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The impact of gender, immunization status and number of siblings on child nutrition in Mogadishu-Somalia

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Abstract

Aim and objectives: To explore the impact of gender, immunization status in children, and number of siblings in the family on child underweight; to describe the general nutritional status (weight-for-age) of children between 6 and 60 months in Mogadishu, and to identify the highest risk age group for underweight.

Method and design: Samples of 556 under-five years old children were selected from a databank of a child clinic in Mogadishu. The nutritional status of the children was measured in relation to weight-for-age by using Z-Score cut-off points. Epi-info version 3.32 for the Z-Score and statistical Package of social sciences (SPSS) version 13.0 for data analysis were used for the study.

Results: More than half of the children showed some type of malnutrition (54%) with 14% in severe underweight. We found no gender difference between boys and girls with respect to underweight ($p = .56$). The fully immunized children showed better weight-for-age than the non-immunized children ($p = .029$). Children with four or more siblings were more underweight than those who had 0 to 1 siblings ($p = .037$). The study demonstrated that 6-17 months old children were the most vulnerable age group for underweight as 63% of their weight fall below -1 Z-Score.

Conclusion: The prevalence of underweight was high for the children under-5 years old of this community (54%) with 25.8% moderate or severely malnourished. Immunization status and low number of siblings demonstrated to have a positive effect on child's weight-for-age. Underweight was most pronounced in children between 6 and 17 months of age.

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Abbreviations

WHO	World Health Organization
MDG	Millennium Development Goals
UNICEF	United Nation Children's Fund
FI	Fully Immunized
UD	Up-To-Date of immunization
PI	Partially Immunized
NI	Not Immunized
ARI	Acute Respiratory Infection
IDC	Internally displaced camps
TFC	Therapeutic feeding centres

Definitions

FULLY IMMUNIZED: Child has had all the vaccines against the six diseases covered by the routine immunization program —tuberculosis, diphtheria, pertussis (Whooping cough), tetanus, polio and measles.

PARTIALLY IMMUNIZED: Child had one or more of the vaccinations and did not turn up for the remaining vaccinations (dropped out from the program).

UP-TO-DATE: Child had one or more vaccines and was still in the program (scheduled).

NOT IMMUNIZED: Child has not been immunized at all.

MALNUTRITION: Poor nutrition resulting in under- or overweight for age.

UNDERWEIGHT: Percent of children (under-5 years) falling below -2 standard deviations for weight-for-age.

WASTING: Percent of children (under-5 years) falling below -1 standard deviations for weight-for-height.

STUNTING: Percent of children (under-5 years) falling below -2 standard deviations for height-for-age;

1. Introduction

There are 12 million children under-five that die each year in developing countries mainly from preventable causes; over 6 million (55%) of these deaths are either directly or indirectly attributable to malnutrition^{1,2}. One in 10 dies in low-income countries before their fifth birthday while one in 143 in high-income countries³. Globally 226 million children below 5 years age are stunted, 67 million are wasted and 183 million weigh less than their expected weight for age⁴.

The world food conference in Rome 1996 stated, “Hunger and malnutrition are fundamentally a question of justice. Unless we agree that the right of every human being to the substance of life comes before the quest of profit, the surge of hunger and malnutrition will continue. Our message is simple: Queremos una tierra para vivir”⁵

The Universal Declaration of Human Rights, established by the United Nations (UN) in 1948, identifies nutrition as a fundamental human right. Half a century later, malnutrition is still viewed as a primary obstacle to the development process itself. It is a violation of the child’s human rights, yet virtually all of it can be prevented⁶.

Malnutrition could both mean over-nutrition (malnutrition plus), which is common in developed countries and under-nutrition (malnutrition minus), which mostly affects the children in developing and low-income countries, especially in the tropical and subtropical regions in Africa. This thesis will only consider the malnutrition type of under-nutrition.

Malnutrition has multidimensional, interrelated and complex causes. It mostly strikes the infants and children under-five years that are at the stage of their crucial optimal growth both physically and cognitively (intellectually)⁷.

Child malnutrition has both immediate and long-term consequences. Low weight-for-age children tend to have more severe outcome of infectious diseases like diarrhea, pneumonia, malaria and measles that makes them more likely to die earlier than their peers. Children who survive from malnutrition are more frequently sick and show poor school performance, impaired intellectual and social development⁸; in adult life they are at less physical, intellectual and productive levels and suffer from more chronic illness and disability.

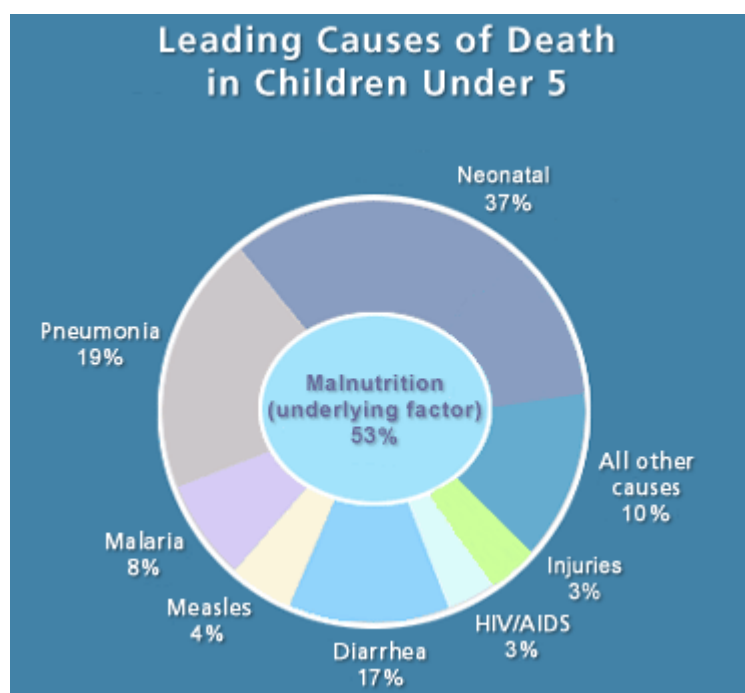
The main aim of this thesis is to explore how gender, immunization status and the number of siblings in the family, as indicator of socio-economic status, have an impact on the malnutrition in under-five years old children.

2. Background

2.1 Global overview

There are 2.2 billion children under-five years old in the world; 1.9 billion (90%) of them live in developing countries⁹. According to World Health Organization 130 million children are born every year, more than two third of these in the developing countries¹⁰. One third of these children, die before their fifth birthday. Malnutrition is recognized as the main cause of these deaths- according to WHO, it is the cause of more than 50% of all deaths¹¹

Figure 1. Underlying death causes in under-five children



Source: Bryce J, Boschi-Pinto C, Shibuya K, Black RE, WHO Child Health Epidemiology Reference Group. "WHO estimates of the causes of death in children." *Lancet* 2005; 365:1147-52.

In September 2000, the largest-ever gathering of Heads of State adopted the UN Millennium Declaration. The Declaration, endorsed by 189 countries, stated eight goals to be reached by 2015. Millennium development goal four was to reduce under-five years old children mortality rates by two thirds. Other goals were to reduce poverty and hunger, tackle ill health, gender inequality, lack of education, lack of access to clean water, improve maternal health, combat HIV/AIDS, malaria and other diseases, and to ensure environmental sustainability.

This seems unattainable for many developing countries. If it is to change the scenario of this condition, it has to begin with decreasing the number of malnourished children; according MDG (Millennium Development Goals) this is the nucleus because of many deaths in this age group. Despite overall decrease of child mortality and morbidity globally, and decrease of prevalence of under-five malnutrition in many countries, this condition has not changed for many countries and even some has worsened since MDGs was developed.

2.2 Somalia overview

Somalia is located in east Africa, along the Indian Ocean, and is bordered by Djibouti to the north, Ethiopia to the west, and Kenya to the south. Its surface area is 637 657 km² with a population of 9.5 million¹². Nearly half (44%) of its population is under 15 years of age with approximately 2 million below 5 years of age. A shared language, religion and culture make Somalia one of the most homogenous countries in the world. This country has the seventh highest child mortality rate and sixth infant mortality rate among more than 190 countries in the world. These are estimated to be 225 and 133 per 1000 live births, respectively^{13,14}.

Figure 2. Map Somalia



Source:<http://www.loc.gov/rr/international/amed/somalia/somalia.html> Portals to the world, library congress

Somalia has been in complex emergence since 1990 with armed conflicts affecting civil population through direct violence, forced displacement and food scarcity causing severe child malnutrition, low immunization coverage and high child mortality and morbidity. The absence of a government resulted in deterioration of health infrastructure, and survival and

health depends upon the aid of organizations and international agencies that has filled the⁴ vacuum in the health sector such as immunization facilities. Somali health and development indicators show the extent of health problems. Lack of government, high illiteracy rate and high birth rate (average 7.3 children per mother)¹⁵ makes child health and the immunization coverage of this country one of the worst and the lowest in the world.

2.3 Mogadishu overview

Mogadishu is the largest, main and the capital city of Somalia. It resides almost half of the urban population of the whole country - approximately 1.2 million¹⁶. It has no public functioning hospital except two hospitals controlled by international organizations. There are several private hospitals and a number of private clinics like private pediatric clinics. There are approximately 400.000 internally displaced people in and around Mogadishu who mostly live in the IDC (Internally Displaced Camps). The children of these families are mostly malnourished. Mogadishu has several nutritional centers known as TFC (Therapeutic feeding centers), which are run by international agencies. The TFCs are attended by the children classified as having severe malnutrition. These children are susceptible to infectious diseases such as diarrhea and ARI (acute respiratory infection).

While exact rates of maternal and child/infant morbidity and mortality are unknown, there are general consensus that Somalia has some of the worst health outcomes in the world, with an average life expectancy estimated to be 47 years, and maternal mortality rate 1600 per 100.000 live births¹⁷.

3. Aims and objectives

3.1 Aim

The main aim of this thesis is to analyse the impact of: gender, immunization status of the child and number of siblings in the family on child nutritional status; and to assess the general nutritional status of these children.

3.2 Objectives

- To describe the overall nutritional status (weight for age) of the children between 6 and 60 months old.
- To investigate differences in nutritional status with respect to:
 - a) Gender
 - b) Immunization status (Fully immunized vs. Not immunized)
 - c) Number of siblings in the family (0-1 vs. more than 4)
- To identify the risk age group for underweight.

4. Material and methods

4.1 Study design

This is a retrospective cross-sectional study drawn from patient file records of a private child health clinic during November 1996 to March 2002 in Mogadishu.

4.2 Setting and study population

The child clinic is located between the two most densely populated districts in Mogadishu. The children attending the clinic come from all districts as well as from the periphery of the city. However, the majority comes from the four proximal (within 4-5 km) districts of the clinic. In addition to common childhood illnesses, the clinic also provided free immunization facilities supported by the Unicef office in Mogadishu.

The study population in the original data consisted of all the children attending the clinic during the above-mentioned period. They represented different socio-economic classes. Most

of the children were brought to the clinic complaining of illnesses while others came for⁶ routine check-ups.

4.3 Selecting the sample

This sample size of 12332 children between 0 and 60 months old (figure 3) was initially contracted from the file records of the clinic. Due to this large sample size and the limited time of the study, two sample reductions were made. Firstly, only data from year 2000 were selected. The reason behind selecting this year was that 2000 represented a year of an average number of children attending the clinic. This brought the sample down to 2535.

Secondly, to accomplish the main purpose of this thesis and to answer the aims and objectives of the study, the following 5 variables were selected from eleven variables: age (months), weight (kg), gender, child immunization status (FI vs. NI), and number of siblings in the family. Only children with information of all the above variables were included.

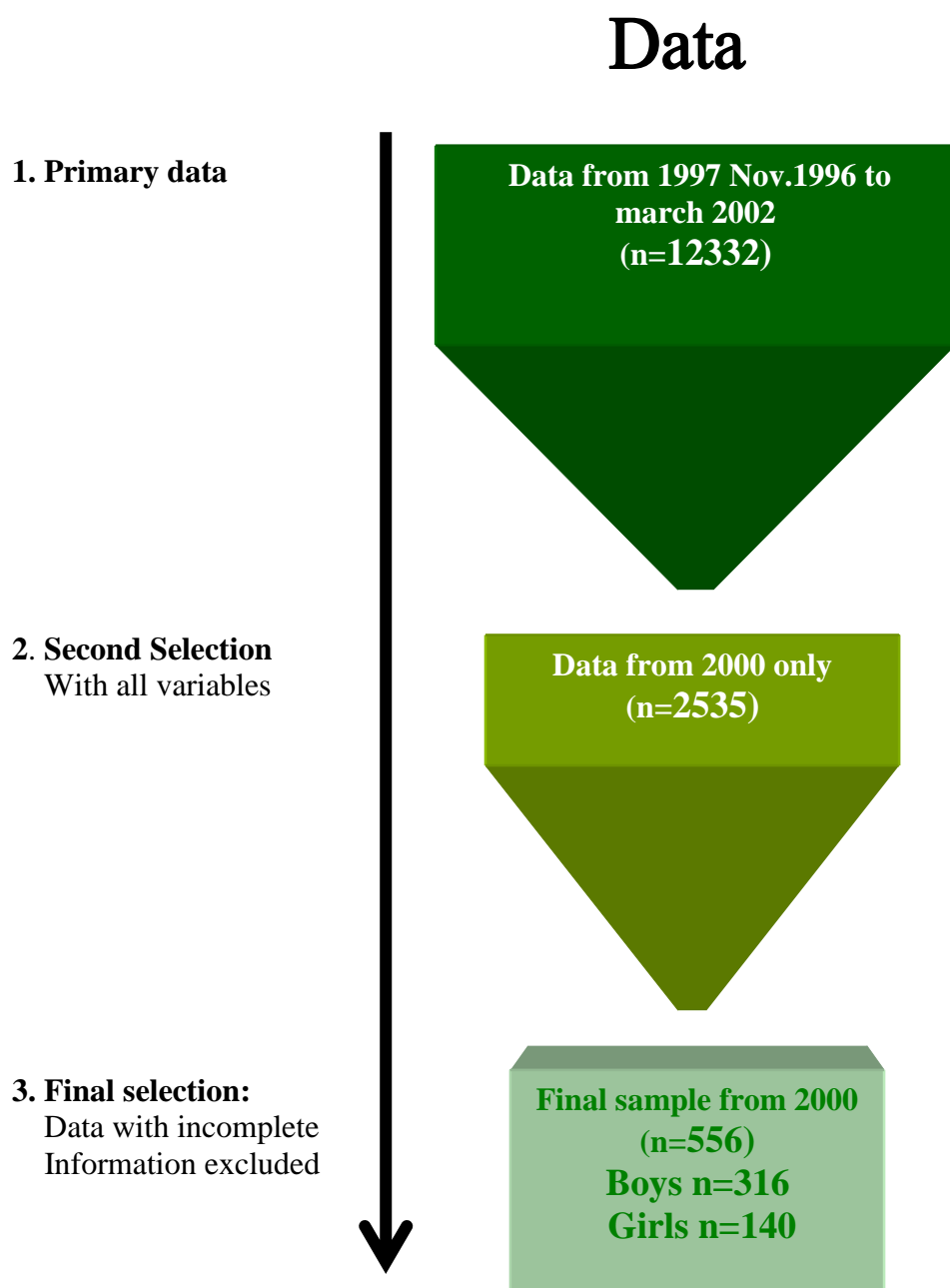
This resulted in a final sample of 556 (boys=316, girls=240).

4.4 Methods of data collection

Paramedic personnel using standard weighing equipment provided by Unicef recorded the age and weight of the children. In many cases, the parents could not exactly provide the month of birth of the child. For children older than a year, the accepted precision was 1-2 months. For children younger than a year the precision of the information had to be 2 weeks to one month. The younger children were weighed lying down and without clothes while older children were standing up and with either light clothing or no clothing. They were all measured to the nearest of 0.1 kg.

A physician recorded the immunization status and the number of siblings. Mothers were asked how many vaccines their children had had. This immunization information was recorded as follows: fully immunized (FI), up-to-date immunized (UD), and partially immunized (PI) and not immunized (NI). The data were not recorded if the mother was uncertain about the immunization status of her child. Parents (mostly mothers) informed the physician about how many children had died before the time of visit.

Figure 3. Procedure of selecting the data



4.5 Method of data analysis, indicators and guidelines used

Two different software programs, Epi Info Version 3.3.2 and the Statistical Package for Social Scientists (SPSS) version 13.0 were used for the analysis. The first was used for the Z-score calculation and the result was combined with the data of the second for the final analysis.

The child underweight (malnutrition) rate was estimated from the weight-for-age of the child using Z-Score. Z-Score is a procedure, which indicates the number of standard deviations a certain data point is away from the mean. Table 1 shows the cut-off Z-scores used in this study.

Table 1. Z-Score cut-offs

Z-Score cut-off			
Malnutrition classification			
≤ -1	to	> -2	mild
≤ -2	to	> -3	moderate
≤ -3			severe

5. Results

The total child population of under-five years old in the study is 556 (female= 240, 43%; male=316, 57%) between 6 and 60 months. Table 2 show age and gender distribution of the children.

Table 2. Age and gender distribution

Age (Months)	Total No.	G e n d e r			
		Girls	%	Boys	%
6 - 17	364	153	42	211	58
18 - 29	75	27	36	48	64
30 - 41	48	29	60	19	40
42 - 53	38	16	41	22	59
54 - 60	31	15	48	16	52
Total	556	240	43	316	57

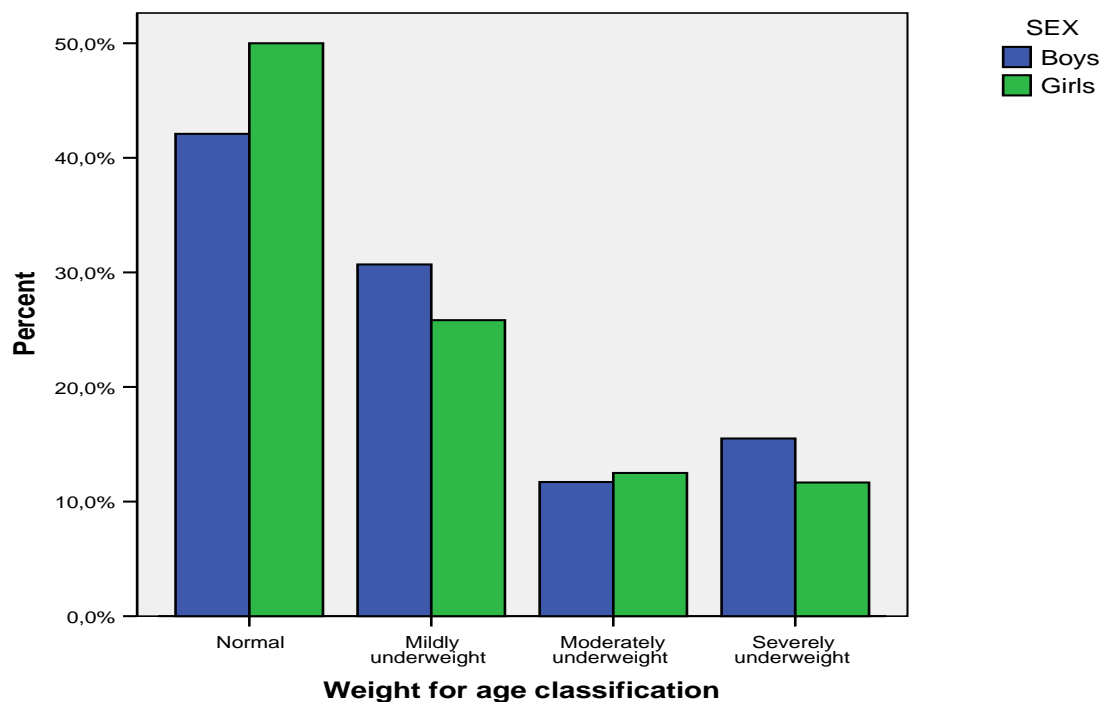
The overall nutritional status of children using standard deviation classification of weight-for-age, is summarized in table 3 and presented by gender in figure 4. About 303 (54.3%) of children have at least some degree of under-weight/malnutrition (≤ -1 Z-Score weight for age)

while 253 (45.5%) of these children are within normal weight (> -1 Z-Score weight for age). Out of the 54.3% of under-weight, 25.8% are of moderate and severe underweight (12% and 13.8%, respectively). Within the underweight group (figure 5), 6-17 old children had 64.4% of mild, moderate and severe underweight (37.3%, 11.6% and 15.5%, respectively). The 54-60 age group has more underweight than 42-53 months age group with 5.3% of total underweight (1.7% severe underweight); while the 42-53 age group had 4.6% of total underweight with .7% severe underweight.

Table 3. Underweight Classification

Nutritional status	Number	Percent
Normal	253	45
Mildly under-weight	159	29
Moderately underweight	67	12
Severely underweight	77	14
Total	556	100

Figure 4. Nutritional status by Gender



In the gender difference between boys (316) and girls (240) in terms of their nutritional status, the result showed no significant difference between the two groups ($p = .560$). Of these children, 126

were fully immunized and 419 were not at all immunised. Fully immunized children are found ¹⁰ to have higher Z-score than their not immunized peer age group with significant difference of (p= .029). There was no difference with respect to immunization in boys and girls as shown in table 4.

Table 4. Percentage immunized in boys and girls

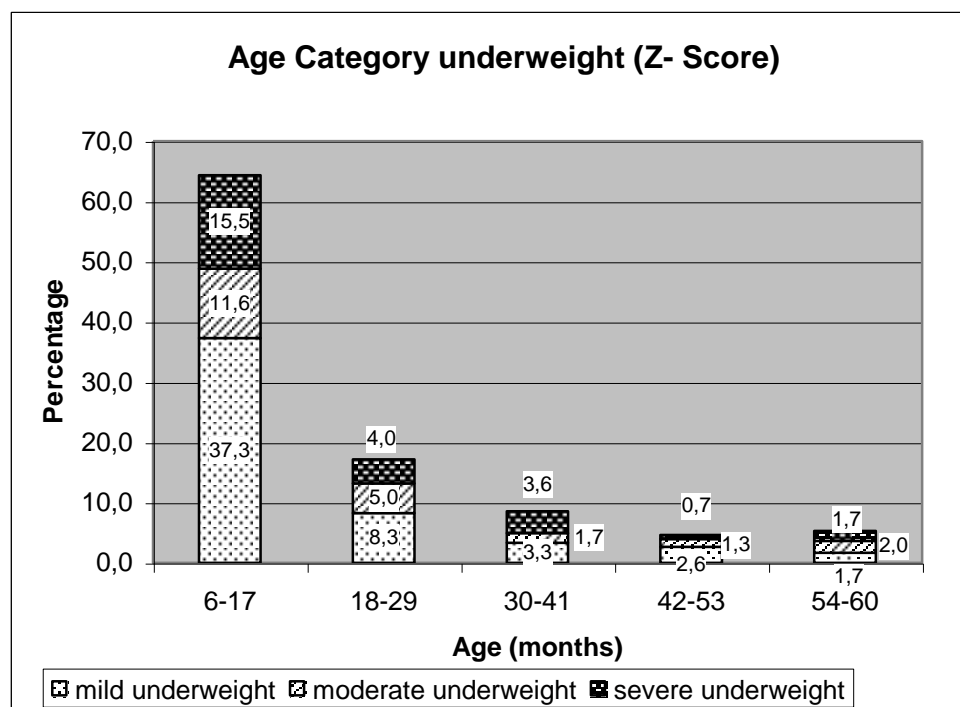
Gender	Fully immunized		Non-Immunized	
	N	%	N	%
Boys	72	23	240	77
Girls	54	23	179	77
Total	126	23	419	77

Considering the effect of the number of sibling in the family, families that had 1-2 children (n=217) were compared to families of more than 5 children (n=177).

The result indicated that more underweight children occurred in the families with 5 or more children when compared to the families with 1-2 children (p= .037).

Figure 5 shows the underweight age category of the children of the study (see table 1 for the age distributions). 64.4 percent of children between 6 to 17 months are underweight (mild=37.3%, moderate= 11.6% and severe=15.5%)

Figure 5. Underweight percentage in various age groups



6. Discussion

The objective of this paper was to evaluate the state of nutrition of children living in Mogadishu and to explore some factors that are associated with underweight. Based on a study of 556 children between 6 to 60 months, our result shows that underweight situation is highest in younger age group (6-17 months) and generally a common problem for all age groups of under-five in this country.

This study has a number of limitations that might affect the outcome. These include:

Firstly, the majority of the mothers are illiterate. They might not recall the exact day and sometimes the month of their child's birth date. To solve this problem, we adjusted the birth date of the child with the local calendar (Traditional and Islamic), which is easier for them to recall.

Secondly, during data collection, we did not have the information of the socio-economic status of the families. This would have helped us when it comes in analysing the number of children in the family in relation to their underweight status. However, it is speculated there are no big socio-economic differences existing between these families.

Thirdly, as the data were collected from a private pediatric clinic, only those who could pay the visiting fee came to the clinic. Therefore, very low socio-economic children such as children from IDCs are missing from the data.

The impact of child malnutrition on mortality is now well established¹⁸. Several previous studies have been concerned on the large number of children who die of acute respiratory infections, acute diarrhea and other infections like measles and malaria. Although the prevalence of malnutrition has decreased globally, it still remains relatively high in many developing countries^{19,20}. We wanted to know more about what risk factors, causes or variables may be associated with child underweight type of malnutrition that may probably be one of the causing factors why some children die earlier than others.

The variables that were of interest and analysed in this study are: age, weight, gender, immunization status of children, and number of siblings in the family.

Anthropometrical measurement used (weight-for-age) measures both acute and chronic malnutrition, while height for age and weight for height (not considered in the study) measures stunting and wasting type of malnutrition, respectively.

With respect to gender there were more boys in the study than girls (57% and 43 %, ¹² respectively). Considering the age categories, boys represented the majority in all groups (see table 2) except in the age group 30-41 months where 60% were girls and 40% were boys (n= 29 and 19, respectively). Although, we do not know the reason behind this, one could speculate that the parents give priority to boys than the girls when both become ill. Other studies suggested that boys are more often taken to medical treatment than the girls when ill²¹. This gender inequality within the family exists in many communities in the world.

Generally, the prevalence of underweight type of malnutrition (weight-for-age) was high for the children of under-five years old of this community (54.3% for the all the three levels of underweight) and 25.8% showed moderate or severe underweight. The severe underweight alone accounted for 13.8% of all the children. Our findings were supported by another recent study from Refugee Nutrition Information System (RNIS) produced by United Nations Administrative Committee on Coordination sub-committee on nutrition, which stated, “The overall nutrition situation in Somalia appears to be deteriorating. Recent surveys in Mogadishu and Kismayo have found high levels of wasting (17-25%) which are attributed to a variety of economic- and security-related factors. Many Somalis, especially in large urban centers, are presently at considerable nutritional risk”²². This proves that malnutrition is a widespread condition of public health concern. In 1999, data from multiple indicator cluster survey (MICS) reported that the moderate and severe underweight prevalence in Somalia is 26% and 7%, respectively, which is different from our findings.

The reason for this difference may be that the data from this country are inconsistent or that the condition of the country has even worsened since the MICS data was done.

We have no exact definitive cause of the underweight problem, but possible explanation may include low socio-economic status of the vast majority of the families, maternal low education level, coupled with absence of a functioning administrative governmental system for the last 15 years and lack of basic health infrastructure. It is well understood that young children with moderate and severe undernutrition (<-2 to >-3 and <-3, respectively) are at increased risk of dying due to infectious diseases - diarrhea, pneumonia, malaria and sometimes measles-before their fifth birthday²³. With this high underweight situation, it is no surprise that many children in this area die before age of 5 years.

Our study contradicts our assumption as well as other previous studies that showed similar results like ours²⁴. We assumed that the boys are usually having higher weight than the girls; the reason of this could be that traditionally males are first fed and get the nutritious part of

the daily meal. But in this study, it seems the cultural trend may be changing and parents are now accepting the equality of their children.

The total number of children analysed for the effect of immunization status on child underweight was 545 children. 76.8% of them were not immunized while only 23.1 were fully immunized. The fully immunized children had a significantly better nutritional status than the non-immunized children ($p=0.029$). Despite the availability and accessibility of immunization facilities; it is apparent from the number of non-immunized children that the level of child immunization in the area is very low. This may increase even more the reoccurrence of infectious diseases on this age group and subsequently cause under-nutrition that may ultimately lead to early death. In order to be fully immunized, the child has to get the six required vaccines: BCG for tuberculosis, OPV for polio, DPT for diphtheria-tetanus-pertussis and measles.

Comparing the effect of the number of children in the family, the study showed that children in families with five or more children were more under-weight than those having one or two children

($p= .037$). This finding expresses the number of children in the family is a risk factor for underweight. In our sample of 556 there were 3.7 children per family in average, the corresponding value being 7.3 per family in the Unicef studies²⁵. The reason for this difference may be explained by the limited and/or the absence of very poor children in the study, while other studies might have taken all children of socio-economic levels into account. Furthermore, Unicef might have been carried out large samples in different places in the country.

The 6-17 month old children were found to have the highest prevalence of underweight, 64.4%, with a high moderate and severe underweight (11.6% and 15.5 %, respectively). The result shows the younger the child the higher prevalence of underweight in the child, except the 54-60 months old children (1.7%) that have relatively higher percentage than 42-53 months old children (0.7%).

7. Conclusion

Despite the limitations of this study, it is shown that underweight is an important contributing factor in most common causes of mortality in children of under-five years of age. Our

findings suggest that the variables used in this study, might be very important to consider¹⁴ while discussing malnutrition and child mortality in Somalia.

More than half of the children in the study showed to be underweight for age, which reveals the magnitude of child malnutrition and health in the area. In our study, there was no gender difference with respect to under-weight. The girls showed a marginally better weight-for-age than the boys although not significant. Immunization status of the children and number of children in the family showed a significant role to trigger the child to become malnourished. Our result indicated the younger age children (6-17 months) to be the highest risk age group in this study.

There are limited studies done in the field of child health in Somalia, especially in child nutrition. This information might help in designing intervention programs directing to nutritional programs and promoting the survival of children in the area.

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Mohamed Keynan

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