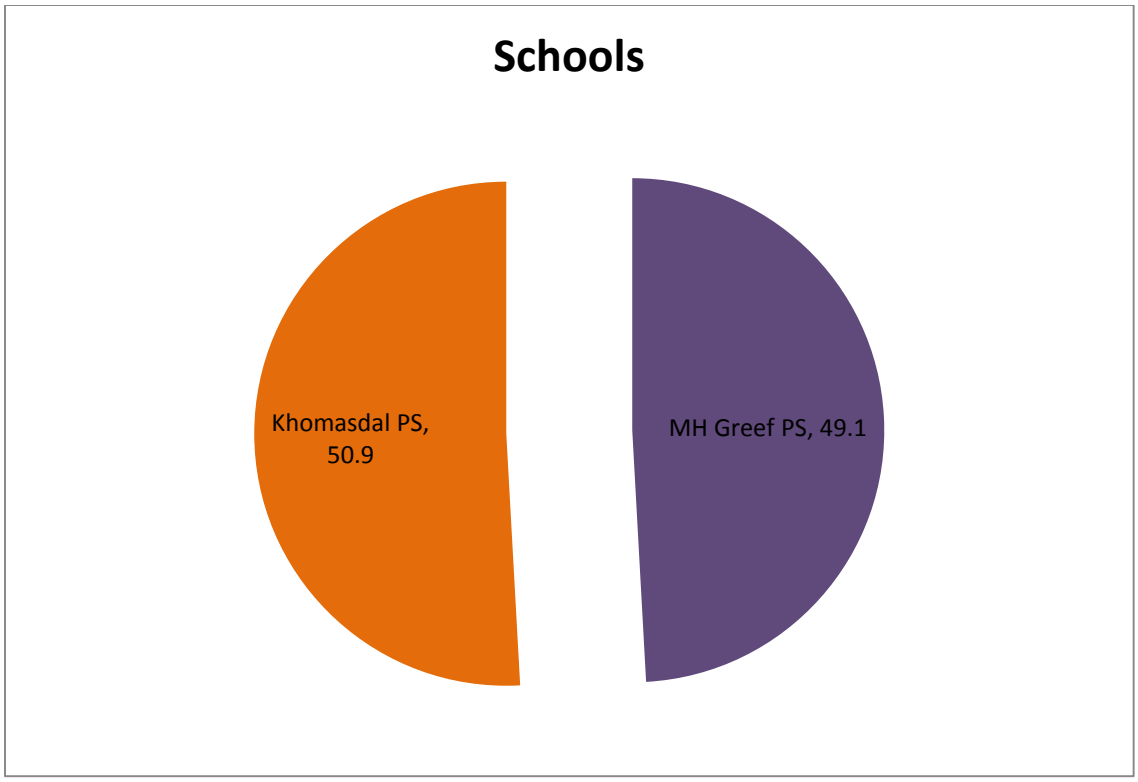


Figure 4-1: Percentage of scholars for each school participated(n=57)

Out of the 57 scholars who participated in the study the majority of participants were female 65% (n=37) while the minority were male 35% (n=20), Figure 4-2. The proportion of females participated in the study compared to males mirrored the actual proportion in classroom because the majority in both classrooms was females.

The proportion of sex in the classroom is mirrored by the general population in Namibia since there is less men in Namibia 49% men comparing to 51% female respectively, (National Planning Commission , 2012). In this regard, there is a greater probability for each classroom in Namibia particularly in circuit one in Khomas region to have more females than males.

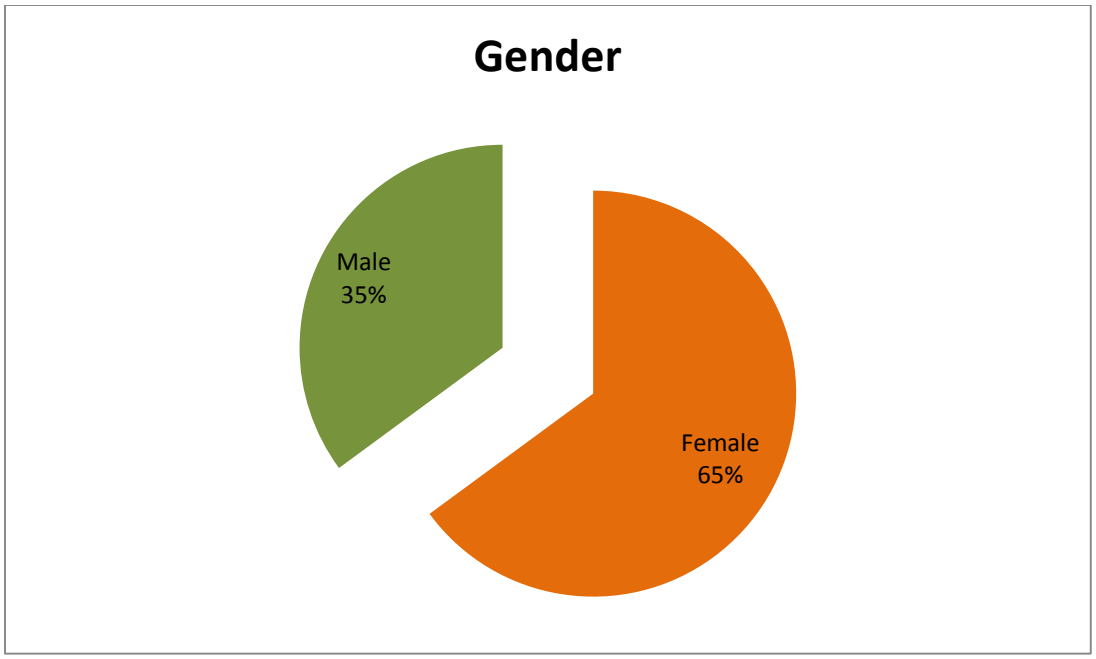


Figure 4-2: Percentage of scholars' gender (n=57)

4.3.2 Academic Performance

Table 4-1 below shows that performance in arithmetic skills is normally distributed because the mean, mode and median is the same (n=4) and thus represent that most of the students performed below average in arithmetic.

Statistics		
Arithmetic		
N	Valid	57
	Missing	0
Mean		3.58
Median		4.00
Mode		4
Std. Deviation		.533
Variance		.284
Skewness		-.694
Std. Error of Skewness		.316

Table 4-1: Arithmetic skills distribution in both schools

Most of the scholars 59.6% (n=34) who participated in the study performed below average in arithmetic (mathematics) while 38.6% (n=22) performed on average and only 1.8% (n=1) performed above average (Figure 4-3 below). Performing below average implies the highest scored in arithmetic was 44%, while the scholars who scored on average scored between 45-64% and above average scholars scored between 65-79% and no scholars scored 80-100%. The results imply that the scholar's ability to perform in arithmetic (which is basically more about adding and subtracting) is critically below average and if the foundation is poor this will affect their academic performance as they progress to other classes. The study done by (Halterman et al., 2001) showed that the children with iron deficiency were twice as likely to score below average on mathematics tests even after allowing for potential confounders and this findings were more pronounced among girls. This could be the case with Namibian scholars, although this study did not test for the level of iron deficeincy.

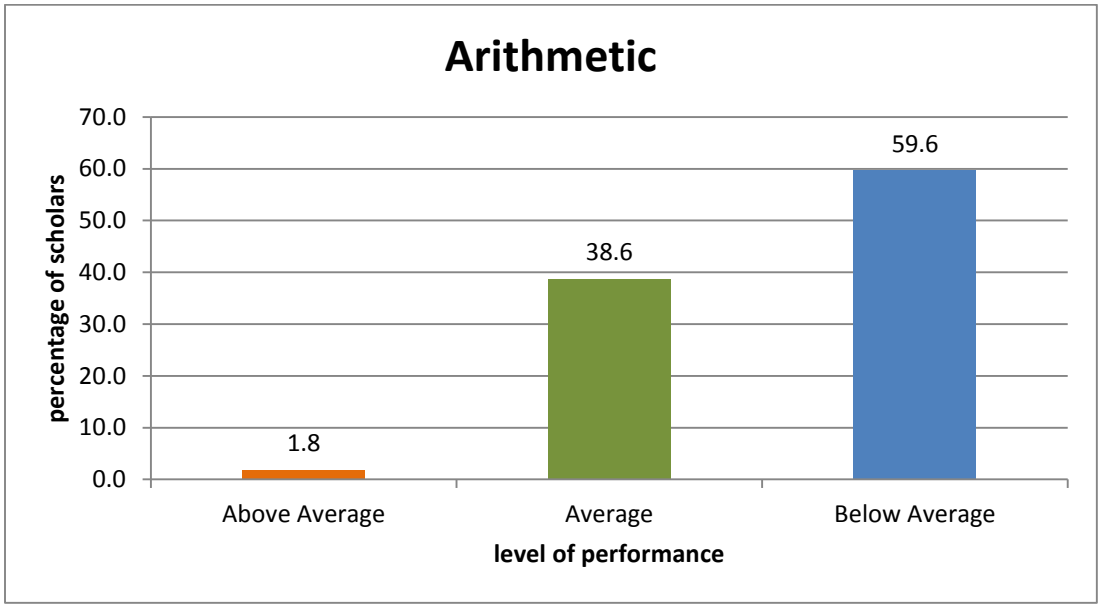


Figure 4-3: Overall performance of scholars in arithmetic (n= 57)

Table 4-2 below shows that performance in reading skills is normally distributed because the mean, mode and median is the same (n=4) and thus represent that most of the students performed below average.

Statistics		
Reading skills		
N	Valid	57
	Missing	0
Mean		3.61
Median		4.00
Mode		4
Std. Deviation		.491
Variance		.241
Skewness		-.481
Std. Error of Skewness		.316

Table 4-2: Reading skills distribution for both schools

Most of the scholars 61.4% (n=35) who participated in the study performed below average in reading (English 2nd language) while 38.6% (n=22) performed on average, (Figure 4-4 below). The results show that the scholars are not performing well in reading skills as no scholars performed above average. Performing below average implies that the highest scored in reading was 44%, while the scholars who scored on average scored between 45-64%; no single scholars performed above average (65-79%) and 80-100%. The results imply that the scholar's ability to read English as 2nd language is critically below average.

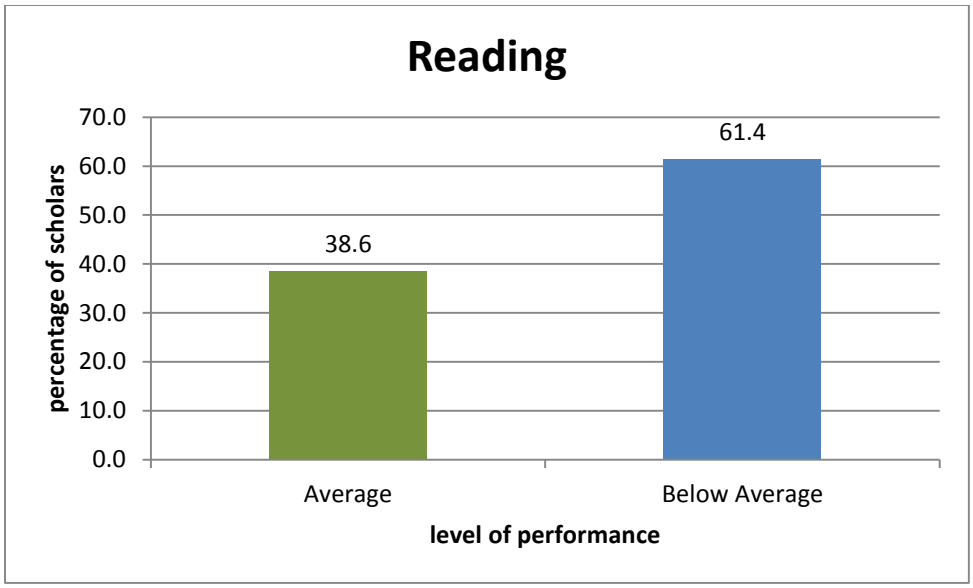


Figure 4-4: Overall performance of scholars in reading (English 2nd language), (n=57)

4.3.3 Nutritional status

Table 4-3 below shows that the nutritional status of the scholars is normally distributed because the mean, mode and median are the same (n=2) and thus represent that most of the scholars have a normal nutritional status.

Statistics		
BMI percentile		
N	Valid	57
	Missing	0
Mean		2.07
Median		2.00
Mode		2
Std. Deviation		.651
Variance		.424
Skewness		1.543
Std. Error of Skewness		.316

Table 4-3: Nutritional status distribution for both schools

Measuring of the scholars BMI percentile who participated in the study revealed that most of them 79% (n=45) had a normal weight comparing to their weight and height, (Figure 4-5 below).

While 11% (n=6) were underweight, 7% (n=4) were obese and only 3% (n=2) of the scholars were overweight. Malnutrition remains a public health problem in Namibia since almost one out of every three children under the age of five is malnourished and that most research shows that one-third of children in the developing world are either underweight or stunted (low height for age) while more than 30% of the developing world's population suffers from micronutrient deficiencies, (MOHSS, 2012; NAFIN, 2010).

The findings from this study has mirrored the outcome from (NAFIN, 2010) study that shows the geographical general pattern in Namibia which indicates that the regions with high levels of poverty, low literacy rates, high HIV/AIDS prevalence rate and with predominantly rural populations have the highest levels of stunting ranging from 39% in Kavango, Hardap, Ohangwena to 22% in Khomas, Erongo and Omaheke to mention the few. This study shows that more scholars nutritional status is normal. This finding is not surprising considering the region and the geographic area of the selected schools. It also shows that nutritional status is not normally distributed across populations, regions, districts, constituencies, schools and circuits. In some circuits or schools it could be higher whereas in others it could be less as it is in this case. Previous study done by Ying, Fengying, Wenjun, Keyou, Daxun, & Onis, (2003) shows that there was a significant difference of underweight across different provinces in China, the Guizhou had the highest prevalence of underweight, followed by Hunan and Guangdong, with prevalence above 30%. While, the lowest prevalence underweight (12.7%) was in Hubei province.

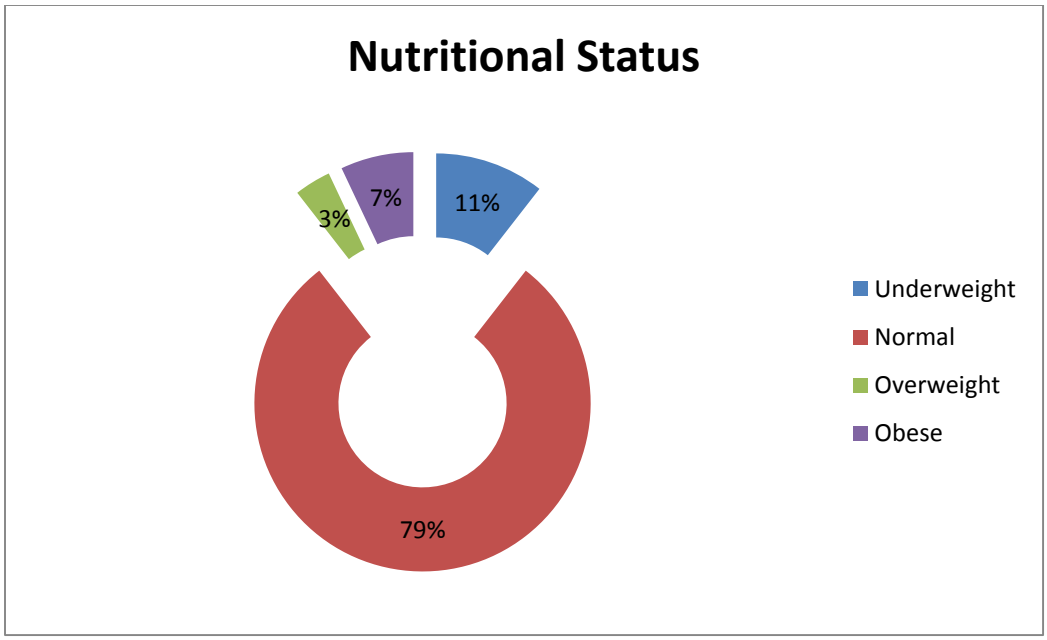


Figure 4-5: Nutritional status of the scholars (n=57)

4.3.4. Attention Span

The Teacher Connor scale that was completed by the class teachers of both the classes from both schools revealed that most scholars' 47.4% (n=27) showed no impairment in giving attention or concentrating in the classroom while 43.9% (n=25) showed slightly impairment of attention, 5.3% (n=3) showed significant impairment of attention and only 3.5% (n=2) showed moderate impairment of attention, (Figure 4-6). According to Florence, Asbridge, & Veugelers, (2008) undernourished children have been shown to have decreased attendance in school and attention span thus in turn it means if the child has a normal weight their attendance in schools will be excellent and their attention span will be at acceptable rate. This study agrees with the above study, since most scholars' nutritional status was normal (Figure 4-5).

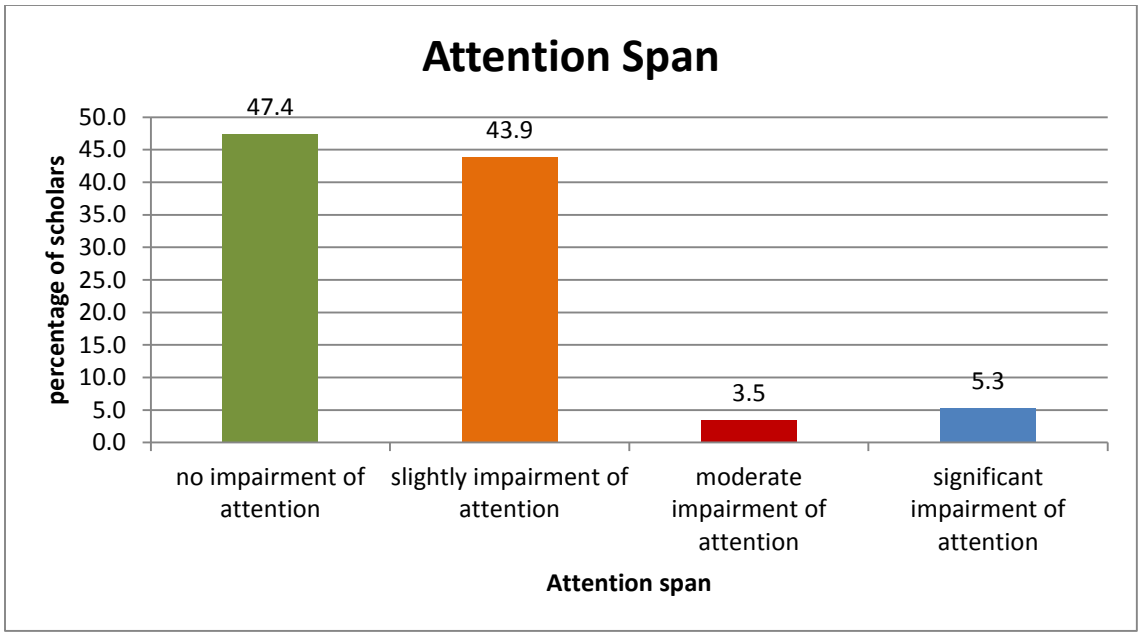


Figure 4-6: Attention span among the scholars who participated in the study (n=57)

4.3.5 Possible confounding factors

In addition, to the Teacher Rating scale questions, 10 questions were added to assess other possible confounding factors that may contribute to the performance of the scholars in schools. The data was analysed using SPSS and the results of the 10 questions are presented in details below. Figure 4-7 below shows that most of the scholars 77% (n=44) were never absent from school without the knowledge of the class teachers, whereas 23% (n=12) scholars were always absent from school with reasons unknown by their class teacher. Most scholars whose nutritional status was normal (Figure 4-5 above), had no attention impairment (Figure 4-6) and where not absent from school unless they had a good reason known by the class teachers such as illness, (Figure 4-7 below), this implies that most scholars where supposed to performed above average in both arithmetic and reading (English as 2nd language) but they are performing below the average.

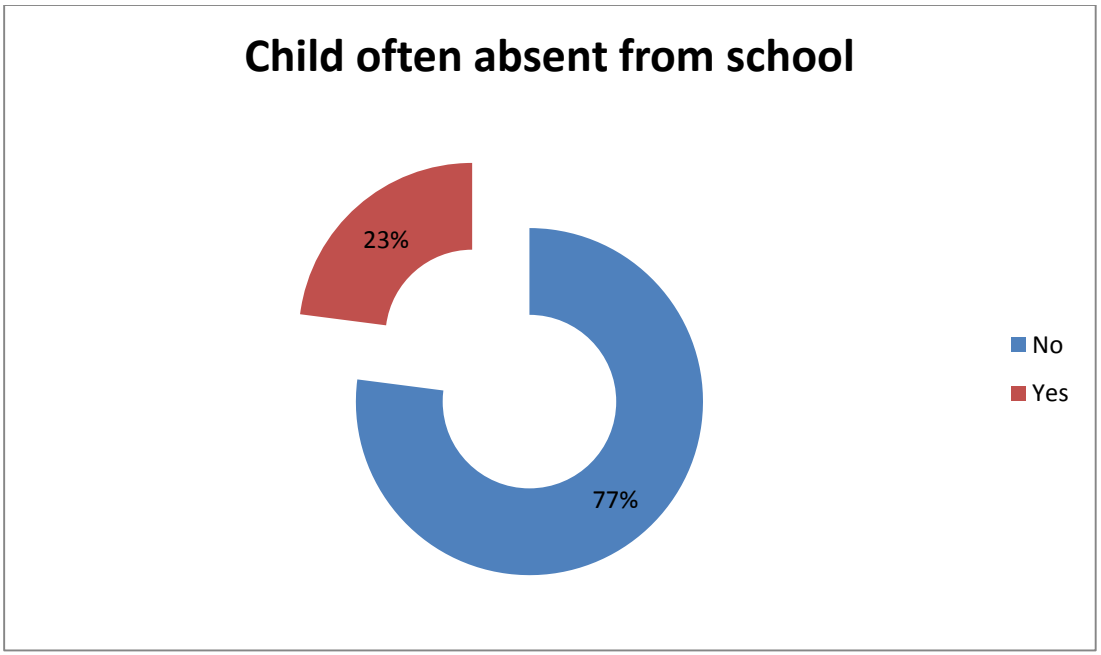


Figure 4-7: Percentage of scholars often absent from school (n=57)

Figure 4-8 below shows that most scholars 51% (n=29) are often absent from school due to illness, while 49% (n=28) were often not absent from school due to illness. Thus, although the majority of scholars had a normal nutritional status 79% (Figure 4-5 above) most of them felt sick according to figure 4-8 below thus they missed out on some lessons in both arithmetic and reading (English as 2nd language).

Consequently, missing some classes can lead to scholars to not complete some homework's which in turn can contribute to the low CASS marks as well as low term marks. In this regard, this can be one of the contributing factors to the poor academic performance of the scholars in both subjects.

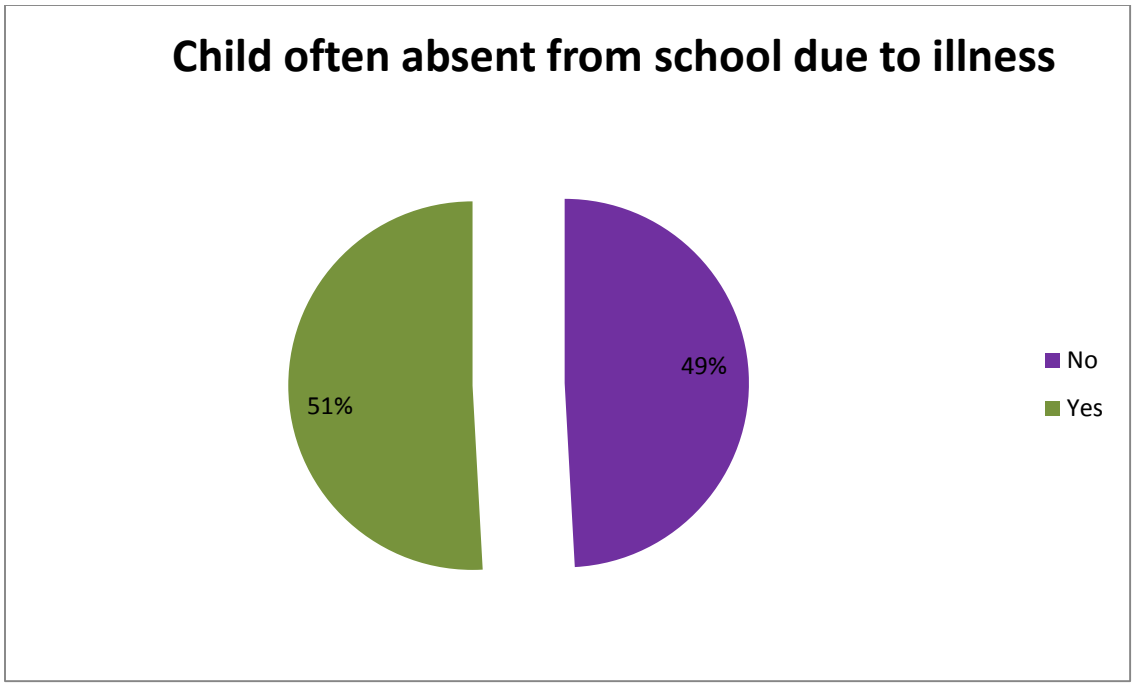


Figure 4-8: Percentage of scholars often absent from school due to illness (n=57)

Figure 4-9 below shows that most scholars did not experience any kind of death be it their close relatives such as father, mother or siblings or be it the extended family such as uncle, cousin, aunt or grandparent, 94.7% (n=54) and 96.5% (n=55) respectively. However, there were few scholars who experienced the death of both their close relatives 3.5% (n=2) and that of extended family members 5.3% (n=3).

This implies that losing a close or extended family does not have a significant impact on the academic performance of the scholars since is only a small portion of scholars lost their parents comparing to those who did not lose any parent or extend family.

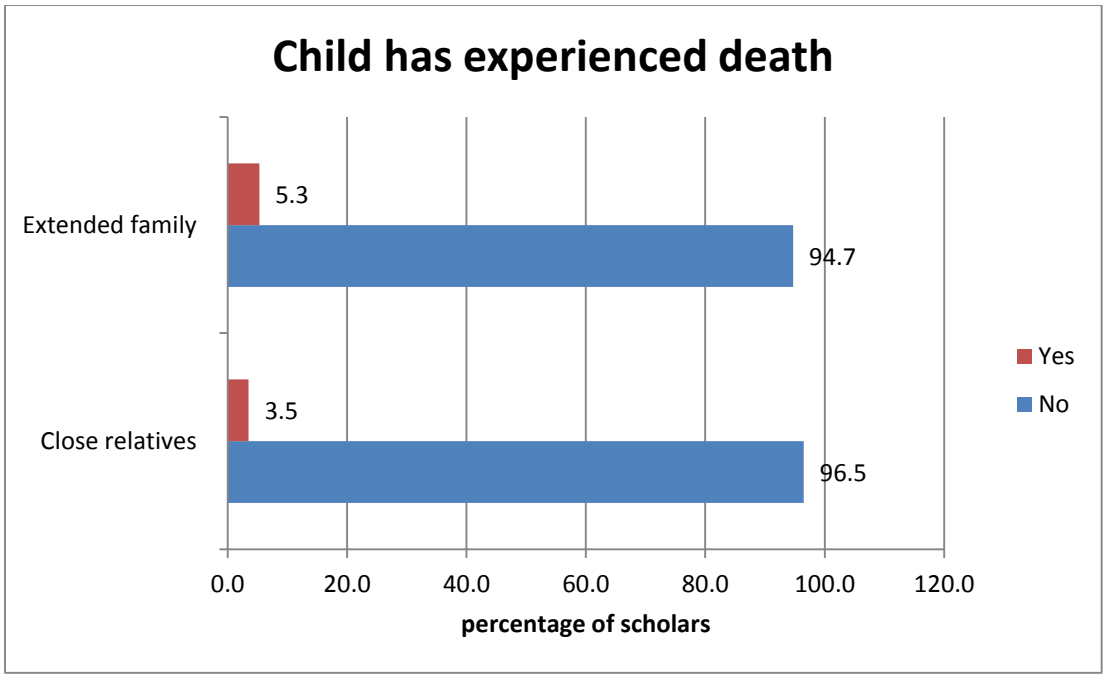


Figure 4-9: Scholars who experienced any death during the past month (n=57)

Table 4-4 below shows that most of scholars 93% (n=53) and 94.7% (n=54) did not experience any form of trauma be it directly (such as child him or herself getting involved in a car accident, parents divorcing, family violence or abuse) or indirectly (such as the child family getting involved in a car accident or abuse). On the other hand few scholars 5.3% (n=3) and 3.5% (n=2) were directly and indirectly involved in trauma for example some of their parents were in the process of divorcing or separating, whereas some of them had to relocate from other places to Windhoek. For 1.8% (n=1) the teacher(s) were uncertain if the scholar was traumatized directly or indirectly event.

Since most scholars were not traumatized, thus basically means that trauma cannot be one of the contributing factors on how scholars' academically performed poorly. Thus, more studies need to be employed to investigate why scholars academically performed poorly despite not being traumatized.

	Indirectly involved in trauma		Directly involved in trauma	
	Frequency (N)	**Percentage (%)**	**Frequency (N)**	**Percentage (%)**
No	54	94.7	53	93
Yes	2	3.5	3	5.3
Uncertain	1	1.8	1	1.8

Table 4-4: Scholars directly or indirectly involved in trauma during the past month (n=57)

Table 4-5 below shows that most scholars' 90% (n=51) primary caregiver did not leave the family during the past month while for 11% (n=6) primary caregivers had left the family in the last month due to other reasoning such as parents getting divorced and separated excluding death. These results demonstrate that trauma cannot be a contributing factor to scholar's poor academic performance as the majority of scholars as shown in table 4-5 below did not leave the family, meaning that they were leaving at home which they are used to.

Child's primary caregiver has left family	Frequency (N)	Percentage (%)
No	51	90
Yes	6	11

Table 4-5: Scholars whose primary caregiver has left the family (n=57)

Table 4-6 below shows that most scholars 93% (n=53) financial status did not change significantly in the last one month while 7% (n=4) scholars' financial status had changed significantly in the last one month due to one parent moving out of the house or the child moving from one parent to another such as aunt, orphanage home, uncle and grandparents. Since, most scholars' financial status was not changed; this cannot be a contributing factor to poor academic performance of scholars in both schools.

Financial status of the child's family	Frequency (N)	Percentage (%)
No	53	93
Yes	4	7

Table 4-6: Financial status of the child has changed significantly in the last month (n=57)

Table 4-7 below shows that most scholars 94.7% (n=54) have not been nomadic, they did not move from one caregiver to another, while 5.3% (n=3) have been nomadic, they moved from one caregiver to another.

Among those scholars who moved, some moved from their biological parents to their grandparents, while others moved to their aunts, uncle or as to the orphanage homes. Since most of scholars did not move from one parent to another as indicated in table 4-7 thus this did not contribute to poor academic performance of scholars.

Child has been nomadic	Frequency (N)	Percentage (%)
No	54	94.7
Yes	3	5.3

Table 4-7: The frequency of movement amongst the study population (n=57)

Table 4-8 below shows that most scholars 86% (n=49) are not living in the child-headed household while 10.5% (n=6) are living in the child-headed household but is only for 3.5% (n=2) scholars whom the teachers were uncertain whom they were living with. Since most scholars were living in parents headed households, this factor has insignificant impact on scholars' academic performance.

Child lives in the child-headed house	Frequency (N)	Percentage (%)
No	49	86
Yes	6	10.5
Uncertain	2	3.5

Table 4-8: Adult versus child headed household (n=57)

4.3.6 Focused Food Frequency Questionnaire (FFFQ)

As mentioned early, the FFFQ was only administered to 8 scholars; two scholars were randomly selected from each nutritional status (undernourished, normal, overweight and obese) to make up 8 scholars. Out of the 8 scholars who participated in this study 75% (n=6) of the respondents were female while 25% (n=2) of the respondents were male, see figure 4-10 below. These results confirmed the results yield in figure 4-2 on page 64, in general there are more females than male therefore for any randomly selected sample there will be more females than males.

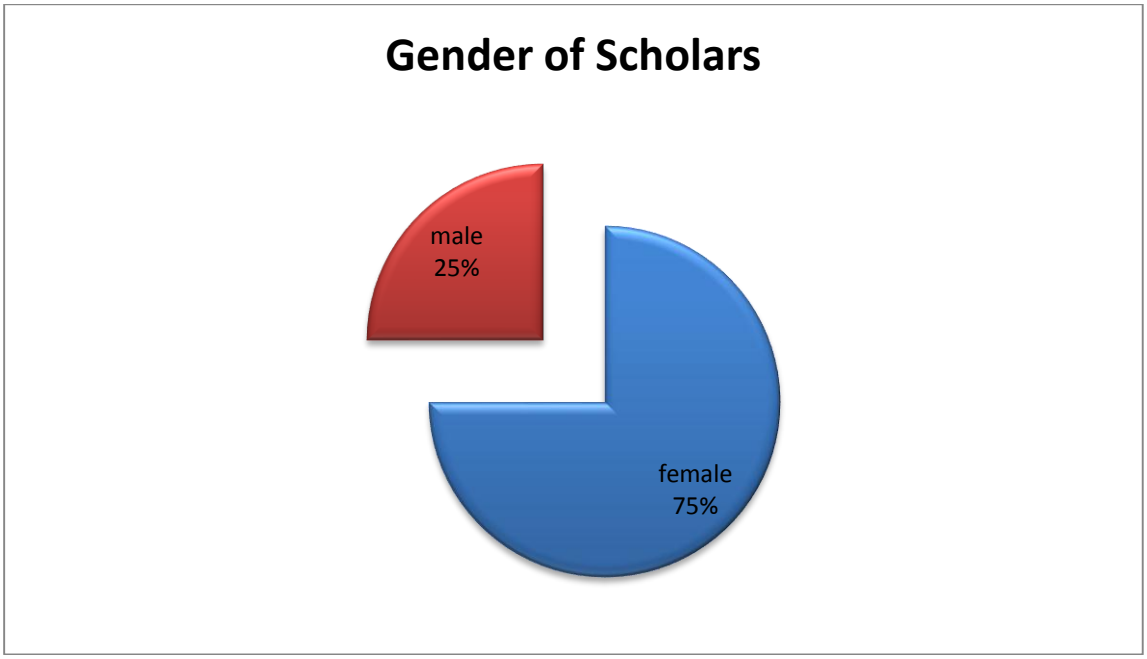


Figure 4-10: Scholars gender who participated in the case study (n=8)

Table 4-9 below shows that most of the scholars were from Khomasdal Primary school 75% (n=6) while only 25% (n=2) of scholars were from MH Greef Primary School. The results below mirrored the results yield for (N=57) on page 57, figure 4-1, which shows that most scholars came from Khomasdal Primary school comparing to MH Greef Primary school thus it make sense to have more scholars for (N=8) cohort to be from Khomasdal Primary School.

NAME OF THE SCHOOLS	FREQUENCY	PERCENTAGE
Khomasdal Primary School	6	75
MH Greef Primary School	2	25
Total	**8**	**100**

Table 4-9: Number of scholars randomly selected for FFFQ (n=8)

Table 4-10 below shows that of the 2 scholars whose nutritional status was normal, one indicated that he normally eats breakfast while another one indicated that he normally does not eat breakfast. One of the two obese scholars indicated having breakfast regularly while the other one indicated not having breakfast regularly. Both overweight scholars have breakfast on regular basis while the other two scholars who were underweight indicated not having breakfast on the regular base. Table 4-10 below shows that there is a significant positive relationship between breakfast and scholars nutritional status; not having breakfast can be one of the contributing factor to current nutritional status, for example both underweight scholars did not regularly take breakfast, meaning that there is no glucose to keep them going throughout the first lessons before the first break.

NUTRITIONAL STATUS		BREAKFAST		Total
		No	Yes	
BMI percentile	NORMAL	1	1	2
	OBESE	1	1	2
	OVERWEIGHT	0	2	2
	UNDERWEIGHT	2	0	2
Total		4	4	8

Table 4-10: Relationship between the nutritional status of scholars and breakfast intake (n=8)

Table 4-11 below shows that out of the 6 female scholars 4 indicated that they do not usually have breakfast regularly, while only 2 (33%) indicated that they usually have breakfast. All male scholars n=2 (100%) indicated that they usually have breakfast on regular basis. Thus, the results

from this study differed from the study done by MOHSS 2004 which showed that males were less likely (38.4%) than female students (40.1%) to eat and/or drink something in the morning before they go to school.

GENDER	BREAKFAST		Total
	No	Yes	
FEMALE	4	2	6
MALE	0	2	2
TOTAL	4	4	8

Table 4-11: Shows the relationship between gender and breakfast intake (n=8)

Figure 4-11 below shows that on average scholars who eat breakfast on regular basis had higher calories intake 8127 during week 1, 6963 during week 2 than two scholars who did not eat breakfast on regular basis, 5035 during week 1, 4874 during week 2 respectively. The calories of scholars who skipped breakfast was lower when compared to those scholars who had breakfast. The former had more than 12 hour gap between dinner and breakfast.

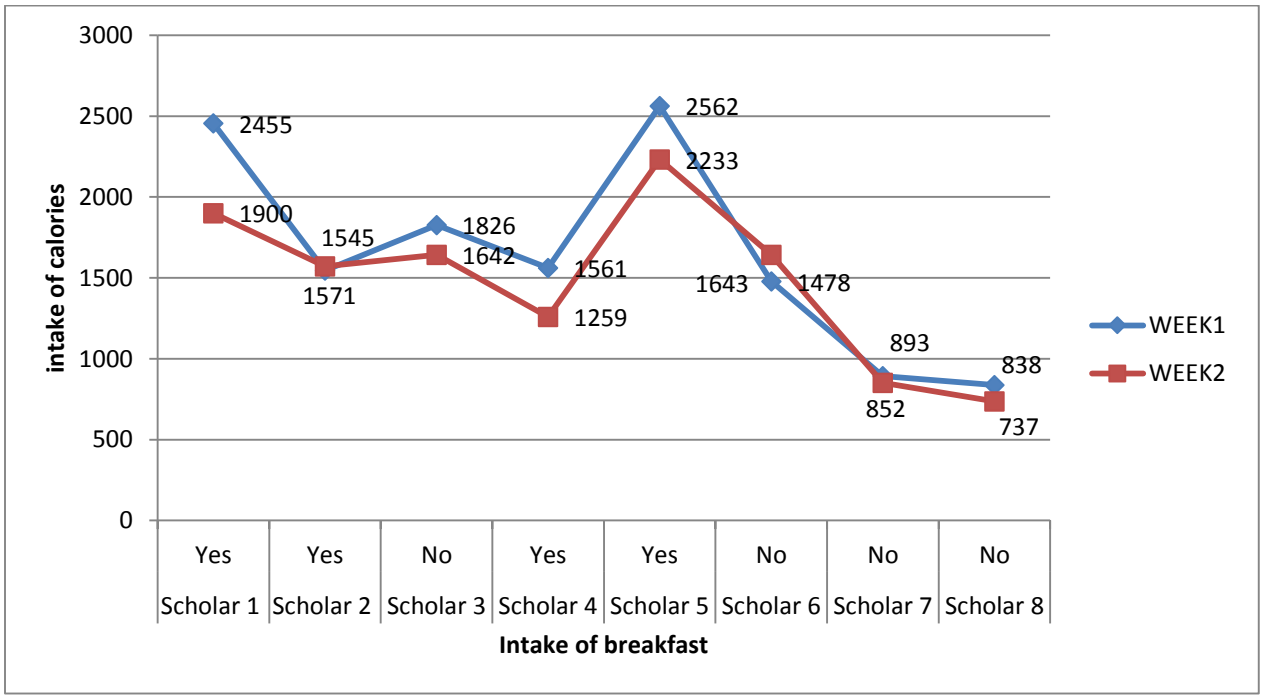


Figure 4-11: Relationship between breakfast intake and overall calories intake in two weeks (n=8)

Figure 4-12 below shows that on average obese and overweight scholars had higher calories intake for both weeks compared to normal and underweight scholars. It is advisable that children eat food that gives them high calories as they are still in a developmental stage, but then it becomes unhealthy for children to become overweight or obese as this implies that either there is less physical activity or that these scholars became obese and overweight due to genetic factors and/or sedentary lifestyles such as sitting in front of the television after school.

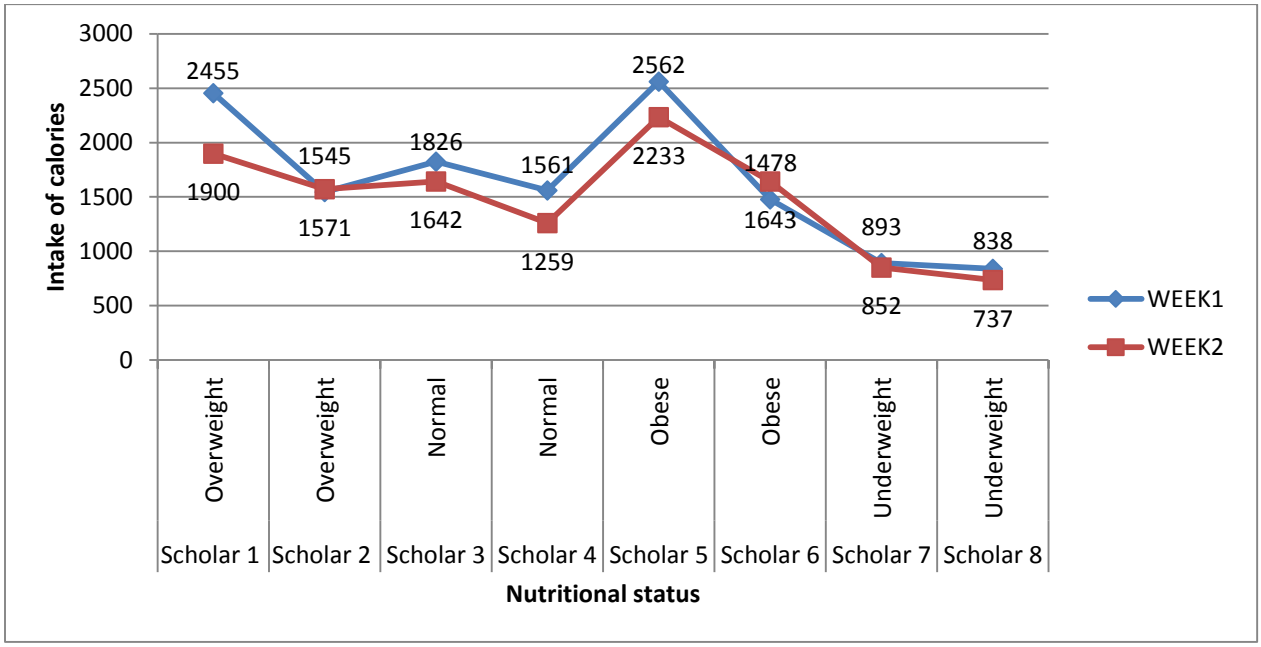


Figure 4-12: Relationship between the nutritional statuses of scholars and the overall calories intake (n=8)

Table 4-12 below shows that the two scholars whose nutritional status was overweight both ate breakfast on regular basis and their performance in both arithmetic and reading was average and they both did not have attention impairment. While the scholars whose nutritional status was normal both did not have attention impairment and the academic performance in both reading and arithmetic was average while one usually have breakfast on the regular base and the other one does not have breakfast on the regular base.

One obese scholars usually have breakfast on the regular basis showed average in academic performance, with regard to reading skills and above average in arithmetic and had no impairment of attention. While scholar 6 who does not eat breakfast on the regular basis performed below average academically but had significant attention impairment. Whilst, scholar 7 and 8 who are both underweight and both did not eat breakfast on the regular basis, however one of them performed on average academically and had no attention impairment; while the other performed below average academically and had significant attention impairment.

According to AL-Oboudi, (2010), if the child has more than the 12 hour gap between dinner and breakfast can cause a decline in blood glucose levels and lead to glucose deprivation which in turn can result in a rapid disturbance in cerebral function if it happens in sufficient degrees. Additionally, usually missing breakfast can have negative effects on cognitive performance, attention span as well as academic performance, (Anding 2010; AL-Oboudi, 2010). This study has confirmed the studies done by (AL-Oboudi, 2010; Anding 2010) respectively. Table 4-12 below indicates that all scholars 100% (n=4) who ate breakfast despite their nutritional status performed on average for both reading and arithmetic and had no attention span impairment. While 50% (n=2) of scholars who indicated not having breakfast performed below average for both reading and arithmetic and had some sort of attention span impairment.

According to Florence, Asbridge, & Veugelers, (2008) undernourished children have shown decreased attendance, attention and academic performance they also experience more health problems compared to well-nourished children. This study agrees with previously described findings. Table 4-12 below, shows that 50% of the undernourished scholars performed below average in both reading and arithmetic and had slight attention span impairment.

ID	BMI percentile	Breakfast	Reading	Arithmetic	Attention span
Scholar 1	Overweight	Yes	Average	Average	No impairment
Scholar 2	Overweight	Yes	Average	Average	No impairment
Scholar 3	Normal	No	Average	Average	No impairment
Scholar 4	Normal	Yes	Average	Average	No impairment
Scholar 5	Obese	Yes	Average	Above Average	No impairment
Scholar 6	Obese	No	Below Average	Below Average	Significant Impairment
Scholar 7	Underweight	No	Average	Average	No impairment
Scholar 8	Underweight	No	Below Average	Below Average	Slightly Impairment

Table 4-12: Shows the scholars academic performance, the BMI, attention span as well as breakfast intake (n=8)

4.3.7 Psychometric Tests

The results shown in tables below are for the five psychometric tests namely Auditory sequencing, Auditory short-term memory, Auditory long-term memory, word recognition (reading) as well as visual discrimination done with the 8 sub-group cohorts who participated in FFFQ to assess their level of scholastic functioning.

4.3.7.1 Level of scholastic functioning

Auditory sequencing

The researcher was required to read a row comprised of letters and numbers at the time to the scholar see annexure K. Whereas, the learner was required to remember what was read to him/her and to repeat to the researcher in the same order as was said to him/her in order to move to another level. However, if the learner unsuccessful to complete a level after three attempts, the test was automatically stopped. Table 4-13 below show statistically significant deviation (developmental backlog) for cohort of participants in terms of Auditory Sequencing, since 5 scholars (2 underweight, 2 obese and 1 normal) out of a cohort of 8 participants demonstrated a developmental backlog in terms of Auditory Sequencing ($p = 0.04431$).

All sub-group of participants with obese and underweight BMI demonstrated statistically significant performance below par, while only 1 of the normal participants demonstrated statistically significant below par skills. Both of the overweight participants performed on par (see table 4-13 below). A study done by Florence, Asbridge, & Veugelers, (2008) showed that undernourished children had decreased attendance, attention and academic performance they also experience more health problems compared to well-nourished children. Poor performance among obese scholars could be attributed to low self-esteem, being teased by other scholars among others. It is therefore very crucial for scholars to have normal weight for them to concentrate in the classroom and to attend school regularly.

Cohort (N = 8)		**Auditory sequencing sub-skill**		
Subgroups (n = 2) each		**On par (N =3)**	**Below par (N = 5)**	
Intra-group scatter	**Normal weight (n =2)**	8 1 50.0 12.5 0.53979 p>0.5	8 1 50.0 12.5 0.53979 p>0.5	Cohort N = 8 Intergroup n = 2 Intergroup row n% Cohort % P value for sub category
	Overweight (n = 2)	8 2 100.0 25.0 0.00001 p<0.5*		Total N = 8 Intergroup n = 2 Intergroup row n% Cohort % P value for sub category
	Obese (n = 2)		8 2	Total N = 8 Intergroup n= 2 Intergroup row

			100.0 25.0 0.00001 p<0.5*	n% Cohort % P value for sub category
	Underweight (n = 2)		8 2 100.0 25.0 0.00001 p<0.5*	Total N = 8 Intergroup n = 2 Intergroup row n% Cohort % P value for sub category
Inter-group scatter		8 3 37.5 0.99668 p>0.5	8 5 62.5 0.01049 p<0.5*	Cohort N = 8 Column N Column % P value for cohort

Table 4-13: Scatter within the cohort for auditory sequencing (n=8)

*** = Statistical significant at 5% level of reliability**

Auditory short-term memory

The researcher was required to read a row comprised of letters only at the time to the scholar, see annexure L. Whereas, the learner was required to remember what was read to him/her and to repeat to the researcher in the same order as was said to him/her in order to move to another level. However, if learner was unsuccessful complete a level after three attempts, the test was automatically stopped.

Table 4-14 below shows a statistically significant deviation (developmental backlog) for cohort of participants in terms of auditory short-term memory, i.e. all of the participants (N=8) demonstrated a developmental backlog in terms of auditory short-term memory (p = 0.00001).

This shows that all sub-groups from the four nutritional status categories (normal, overweight, obese and underweight) participants 100% (N=8) demonstrated statistically significant performance below par in terms of auditory short-term memory sub-skills, (see table 4-14 below). This shows that scholars from each nutritional status were unable to repeat the letters in the correct sequence to the acceptable level. Thus, regardless of the nutritional status scholars performed below average, this could reflect that nutritional status of scholars may not have the direct influence on their performances as suggested by other studies.

Cohort (N = 8)		**Auditory short-term memory sub-skill**		
Subgroups (n = 2) each		**On par**	**Below par**	
Intra-group scatter	**Normal weight (n =2)**		8 2 100.0 25.0 0.00001 p<0.5*	Cohort N = 8 Intergroup n = 2 Intergroup row n% Cohort % P value for sub category
	Overweight (n = 2)		8 2 100.0 25.0 0.00001 p<0.5*	Cohort N = 8 Intergroup n = 2 Intergroup row n% Cohort % P value for sub category

	Obese (n = 2)		8 2 100.0 25.0 0.00001 p<0.5*	Cohort N = 8 Intergroup n = 2 Intergroup row n% Cohort % P value for sub category
	Underweight (n = 2)		8 2 100.0 25.0 0.00001 p<0.5*	Cohort N = 8 Intergroup n = 2 Intergroup row n% Cohort % P value for sub category
Inter-group scatter			8 8 100.0 0.00001 p<0.5*	Cohort N = 8 Column N Column % P value for cohort

Table 4-14: Scatter within the cohort for auditory short-term memory (n=8)

*** = Statistical significant at 5% level of reliability**

Auditory long-term memory

The researcher was required to read a short story, slowly with good pronunciations to each scholar, see annexure J. Thereafter, the scholar was to repeat the story to the researcher in no particular order and the researcher ticked the correct words using the score cards.

Table 4-15 below shows statistically significant deviation (performance on or above par) for the cohort of participants in terms of auditory long-term memory (p = 0.00001). Most of the sub-groups of participants 75% (n=6) from the four nutritional status (e.g. 2 = overweight, 1= obese, 2= underweight and 1= normal) demonstrated statistically significant on par skills in terms of auditory long-term memory sub-skills, (see table 4-15 below). While the least of the participants 25% (n=2) from normal and obese demonstrated statistically significant below par respectively, (see table 4-15 below). Most scholars were able to remember the story read to them, meaning that they had good memory regardless of their nutritional status.

Cohort (N = 8)		**Auditory long-term memory sub-skill**		
Subgroups (n = 2) each		**On par**	**Below par**	
Intra-group scatter	**Normal weight (n =2)**	8 1 50.0 12.5 0.53979 p>0.5	8 1 50.0 12.5 0.53979 p>0.5	Cohort N = 8 Intergroup n = 2 Intergroup row n% Cohort % P value for sub category
	Overweight (n = 2)	8 2 100.0 25.0 0.00001 p<0.5*		Cohort N = 8 Intergroup n = 2 Intergroup row n% Cohort % P value for sub category
	Obese (n = 2)	8 1 50.0	8 1 50.0	Cohort N = 8 Intergroup n = 2 Intergroup row n% Cohort %

		12.5 0.53979 p>0.5	12.5 0.53979 p>0.5	P value for sub category
	Underweight (n = 2)	8 2 100.0 25.0 0.00001 p<0.5*		Cohort N = 8 Intergroup n = 2 Intergroup row n% Cohort % P value for sub category
Inter-group scatter		8 6 75.0 0.00001 p<0.5*	8 2 25.0 1.00000 p>0.5	Cohort N = 8 Column N Column % P value for cohort

Table 4-15: Scatter within the cohort for auditory long-term memory (n=8)

*** = Statistical significant at 5% level of reliability**

One minute Reading (Word Recognition-reading)

This test was done individually with the scholar, see annexure M. The time limit for the test was one minute; the scholar was requested to read words horizontally as reading from the book as quickly and correctly as they can. At the end of one minute the researcher indicated with a star the last word the scholar has read. Thereafter, the total number of words read correctly were added together to determine the level of word recognition by the scholar.

Table4-16 below shows statistically significant deviation (developmental backlog) for cohort of participants in terms of one minute reading, which measures scholars word recognition, i.e. all of

the participants (N=8) demonstrated a developmental backlog in terms of one minute reading (word recognition) (p = 0.00001).

All sub-groups from the four nutritional status categories (normal, overweight, obese and underweight) participants 100% (N=8) demonstrated statistically significant performance below par in terms of visual recognition of words sub-skill i.e. single word reading, (see table 4-16 below). This shows that scholars from each nutritional status were unable to recognize and read many words as quickly as they can at the acceptable level. Thus, regardless of the nutritional status scholars performed below average, this could reflect that nutritional status of scholars may not have the direct influence on their performances as suggested by other studies.

Cohort (N = 8)		**Visual recognition (words) sub-skill**		
Subgroups (n = 2) each		**On par**	**Below par**	
Intra-group scatter	**Normal weight (n =2)**		8 2 100.0 25.0 0.00001 p<0.5*	Cohort N = 8 Intergroup n = 2 Intergroup row n% Cohort % P value for sub category
	Overweight (n = 2)		8 2 100.0 25.0 0.00001 p<0.5*	Cohort N = 8 Intergroup n = 2 Intergroup row n% Cohort % P value for sub category
	Obese (n = 2)		8	Cohort N = 8 Intergroup n = 2

			2 100.0 25.0 0.00001 p<0.5*	Intergroup row n% Cohort % P value for sub category
	Underweight (n = 2)		8 2 100.0 25.0 0.00001 p<0.5*	Cohort N = 8 Intergroup n = 2 Intergroup row n% Cohort % P value for sub category
Inter-group scatter			8 8 100.0 0.00001 p<0.5*	Cohort N = 8 Column N Column % P value for cohort

Table 4-16: Scatter within the cohort for visual recognition (words) sub-skills (n=8)

*** = Statistical significant at 5% level of reliability**

Visual discrimination

The researcher showed a word or a symbol to each scholar at the time and thereafter hidden the word or symbol, see annexure N. Next to each word or symbol shown by the researcher there were five options of which one matched the initial word o symbol. Thereafter, the scholar was required to scan through the word or symbol as shown by the researcher and point the correct one among the five options given.

Table 4-17 below show statistically significant deviation (developmental backlog) for cohort of participants in terms of visual discrimination, since 5 (2 underweight, 2 obese and 1 normal) out of a cohort of 8 participants demonstrated a developmental backlog in terms of Visual discrimination ($p = 0.04431$). The visual discrimination results mirrored the results revealed through auditory sequencing.

All sub-group of participants with obese and underweight BMI demonstrated statistically significant performance below par in terms of auditory sequencing, while only 1 of the normal participants demonstrated statistically significant below par skills in terms of visual discrimination (forms and shapes) sub-skills, both of the overweight participants performed on par (see table 4-17 below). The results for undernourished children were in agreement with the study done by Florence, Asbridge, & Veugelers, (2008) that showed a decreased in attendance, attention and academic performance as well as experiencing more health problems among undernourished children compared to well-nourished children. Poor performance among obese scholars could be due to low self-esteem, being teased by other scholars among others. Thus, is very crucial for scholars to have normal weight for them to concentrate in the classroom and to attend school regularly.

Cohort (N = 8)		**Visual discrimination sub-skill**		
Subgroups (n = 2) each		**On par**	**Below par**	
Intra-group scatter	**Normal weight (n =2)**	8 1 50.0 12.5	8 1 50.0 12.5	Cohort N = 8 Intergroup n = 2 Intergroup row n% Cohort % P value for sub

		0.53979 p>0.5	0.53979 p>0.5	category
	Overweight (n = 2)	8 2 100.0 25.0 0.00001 p<0.5*		Cohort N = 8 Intergroup n = 2 Intergroup row n% Cohort % P value for sub category
	Obese (n = 2)		8 2 100.0 25.0 0.00001 p<0.5*	Cohort N = 8 Intergroup n = 2 Intergroup row n% Cohort % P value for sub category
	Underweight (n = 2)		8 2 100.0 25.0 0.00001 p<0.5*	Cohort N = 8 Intergroup n = 2 Intergroup row n% Cohort % P value for sub category
Inter-group scatter		8 3 37.5 0.99668 p>0.5	8 5 62.5 0.01049 p<0.5*	Cohort N = 8 Column N Column % P value for cohort

Table 4-17: Scatter within the cohort for visual discrimination (forms & shapes) sub-skills (n=8)

*** = Statistical significant at 5% level of reliability**

Most studies as discussed above showed that undernourished children turned to perform academically below average when compared to well-nourished children. The 8 scholars wrote 5 psychometric tests namely, auditory sequencing, auditory long-term sequencing, auditory short-term sequencing, one minute reading (word recognition) and visual discrimination (words and shape discrimination). Only two tests namely, auditory sequencing and visual discrimination that discriminated the performance of scholars in terms of remembering the mixture of words and numbers as well as remembering the words or shapes in comparison to scholars nutritional status. The discriminant value of these results lie therein that both obese and underweight participants deviated statistically significant from normative values in terms of both visual discrimination and auditory sequencing.

The performance of scholars in terms of auditory short-term sequencing and one minute reading in comparison to nutritional status was not discriminated and it did not mirror previous studies as all scholars performed below par despite their differences in terms of nutritional status. In addition, most scholars performed on par in terms of auditory long-term sequencing (whereby the researcher read a story to them and they were supposed to repeat the story to the researcher). The performance of scholars in the five psychometric tests (see annexure A) mirrored the academic performance of scholars in the class room, (see figure 4-12). They both did not show a significant academic performance differences in terms of nutritional status, all scholars performed more or less the same.

4.3.8 Relationships between variables

The frequency of BMI percentile and the likelihood of scholars giving attention in class shows a weak positive linear correlation, r (N=57) =0.116, p=0.389. Thus, there is no significant correlation between the frequency of BMI percentile and the likelihood of giving attention in the

class, (see table 4-18 below). According to Sorhaindo & Feinstein, (2006) students experiencing hunger are more likely to be hyperactive and suspended from school meaning they will have significant attention impairment. In addition, children diagnosed with Attention-deficit-hyperactivity disorder (ADHD) suffer from difficulty in concentrating, sitting still and being quiet and tend to have short attention spans. In this regard, since most scholars' nutritional status was normal (79%) as shown in Figure 4-5 above thus could not affect the scholars' attention span in the classroom.

		BMI percentile	**Attention span**
BMI percentile	**Pearson Correlation**	1	.116
	Sig. (2-tailed)		.389
	N	57	57
Attention span	**Pearson Correlation**	.116	1
	Sig. (2-tailed)	.389	
	N	57	57

Table 4-18: Relationship between the scholars BMI percentile and attention span

***. Correlation is significant at the 0.05 level (2-tailed).**

Table 4-19 below shows that there is a significant but negative weak linear correlation between the BMI percentile and the arithmetic sub-skills of scholars, r (57) = -0.274, p=0.039. Most studies done on nutrition and academic performance have shown that poor quality diet, lack of micronutrients and current nutritional status have influence on the academic performance of scholars and on mathematics in particular (Florence, Asbridge, & Veugelers, 2008; Halterman et al., 2001 cited in Sorhaindo & Feinstein, 2006). However, according to this study most scholars nutritional status was normal (see figure 4-5) but they performed poorly in arithmetic, thus nutritional status cannot have a negative impact on the scholars' academic performance.

		BMI percentile	Arithmetic
BMI percentile	**Pearson Correlation**	1	-.274*
	Sig. (2-tailed)		.039
	N	57	57
Arithmetic	**Pearson Correlation**	-.274*	1
	Sig. (2-tailed)	.039	
	N	57	57

Table 4-19:Relationship between the BMI percentile and Arithmetic skills

***. Correlation is significant at the 0.05 level (2-tailed).**

Table 4-20 below shows that there is no significant correlation between the scholars BMI percentile and reading skills and there is a negative correlation between the scholars BMI percentile and reading skills, r (57) = -0.025, p=0.851.Most studies done on nutrition and academic performance have shown that poor quality diet, lack of micronutrients and current nutritional status have influence on the academic performance of scholars,(Florence, Asbridge, & Veugelers, 2008; Halterman et al., 2001).

The comparison between BMI percentile and reading sub-skills have yielded more or less the same result as shown in table 4-19. Thus, shows nutritional status have little or no influence on scholars reading sub-skills since most scholars nutritional status was normal (see figure 4-5) and most performed poorly in reading.

		BMI percentile	Reading
BMI percentile	**Pearson Correlation**	1	-.025
	Sig. (2-tailed)		.851
	N	57	57
Reading	**Pearson Correlation**	-.025	1
	Sig. (2-tailed)	.851	
	N	57	57

Table 4-20: Relationship between BMI percentile and Reading skills

***. Correlation is significant at the 0.05 level (2-tailed).**

Table 4-21 below shows that there is significant and a moderate strong linear relationship between the scholars' attention span and the reading skills, $r(57) = 0.59$, $p<0.001$. This basically means that the attention spans of the scholar in class have an influence on the performance of scholars in relation to reading sub-skills. Figure 4-6 above showed that 52.7% scholars showed little or more attention impairment while 47.4% did not show any attention impairment. This, could be a contributing factor to poor academic performance of scholars in relation to reading sub-skill as shown by the study done by Sorhaindo & Feinstein, (2006) that showed children diagnosed with Attention-deficit-hyperactivity disorder (ADHD) suffer from difficulty in concentrating, sitting still and being quiet and tend to have short attention spans. This kind of behaviour affects the scholars school performance and interaction with other peers as well as compromise self esteem.

		Reading	Attention span
Reading	**Pearson Correlation**	1	.585**
	Sig. (2-tailed)		.000
	N	57	57
Attention span	**Pearson Correlation**	.585**	1
	Sig. (2-tailed)	.000	
	N	57	57

Table 4-21: Relationship between attention and reading skills

****. Correlation is significant at the 0.01 level (2-tailed).**

Table 4-22 below shows that there is a significant and positive linear relationship between the scholars attention span and arithmetic skills, r (57) =0.34, p=0.009. This basically means that the attention spans of the scholar in class have an influence on the performance of scholars in relation to arithmetic sub-skills. Figure 4-6 above showed that 52.7% scholars showed little or more attention impairment comparing to 47.4% who did not show any attention impairment. Thus, could be a contributing factor to poor academic performance of scholars in relation to arithmetic sub-skill as shown by the study done by Sorhaindo & Feinstein, (2006) that showed children diagnosed with Attention-deficit-hyperactivity disorder (ADHD) suffer from difficulty in concentrating, sitting still and being quiet and tend to have short attention spans. This kind of behaviour affects the scholars school performance and interaction with other peers as well as compromise self esteem.

		Attention span	Arithmetic
Attention span	**Pearson Correlation**	1	.341**
	Sig. (2-tailed)		.009
	N	57	57
Arithmetic	**Pearson Correlation**	.341**	1
	Sig. (2-tailed)	.009	
	N	57	57

Table 4-22: Relationship between scholar's attention span and arithmetic skills

****. Correlation is significant at the 0.01 level (2-tailed).**

4.4 SUMMARY

This section covered the presentation and discussion of the results based on the data analysis produced from SPSS and Microsoft Excel. Different analyses were performed such as descriptive statistics, frequency distribution, cross tabulations and correlations across different variables collected such as the demographics data (such as age, sex, name of schools), academic performance, attention span and nutritional status. The results reveal that there is a weak positive linear correlation between BMI percentile and variables such as academic performance in both arithmetic and reading sub-skills. The result shows that the nutritional status has little or no effects on the academic performance since all scholars despite their nutritional status differences performed academically poorly. On the other hand, attention span had a significant positive linear correlation in regard to academic performance in both arithmetic and reading sub-skills. The result shows that scholars' attention can have an influence on their academic performance. Chapter 5 provides conclusions, recommendations and limitations of this study based on the findings.

CHAPTER FIVE
CONCLUSIONS, RECOMMENDATIONS AND LIMITATIONS OF THE STUDY

5.1 INTRODUCTION

In the previous chapter, the results, discussions and findings on the link between routine diet, attention span and scholastic performance among grade two scholars in circuit one in Khomas region was outlined and described at length.

This chapter focuses on the conclusion, limitations, and recommendations for the improvement of the education system, the scholars' nutritional status, the attention span as well as the academic performance.

5.2 METHOD EMPLOYED

The descriptive survey was conducted and five data collection tools were used for data collection. The study population was the grade two scholars from two schools that were selected randomly in Windhoek from circuit one.

The first tool was the Teacher Connor scale which was administered by the class teacher with the assistant of the researcher and the assistant researcher for all the participants. The weight and the height of the scholars were collected using the BMI checklist to determine the nutritional status of all the participants. The third tool used was the academic performance checklist where the term marks and continuous assessment marks were recorded for all the participants.

Out of the fifty seven (N=57) participants, a cohort of eight (N=8) scholars were selected based on the four categories of nutritional status (e.g. underweight, normal, overweight and obese) whereby two scholars were selected from each category to determine their routine diet using the Focused Food frequency completed by the parents and/or guardian within two weeks, as well as the psychometric tests that was administered by the researcher.

5.3 CONCLUSIONS

The conclusions and recommendations are based on the purpose and the objectives of the study set forth as outline below:

5.3.1 Purpose and objectives

The purpose of this study was to determine and describe the link between routine diet capacity for sustained attention span and scholastic performance among Grade 2 scholars in circuit one in Khomas region. The following research objectives were formulated in order to achieve the overall aim. These objectives are:

5.3.1.1. Objective 1- To assess the routine diet of Grade 2 scholars in circuit one in Khomas region

In order to meet the first objective which was to assess the routine diet of the grade 2 scholars in both schools the focused food frequency questionnaire (FFF) was utilized. The questionnaire was completed by the parents or legal guardian of the 8 scholars' cohorts who were selected based on their nutritional status. The parents or legal guardian completed the questionnaire over the period of two weeks. Thereafter, the average calories taken per day were calculated manually to determine the calories intake per day.

Conclusions: This study confirmed the study done by MOHSS (2004) that showed most scholars (39.3%) always eat and or drinks something in the morning before they go to school, while 18.8% never eat and/or drink anything and 23% eats and/or drink something only sometimes. The result from this study yield that 50% of the scholars ate breakfast while the other half 50% did not eat breakfast on regular basis. However, on the other hand this study could not confirm on who eats most when it comes to gender as indicated by the study done by MOHSS (2004) which indicated that male students are less likely (38.4%) than female students (40.1%) to eat and or drink something in the morning before they go to school.

However the findings from the study confirm similar reasons cited in MOHSS (2004). The study reveals that the main reason why scholars did not have breakfast was due to the fact that they did not have time for breakfast (23.4%), that they could not eat in the morning (16.7%), that there is no food at home (13.3%) and that they do like the food at home (3.4%), (MOHSS 2004).

The study revealed that on average scholars who eat breakfast on regular basis had calories intake higher 8127 in week 1, 6963 in week 2 compare to scholars who did not eat breakfast on regular basis 5035 in week 1, 4874 in week 2. Additionally, the study revealed that on average scholars whose nutritional statuses was obese and overweight had higher calories intake for both weeks compared to those scholars whose nutritional status was normal and underweight.

Moreover, scholars whose nutritional status was overweight both ate breakfast on regular basis and their performance in both arithmetic and reading was average and they both did not have attention impairment. While the scholars whose nutritional status was normal both did not have attention impairment and their academic performance in both reading and arithmetic was average while only one of them used to have breakfast n regular basis. Among the scholars whose

nutritional status was obese one performed academically well compared to the other one who performed below average. Whilst, both the underweight did not eat breakfast on regular basis however one of them academically performed on average and had no attention impairment; while the other one academically performed below average and had significant attention impairment.

The performance of scholars in the five psychometric tests done with N=8 scholars (see annexure A) mirrored the academic performance of scholars done with N=57 in the class room, (see figure 4-12). They both did not show a significant academic performance differences in terms of nutritional status, as all scholars performed more or less the same.

5.3.1.2 Objective 2- To assess Grade 2 scholars' ability for sustained attention in class in circuit one in Khomas region

In order to meet the second objective which was to assess the Grade 2 scholars' ability for sustained attention in class in circuit one in Khomas region in both schools the Teacher Connor scale was utilized. Initially the questionnaire was supposed to be completed by the class teacher of the scholars' however, they claimed that the questionnaire was too long and it was taking their times thus the researcher and the assistant had to go to the school on a daily basis to interview the teachers on that particular scholar. The raw data was entered and analysed using SPSS 20.0 to determine the attention span of the scholars.

Conclusions: this study showed that a total of 52.7% scholars showed little or more attention impairment comparing to 47.4% who did not show any attention impairment. In this regard, this study did not reflect the study done by Florence, Asbridge, & Veugelers, (2008) that revealed undernourished children have shown to have decreased attendance in school and attention span

thus in turn it means if scholars have normal weight their attendance and attention span in schools was supposed to be excellent. However, is not the case with this study, although most scholars have normal weight, most of them 52.7% had little or more attention impairment.

Moreover, another study has shown that children who do not eat breakfast are more likely to do poorly on schoolwork, have decreased attention span, and have more behavioral problems than their peers who do eat breakfast (AL-Oboudi, 2010). The findings from the 8 sub-groups in Chapter 4 revealed that most scholars (50%) have breakfast on regular basis thus in turn the scholars were supposed to be attentive in class. To conclude this means that if the scholars are eating breakfast every morning this will assist them to perform well academically, to attend classes as well as to have full attention in class as they will have enough glucose to keep them awake throughout the day. However, this is not the case with this study, since 52.7% of scholars have little or more attention span despite the fact that the majority (50%) have breakfast on regular basis.

5.3.1.3 Objective 3- To determine the scholastic performance of Grade 2 scholars' in circuit one in Khomas region

In order to meet the third objective which is to determine the scholastic performance of Grade 2 scholars in circuit one in Khomas region in both schools the Performance checklist was utilized which capture the points each scholar scored in both the arithmetic and reading subjects to determine their performance. In addition, the five psychometric tests were done to assess the performance of the 8 sub-sample that was selected from each category of nutritional status namely normal, underweight, obese and overweight. The researcher and the assistant tested all

the 8 sub-sample on the five psychometric tests within the same time period the FFFQ was completed.

Conclusions: Lack of breakfast can lead to poor performance in school and that undernourished children have shown to have decreased attendance, attention and academic performance as well as experiencing more health problems compared to well-nourished children (Florence, Asbridge, & Veugelers, 2008). In addition, the study done among 5200 grade five students in Nova Scotia, Canada on diet quality and school performance demonstrated an association between various indicators of diet quality in relation to academic performance, (Florence, Asbridge, & Veugelers, 2008). Students reporting increased diet quality were significantly less likely to fail the literacy assessment, whereas students in the second and third tertile were 26% and 41% less likely to fail the literacy assessment. Whilst, students with an increased fruit and vegetable intake and lower caloric intake of fat were significantly less likely to fail the assessment; while boys were twice as likely to fail their literacy assessment compare to girls.

However, this study has shown a different picture to the findings from the scholastic performance and the five psychometric tests done with all sub-groups (the main group N=57; and the subgroup N=8) as they all showed poor academic performance despite the majority having a normal weight and having breakfast on regular basis. This implies that nutritional status, eating or not eating breakfast is not the only contributing factors to poor academic performance, scholars could perform poorly because of the number of scholars in a classroom which could compromise the attention given to each scholar and the method or the approach of teaching as well as lack of eating quality diet.

5.3.1.4 Objective 4- To describe the link between routine diets, attention span and scholastic performance among grade 2 scholars' in circuit one in Khomas region

In order to meet the fourth objective the following variables were collected the attention span, scholastic performance, the diet of the scholars using the correct data collection tools and they were entered and analysed using appropriate statistical software. Thereafter the correlation between the variables was determined using Pearson correlation.

Conclusions: the study done by Florence, Asbridge, & Veugelers, (2008) showed that undernourished children have been shown to have decreased attendance, attention and academic performance as well as experiencing more health problems comparing to well-nourished children. However, this study showed a weak linear negative and positive correlation between BMI percentile in comparison to the scholars' current nutritional status and the academic performance either in reading or arithmetic skills as well as the ability to sustain attention. However, according to this study depsite most scholars nutritional status being normal (see figure 4-5) they performed poorly in both reading and arithmetic as well as in the five psychometric tests, thus nutritional status cannot be one of the contrubuting factors to poor academic performance as stated in the previous studies.

However, the results from the same analysis showed a strong linear correlation between the ability to sustain attention and the academic performance in both arithmetic and reading (English 2nd). Since Figure 4-6 showed that 52.7% scholars showed little or more attention impairment comparing to 47.4% who did not show any attention impairment and majority of this scholars perform poorly in school. The study done by (Afman & Muller, 2006; Brown, 2005; Bellisle, 2004) mirror this study as it showed that attention deficit can result in impaired academic

functioning. In addition, attention deficit could be a contributing factor to poor academic performance of scholars in relation to arithmetic and reading sub-skills as shown by the study done by Sorhaindo & Feinstein, (2006) that showed children diagnosed with Attention-deficit-hyperactivity disorder (ADHD) suffer from difficulty in concentrating, sitting still and being quiet and tend to have short attention spans. This kind of behaviour affects the scholars school performance and interaction with other peers as well as compromise self esteem.

However, this study did not answer the question, why most scholars (52.7%) had little or significantattention impairment despite their nutritional status being normally distributed since according to Sorhaindo & Feinstein, (2006) scholars experiencing hunger are more likely to be hyperactive and suspended from school.

5.4 RECOMMENDATIONS

Several recommendations emanated from the study. Possible stakeholders who can act on these recommendations include; Ministry of Health and Social services, Ministry of Education, private companies, civil societies as well as the community at large.

5.4.1 Recommendations to Ministry of Health and Social Services (MoHSS)

- Since malnutrition is associated with diseases and poor academic performance it is the opinion of the researcher that the Nutritional department under Primary Health Care (PHC) within MOHSS should consider all ages for the nutrition programmes since at the moment the focus is mostly on children who are five years and lesser.

- The Nutritional department under PHC within MOHSS should collaborate with Ministry of Education (MoE) to offer nutritional feeding at least to all Primary schools in Namibia. Feeding programme should be available at all Primary schools to give scholars the opportunity to opt to eat or not to eat, rather than not having nutritional food available at school.

- Additionally, the MOHSS can revise school health policy as well as the curriculum in collaboration with the MoE so that it can accommodate the nutritional aspect and ensure that the policy is implemented through training of the school principals, school board members, life skill teachers and the entire school family.

5.4.2 Recommendations to Ministry of Education (MoE)

- The main findings that came out of this study have shown that scholars are performing poorly academically in both arithmetic and reading (English 2nd language). Additionally, the five psychometric tests that were done with the 8 sub-scholars have added value to the normal academic performance as the majority of the scholars also performed poorly in all five tests done with them. Firstly, in collaboration with the MOHSS, MoE can implement school feeding programme in all schools despite the location of the schools to be provided at least twice a day, either during the first break or first thing in the morning as well as at lunch before the scholars leave the school premises.

- Secondly, MoE can look at the following in order to improve the quality of education and to improve the performance of the scholars in Khomas regions circuit one as well as the whole education system in Namibia.

- Policy, guidelines and regulation should be developed in order to facilitate the methods of teaching at schools especially at the primary school level as it is foundation for the child to progress smoothly through all the grades.
- The number of scholars in classroom should be set at the maximum of 30 so that the teacher can be able to give enough and quality attention to each and every child in the classroom.

  - The schools need to educate parents and children on how to live a healthy lifestyle that includes proper nutrition by establishing committees that include parents and communities members to promote a healthy school atmosphere by focusing on nutrition and vending policies. In addition, schools can help school aged children develop healthy eating habits by emitting a consistent health message by ensuring that healthy food choices are offered at school. At the same time, school administrators can provide opportunities for staffs to receive education on good nutrition and health in the school environment.

  - Schools should ensure that only nutritious and appealing foods and beverages are provided in schools in school cafeterias, vending machines, snacks bars, schools stores and other venues that offer food and beverages to scholars.

5.4.3 Recommendations for future research

- The sample population used for this study was small as the participant's parents voluntarily withdrew from the study. Thus, there is a need to replicate this study with the large group in order to assess if the study will yield the same or different results. This study can be replicated either:

- with the same grades, schools and circuit or

- different grades, schools, circuit and region

- Additionally, the researcher can add the Connor Parent Rating scale in order to get the view of the parents and validate the data with the Connor Teacher Rating scale. It will also be crucial to do the Focus Food Frequency questionnaire and the five Psychometric tests with all the scholars participating in the study in turn to get a broader view on the larger sample population. In addition, it will be essential to compare scholar's nutritional status, academic performances as well as attention from different circuits within the same region.

5.5 LIMITATIONS OF THE STUDY

- The randomly selected schools happen to be from one suburb and the majority of the participants happen to be from the same area thus the study was not able to capture characteristics of the different population. Additionally, not all selected subjects participated in the study because it was voluntary and some subjects preferred to drop out. This led to the number of participants to be smaller compared to the initial number. In this regard, it will be crucial for future research to increase the number of schools and scholars in order to ensure that the research population is representative of the larger population.

- The data collection tools and the consent letter were developed in English that led to a language barrier since the parents were not able to understand what the study was all about. In this regard, someone had to be hired who in turn translated the consent letters into Afrikaans, which was the most spoken language in the suburb.

- The teachers who were supposed to administer the Connor Teacher Rating scale claimed that the questionnaire was too long and it was taking most of their times hence they were not able to complete the forms on their own. As a result, the researcher and the assistant had to go to school on the daily base for a period of two weeks to assist with administering the Connor Teacher Rating scale.

- The findings from the sample population used for the Focused Food Frequency Questionnaire (FFFQ) and psychometric tests was too small to be generalized to the rest of the population but can only be generalized to the same school population.

- There is a great scarcity of local literature on school aged children, attention span in class, nutritional status of scholars and diet as well as the scholastic performance in relation to the mentioned variables.

5.6 SUMMARY

The chapter outlined the findings in detailed; the limitations of the study, conclusions based on the findings as well as the recommendations. The findings of the study are outlined based on the overall purpose of the study in which four objectives were evaluated. The main purpose of the study was to determine and describe the link between routine diet capacity for sustained attention span and scholastic performance among Grade two scholars in circuit one in Khomas region. The routine diet of the scholars was determined using the focused food frequency, while the attention span was determined using the Teacher Connor scale while the school performance was determined using the term reports.

The findings have revealed that most of the scholars performed below average in both the reading and arithmetic skills, while most of them did not have the attention impairment and their nutritional status was normal based on the BMI percentile. However, it is crucial to improve the nutritional status of school aged children whose nutritional status was underweight as this is the effective investment for the future generation. Improving of the child nutrition should start with the mother throughout her life or particularly during pregnancy, because the human brain develops faster that other organs, particularly in the last third of pregnancy and the first two years of life, (Benton, 2011). Additionally, it is crucial that school feeding programme should be implemented at all the Pre and Primary schools. Whilst, the academic performance for the scholars can be improved by focusing on the various aspects such as the teaching methods, the class arrangement, the number of scholars in the class as well as the attention given by the teacher.

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ANNEXURE A: SCHOLASTIC FUNCTIONING EXPRESSED IN TERMS OF 6 MONTHS INTERVALS

	Level of Scholastic Functioning				
Chronological Age on Day of Testing	**Auditory Sequencing**	**Auditory Short-term Memory**	**Auditory Long-term Memory**	**Word recognition (reading)**	**Visual Discrimination**
1. Scholar 1 **7 years 8 months** **Overweight**	8 years 0 months **Functioning on par**	6 years 0 months to 6 years 11 months **1 year developmental backlog**	8 years 0 months to 8 years 11 months **1 year ahead of chronological age**	Greater than 9 years 0 months **1 year ahead of chronological age**	6 years 0 months **1 year developmental backlog**
2. Scholar 2 **7 years 11 months** **Overweight**	9 years 6 months **1 year 6 months ahead of chronological age**	6 years 0 months to 6 years 11 months **1 year developmental backlog**	9 years 0 months to 9 years 11 months **1 year 6 months ahead of chronological age**	Greater than 9 years 0 months **1 year 6 months ahead of chronological age**	Below 5 years level **2 years developmental backlog**
3. Scholar 5 **8 years 1 month** **Obese**	5 years 0 months (pre-school level) **3 years developmental backlog**	7 years 0 months to 7 years 11 months **1 year developmental backlog**	9 years 0 months to 9 years 11 months **1 year ahead of chronological age**	Greater than 9 years 0 months **1 year ahead of chronological age**	6 years 0 months **2 years developmental backlog**
4. Scholar 3 8 years 2 months **Normal**	10 years 0 months **2 years ahead of chronological**	5 years 0 months to 5 years 11 months **3 years developmental**	7 years 0 months to 7 years 11 months **1 year developmental**	8 years 0 months **On par with chronological age**	5 years 0 months **3 years developmental backlog**

		age	**backlog**	**backlog**		
5.	Scholar 8 8 years 5 months **Underweight**	7 years 6 months **1 year developmental backlog**	7 years 0 months to 7 years 11 months **1 year developmental backlog**	9 years 0 months to 9 years 11 months **1 year ahead of chronological age**	Below 7 years level **1 year developmental backlog**	Below 5 years level **3 years developmental backlog**
6.	Scholar 6 8 years 8 months **Obese**	5 years 0 months (pre-school level) **3 years developmental backlog**	7 years 0 months to 7 years 11 months **1 year developmental backlog**	7 years 0 months to 7 years 11 months **1 year developmental backlog**	Below 7 years level **1 year developmental backlog**	Below 5 years level **3 years developmental backlog**
7.	Scholar 4 8 years 6 months **Normal**	5 years 6 months (pre-school level) **3 years developmental backlog**	7 years 0 months to 7 years 11 months **1 year developmental backlog**	8 years 0 months to 8 years 11 months **On par with chronological age**	Below 7 years level **1 year developmental backlog**	Below 5 years level **3 years developmental backlog**
8.	Scholar 7 8 years 0 months **Underweight**	Below 5 years level **3 years developmental backlog**	5 years 0 months to 5 years 11 months **3 years developmental backlog**	8 years 0 months to 8 years 11 months **On par with chronological age**	Below 7 years level **1 year developmental backlog**	Below 5 years level **3 years developmental backlog**
Breakdown of sample (N = 8)						
	Developmentally ahead of chronological	Participant #2_OW	Null	Participant #1_OW	Participant #1_OW	Null

age	Participant #4_N		Participant #2_OW Participant #3_O Participant #5_UW	Participant #2_OW Participant #3_O	
Total N **Total of N** **Column %** **Total %** **P value**	8 2 25.00% 100% 1.00000 p>0.05		8 4 50.0% 100% 0.53979 p>0.05	8 3 37.5% 100% 0.99668 p>0.05	
On par development	Participant #1_OW	Null	Participant #7_N Participant #8_UW	Participant #4_N	Null
Total N **Total of N** **Column %** **Total %** **P value**	8 1 12.5% 100% 1.00000 p>0.05		8 2 25.00% 100% 1.00000 p>0.05	8 1 12.5% 100% 1.00000 p>0.05	

Participants performing above or on par	**Total N** **Total of N** **Column %** **Total %** **P value**	**8** **3** **37.5%** **100%** **0.99668** **p>0.05**		**8** **6** **75.0%** **100%** **0.00001** **p<0.05***	**8** **4** **50.0%** **100%** **0.53979** **p>0.05**	
	Developmental backlog of 6 months	Null	Null	Null	Null	Null
	Total N **Total of N** **Column %** **Total %** **P value**					
	Developmental backlog of 1 year	Participant #5_UW	Participant #1_OW Participant #2_OW Participant #3_O Participant #5_UW Participant #6_O Participant #7_N	Participant #4_N Participant #6_O	Participant #5_UW Participant #6_O Participant #7_N Participant #8_UW	Participant #1_OW
	Total N **Total of N** **Column %** **Total %** **P value**	8 1 12.5% 100%	8 6 75.0% 100%	8 2 25.00% 100%	8 4 50.0% 100%	8 1 12.5% 100%

	1.00000 p>0.05	0.00001 p<0.05*	1.00000 p>0.05	0.53979 p>0.05	1.00000 p>0.05
Developmental backlog of 2 years	Null	Null	Null	Null	Participant #2_OW Participant #3_O
Total N **Total of N** **Column %** **Total %** **P value**					8 2 25.00% 100% 1.00000 p>0.05
Developmental backlog greater than 2 years	Participant #3_O Participant #6_O Participant #7_N Participant #8_UW	Participant #4_N Participant #8_UW	Null	Null	Participant #4_N Participant #5_UW Participant #6_O Participant #7_N Participant #8_UW
Total N **Total of N** **Column %** **Total %** **P value**	8 4 50.0% 100%	8 2 25.0% 100%			8 5 62.5% 100%

		0.53979 p>0.05	1.00000 p>0.05			0.01049 p<0.05*
Participants performing below par	**Total N** **Total of N** **Column %** **Total %** **P value**	8 5 62.5% 100% 0.04431 p<0.05*	8 8 100% 100% 0.00001 p<0.05*	8 2 25.0% 100% 1.00000 p>0.05	8 4 50.0% 100% 0.53979 p>0.05	8 8 100% 100% 0.00001 p<0.05*

LETTERS

ANNEXURE B: LETTER TO THE REGIONAL DIRECTOR

UNIVERSITY OF NAMIBIA

Private Bag 13301
Windhoek
Namibia
340 Mandume Ndemufayo Avenue

Tel: 061-206 3111
Email: lhaoses@unam.na

Enquiries: Dr. L. Haoses-Gorases

Date: 17 February 2013

Ms. T. Seefeldt
Regional Director
Ministry of Education
Private Bag 13236
Windhoek

Dear Ms. Seefeldt

RE: THE LINK BETWEEN ROUTINE DIET, ATTENTION SPAN AND SCHOLASTIC PERFORMANCE AMONG GRADE 2 SCHOLARS IN CIRCUIT ONE IN KHOMAS REGION.

This letter serves to introduce Elsie Tjituri, an enrolled Master student at the University of Namibia (UNAM). She is currently in her last year of thesis and the title of her study is **the link between routine diet, attention span and scholastic performance among grade 2 scholars in circuit one in Khomas region**. For the purpose of this study only 2 primary schools in circuit one will be visited namely for approximately one month from 21 May to 30 June 2013.

The aim of this study is to determine and describe the link between routine diet, capacity for sustained attention span and scholastic performance among Grade 2 scholars. The objectives of the study are as follows:

To determine the routine diet of Grade 2 scholars: in order to determine the diet of the scholars the Body Mass Index (BMI) will be measured and the focused food frequency list will be used to determine the type of the food the scholars take on the daily base.

To determine Grade 2 scholars' ability for sustained attention per category: the standardized Conners Teacher Rating Scale (CTRS-R) will used to obtain data on the ability for sustained attention and it will be administered by the class teacher.

To determine the scholastic performance of Grade 2 scholars per category: three term scholastic progress reports of the grade 2 scholars from the previous year will be assessed.

This study will be crucial to be carried out since it will contribute to a new body of knowledge, since no similar data base for Grade 2-scholars exists in Namibia. It may contribute to the school feeding program policy and it might strengthen the nutrition section in the environmental studies curriculum for primary schools. It can also provide the baseline data for the Namibia Alliance for Improved Nutrition (NAFIN), chaired by the honorable Prime Minister, and may inform relevant Ministries, Non-Governmental Organizations and development partners running school feeding programs.

It is in the light of the above that I am approaching your research board/committee to consider the student proposal. I trust and hope that you will consider this request favorably.

For any enquiries, please do not hesitate to contact the relevant supervisors within the Faculty of Health Sciences, University of Namibia namely, Dr. L. Haoses-Gorases (Supervisor, SoNPH) at 0811270252,or Dr. Hans Amukugo (Co-supervisor, SoNPH) at 0811493928, or Prof. H. Thirion-Naudé (Co-supervisor, SoM) at (061) 221095.

Thank you

_____

Dr. L. Haoses-Gorases
Main Supervisor

ANNEXURE C: LETTER TO KHOMASDAL PRIMARY SCHOOL

340 Mandume Ndemufayo Avenue
Private Bag 13301
Windhoek
Tel: 061-206 3111

10 April 2013

Mr. R.P Matengu
Khomasdal P.S
Ministry of Education
P.O Box 10268
Khomasdal

Dear Mr. R.P. Matengu

RE: REQUEST FOR PERMISSION TO CONDUCT FIELD RESEARCH

This letter serves to introduce **Elsie Tjituri**, an enrolled Master's degree student at the University ofNamibia (UNAM) as the responsible researcher, and to request permission to conduct field research within your school. In 2013, this researcher has to conduct field research, i.e. data gathering, towards completion of her thesis entitled, **the link between routine diet, attention span and scholastic performance among grade 2 scholars in circuit one in Khomas region**. Approval for this research project has already been obtained from the relevant Ministerial Office, subject to approval and collaboration with the principals of the identified schools. In order to have selected the research sample within circuit one, stratified and simple random sampling resulted in your school being selected as participant school within circuit one. From every participant school, only one (1) of the grade 2 classes will be selected as research sample, using a simple random sampling technique.

The aim of this study is to determine and describe the link between routine diet, capacity for sustained attention and scholastic performance among Grade 2 scholars. The objectives of the study are as follows:

- **To determine the routine diet of Grade 2 scholars:** The parents of participant grade 2 scholars will fill out a focused food frequency survey, aimed at determining the routine food intake of scholars over a period of two (2) weeks. Being cognizant thereof that such a survey may only render a sample of the routine food intake of scholars, subject to a number of possible variables, the researcher will also measure and calculate the Body Mass Index (BMI) of participant grade 2 scholars to obtain baseline data that might explain the link between over-nutrition, malnutrition, and under-nutrition resulting from scholars' routine food intake, and how this nutritional status (per category) links with classroom attention and scholastic performance.

- **To determine Grade 2 scholars' ability for sustained attention per category:** The standardized Connors Teacher Rating Scale (CTRS-R) will be used to obtain data on participant grade 2 scholars' capacity for sustained attention within the classroom. The CTRS-R will be administered by the class teacher, based thereupon that the class teacher is in an advantageous position to make accurate observations of participant grade 2 scholars' classroom behaviour over a period of time, thereby providing trustworthy data on participant scholars' capacity for sustained attention. The researcher will link the CTRS-R data with the nutritional status (per category) of participant grade 2 scholars, as well as to their BMI.

- **To determine the scholastic performance of Grade 2 scholars per category:** The participant grade 2 scholars' scholastic progress reports for the first term will finally be linked to the following variables: the participant grade 2 scholars' individualized category (i.e. meeting under-nutrition, over-nutrition, or malnutrition status, based on routine food intake), the participant grade 2 scholars' BMI, and the participant grade 2 scholars' results of the CTRS-R. A comparison of sub-sets of data is likely to explain the link between routine food intake (i.e. nutritional status), attention span and scholastic performance among grade 2 scholars. The participant grade 2 scholars' progress report will be obtained either from the parents or the school.

Thus, the study population comprises of a sample of grade 2 scholars from participant schools, the parents of participant grade 2 scholars from these schools, and the class teachers of participant grade 2 classes from these participant schools. All data so gathered will be subject to **anonymity**, i.e. participant schools, parents, scholars, and teachers will not be identified in the research report, save for the fact that the sample was drawn from grade 2 scholars within circuit one of the Khomas region. All other ethical practice rules applicable to research will be adhered to.

Since this research project depends on the availability of first term scholastic reports, while also adhering to University timeframes, it would be ideal if the researcher could conduct this field research within the period **21 May to 30 June 2013**; however, if this timeframe is inconvenient, your Office is kindly invited to propose an alternative timeframe.

It is against this background that I am approaching the Office of the School Principal to grant us permission to conduct this study in your school. For any enquiries, please do not hesitate to

contact the main supervisor, Dr. L.Haoses-Gorases, Faculty of Health Sciences, University of Namibia, or Mr. Paulus Lewin (Inspector of Education: Circuit 1, Khomas Region, Ministry of Education) at 081 161 8144.

For feedback on this application, kindly contact the main supervisor by email. I trust and hope that you will consider this request favourably.

Sincerely,

_____

Dr. L. Haoses-Gorases
Main Supervisor

Phone: 081 127 0252
Email: lhaoses@unam.na

ANNEXURE D: LETTER TO MH GREEF PRIMARY SCHOOL

340 Mandume Ndemufayo Avenue
Private Bag 13301
Windhoek
Tel: 061-206 3111

10 April 2013

Acting Mr. G. Kandetu
M.H. Greeff P.S
Ministry of Education
P.O Box 22900
Khomasdal

Dear Acting Mr. G. Kandetu

RE: REQUEST FOR PERMISSION TO CONDUCT FIELD RESEARCH

This letter serves to introduce **Elsie Tjituri**, an enrolled Master's degree student at the University of Namibia (UNAM) as the responsible researcher, and to request permission to conduct field research within your school. In 2013, this researcher has to conduct field research, i.e. data gathering, towards completion of her thesis entitled, **the link between routine diet, attention span and scholastic performance among grade 2 scholars in circuit one in Khomas region**. Approval for this research project has already been obtained from the relevant Ministerial Office, subject to approval and collaboration with the principals of the identified schools. In order to have selected the research sample within circuit one, stratified and simple random sampling resulted in your school being selected as participant school within circuit one. From every participant school, only one (1) of the grade 2 classes will be selected as research sample, using a simple random sampling technique.

The aim of this study is to determine and describe the link between routine diet, capacity for sustained attention and scholastic performance among Grade 2 scholars. The objectives of the study are as follows:

- **To determine the routine diet of Grade 2 scholars:** The parents of participant grade 2 scholars will fill out a focused food frequency survey, aimed at determining the routine food intake of scholars over a period of two (2) weeks. Being cognizant thereof that such a survey may only render a sample of the routine food intake of scholars, subject to a number of possible variables, the researcher will also measure and calculate the Body Mass Index (BMI) of participant grade 2 scholars to obtain baseline data that might explain the link between over-nutrition, malnutrition, and under-nutrition resulting from scholars' routine food intake, and how this nutritional status (per category) links with classroom attention and scholastic performance.

- **To determine Grade 2 scholars' ability for sustained attention per category:** The standardized Connors Teacher Rating Scale (CTRS-R) will be used to obtain data on participant grade 2 scholars' capacity for sustained attention within the classroom. The CTRS-R will be administered by the class teacher, based thereupon that the class teacher is in an advantageous position to make accurate observations of participant grade 2 scholars' classroom behaviour over a period of time, thereby providing trustworthy data on participant scholars' capacity for sustained attention. The researcher will link the CTRS-R data with the nutritional status (per category) of participant grade 2 scholars, as well as to their BMI.

- **To determine the scholastic performance of Grade 2 scholars per category:** The participant grade 2 scholars' scholastic progress reports for the first term will finally be linked to the following variables: the participant grade 2 scholars' individualized category (i.e. meeting under-nutrition, over-nutrition, or malnutrition status, based on routine food intake), the participant grade 2 scholars' BMI, and the participant grade 2 scholars' results of the CTRS-R. A comparison of sub-sets of data is likely to explain the link between routine food intake (i.e. nutritional status), attention span and scholastic performance among grade 2 scholars. The participant grade 2 scholars' progress report will be obtained either from the parents or the school.

Thus, the study population comprises of a sample of grade 2 scholars from participant schools, the parents of participant grade 2 scholars from these schools, and the class teachers of participant grade 2 classes from these participant schools. All data so gathered will be subject to **anonymity**, i.e. participant schools, parents, scholars, and teachers will not be identified in the research report, save for the fact that the sample was drawn from grade 2 scholars within circuit one of the Khomas region. All other ethical practice rules applicable to research will be adhered to.

Since this research project depends on the availability of first term scholastic reports, while also adhering to University timeframes, it would be ideal if the researcher could conduct this field research within the period **21 May to 30 June 2013**; however, if this timeframe is inconvenient, your Office is kindly invited to propose an alternative timeframe.

It is against this background that I am approaching the Office of the School Principal to grant us permission to conduct this study in your school. For any enquiries, please do not hesitate to

contact the main supervisor, Dr. L.Haoses-Gorases, Faculty of Health Sciences, University of Namibia, or Mr. Paulus Lewin (Inspector of Education: Circuit 1, Khomas Region, Ministry of Education) at 081 161 8144.

For feedback on this application, kindly contact the main supervisor by email. I trust and hope that you will consider this request favourably.

Sincerely,

_____

Dr. L. Haoses-Gorases
Main Supervisor

Phone: 081 127 0252
Email: lhaoses@unam.na

ANNEXURE E: CONSENT LETTER TO PARENTS

340 Mandume Ndemufayo Avenue
Private Bag 13301
Windhoek
Tel: 061-206 3111

6 June 2013

Dear Parents and/or Custodians,

RE: REQUEST FOR CONSENT TO PARTICIPATE IN RESEARCH

My name is **Elsie Tjituri**, and I am an enrolled Master's degree student at the University of Namibia (UNAM). I am the principle researcher conducting field research within your school. The research theme is entitled, **the link between routine diet, attention span and scholastic performance among grade 2 scholars in circuit one in Khomas region**. Approval for this research project has already been obtained from the relevant Ministerial Office and School Principals. The aim of this study is to determine and describe the link between routine diet, capacity for sustained attention and scholastic performance among Grade 2 scholars. After having been authorized to conduct this research in your child's school, **the grade 2D class** was randomly selected to participate in this research. Hence, the parents and custodians of grade 2D-learners are herewith **requested to consent to participation**.

Participation in this research project entails the following:

1. The researcher will arrange a meeting with the parents/custodians at your child's school to explain the research project. However, if a parent/custodian is unable to attend this meeting, the researcher will arrange a home visit to these parents/custodians.
2. Parents/custodians are required to fill out a **Daily Food Intake** tick list on behalf of the child for a period of two weeks, i.e. from 17 to 30 June 2013. Completion of this tick list will take no more than a few minutes daily, since the parents/custodians are only required to tick from a list of foods, what their child has eaten on that particular day of the week.
3. The class teacher is required to fill out the Connors Teacher Rating Scale to assess the attention of your child within the classroom within the same said period.
4. The researcher, under the supervision of the class teacher, will collect the weight and the height of your child at the school.
5. Finally, the researcher will obtain your child's scholastic performance marks from the school for the first term of this year.

All participants to the research project are entitled to the following **protections** under the **code of research ethics**:

1. Confidentiality - your participation in this research is strictly confidential. All personal information collected will be kept private. No-one will be able to identify research participants, since all participants will be allocated a research number, instead of using personally identifiable names/surnames.

2. All information will be kept and stored electronically on a password protected computer to which only the researcher has access to. No documentation or reports will carry your name or your child's name on it.
3. The research findings are anonymous, and only these anonymous findings will be made available to the Ministry of Education and the Ministry of Health and Social Services for purposes of intervention, if needed. All reporting of the findings will be anonymous, e.g. reporting done in the thesis, as well as via subsequent research articles.
4. No research participant will be remunerated in exchange of their participation – it is a "for-free" research project;
5. No research participant will suffer any **harm** whatsoever from participation in this research project.
6. Participation is voluntary, and any participant is free to withdraw and cancel (in writing) participation in this research project at any time – even after commencement of the research project.
7. Parents, custodians and their children will benefit from participation as follows: Upon conclusion of the research project, the researcher undertakes to arrange a parent-teacher meeting at the school, to give feedback on the research findings, together with limited consultation services on the benefits of a healthy diet in terms of ability to pay attention, and scholastic performance.

Sincerely,

_____

Elsie Tjituri
Principal researcher
Email: roxye03@yahoo.co.uk

……
Please cut here, and only return the signed certificate of consent
……

CERTIFICATE OF CONSENT

I understand that I have been invited to participate in a research project, subject to the terms outlined in paragraphs 1 to 5 and 1 to 7 respectively. My participation in this study is voluntary and I may refuse or withdraw at any time without any consequences. I understand that any information I provide will be kept strictly confidential. The research findings will be compiled and shared anonymously along with other data in such a manner that I am not personally identifiable. I have read the attached information sheet or it has been read to me. I have had the opportunity to ask questions about this project, and the questions were answered to my

satisfaction. I herewith consent to voluntary participation in the research project, as well participation of my child.

Dated this _____ day of _____ (month) of 2013 this _____(town/city)

_____ _____

Signature Name of Parent/Custodian

_____

Name of my child

DATA COLLECTON TOOLS

ANNEXURE F: ANTHROPOMETRIC CHECKLIST

ID (optional)	Name (optional)	Sex	Date of birth	Date of measurement	Height (centimeters)	Weight (kilograms)	BMI	BMI %ile

ANNEXURE G: SCHOLAR PERFORMANCE CHECKLIST

Circuit one
Khomas region

ID	English	Reading	Afrikaans	Mathematics	Environmental studies	Religion studies	Arts	Physical Education
35								
36								
37								
38								
39								
40								
41								
42								
43								
44								
45								
46								
47								
48								
49								
50								
51								
52								
53								
54								
55								

ANNEXURE H: THE SNAP-IV TEACHER AND PARENT RATING SCALE

(Teacher's Connors Scale, revised by ©James M. Swanson, Ph.D., University of California, Irvine, CA92715)

Research participant (child's) research number: Child's gender:_____

Child's age: Grade the child is currently in:_____Completed by:_____

Name of School:_____Type of Class (i.e. mainstream, special, or remedial class):_____
Class size:____

PART 1

Instructions for administration of questionnaire:

For each item, check the tick box which best describes this child (tick only one answer per question):

Not At All	Just A Little	Quite a bit	Very much

Kindly answer **all** of the questions in this section:

1. Child often fails to give close attention to details or makes careless mistakes in schoolwork or tasks

Not At All	Just A Little	Quite a bit	Very much

2. Child often has difficulty sustaining attention in tasks or play activities

Not At All	Just A Little	Quite a bit	Very much

3. Child often does not seem to listen when spoken to directly

Not At All	Just A Little	Quite a bit	Very much

4. Child often does not follow through on instructions and fails to finish schoolwork, chores, or duties

Not At All	Just A Little	Quite a bit	Very much

5. Child often has difficulty organizing tasks and activities

Not At All	Just A Little	Quite a bit	Very much

6. Child often avoids, dislikes, or shows reluctantly to engage in tasks requiring sustained mental effort

Not At All	Just A Little	Quite a bit	Very much

7. Child often loses things necessary for activities (e.g., toys, school assignments, pencils, or books)

Not At All	Just A Little	Quite a bit	Very much

8. Child often is distracted by extraneous stimuli, such as noise/sound outside the classroom or classmates' sounds/noise

Not At All	Just A Little	Quite a bit	Very much

9. Child often is forgetful in daily activities

Not At All	Just A Little	Quite a bit	Very much

10. Child often has difficulty maintaining alertness, orienting to requests, or executing directions

Not At All	Just A Little	Quite a bit	Very much

11. Child often fidgets with hands or feet or squirms in seat

Not At All	Just A Little	Quite a bit	Very much

12. Child often leaves seat in classroom or in other situations in which remaining seated is expected (e.g. wandering around in the classroom)

Not At All	Just A Little	Quite a bit	Very much

13. Child often runs about or climbs excessively in situations in which it is inappropriate

Not At All	Just A Little	Quite a bit	Very much

14. Child often has difficulty playing or engaging in leisure activities quietly

Not At All	Just A Little	Quite a bit	Very much

15. Child often is “on the go” or often acts as if “driven by a motor”

Not At All	Just A Little	Quite a bit	Very much

16. Child often talks excessively

Not At All	Just A Little	Quite a bit	Very much

17. Child often blurts out answers before questions have been completed

Not At All	Just A Little	Quite a bit	Very much

18. Child often has difficulty awaiting his/her turn

Not At All	Just A Little	Quite a bit	Very much

19. Child often interrupts or intrudes on others (e.g., butts into conversations/games)

Not At All	Just A Little	Quite a bit	Very much

20. Child often has difficulty sitting still, being quiet, or inhibiting his/her impulses in the classroom or at home

Not At All	Just A Little	Quite a bit	Very much

21. Child often loses temper

Not At All	Just A Little	Quite a bit	Very much

22. Child often argues with adults

Not At All	Just A Little	Quite a bit	Very much

23. Child often actively defies or refuses adult requests or rules

Not At All	Just A Little	Quite a bit	Very much

24. Child often deliberately does things that annoy other people

Not At All	Just A Little	Quite a bit	Very much

25. Child often blames others for his or her mistakes or misbehaviour

Not At All	Just A Little	Quite a bit	Very much

26. Child is often touchy or easily annoyed by others

Not At All	Just A Little	Quite a bit	Very much

27. Child often is angry and resentful

Not At All	Just A Little	Quite a bit	Very much

28. Child often is spiteful or vindictive

Not At All	Just A Little	Quite a bit	Very much

29. Child often is quarrelsome

Not At All	Just A Little	Quite a bit	Very much

30. Child often is negative, defiant, disobedient, or hostile toward authority figures

Not At All	Just A Little	Quite a bit	Very much

31. Child often makes noises (e.g., humming or odd sounds)

Not At All	Just A Little	Quite a bit	Very much

32. Child often is excitable, impulsive

Not At All	Just A Little	Quite a bit	Very much

33. Child often cries easily

Not At All	Just A Little	Quite a bit	Very much

34. Child often is uncooperative

Not At All	Just A Little	Quite a bit	Very much

35. Child often acts “smart” (i.e. the classroom “clown”)

Not At All	Just A Little	Quite a bit	Very much

36. Child often is restless or overactive

Not At All	Just A Little	Quite a bit	Very much

37. Child often disturbs other children

Not At All	Just A Little	Quite a bit	Very much

38. Child often changes mood quickly and drastically

Not At All	Just A Little	Quite a bit	Very much

39. Child often gets easily frustrated if demands are not met immediately

Not At All	Just A Little	Quite a bit	Very much

40. Child often teases other children and interferes with their activities

Not At All	Just A Little	Quite a bit	Very much

PART II

Instructions for administration of questionnaire:

For each item, check the tick box which best describes this child (tick only one answer per question):

Not At All	Just A Little	Quite a bit	Very much

Kindly answer **all** of the questions in this section:

41. Child often is aggressive to other children (e.g., picks fights or bullies)

Not At All	Just A Little	Quite a bit	Very much

42. Child often is destructive with property of others (e.g., vandalism)

Not At All	Just A Little	Quite a bit	Very much

43. Child often is deceitful (e.g., stealing, lies, forges, copies the work of others, or "cons" others)

Not At All	Just A Little	Quite a bit	Very much

44. Child often and seriously violates rules (e.g., is truant, runs away, or completely ignores class rules)

Not At All	Just A Little	Quite a bit	Very much

45. Child has persistent pattern of violating the basic rights of others or major societal norms

Not At All	Just A Little	Quite a bit	Very much

46. Child has episodes of failure to resist aggressive impulses (to assault others or to destroy property)

Not At All	Just A Little	Quite a bit	Very much

47. Child has motor or verbal tics (sudden, rapid, recurrent, non-rhythmic motor or verbal activity)

Not At All	Just A Little	Quite a bit	Very much

48. Child has repetitive motor behaviour (e.g., hand waving, body rocking, or picking at skin)

Not At All	Just A Little	Quite a bit	Very much

49. Child has obsessions (persistent and intrusive inappropriate ideas, thoughts, or impulses)

Not At All	Just A Little	Quite a bit	Very much

50. Child has compulsions (repetitive behaviours or mental acts to reduce anxiety or distress)

Not At All	Just A Little	Quite a bit	Very much

51. Child often is restless or seems keyed up or on edge

Not At All	Just A Little	Quite a bit	Very much

52. Child often is easily fatigued

Not At All	Just A Little	Quite a bit	Very much

53. Child often has difficulty concentrating (mind goes blank)

Not At All	Just A Little	Quite a bit	Very much

54. Child often is irritable

Not At All	Just A Little	Quite a bit	Very much

55. Child often complains of muscle tension and/or headache

Not At All	Just A Little	Quite a bit	Very much

56. Child often has excessive anxiety and worry (e.g., apprehensive expectation)

Not At All	Just A Little	Quite a bit	Very much

57. Child often has daytime sleepiness (unintended sleeping in inappropriate situations)

Not At All	Just A Little	Quite a bit	Very much

58. Child often has excessive emotionality and attention-seeking behavior

Not At All	Just A Little	Quite a bit	Very much

59. Child often has need forundue admiration,grandiosebehavior, or lack of empathy towards others (animals or persons)

Not At All	Just A Little	Quite a bit	Very much

60. Often has relationships with others, reactive mood, and/or impulsivity

Not At All	Just A Little	Quite a bit	Very much

61. Child sometimes for <u>at least a week</u> has inflated self-esteem or grandiosity

Not At All	Just A Little	Quite a bit	Very much

62. Child sometimes for <u>at least a week</u> is more talkative than usual or seems pressured to keep talking

Not At All	Just A Little	Quite a bit	Very much

63. Child sometimes for <u>at least a week</u> has flight of ideas or says that thoughts are racing

Not At All	Just A Little	Quite a bit	Very much

64. Child sometimes for <u>at least a week</u> has elevated, expansive or euphoric mood

Not At All	Just A Little	Quite a bit	Very much

65. Child sometimes for <u>at least a week</u> is excessively involved in pleasurable but risky activities

Not At All	Just A Little	Quite a bit	Very much

66. Child sometimes for <u>at least 2 weeks</u> has depressed mood (sad, hopeless, and/or discouraged)

Not At All	Just A Little	Quite a bit	Very much

67. Child sometimes for <u>at least 2 weeks</u> has irritable or cranky mood (not just when frustrated)

Not At All	Just A Little	Quite a bit	Very much

68. Child sometimes for at least 2 weeks has markedly diminished interest or pleasure in most activities

Not At All	Just A Little	Quite a bit	Very much

69. Child sometimes for at least 2 weeks has psychomotor agitation (even more active than usual)

Not At All	Just A Little	Quite a bit	Very much

70. Child sometimes for at least 2 weeks has psychomotor retardation (slowed down in most activities)

Not At All	Just A Little	Quite a bit	Very much

71. Child sometimes for at least 2 weeks is fatigued orhas loss of energy

Not At All	Just A Little	Quite a bit	Very much

72. Child sometimes for at least 2 weeks has feelings of worthlessness or excessive, inappropriate guilt

Not At All	Just A Little	Quite a bit	Very much

73. Child sometimes for at least 2 weeks has diminished ability to think or concentrate

Not At All	Just A Little	Quite a bit	Very much

74. Child shows chronic low self-esteem most of the time for at least a year

Not At All	Just A Little	Quite a bit	Very much

75. Child shows chronic poor concentration or difficulty making decisions most of the time for at least a year

Not At All	Just A Little	Quite a bit	Very much

76. Child shows chronic feelings of hopelessness most of the time for at least a year

Not At All	Just A Little	Quite a bit	Very much

77. Currently the child is hyper vigilant (overly watchful or alert) or has exaggerated startle response

Not At All	Just A Little	Quite a bit	Very much

78. Currently the child is irritable, has anger out bursts, or has difficulty concentrating

Not At All	Just A Little	Quite a bit	Very much

79. Currently the child has an emotional (e.g., nervous, worried, hopeless, tearful) response to stress

Not At All	Just A Little	Quite a bit	Very much

80. Currently the child has a behavioral (e.g., fighting, vandalism, truancy) response to stress

Not At All	Just A Little	Quite a bit	Very much

81. Child has difficulty getting started on classroom assignments

Not At All	Just A Little	Quite a bit	Very much

82. Child has difficulty staying on task for an entire classroom period

Not At All	Just A Little	Quite a bit	Very much

83. Child has problems in completion of work on classroom assignments

Not At All	Just A Little	Quite a bit	Very much

84. Child has problems in accuracy or neatness of written work in the classroom

Not At All	Just A Little	Quite a bit	Very much

85. Child has difficulty attending to a group classroom activity or discussion

Not At All	Just A Little	Quite a bit	Very much

86. Child has difficulty making transitions to the next topic or classroom period

Not At All	Just A Little	Quite a bit	Very much

87. Child has problems in interactions with peers in the classroom

Not At All	Just A Little	Quite a bit	Very much

88. Child has problems in interactions with staff (teacher or classroom assistant)

Not At All	Just A Little	Quite a bit	Very much

89. Child has difficulty remaining quiet according to classroom rules

Not At All	Just A Little	Quite a bit	Very much

90. Child has difficulty staying seated according to classroom rules

Not At All	Just A Little	Quite a bit	Very much

PART III

Instructions:

For each item, check the tick box that is most applicable:

Kindly answer **all** of the questions in this section:

91. For reasons unknown to the teacher, the child is often absent from school

No Yes Uncertain

92. The child is often sick absent from school due to illness

No Yes Uncertain

93. The child has experienced death of a close relative during the past month (e.g. only tick yes if death of father, mother, sibling)

No Yes Uncertain

94. The child has experienced death of a family member during the past month (e.g. only tick yes if death of extended family member such as uncle, aunt, cousin or grandparent)

No Yes Uncertain

95. The child has been directly involved in trauma during the past month (e.g. the child him/herself was involved in a car accident, armed robbery, abuse, family violence)

No Yes Uncertain

96. The child has been indirectly involved in trauma during the past month (e.g. the child's close family member was involved in a car accident, armed robbery, abuse, family violence)

No Yes Uncertain

97. The child's primary caregiver has left the family (not due to death) during the past month

No Yes Uncertain

98. The financial status of the child's family has changed significantly during the past Month (e.g. due to parent becoming unemployed during past month)

No Yes Uncertain

99. The child has been nomadic, i.e. the child was moved to live with another caregiver during the past month

No Yes Uncertain

100. The child lives in a child-headed household

No Yes Uncertain

Thank you for your cooperation and assistance towards completion of this questionnaire.

The Research Team

University of Namibia

School of Nursing & Public Health

ANNEXURE I: PSYCHOMETRIC TEST 1 AUDITORY LONG TERM MEMORY

Instructions to the administrators

1. First read the story to the child slowly with good pronunciation.

2. The child must then repeat the story to the test administrator.

3. The child may recall in any specific order, and the test administrator must tick the child's words as he/she repeats the story, using the score chart. Tick every fact the child is able to recall.

4. **Never** give any indication of right or wrong answers (repeats), since this indication could be negative or positive reinforcement influencing the test results in one or another way.

Before starting the tests, the Test Administrator says to the learner:

"I'm going to slowly read to you a little story. Pay close attention, because when I'm done, I'm

Going to ask you to repeat the story to me, exactly as you've heard them."

Now the Test Administrator starts with the test by reading the following story to the child.

Mr. and Mrs. Brown have two children, John, ten years old, and Mary eightYears old. Last Friday the parents took the children to the sea (side).At first the children played with a red ball. Mr. Brown went fishing on the dangerous rocks. Mrs. Brown read a story book on the beach. Later on John went swimming in thesea with his friends and his sister picked up shells. At the end of the day they unwillingly packed the car and went home.

Test Administrator to child: *"Now, please tell me everything that you can remember about this story."*

Use the Recording Checklist to record the results:

Recording Checklist

Respondent no.:	
Name:	
Date of birth	

Tick response here withV *Tick response here withV*

Mr		Mrs Brown	
And Mrs		read	
Brown		A story book	
Have two children		On the beach	
John		Later on	
10(years old)		John	
And Mary		Went swimming	
8(years old)		In the sea	
Last Friday		With his friends	
The parents took*(the father and mother also*		(*and*) his sister	
the children*(John and Mary also correct)*		Picked up	
To the sea*(sea side also correct)*		shells	
At first		At the end	
the children		of the day	
played		they	
With a red		unwillingly	
ball		packed	
Mr Brown		the car	
went fishing		And went home	
On the dangerous			
rocks			
Total number of correct ticks:			

ANNEXURE J: PSYCHOMETRIC TEST 2 AUDITORY SEQUENCING

Instructions to the test administrator:

1. In auditory sequencing first do the practice example with the learner.
2. The learner does not get a second chance, but the learner may spontaneously correct him/herself.
3. Start by reading the **first** row of numbers under Level1 to the learner at area ding pace of two seconds per number to the learner.
4. The learner must repeat the numbers in the same order (sequence).
5. If the learner is successful, go to the first row of the next level and do the same.
6. If the learner does not successfully repeat the numbers in the same order, say nothing, but read the **second** row under Level1 to the learner, consisting of letters.
7. If the learner does not successfully repeat this row either, say nothing, but read the

   Third row under Level1 to the learner, consisting of a mix of numbers and letters.
8. Stop after three (3) consecutive unsuccessful attempts at the same level.
9. The learner functions at the previously level and the test administrator must note down the level at which the learner was successful.
10. The learner must successfully repeat **any one of the three (3) rows** under any specific level to be successful at that level, and in order to advance to the next level. **Do not** tell the learner at which level or which row you are, just start reading the1st row, if successfully repeated, skip and go straight to the next 1st row (level 2),and so forth. If unsuccessful at 1st row (level 1), say nothing but start reading the 2nd row of level1. If successful, go straight to the1st row of the second level. If unsuccessful with this attempt at 2nd row as well, say nothing but start reading the 3rd row of level1. **Never** give any indication of right or wrong answers (repeats), since this indication could be negative or positive reinforcement influencing the test results in one or another way.

Before starting the tests, the Test Administrator says to the learner:

"I'm going to slowly read to you a list of numbers. Please listen carefully to the numbers ,and when I'm done, please repeat the numbers to me in the same order, exactly as you've heard them."

Test Administrator: *"Let's first try an example. If I say toyou,**7,5,9**,whatdo you need to say to me?"*

Learner repeats: *"**7, 5, 9**"*

This example may be repeated until the learner understands what is expected of him/her. Test Administrator: *"Correct, let's try some more. You have to repeat them exactly as you've Done now."*

Now the Test Administrator starts with the test.

Auditory sequencing

	Level1	(Pre-school level)
92 3 7	1st row	
wret	2nd row	
	Level2	(6:0–6:11level)
b s mp p	2nd row	
7 1 k4 4	3rd row	
	Level3	(7:0–7:11level)
mmakt	2nd row	
tt47 d	3rd row	
	Level4	(8:0–8:11level)
blkmo	2nd row	
cw9 5 a	3rd row	
	Level5	(9:0–9:11level)
a3d ryy	2nd row	
47 k n2 2	3rd row	

Record results:

Participant	Date of birth	Current grade	Level successful completed
Participant 1			
Participant 2			
Participant 3			
Participant 4			
Participant 5			
Participant 6			

ANNEXURE K: PSYCHOMETRIC TEST 3 AUDITORY SHORT TERM MEMORY

Instructions to the test administrator:

1. In auditory sequencing first do the practice example with the learner.
2. The learner does not get a second chance, but the learner may spontaneously correct him/herself.
3. Start by reading the **first** row of words under Level 1 to the learner at a reading pace of two seconds per number to the learner.
4. The learner must repeat the words in the same order (sequence).
5. If the learner is successful, go to the first row of the next level and do the same.
6. If the learner does not successfully repeat the words in the same order, say nothing, but read the **second** row under Level 1 to the learner, consisting of another set of words.
7. If the learner does not successfully repeat this row either, say nothing, but read the **third** row under Level 1 to the learner, consisting of another set of words.
8. Stop after three (3) consecutive unsuccessful attempts at the same level.
9. The learner functions at the previously level and the test administrator must note down the level at which the learner was successful.
10. The learner must successfully repeat **any one of the three (3) rows** under any specific level to be successful at that level, and in order to advance to the next level. **Do not** tell the learner at which level or which row you are, just start reading the 1st row, if successfully repeated, skip and go straight to the next 1st row (level 2) , and so forth. If unsuccessful at 1st row (level 1), say nothing but start reading the 2nd row of level 1. If successful, go straight to the 1st row of the second level. If unsuccessful with this attempt at 2nd row as well, say nothing but start reading the 3rd row of level 1. **Never** give any indication of right or wrong answers (repeats), since this indication could be negative or positive reinforcement influencing the test results in one or another way.

Before starting the tests, the Test Administrator says to the learner:
"I'm going to slowly read to you a list of words. Please listen carefully to these words, and when I'm done, please repeat the words to me in the same order, exactly as you've heard them."
Test Administrator: *"Let's first try an example. If I say to you,* ***cat, door, tree****, what do you need to say to me?"*
Learner repeats: *"****cat, door, tree****"*
This example may be repeated until the learner understands what is expected of him/her.
Test Administrator: *"Correct, let's try some more. You have to repeat them exactly as you've done now."*

Now the Test Administrator starts with the test.

Auditory short term memory

	Level1	(Pre-school level)
	1st row	
jam road key		
salt ball flower	2nd row	
	Level2	(5:0–5:11level)
thin goat iron	1st row	
plan rose lamp light	2nd row	
child ladder		
	Level3	(6:0–6:11level)
self fire hot dust	1st row	
Frog drink leaf mouth man	2nd row	
tree cow run		
	Level4	(7:0–7:11level)
coat pear rug cold paint road	1st row	
tongue strong worry street grow table	2nd row	
doormat car chair		
	Level5	(8:0–8:11level)
floor worm behind old horse frock	1st row	
house grass heart first dove clown giant	2nd row	
finger elbow home friend every		
	Level6	(9:0–9:11level)
chair happy grumble table watch trick straw	1st row	
gently chicken hundred wolf stone white taste	2nd row	
dog tree river cat hat train run	3rd row	

Record results:

Participant	Date of birth	Current grade	Level successful completed
Participant 1			
Participant 2			
Participant 3			
Participant 4			
Participant 5			
Participant 6			

ANNEXURE L: Psychometric test 4 One Minute Reading Test

Instructions to the test administrator:

1. This test is done individually with each child
2. The time limit is **<u>One Minute</u>**, but don't tell this to the child.
3. The child is requested to read as quickly and correctly the words horizontally as if reading from a book.
4. **<u>Never</u>** give any indication of right or wrong answers (repeats) during reading, since this indication could be negative or positive reinforcement influencing the test results in one or another way.
5. The Test Administrator keeps a copy of the test (ordinary font) in front of her and indicates the mistakes of the child by underlining the particular mistake (by misreading, mispronunciation, trying to decipher by sounding the word, etcetera).If the child omits a specific word, draw a line through that word.
6. At the end of one minute, indicate with a"*"the last word that the child has read, and let the child read on two or three more words before stopping the child by saying: "*You may stop now, thank you.*"

Before starting the tests, the Test Administrator places the large font in front of the child, and says:

*"This is a sheet of paper with many word son it. I want you to read these word horizontally (*show*),as quickly and correctly as you can."*

Now the Test Administrator starts the stop watch on the first word that the child reads.

How to score the test:

Count all the words that the child has correctly read. Don't count the words that were mispronounced, that were wrongly read, or that were omitted. Only count the words correctly read untilthe1minuteexpired, and then note down that number on the child's recording checklist.

Place the large font printed sheet in front of the child to read from. Never write on this sheet. Use a separate sheet in small font for each participant to discretely record the mistakes.

After having finished the reading test, the child usually asks how well he/she performed. Only now may the Test Administrator say: “Thank you, you did well…”

One-minute Reading Test (Learner's copy)

is	me	on	at	by	so	us
an	it	or	be	to	as	he
of	in	go	up	am	if	no
we	my	ox	do	the	and	for
but	him	are	can	she	dog	let
you	not	was	out	try	see	mix
cat	now	boy	saw	bit	met	top
run	man	pet	lot	get	dig	van
bad	red	cup	bee	lit	pin	had
ran	pen	nut	big	old	yet	rob
gun	leg	fun	lip	new	fog	has
sit	sly	wig	mud	box	ink	sat
end	cut	pay	fed	who	six	lad
met	dry	cow	his	peg	tin	say
eat	any	far	set	bud	kid	pup
fox	ask	egg	cab	ill	use	jam
all	pit	got	sad	tea	sky	one
yes	fur	act	toe	her	own	ten
arm	rock	gone	feel	that	rich	
till	long	flat	this	part	foot	

One-minute Reading Test (TestAdministrator' copy)

Respondentno.1:	
Name:	
Date of birth	

is	**me**	**on**	**at**	**by**	**so**	**us**	7
an	**it**	**or**	**be**	**to**	**as**	**he**	14
of	**in**	**go**	**up**	**am**	**if**	**no**	21
we	**my**	**ox**	**do**	**the**	**and**	**for**	28
but	**him**	**are**	**can**	**she**	**dog**	**let**	35
you	**not**	**was**	**out**	**try**	**see**	**mix**	42
cat	**now**	**boy**	**saw**	**bit**	**met**	**top**	49
run	**man**	**pet**	**lot**	**get**	**dig**	**van**	56
bad	**red**	**cup**	**bee**	**lit**	**pin**	**had**	63
ran	**pen**	**nut**	**big**	**old**	**yet**	**rob**	70
gun	**leg**	**fun**	**lip**	**new**	**fog**	**has**	77
sit	**sly**	**wig**	**mud**	**box**	**ink**	**sat**	84
end	**cut**	**pay**	**fed**	**who**	**six**	**lad**	91
met	**dry**	**cow**	**his**	**peg**	**tin**	**say**	98
eat	**any**	**far**	**set**	**bud**	**kid**	**pup**	105
fox	**ask**	**egg**	**cab**	**ill**	**use**	**jam**	112
all	**pit**	**got**	**sad**	**tea**	**sky**	**one**	119
yes	**fur**	**act**	**toe**	**her**	**own**	**ten**	126
arm	**rock**	**gone**	**feel**	**that**	**rich**		132
till	**long**	**flat**	**this**	**part**	**foot**		138

ANNEXURE M: PSYCHOMETRIC TEST 5 VISUAL DISCRIMINATIONTEST

Instructions to the test administrator:

1. This test is done individually with each child
2. There is no time limit, but the child should work as quickly as he/she can.
3. The child is requested to compare the word in the first column on the left side with those in the rest of the row, and indicate cross out the words that differ from the stimulus word in the first column on the left side.
4. **Never** give any indication of right or wrong answers (repeats) during test-taking, since this indication could be negative or positive reinforcement influencing the test results in one or another way.

Before starting the tests, the Test Administrator hand the child a pencil, and places the large font in front of the child, and says:

"I want you to look at the first word, and then cross out all the words in that row that differs from the first word. Work as quickly and correctly as you can. We'll first do an example."

Now turn to the examples on the test sheet, and make sure the child understands what is expected of him/her.

1. **Let the child look at the stimulus word. The Test Administrator then covers the stimulus word with her finger, and instructs the child the cross out all words or figures that are different from the one the child can remember (now covered by the finger).**
2. **The child is only allowed to have a second look when doing the practice examples.**
3. **Do the same with the test, only now no more second looks are allowed.**
4. **Note, if the child does not indicate a narrow that points in the wrong direction, explain to the child that even differences indirection or sequence of letters in words count as "different" from the first word on the left.**

How to score the test:

Place the large font printed sheet in front of the child to read from. Never write on this sheet. After having finished the test, the child usually asks how well he/she performed. Only now may the Test Administrator say: "Thank you, you did well…"

VISUAL DISCRIMINATION TEST

Respondentno.1:	
Name:	
Dateofbirth	

1.						
2.	man	nam	man	nma	man	nam
3.	copper	coper	cooper	copper	coppr	coppre
4.	lively	lifely	levily	lively	livley	lively
5.	scholar	sholar	scholar	scholer	schaler	scholer
6.	moon	moon	noom	noon	moon	noom
7.	235	253	235	325	532	235
8.	mum	mnm	mun	mnm	nmu	mnm
9.	sing	sing	snig	simg	sing	sinq
10.	bop	pob	dob	bop	dob	qop
11.	swing	ƨwing	sming	swign	ƨwing	swing
12.	dog	dog	bog	pog	dog	bog
13.	pdq	pbq	pdq	pdp	pdq	dbp
14.	aeu	aəu	əau	aeu	aue	aəu
15.	climb	clinb	climd	dlimb	climq	climb

ANNEXURE N: FOCUSED FOOD FREQUENCY QUESTIONNAIRE

Record of Daily Food Intake

Instructions: Below is a table of foods that children usually eat. Kindly fill out all the foods that your child has eaten on any specific day over **two (2) weeks** by checking with √ only. If you need to provide additional information, kindly use the spaces provided. By illustration:

Breakfast Cereals		Serving size?		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Corn Flakes			More than 1 cup						√	√			√	√			√
			1 cup	√			√	√									
			± ½ cup														
			Less than ½ cup								√				√	√	
All Bran			More than 1 cup			√											
			1 cup									√					
			± ½ cup		√												
			Less than ½ cup														

Please fill out the following information:

Name of child: .....
Date of birth: .....
Age of child: .....
Grade of child: .....
School: .....

Did **anything** happen during **week 1** that could have **changed** (e.g., eat less or eat more) your child's usual eating patterns? ***Please check*** □YES or check □NO
Did **anything** happen during **week 2** that could have **changed** (e.g., eat less or eat more) your child's usual eating patterns? ***Please check*** □YES or check □NO

If you have ticked YES, please provide details:
.....
.....
.....
.....
.....

Muesli			More than 1 cup																1 cup = 120g Calories = 458
			1 cup																
			± ½ cup																
			Less than ½ cup																
Oats (cooked)			More than 1 cup																½ cup = 260g Calories = 340
			1 cup																
			½ cup																
			Less than ½ cup																
Rice Krispies			More than 1 cup																1 cup = 30g Calories = 100
			1 cup																
			± ½ cup																
			Less than ½ cup																
Froot Loops			More than 1 cup																1 cup = 29g Calories = 110
			1 cup																
			± ½ cup																
			Less than ½ cup																
Mieliepap			More than 1 cup																½ cup = 100g Calories = 340
			1 cup																
			½ cup																
			Less than ½ cup																
Polenta (Corn Grits)			3 slices or more																2 slices Calories = 340
			2 slices																
			1 slice																
			Less than 1 slice																
Maltabella pap			More than 1 cup																½ cup = 100g Calories = 145
			1 cup																
			½ cup																
			Less than ½ cup																

Cheerios			More than 1 cup																1 cup = 28g Calories = 100
			1 cup																
			± ½ cup																
			Less than ½ cup																
Frosties			More than 1 cup																1 cup = 30g Calories = 172
			1 cup																
			± ½ cup																
			Less than ½ cup																
Chocos			More than 1 cup																1 cup = 30g Calories = 114
			1 cup																
			± ½ cup																
			Less than ½ cup																
Special K			More than 1 cup																1 cup = 40g Calories = 196
			1 cup																
			± ½ cup																
			Less than ½ cup																
Pronutro (plain or flavoured)			More than 1 cup																½ cup = 50g Calories = 170
			1 cup																
			½ cup																
			Less than ½ cup																
Future Life			More than 1 cup																½ cup = 100g
			1 cup																
			½ cup																
			Less than ½ cup																

Please write down any other BREAKFAST CEREAL that your child has eaten, but not listed as BREAKFAST CEREALS under this category?

Please write them down here:

What _____ did your child eat today? Please study this list of BREADS and check with √ only those breads that your child has eaten on a specific day of the week.				Week 1 Check your child's serving size with √ in the box next to the applicable portion size for each day of this week								Week 2 Check your child's serving size with √ in the box next to the applicable portion size for each day of this week						Official use only:
Breads		**Serving size?**		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	
White bread			4 slices or more															1 slice Calories = 120
			3 slices															
			2 slices															
			1 slice or less															
Brown bread			4 slices or more															1 slice Calories = 90
			3 slices															
			2 slices															
			1 slice or less															
Bread roll brötchen			4 buns / rolls															1 roll Calories = 120
			3 buns / rolls															
			2 buns / rolls															
			1 bun / roll															
Whole wheat bread			4 slices or more															1 slice Calories = 110
			3 slices															
			2 slices															
			1 slice or less															

Hot dog bun			3 buns or rolls or more																1 bun Calories = 140
			2 buns or rolls																
			1 bun or roll																
			½ bun or roll																
Pita bread			3 pita breads or more																1 bread Calories = 165
			2 pita breads or more																
			1 pita bread																
			½ pita bread																
Corn bread			4 slices or more																1 slice Calories = 170
			3 slices																
			2 slices																
			1 slice																
Rye bread			4 slices or more																1 slice Calories = 118
			3 slices																
			2 slices																
			1 slice																
Rice cake			4 rice cakes or more																1 cake Calories = 35
			3 rice cakes																
			2 rice cakes																
			1 rice cake																

Please write down any other BREADS your child has eaten, but not listed as BREADS under this category?

Please write them down here:

What _____ did your child eat today?

Please study this list of DAIRY PRODUCTS and check with √ only those dairy products that your child has eaten on a specific day of the week.

Dairy products		Serving size?		Week 1: Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Week 2: Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Official use only:
				Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	
Cheese, including cream cheese & cheese spread			1 cup grated cheese															100g grated (¾ cup) Calories = 114
			¾ cup grated cheese															
			½ cup grated cheese															
			¼ cup grated cheese															
																		½ cup Calories = 110
																		1 tbsp Calories = 70
Evaporated milk or condensed milk			4 tablespoons															1 cup evaporated Calories = 340 1 tbsp condensed Calories = 55
			3 tablespoons															
			2 tablespoons															
			1 tablespoon															

Fresh milk			1 cup fresh milk																1 cup Calories = 146
			¾ cup fresh milk																
			½ cup fresh milk																
			¼ cup fresh milk																
Buttermilk			1 cup buttermilk																1 cup Calories = 464
			¾ cup buttermilk																
			½ cup buttermilk																
			¼ cup buttermilk																
Sour milk			1 cup sour milk																1 cup Calories = 146
			¾ cup sour milk																
			½ cup sour milk																
			¼ cup sour milk																
Soymilk			1 cup soymilk																1 cup Calories = 135
			¾ cup soymilk																
			½ cup soymilk																
			¼ cup soymilk																
Sour cream			4 tablespoons																1 tbsp Calories = 31
			3 tablespoons																
			2 tablespoons																
			1 tablespoon																

Yogurt or drinking yogurt (flavored)			2 cups yoghurt																1 cup Calories = 208
			1½ cups yoghurt																
			1 cup yoghurt																
			½ cup yoghurt																
Bulgarian yogurt (plain yogurt)			2 cups yoghurt																1 cup Calories = 150
			1½ cups yoghurt																
			1 cup yoghurt																
			½ cup yoghurt																
Eggs			4 eggs																1 boiled Calories = 80 1 fried Calories = 95
			3 eggs																
			2 eggs																
			1 egg																

Please write down any other DAIRY PRODUCT that your child has eaten, but not listed as DAIRY PRODUCTS under this category?

Please write them down here:

What _____ did your child eat today?

Please study this list of BAKERY PRODUCTS and check with √ only those foods that your child has eaten on a specific day of the week.

Bakery products	Serving size?		Week 1 Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Week 2 Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Official use only:
			Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	
Bagel			3 bagels or more														1 bagel Calories = 270
			2 bagels														
			1 bagel														
			½ bagel														

Scone			4 scones or more															1 scone Calories = 232
			3 scones															
			2 scones															
			1 scone															
Croissant			4 croissants or more															1 croissant Calories = 412
			3 croissants															
			2 croissants															
			1 croissant															
Cookies and biscuits with or without filling			4 biscuits / cookies or more															1 cookie Calories = 130
			3 biscuits or cookies															
			2 biscuits or cookies															
			1 biscuit or cookie															
Cake			More than 2 slices of cake															1 slice of cake with icing Calories = 235
			2 slices of cake															
			1 slice of cake															
			½ slice of cake															
Tart Tart			4 tarts or more															1 medium tart Calories = 197
			3 tarts															
			2 tarts															
			1 tart															
Cheese cake			3 or more slices															1 slice Calories = 290
			2 slices															
			1 slice															
			½ slice															
Doughnut			4 or more doughnuts															1 doughnut
			3 doughnuts															
			2 doughnuts															
			1 doughnut															

Brownie			4 or more brownies																1 brownie Calories = 210
			3 brownies																
			2 brownies																
			1 brownie																
Meat pie or sausage roll			4 or more meat pies / rolls																1 meat pie Calories = 440
			3 meat pies / rolls																
			2 meat pies / rolls																
			1meat pies / rolls																
Sweet pie / fruit pie			3 or more pie slices																1 slice Calories = 440
			2 pie slices																
			1 pie slice																
			½ pie slice																
Cupcake			4 or more cupcakes																1 cupcake Calories = 250
			3 cupcakes																
			2 cupcakes																
			1 cupcake																
Cream or custard éclair			3 or more éclairs																1 éclair Calories = 267
			2 éclairs																
			1 éclair																
			½																
Wafer / cracker / provita			4 or more wafers /crackers																1 cracker Calories = 50
			3 wafers /crackers																
			2 wafers /crackers																
			1 wafer /cracker																
Rusk			4 or more rusks																1 rusk
			3 rusks																
			2 rusks																
			1 rusk																

Pastry, e.g. cinnamon bun			4 or more buns																1 roll Calories = 150
			3 buns																
			2 buns																
			1 bun																
French toast			3 or more slices																1 slice Calories = 160
			2 slices																
			1 slice																
			½ slice																
Pancake			4 or more pancakes																1 pancake Calories = 300
			3 pancakes																
			2 pancakes																
			1 pancake																
Waffle			3 or more waffles																1 waffle Calories = 510
			2 waffles																
			1 waffle																
			½ waffle																
Grain-based bar / cereal bar			3 or more bars																1 bar Calories = 140
			2 bars																
			1 bar																
			½ bar																
Pizza			3 or more slices																1 pizza
			2 slices																
			1 slice																
			½ slice																

Please write down any other BAKERY PRODUCT your child has eaten, but not listed as BAKERY PRODUCTS under this category?

Please write them down here:

What _____ did your child drink today?

Please study this list of BEVERAGES and check with √ only those beverages that your child drank on a specific day of the week.

Beverages		Serving size?		Week 1: Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Week 2: Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Official use only:
				Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	
Carbonated soda (e.g. Coke Sparletta, cream soda, Fanta, Pepsi)			3 or more cans of soda															1 can Calories = 140
			2 cans of soda															
			1 can of soda															
			½ can of soda															
Soft drinks (non-carbonated sweetened)			4 glasses of prepared Oros															¼ cup of Oros concentrate diluted in water Calories = 15
			3 glasses of prepared Oros															
			2 glasses of prepared Oros															
			1 glass of prepared Oros															
Fruit juice			3 or more glasses fruit juice															1 cup Calories = 221
			2 glasses fruit juice															
			1 glass fruit juice															
			½ glass fruit juice															
Sports drinks			3 or more bottles sports drink															1 bottle Calories = 116
			2 bottles sports drink															
			1 bottle sports drink															
			½ bottle sports drink															

Coffee with sugar (with or without milk)			Daily intake of sugar with coffee = 12 – 14 teaspoons																1 tsp = 25 calories
			Daily intake of sugar with coffee = 8 - 10 teaspoons																
			Daily intake of sugar with coffee = 6 - 8 teaspoons																
			Daily intake of sugar with coffee = 2 - 4 teaspoons																
Coffee without sugar (with or without milk)			8 or more cups **unsweetened** coffee																
			5-7 cups **unsweetened** coffee																
			3-4 cups **unsweetened** coffee																
			1-2 cups **unsweetened** coffee																
Tea with sugar (with or without milk)			Daily intake of sugar with tea = 12 – 14 teaspoons																1 tsp = 25 calories
			Daily intake of sugar with tea = 8 - 10 teaspoons																
			Daily intake of sugar with tea = 6 - 8 teaspoons																
			Daily intake of sugar with tea = 2 - 4 teaspoons																
Tea without sugar (with or without milk)			8 or more cups **unsweetened** tea																
			5-7 cups **unsweetened** tea																
			3-4 cups **unsweetened** tea																
			1-2 cups **unsweetened** tea																

Hot or cold flavored milk drink			4 or more small glasses															1 small glass Calories = 288
			3 small glasses															
			2 small glass															
			1 small glass															

Please write down any other BEVERAGE that your child has had, but not listed as BEVERAGES under this category?

Please write them down here:

What DESSERTS did your child eat today?

Please study this list of DESSERTS and check with √ only those that your child has eaten on a specific day of the week.

Desserts		Serving size? *Please use these serving sizes as a guide*		Week 1 Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Week 2 Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Official use only:
				Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	
Custard			1½ or more cups custard															
			1 cup custard															½ cup Calories = 140
			½ cup custard															
			¼ cup custard															
			1½ or more cups jelly															
Jelly			1 cup jelly															½ cup Calories = 88
			½ cup jelly															
			¼ cup jelly															

Baked pudding			1½ or more cups baked pudding																½ cup Calories = 350
			1 cup baked pudding																
			½ cup baked pudding																
			¼ cup baked pudding																
Instant pudding			1½ or more cups instant pudding																½ cup Calories = 110
			1 cup instant pudding																
			½ cup instant pudding																
			¼ cup instant pudding																
Ice cream			1½ or more cups ice cream																½ cup Calories = 170
			1 cup ice cream																
			½ cup ice cream																
			¼ cup ice cream																
Ice cream toppings (chocolate sauce)			4 or more tablespoons of topping																2 tbsp Calories = 100
			3 tablespoons of topping																
			2 tablespoons of topping																
			1 tablespoon of topping																

Please write down any other DESSERTS that your child has eaten, but not listed as DESSERTS under this category?

Please write them down here:

What ___, _____ did your child eat today? Please study this list of OILS, FATS AND SPREADS and check with √ only those that your child has eaten on a specific day of the week.				Week 1 Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Week 2 Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Official use only:
Oils, fats and spreads		**Serving size?**		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	
Butter (salted or unsalted)			4 or more 1 tablespoons 3 tablespoons 2 tablespoons 1 tablespoon															1 tbsp Calories = 182
Margarine			4 or more 1 tablespoons 3 tablespoons 2 tablespoons 1 tablespoon															1 tbsp Calories = 182
Cooking fat			4 or more 1 tablespoons 3 tablespoons 2 tablespoons 1 tablespoon															1 tbsp Calories = 190
Vegetable oil			4 or more 1 tablespoons 3 tablespoons 2 tablespoons 1 tablespoon															1 tbsp Calories = 120

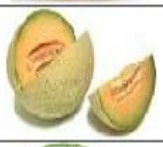
Olive oil			4 or more 1 tablespoons																1 tbsp Calories = 120
			3 tablespoons																
			2 tablespoons																
			1 tablespoon																
Mayonnaise sandwich spread			4 or more 1 tablespoons																1 tbsp Calories = 90
			3 tablespoons																
			2 tablespoons																
			1 tablespoon																
Peanut butter			4 or more 1 tablespoons																2 tbsp Calories = 190
			3 tablespoons																
			2 tablespoons																
			1 tablespoon																
Nutella spread			4 or more 1 tablespoons																2 tbsp Calories = 100
			3 tablespoons																
			2 tablespoons																
			1 tablespoon																
White sugar (e.g. with cereal or porridge)			4 or more teaspoons																1 tsp Calories = 25
			3 teaspoons																
			2 teaspoons																
			1 teaspoon																

Brown sugar (e.g. with cereal or porridge)			4 or more teaspoons																1 tsp Calories = 25
			3 teaspoons																
			2 teaspoons																
			1 teaspoon																
Honey (used as a spread or with tea)			4 or more 1 tablespoons																1 tbsp Calories = 60
			3 tablespoons																
			2 tablespoons																
			1 tablespoon																
Jam			4 or more 1 tablespoons																1 tbsp Calories = 60
			3 tablespoons																
			2 tablespoons																
			1 tablespoon																
Golden syrup			4 or more 1 tablespoons																1 tbsp Calories = 60
			3 tablespoons																
			2 tablespoons																
			1 tablespoon																
Oxo / marmite			4 or more teaspoons																1 tsp Calories = 20
			3 teaspoons																
			2 teaspoons																
			1 teaspoon																
Fish paste			4 or more teaspoons																2 tsp
			3 teaspoons																
			2 teaspoons																
			1 teaspoon																

Please write down any other OILS, FATS AND SPREADS that your child has eaten, but not listed as OILS FATS AND SPREADS under this category?
Please write them down here:

What _____ did your child eat today?

Please study this list of FRUITS AND NUTS and check with √ only those that your child has eaten on a specific day of the week.

Fruits and Nuts		Serving size?		Week 1: Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Week 2: Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Official use only:
				Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	
Citrus fruit (lemon or orange)			4 or more citrus fruits															
			3 citrus fruits															
			2 citrus fruit2															
			1 citrus fruit															
			4 or more apples															1 fruit Calories = 80
Apple			3 apples															
			2 apples															
			1 apple															1 apple Calories = 55 Calories = 100
			3 or more slices melon															
Melon			2 slices melon															
			1 slice melon															
			½ slice melon															
			3 or more slices															1 slice Calories =
Watermelon			watermelon 2 slices watermelon															
			1 slice watermelon															
			½ slice watermelon															
																		1 slice Calories = 70

Avocado			1 avocado																1 avocado Calories = 322
			¾ avocado																
			½ avocado																
			¼ avocado																
Banana			4 or more bananas																1 banana Calories = 110
			3 bananas																
			2 bananas																
			1 banana																
Pear			3 or more pears																1 pear Calories = 100
			2 pears																
			1 pears																
			½ pear																
Peach			3 or more peaches																1 peach Calories = 70
			2 peaches																
			1 peach																
			½ peach																
Apricot			4 or more apricots																1 apricot Calories = 20
			3 apricots																
			2 apricots																
			1 apricot																
Mango			3 or more mangos																1 mango Calories = 100
			2 mangos																
			1 mango																
			½ mango																
Pineapple			3 slices pineapple																1 slice Calories = 40
			2 slices pineapple																
			1 slice pineapple																
			½ slice pineapple																

Grapefruit			3 or more grapefruits																1 fruit Calories = 100
			2 grapefruits																
			1 grapefruit																
			½ grapefruit																
Grapes			2 or more cups of grapes																1 cup Calories = 110
			1½ cup of grapes																
			1 cup of grapes																
			½ cup of grapes																
Guava			4 or more guavas																1 fruit Calories = 45
			3 guavas																
			2 guavas																
			1 guava																
Papaya			1 papaya																1 papaya Calories = 60
			¾ papaya																
			½ papaya																
			¼ papaya																
Canned fruit			1 cup of canned fruit																1 cup Calories = 140
			¾ cup of canned fruit																
			1 cup of canned fruit																
			½ cup of canned fruit																
Dried fruit (raisins, dates, figs)			1 cup or more of dried fruit																½ cup Calories = 250
			¾ cup of dried fruit																
			½ cup of dried fruit																
			¼ cup of dried fruit																
Peanuts or other nuts			1 cup or more of nuts																½ cup Calories = 435
			¾ cup of nuts																
			½ cup of nuts																
			¼ cup of nuts																

Please write down any other FRUITS AND NUTS that your child has eaten, but not listed as FRUITS AND NUTS under this category?
Please write them down here:

What _____ did your child eat today? Please study this list of GRAINS and check with √ only those grains that your child has eaten on a specific day of the week.				Week 1: Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Week 2: Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Official use only:
Grains		**Serving size?**		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	
Cooked white rice			1½ cups white rice or more															½ cup Calories = 100
			1 cup white rice															
			½ cup white rice															
			¼ cup white rice															
Cooked brown rice			1½ cups brown rice or more															½ cup Calories 80
			1 brown cup rice															
			½ cup brown rice															
			¼ cup brown rice															
Couscous			1½ cups couscous or more															½ cup Calories = 90
			1 cup couscous															
			½ cup couscous															
			¼ cup couscous															

Pasta (macaroni, noodles, Spaghetti)			1½ cups pasta or more															½ cup Calories = 100
			1 cup pasta															
			½ cup pasta															
			¼ cup pasta															
Cooked wheat			1½ cups cooked wheat or more															½ cup Calories = 160
			1 cup cooked wheat															
			½ cup cooked wheat															
			¼ cup cooked wheat															

Please write down any other GRAINS that your child has eaten, but not listed as GRAINS under this category?

Please write them down here:

What _____ did your child eat today?

Please study this list of MEAT PRODUCTS and check with √ only those meats that your child has eaten on a specific day of the week.

Meat products	Serving size?	Week 1: Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Week 2: Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Official use only:
		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	
Pork rashers 	4 or more rashers 															1 strip Calories = 340
	3 rashers															
	2 rashers															
	1 rasher															

Bacon			4 or more strips bacon															1 strip Calories = 300
			3 strips bacon															
			2 strips bacon															
			1 strip bacon															
Biltong / droëwors dried meat			20 or more cm strip															½ cup (40g) Calories = 96
			15 cm strip															
			10 cm strip															
			5 cm strip															
Salami polonies cold & processed meat & ham			4 or more slices cold meat															1 slice Calories = 70
			3 slices cold meat															
			2 slices cold meat															
			1 slice cold meat															
Mince meat			1½ cups or more mince meat															½ cup Calories = 182
			1 cup mince meat															
			¾ cup mince meat															
			½ cup mince meat															
Sausage (Vienna, frankfurter, pork, bratwurst, braaiwors, smoked wieners			4 or more sausages															1 sausage Calories = 170
			3 sausages															
			2 sausages															
			1 sausage															
Kentucky fried chicken (KFC)			4 or more pieces KFC															1 portion Calories = 290
			3 pieces KFC															
			2 pieces KFC															
			1 piece KFC															

Meat patty / chicken patty			4 or more patties																1 patty Calories = 215
			3 patties																
			2 patties																
			1 patty																
Meatballs			4 or more meatballs																1 meatball Calories = 182
			3 meatballs																
			2 meatballs																
			1 meatball																
Canned meat Or poultry			4 or more slices canned meat																1 slice Calories = 94
			3 slices canned meat																
			2 slices canned meat																
			1 slice canned meat																
Home cooked meat, chicken, pork, or stew			2 cups cooked meat																1 cup Calories = 350
			1½ cups cooked meat																
			1 cup cooked meat																
			½ cup cooked meat																
Home fried meat or chicken pork			4 portions or more																1 portion Calories = 290
			3 portions																
			2 portions																
			1 portion																
Corned meat (bully beef)			4 or more slices																1 slice Calories = 55
			3 slices																
			2 slices																
			1 slice																
Fish (fresh e.g. hake)			4 or more fillets																1 fillet Calories = 142
			3 fillets																
			2 fillets																
			1 fillet																

ish tinned (tuna, Pilchard Mackerel sardines			4 or more sardines																1 sardine Calories = 50
			3 sardines																
			2 sardines																
			1 sardine																

Please write down any other MEAT PRODUCTS that your child has eaten, but not listed as MEAT PRODUCTS under this category?

Please write them down here:

What SNACKS did your child eat today?

Please study this list of SNACKS and check with √ only those snacks that your child has eaten on a specific day of the week.

Snack foods	Serving size?	Week 1: Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Week 2: Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Official use only:
		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	
	4 or more small packets															1 small packet Calories = 118
																
																1 small packet Calories = 150
																
																1 cup Calories = 578
																

Crackers (salty)			7-9 crackers (or more)																1 cracker Calories = 13
			5-6 crackers																
			3-4 crackers																
			1-2 crackers																
Cookies			4 cookies																1 cookie Calories = 100
			3 cookies																
			2 cookies																
			1 cookie																
Popcorn			2 cups popcorn																1 cup Calories = 55
			1½ cups popcorn																
			1cup popcorn																
			½ cup popcorn																
Candy			8-10 pieces candy																1 candy piece Calories = 23
			5-7 pieces candy																
			3-4 pieces candy																
			1-2 pieces candy																
Fudge			8-10 pieces fudge																1 piece (cube) Calories = 110
			5-7 pieces fudge																
			3-4 pieces fudge																
			1-2 pieces fudge																
Muffin			4 or more muffins																1 muffin Calories = 364
			3 muffins																
			2 muffins																
			1 muffin																
Chocolate bar			Four 90 gram bars																One 90g bar Calories = 530
			Three 90 gram bars																
			Two 90 gram bars																
			One 90 gram bar																

Energy bar			4 energy bars																1 bar Calories = 210
			3 energy bars																
			2 energy bars																
			1 energy bar																
Ice cream			2 cups ice cream																½ cup Calories = 170
			1½ cups ice cream																
			1 cup ice cream																
			½ cup ice cream																
Hot dog			4 hot dogs																1 hot dog Calories = 350
			3 hot dogs																
			2 hot dogs																
			1 hot dog																
Hamburger			4 hamburgers																1 hamburger Calories = 537
			3 hamburgers																
			2 hamburgers																
			1 hamburger																
Meat pie			4 meat pies																1 meat pie Calories = 537
			3 meat pies																
			2 meat pies																
			1 meat pie																
Sausage			4 sausages																1 sausage Calories = 200
			3 sausages																
			2 sausages																
			1 sausage																
Sandwich (toasted or regular)			3 sandwiches																1 sandwich (2 slices of Calories = 450
			2 sandwiches																
			1 sandwich																
			½ sandwich																

Drinking yogurt			4 drinking yogurts																1 drinking yogurt Calories = 252
			3 drinking yogurts																
			2 drinking yogurts																
			1 drinking yogurt																
Corncob			3 or more corncobs																1 corncob Calories = 100
			2 corncobs																
			1 corncob																
			½ corncob																
Toffee apple			4 toffee apples																1 toffee apple Calories = 160
			3 toffee apples																
			2 toffee apples																
			1 toffee apple																

Please write down any other SNACK not listed as SNACK FOODS under this category?

Please write them down here:

What SOUPS, GRAVIES & SAUCES did your child eat today?			Week 1							Week 2							
Please study this list of SOUPS, GRAVIES & SAUCES and check with √ only those that your child has eaten on a specific day of the week.			**Check your child's serving size with √ in the box next to the applicable portion size for each day of this week**							**Check your child's serving size with √ in the box next to the applicable portion size for each day of this week**							**Official use only:**
Soups, Gravies & Sauces	**Serving size?** *Please use these serving sizes as a guide*		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	
Any variety of soup		3 cups prepared soup															
		2 cups prepared soup															1 cup prepared Calories = 60
		1 cup prepared soup															

			½ cup prepared soup																
Gravy		 tablespoon	4 or more tablespoons gravy																2 tbsp gravy Calories = 20
			3 tablespoons gravy																
			2 tablespoons gravy																
			1 tablespoon gravy																
Tomato sauce		 tablespoon	4 or more tablespoons tomato sauce																2 tbsp Calories = 30
			3 tablespoons tomato sauce																
			2 tablespoons tomato sauce																
			1 tablespoon tomato sauce																
Curry sauce		 tablespoon	4 or more tablespoons curry sauce (prepared)																2 tbsp Calories = 50
			3 tablespoons curry sauce (prepared)																
			2 tablespoons curry sauce (prepared)																
			1 tablespoon curry sauce (prepared)																

Please write down any other SOUP GRAVY OR SAUCE that your child has eaten, but not listed as SOUPS GRAVIES AND SAUCES under this category?

Please write them down here:

What STARCHY VEGETABLES did your child eat today? Please study this list of STARCHY VEGETABLES and check with √ only those foods that your child has eaten on a specific day of the week.		**Week 1** **Check your child's serving size with √ in the box next to the applicable portion size for each day of this week**							**Week 2** **Check your child's serving size with √ in the box next to the applicable portion size for each day of this week**							**Official use only:**
Starchy vegetables	**Serving size?** *Please use these serving sizes as a guide*	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	

Potato (cooked)			3 potatoes																1 potato Calories = 68
			2 potatoes																
			1 potato																
			½ potato																
Corn			3 or more corncobs																1 corncob Calories = 100
			2 corncobs																
			1 corncob																
			½ corncob																
Sweet potato (cooked)			2 cups sweet potato																1 cup Calories = 180
			1½ cups sweet potato																
			1 cup sweet potato																
			½ cup sweet potato																

Please write down any other STARCHY VEGETABLES that your child has eaten, but not listed as STARCHY VEGETABLES under this category?

Please write them down here:

What VEGETABLES did your child eat today?

Please study this list of VEGETABLES and check with √ only those foods that your child has eaten on a specific day of the week.

			Week 1							Week 2							
			Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Official use only:
Vegetables		**Serving size?** *Please use these serving sizes as a guide*	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	
Beetroot			2 cups beetroot														
			1½ cups beetroot														1 cup Calories = 58
			1 cup beetroot														
			½ cup beetroot														
Broccoli			2 cups broccoli														
			1½ cups broccoli														1 cup Calories = 31
			1 cup broccoli														

			½ cup broccoli																
Cabbage			2 cups or more cabbage																1 cup shredded Calories = 13
			1½ cups cabbage																
			1 cup cabbage																
			½ cup cabbage																
Lettuce			2 cups or more lettuce																1 cup shredded Calories = 10
			1½ cups lettuce																
			1 cup lettuce																
			½ cup lettuce																
Mushroom			2 cups or more mushroom																1 cup sliced Calories = 15
			1½ cups mushroom																
			1 cup mushroom																
			½ cup mushroom																
Spinach			2 cups or more spinach																1 cup shredded Calories = 50
			1½ cups spinach																
			1 cup spinach																
			½ cup spinach																
Cucumber			2 cups or more cucumber																1 cup sliced Calories = 16
			1½ cups cucumber																
			1 cup cucumber																
			½ cup cucumber																
Eggplant			2 cups or more eggplant																1 cup boiled Calories = 35
			1½ cups eggplant																
			1 cup eggplant																
			½ cup eggplant																

Pumpkin with sugar			2 cups or more pumpkin (with sugar)																1 cup Calories = 130
			1½ cups pumpkin **(sweetened)**																
			1 cup pumpkin **(sweetened)**																
			½ cup pumpkin **(sweetened)**																
Pumpkin without sugar			2 cups or more **unsweetened** pumpkin																1 cup Calories = 80
			1½ cups **unsweetened** pumpkin																
			1 cup **unsweetened** pumpkin																
			½ cup **unsweetened** pumpkin																
Gem squash with sugar			3 or more gem squashes **(sweetened)**																1 gem squash Calories = 80
			2 gem squashes **(sweetened)**																
			1 gem squash **(sweetened)**																
			½ gem squash **(sweetened)**																
Gem squash without sugar			3 or more gem squashes **(unsweetened)**																1 gem squash Calories = 30
			2 gem squashes **(unsweetened)**																
			1 gem squash **(unsweetened)**																
			½ gem squash **(unsweetened)**																
Tomato			3 or more tomatoes																1 tomato Calories = 25
			2 tomatoes																
			1 tomato																
			½ tomato																
Cauliflower			2 cups																1 cup Calories = 25
			1½ cups																
			1 cup																
			½ cup																

Onion			3 onions																1 medium onion Calories = 46
			2 onions																
			1 onion																
			½ onion																
Carrot			2 cups or more carrots																1 cup chopped Calories = 53
			1½ cups carrots																
			1 cup carrots																
			½ cup carrots																

Please write down any other VEGETABLES that your child has eaten, but not listed as VEGETABLES under this category?

Please write them down here:

What _____ did your child eat today?

Please study this list of LEGUMES and check with √ only those that your child has eaten on a specific day of the week.

		Week 1							Week 2							
		Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Check your child's serving size with √ in the box next to the applicable portion size for each day of this week							Official use only:
Legumes (beans, etc.)	**Serving size?**	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	
	2 cups or more tofu															1 cup Calories = 305
	½ cup															½ cup Calories = 130

Please write down any other LEGUMES that your child has eaten, but not listed as LEGUMES under this category?
Please write them down here:

Final Remarks:

Does your child usually eat breakfast before school? □YES □ NO

The researcher acknowledges that various factors may influence and/or change your child's usual eating habits. Some factors include celebrating a birthday, being invited to a birthday party, death in the family, illness of a close friend or relative, unexpected factors that leave the family with less money for groceries, absence of the primary care giver from home, anxiety over some event that happened at school, and etcetera. If you are aware of any such factor that could have influenced your child's usual eating habits over the past two (2) weeks, i.e. the duration of the Daily Food Record, kindly provide us with such details:

Please write them down here:

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Thank you for your cooperation