ASSESSMENT OF CLINIC-BASED GROWTH MONITORING AND PROMOTION IN THE ACCRA METROPOLITAN AREA OF GHANA

THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MPHIL NUTRITION DEGREE

BY

SANDRA GYAMPOH

(10167491)

JULY, 2012

DECLARATION

This is to certify that this thesis is the result of research that I, Sandra Gyampoh, have undertaken towards the award of the Master of Philosophy Degree in Nutrition in the Department of Nutrition and Food Science, University of Ghana, under the supervision of Dr. Gloria E. Otoo of the Department of Nutrition and Food Science and Dr. Richmond Aryeetey of the School of Public Health. All references cited have been duly acknowledged.

....

Sandra Gyampoh Date

(Student)

....

Date

Dr. Gloria E. Otoo

(Supervisor)

....

Date

Dr. Richmond Aryeetey

(Supervisor)

ABSTRACT

Growth Monitoring and Promotion (GMP) is a public health intervention which makes use of frequent assessment of the growth of children under five years. The programme enables health workers to early detect growth failure and take corrective actions through improvements in feeding and care practices. Despite evidence that most caregivers in Ghana have contact with GMP through monthly child welfare clinics (CWC), child feeding practices remain sub-optimal and child undernutrition persists. The study assessed the implementation of GMP in Ghana and the relationship between caregiver exposure to GMP and child feeding knowledge and practices, the nutritional status of their children and knowledge of GMP. The study was cross-sectional, involving 206 caregiver-child pairs attending child welfare clinics (CWC) and 17 health workers providing GMP services at the CWC in the Accra Metropolitan Area (AMA). Observation checklists were used to assess health worker implementation of GMP activities for caregiver-child pairs. Child health records provided data on caregiver attendance. Structured questionnaires were used to collect data on caregiver-child pair characteristics, child feeding knowledge and practices, and knowledge of GMP activities. Weights and heights of participating children were measured to determine nutritional status. Structured questionnaires were also used to collect data on health worker knowledge of recommended child feeding and GMP activities. Comprehension of the child growth chart by caregivers and health workers was assessed using sample charts. Recording of child weights on the appropriate growth chart for boys and girls were correctly done in over 97% of children. However, over 50% of children did not have all their monthly weight points connected on the growth chart to show the trend of growth. More than 60% of caregiver-child pairs in the study received no growth promotion education and only

about 3% of children experiencing faltering growth in two consecutive months were referred for appropriate intervention as prescribed in the health records book by the Ghana Health Service. Caregivers who had not missed any CWC attendance had significantly better growth chart comprehension scores (p=0.026). Nutritional status of children and caregiver knowledge of recommended child feeding was not significantly associated with CWC attendance (p= 0.707; p=0.136). The relationship between caregiver CWC attendance and child feeding practices was also not found to be significant. Overall, over half of the percentage of health workers in the study had poor knowledge scores of recommended child feeding practices and the growth chart. Generally most health workers knew recommended child feeding practices and GMP activities, however some health workers could not adequately indicate recommended actions for particular growth trends on the growth chart. Data recording and charting practices were appropriately carried with the exception of plotting of child weights. Growth promotion education was also observed to be inadequately carried out. Among caregivers breastfeeding practices were well practiced while complementary feeding practices were suboptimal. Not missing any CWC was not significantly associated good feeding knowledge and practice scores and child nutritional status as with good growth chart comprehension. For GMP to achieve its goals, it is necessary for the government/GHS to routinely train health workers on GMP. It is also equally essential to provide the needed logistics and improve the organisation of CWC in order to reduce health worker workload and enhance effectiveness.

DEDICATION

This work is dedicated to God Almighty; for how far along I have come.

ACKNOWLEDGEMENT

This work would not have been successful without God, to whom I am most grateful. My appreciation goes to my very able supervisors, Dr. Gloria E. Otoo and Dr. Richmond Aryeetey for the time, support, guidance and thorough probing. My gratitude goes to the Greater Accra Metropolitan Health Administration of the GHS, the administrative offices of the selected health facilities, nurses, nutrition officers and caregivers for the approval and support. Thank you to Mr. Isaac Kofi Mensah for the funds to undertake this study. To my family, Cyrus Baidoo, and all friends; I am very grateful for the financial, emotional and spiritual support to go through the entire course, I cannot thank you enough, and God bless you.

.

TABLE OF CONTENTS

CONTENTS **PAGE**

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AMA- Accra Metropolitan Area

CF- Complementary feeding

cm- Centimetre (s)

CMAM- Community Management of Acute Malnutrition

CWC- Child welfare clinics

EBF- Exclusive breast feeding

FAO- Food and Agricultural Organization

g- Gram (s)

GDHS- Ghana Demographic and Health Survey

GHS- Ghana Health Service

GMP- Growth Monitoring and Promotion

Kg- Kilogram (s)

LAZ- Length-for-age z-score

PAHO- Pan American Health Organization

SD- Standard deviation

SES- Socio-economic status

UNICEF-United Nations Children's Fund

UNSCN- United Nations Standing Committee on Nutrition

USA- United States of America

IYCN- Infant and Young Child Nutrition Project

WAZ- Weight-for-age z-score

WHO- World Health Organization

WLZ- Weight-for-length z-score

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Undernutrition in children under five years accounts for at least 35% of deaths within this age group around the world, and contributes to 50-70% of the burden of diarrhoeal diseases, measles, malaria and lower respiratory infections in such children living in developing countries (Black *et al*., 2008; WHO, 2003; UNICEF, 1998). In Ghana, undernutrition in children under the age of five years is estimated to explain about 40% of deaths in this age bracket (Ghana Health Service, 2011). Sadly, the rate of decline of child undernutrition has been poor; as low as 0.1% annually in sub-Saharan Africa (UNSCN, 2010).

Interventions to reduce undernutrition in children include prevention and rehabilitation programmes. Much evidence supports intervention during the early periods of life (Shrimpton *et al*., 2001; de Onis and Blossner, 2003; Black *et al*., 2008). One such programme aimed at improving child nutrition through better targeting is Growth Monitoring and Promotion (GMP). The programme which has been on-going in most developing countries for over 40 years is carried out as part of routine child health services (Owusu and Lartey, 1992; Roberfroid *et al*., 2005a). In Ghana, it is carried out at child welfare clinics (CWC), where immunizations and other child health services are administered. The programme is aimed at influencing family decisions for positive child growth outcomes and has the potential to contribute to improving child survival if the necessary conditions are met as shown in **Figure 1.1** (Griffiths and Del Rosso, 2007).

Such conditions include proper implementation of GMP activities by skilled health workers, adequate nutrition counselling, and caregiver comprehension of information given (Griffiths and Del Rosso, 2007; Ashworth *et al*., 2008). Monitoring the growth of a child only, without relating it to the appropriate actions such as nutrition education or referral will not result in improved growth (Griffiths and Del Rosso, 2007).

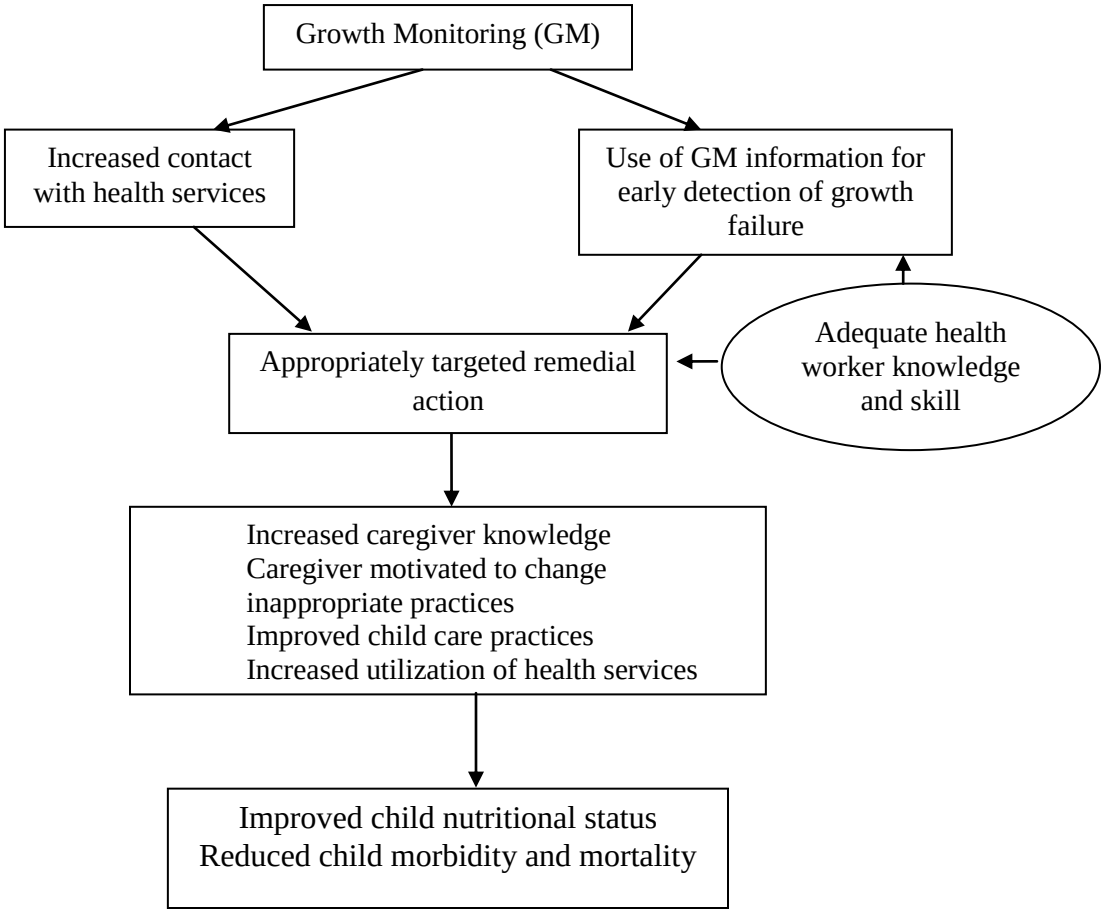


Figure 1.1 Growth Monitoring and Promotion framework (modified from Griffiths and Del Rosso, 2007).

1.2 Study Rationale

In Ghana, caregivers of children are encouraged to attend CWC after delivery in order to benefit from Primary Health Care services including child immunizations and GMP- commonly termed 'weighing'. According to the 2008 GDHS, 86% of children under-five years had health cards and 70% were fully immunized by 12 months of age. This gives an indication that most caregivers have some contact with CWC where GMP is a major component. Studies in Ghana have also identified health workers at these clinics, as major sources of child feeding advice for caregivers (Otoo *et al*., 2009; Sika-Bright, 2010). However, in spite of this interaction, between caregivers and CWC, child undernutrition persists and child feeding practices remain sub-optimal in Ghana.

Studies on GMP in Ghana have assessed maternal comprehension of child growth charts used in assessing growth and factors related with maternal attendance to CWC. However, the implementation process of GMP has not been assessed. Also the relationship between caregiver participation in GMP and child feeding knowledge and practices, and child nutritional status has not been assessed.

1.3 Research Questions

1. Do health workers exhibit adequate knowledge and skills while carrying out GMP activities?
2. Is health worker response to each caregiver-child pair appropriate to children's growth pattern?

3. Do caregivers have adequate understanding of child feeding and comprehend GMP activities?
4. Is recorded attendance associated with caregiver knowledge and practices on feeding and child nutritional status?

1.4 Objectives

1.4.1 Main Objective

The study assessed the implementation of GMP by health workers in the Accra Metropolitan Area (AMA) and the relationship between GMP exposure and caregiver child feeding knowledge and practices, knowledge of GMP activities and the nutritional status of children.

1.4.2 Specific Objectives

1. To assess health worker knowledge of infant and young child feeding and comprehension of the growth chart and GMP activities
2. To assess data recording and charting, and the use of appropriate growth promotion for caregiver-child pairs attending CWC in the AMA
3. To assess child feeding knowledge and practices among caregivers attending CWC in the AMA
4. To describe frequency of caregiver attendance to CWC and comprehension of the growth chart and GMP activities

5. To identify the relationship between recorded CWC attendance and caregiver knowledge and practices on feeding, and child nutritional status

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Epidemiology and Effects of Child Undernutrition

Developing countries bear the burden of malnutrition in terms of undernutrition. An analysis of 388 national surveys from 139 countries found 20% and 32% (of 178 million) of children less than 5 years old in low-income and middle-income countries, to be underweight and stunted respectively (Black *et al*., 2008). Nonetheless, among developing countries, those in sub-Saharan Africa and South Asia account for 70% (Shrimpton *et al*., 2001). After standardizing data from 846 worldwide population-based nutrition surveys of children below the age of five years, high rates of stunting in sub-Saharan Africa and South-central and South-eastern Asia were identified by de Onis and Blossner (2003). Despite the enormity of the challenge to reduce child undernutrition, the 25 years spanning between 1970 and 1995 observed a drop in prevalence from 46.5% to 31% in developing countries (Smith and Haddad, 2000). Also, the proportion of undernourished (displaying stunting, wasting and underweight) children below five years of age decreased from 33% in 1990 to 26% in 2006 (UNSCN, 2010). In spite of these declines, the slowest rate of decline has been seen in the sub-Saharan region (Smith and Haddad, 2000; UNICEF, 2008; UNSCN, 2010).

The incidence of child undernutrition differs with reference to underweight, stunting and wasting. In the first three months of a child's life, weight-for-age z-scores (WAZ) remain parallel to the reference indicator used to assess normal growth patterns, while length–for-age z-scores (LAZ) decrease (Shrimpton *et al*., 2001). Weight for length z–scores

(WLZ) in contrast increase in the first 3 months (Shrimpton *et al*., 2001). From the fourth month, WAZ falls similar to trends in LAZ until around the 12th month when it stops decreasing and stabilizes. LAZ on the contrary continue to fall into the 24th month. WLZ however continues to increase until 18 months when it increases slowly until 40 months and then parallels to the reference population afterwards. Shrimpton *et al*. (2001) state that becoming stunted and wasted are independent of each other.

Undernutrition in children has consequences on child morbidity, mortality, intellectual development and ability and effects in adulthood. Thirty-five percent of children dying worldwide are as a result of undernutrition, and of this percentage; three quarters are among children who show no visible signs of the condition (UNICEF, 1998; Black *et al*., 2008). According to Black *et al*. (2008), stunting and severe wasting in children under the age of five are two of three nutrition-related factors responsible for an estimated 2.2 million deaths and 21% of disability-adjusted-life-years (DALYs). In terms of micro-nutrient deficiencies, zinc and vitamin A deficiencies are the most burdensome, with vitamin A deficiencies alone accounting for 6% of deaths and 5% of DALYs (Black *et al*., 2008). Malnutrition results in reduced resistance to infections due to a weakened immune function leading to longer, more severe and frequent infections (UNICEF, 1998; Smith and Haddad, 2000).

2.2 Child Undernutrition in Ghana

In Ghana, prevalence of indicators of undernutrition in children under five years has demonstrated a rise and fall pattern over the years. Data from the GDHS (2003 and 2008)

show that stunting increased from 26% in 1998 to 30% in 2003 and fell to 28% in 2008. Wasting on the other hand showed a consistent decrease from 25% in 1998 to 22% in 2003, and then decreased substantially to 9% in 2008. In contrast, underweight increased from 7% in 2003 to 14% in 2008. In addition, anaemia is prevalent in 78% of Ghananian children between the ages of 6 and 59 months (GDHS, 2008).

The existence of undernutrition in Ghana however, shows variability in terms of age, sex, socio-economic status (SES) and region. Levels of stunting, wasting and underweight have been observed to be higher in boys than in girls, and higher in rural areas than in the urban areas (Alderman, 1990; Poel *et al*., 2007; GDHS, 2008). In terms of age, the highest level of stunting was identified in children within the ages of 18-23 months (40%) in 2008; a level WHO classifies as one of very high severity (GDHS, 2003 and 2008; de Onis and Blossner, 2003). In contrast, children 6-8 months were indicated to have the highest levels of wasting (28.9%) by the 2008 GDHS. Anaemia prevalence has also been observed to be at higher levels in rural areas.

2.3 Infant and Young Child Feeding, Child Nutritional Status and Survival

Several factors affect the ability of a child to attain the right nutritional status in order to maintain good health and overall survival. These determinants are multidimensional in nature and interact (UNICEF, 1998; Smith and Haddad, 2000). One of such factors operating at the immediate level is the dietary intake of the individual child. Malnutrition is more likely in children who lack diets adequate in nutritional quality and quantity.

Internationally accepted infant and young child feeding (IYCF) recommendations for ensuring optimal growth for an infant, is to practice exclusive breastfeeding (EBF) for the first six months of a child's life. Despite these recommendations, EBF remains sub-optimal in many parts of the world. Worldwide, only 35% of infants are exclusively breastfed during the first four months of life and in Africa, Asia and Latin America and the Caribbean, only 47-57% of infants younger than two months are exclusively breastfed (WHO/UNICEF, 2003; Black *et al*., 2008). Studies in parts of Africa reveal that although breastfeeding rates are high, fewer children are exclusively breastfed (Kruger and Gericke, 2003; Kimani-Murage *et al*., 2011). In Ghana, EBF rates increased from 53% to 63% over the 5 years spanning between 2003 and 2008 (GDHS, 2003 and 2008). These data were obtained maternal recall of feeding practices in the previous 24 hours. The WHO however indicates that using the 24 hour recall is likely to exaggerate the actual percentage of those practicing EBF (WHO, 2008a). Findings by Aidam *et al*. (2005a) from a study of 376 mothers attending maternal and child clinics in Ghana agree with this. Aidam *et al*. (2005a) identified EBF rates to be 70.2% using a 24 hour recall, however on assessing EBF since birth the percentage reduced to 51.6%.

Starting at six months, the growing child must be fed nutritionally adequate and safe complementary foods in addition to continued breastfeeding until two years or more (UNICEF 1998; WHO/UNICEF, 2003). Yet in Ghana, water, semi-solid and solid foods are introduced too early (GDHS, 2008). By 4-5 months of age, over 30% of children are introduced to semi-solid or solid foods (GDHS, 2008). Sika-Bright (2010), in a cross-sectional study in Cape-Coast, Ghana, found that 44.9% of children were fed

complementary foods between the ages of 3-4 months. The median age of introduction of complementary foods was identified at 5.2 months by Armar-Klemesu *et al.* (2000). In addition to early introduction, complementary foods are often low in nutrients and fed below the recommended frequency (Dewey and Adu-Afarwuah, 2008). In Ghana, foods made from unfortified cereals are the most commonly fed during the start of complementary feeding (CF) whereas animal source foods are not fed until the child is older (Ruel *et al*., 1999; Davis *et al*., 2003; GDHS, 2003; Robinson, 2009). These practices impact negatively on the growth and survival of the child.

Sub-optimal EBF and early or late introduction of complementary foods which are nutritionally inadequate or unsafe may result in growth faltering and/or increased incidence of infections and mortality (Yoon *et al*., 1996; Arifeen *et al*., 2001; Bhandari *et al*., 2003). Ruel *et al*. (1999) identified that the prevalence of stunting was three times more among children whose mothers had the lowest feeding practice in Ghana, while underweight increased 2.5 times more in the same children. Similar findings were made in Latin America where feeding practices were strongly and significantly associated with child HAZ especially among 12-36 month olds (Ruel and Menon, 2002). Appoh and Krekling (2005) in a cross-sectional study in the Volta Region of Ghana, also found a significant association between early introduction of complementary foods and WAZ among malnourished and well nourished children ($p<0.001$). Jones *et al*. (2003) indicate that focusing on achieving optimal breastfeeding and complementary feeding can reduce under-five child deaths by 13% and 6% respectively. To ensure appropriate feeding, accurate information and skilled support from family, community and the health care

system are essential as inadequate knowledge can result in malnutrition than lack of food (WHO/UNICEF (2003).

2.3.1 Factors Influencing Child Feeding Practices

Child feeding practices which do not correspond to recommendations may be driven by factors at the national, community, household and individual levels. These factors may pertain to a caregiver's socio-economic status (SES), cultural and religious beliefs, level of education and nutrition knowledge (WHO, 1998).

Socio-economic status or wealth may affect a caregiver's access to food and other resources. Ng *et al*. (2011) identified household wealth index to be significantly associated with a child's dietary diversity in Indonesia. The odds of not meeting the minimum recommended dietary diversity set by WHO was 2.18 times more in poor families than in rich families (p=0.008). Likewise, Memon *et al*. (2010) found the probability of having incorrect EBF practices in poor mothers to be 0.39 times greater than among richer mothers in Pakistan (p<0.001). Aidam *et al*. (2005a) observed a similar trend among breastfeeding mothers in Ghana. However, Memon *et al*. (2010) in their study did not find CF practices to be associated with any SES indicator but rather with maternal education.

Mothers or caregivers with higher levels of formal education have been observed to have better child feeding practices. The advantage educated mothers have over uneducated mothers lies in the greater confidence and influence they have in making informed

feeding and health choices (WHO, 1998). Memon *et al*. (2010) in a cross-sectional survey in Pakistan, found the odds of having incorrect EBF and CF practices to be 2.46 times and 3.74 times greater in uneducated mothers ($p<0.001$). Similarly, Kimani-Murage *et al*. (2011) in South Africa observed that early introduction of complementary foods was 10% lower among caregivers with secondary education or higher. In Ghana, Armar-Klemesu *et al*. (2000) identified maternal schooling as the only care resource significantly associated with child feeding. No associations were found between feeding practices and household food availability, income or wealth. In contrast to these findings, Sika-Bright (2010) observed formula feeding and mixed feeding to be more frequent among mothers with tertiary education ($p<0.001$). This observation may be due to these mothers having opportunities to work outside the home (Sika-Bright, 2010; Otoo *et al*., 2009).

Aidam *et al*. (2005a) in a study in Ghana identified the influence of caregiver nutrition knowledge on EBF practices. EBF since birth was 2.22 times more among mothers with a high knowledge of EBF recommendations ($p>0.05$). Kruger and Gericke (2003) in South Africa found caregivers with inadequate knowledge of the proper introduction of complementary foods to have poor feeding practices. In contrast, to these findings, Singh (2010) and Kimani-Murage *et al*. (2011) found that though caregivers knew the appropriate age for introducing complementary foods, CF had began too early. This may be as a result of a caregiver's cultural or religious environment (Brabin, 2001; Kruger and Gericke, 2003; Otoo *et al*. 2009; IYCN, 2011).

Cultural beliefs such as those that pertain to food taboos and the distribution of food to young children may hinder appropriate CF (Brabin, 2001; IYCN, 2011). In a study of barriers and incentives to EBF, undertaken by Otoo *et al*. (2009) in Ghana, mothers generally believed water could be given to an infant if clean, although most believed EBF as the best feeding practice. Also, pressures from influential family members such as grandmothers resulted in mixed feeding among these mothers. Kruger and Gericke (2003) also in a qualitative exploratory study in South Africa identified that cultural belief together with inadequate child feeding knowledge led to poor child feeding.

2.3.2 Role of Health Services in Ensuring Appropriate Nutrition Knowledge and Practices

Poor knowledge, advice and support on the right way to feed a child may lead to poor feeding practices and undernutrition even in areas where food security is not a limitation (Appoh and Krekling, 2005; Penny *et al*., 2005). Health services provide a reliable source of health information for caregivers and families in many societies (McLorg and Bryant, 1989; Pelto *et al*., 2004; Otoo *et al*., 2009; Sika-Bright, 2010; Singh, 2010). However in some areas, family members may have a greater influence (Memon *et al*., 2010).

As a major source of nutrition information, health workers should be qualified and equipped to give advice and care that is total and based on recommendations (WHO/UNICEF, 2003; UNICEF, 2009). Researchers have found conflicting results between health worker work experience, level of education and nutrition knowledge. A

study of nurses sampled from fifty hospitals in the U.S.A showed a weak but significant positive correlation between breastfeeding knowledge score and length of experience (r=0.30, p<0.001); with head nurses scoring higher than registered staff nurses (Anderson and Geden, 1990). In contrast, Crowder (1981) identified that nurses with greater experience (15 years and over) had lower mean scores. Nurses with higher education levels were also found to have higher knowledge scores. The observed lower scores among more experienced nurses were attributed to a lack of continued education or not keeping up with current knowledge. Poor health worker knowledge may result in the use of inaccurate statements during nutrition education, which may lead to inadequate and non-factual caregiver knowledge (Otoo *et al*., 2009; Robinson, 2009).

The use of specific nutrition education to improve caregiver feeding practices has been noted as a possible short-term intervention to improving child nutrition (Christian *et al*., 1988; Ruel *et al*., 1999). When caregivers are equipped with accurate information and practical help from trained health workers, they build confidence, initiate and sustain appropriate feeding practices, prevent and overcome difficulties and improvements are seen in child growth (Santos *et al*., 2001; Haque *et al*., 2002; WHO/UNICEF, 2003; Pelto *et al*., 2004; Penny *et al*., 2005; Zaman *et al*., 2008). The results of a randomized controlled trial by Aidam *et al*. (2005b) showed that at 6 months post-partum, percentage of exclusively breastfed infants was significantly higher (39.5% vs. 19.6%, p< 0.05) for women who received breastfeeding education during the pre-, peri- and postnatal periods, in urban Ghana. A cluster-randomized control trial, revealed that the provision of enhanced simple, standard and age-appropriate nutrition counselling on complementary

feeding, delivered through health services increased the consumption of animal source foods and nutrient-dense thick foods among children in Peru (Penny *et al*., 2005). Similar improvements in weight gain, increased food density, feeding of animal source foods, legumes, eggs and green leafy vegetables was seen in a similar intervention group in Brazil (p <0.05) (Santos *et al*., 2001).

2.4 Growth Monitoring and Promotion (GMP) As a Strategy against Child Malnutrition

GMP is a strategy against poor child growth which utilizes the contact between health workers and caregivers to prevent or rehabilitate growth faltering (Garner *et al*; 2000; Griffiths and Del Rosso, 2007; Ashworth *et al*., 2008). The programme links information obtained from the frequent anthropometric assessment of child growth to growth promotion activities (Griffiths and Del Rosso, 2007). By this, early identification and referral of poor growth for appropriate medical or nutrition attention is achieved (Griffiths and Del Rosso, 2007; Shrimpton *et al*., 2001; Ashworth *et al*., 2008).

The focus of GMP is to affect family-level decisions and individual child nutritional outcomes (Griffiths and Del Rosso, 2007). For health workers, it provides an opportunity to assess child health status and offer counselling on feeding and health whereas for caregivers, they acquire knowledge about the growth of their children and how to improve it (Charlton *et al*., 2009). Despite these, there are varied opinions on the effectiveness of GMP in achieving its set objectives. Several studies assessing one or

more of the programme's objectives have raised a case for and against the proposed benefits of the programme against child malnutrition.

2.4.1 The Use of Growth Charts in GMP

2.4.1.1 Plotting and charting of child growth

During GMP, children are to be weighed, their weights properly plotted on a growth chart, and their growth patterns interpreted. Growth charts provide a graphic representation of a child's growth using anthropometric indices (de Onis *et al*., 2004; Ashworth *et al*., 2008). The interpretation of a child's growth pattern informs options and future actions to be discussed with the caregiver (Ashworth *et al*., 2008).

In interpreting a child's growth during GMP, the focus is on the velocity of growth and not on nutritional status and it is therefore important that charting of weights be done properly for clear identification of growth patterns (Brownlee, 1999). Though weights are reported to be more accurately recorded and charted in some studies (Gerein and Ross, 1991; Charlton *et al*., 2009), a common problem identified is that dots representing the child's monthly weights on the curve are often left unconnected (Brownlee, 1990; Valadez *et al*., 1996). Brownlee (1999) attributes this to health workers focusing more on the child's nutritional status and not on the trend of growth. Ashworth *et al*. (2008) also associates poor weighing, data recording and charting practices with faulty or inadequate equipments, inadequately trained and insufficient staff.

2.4.1.2 Caregiver comprehension of growth charts

The growth chart also serves as an educational tool for health workers (Aden *et al*., 1990; Roberfroid, 2007; Ashworth *et al*, 2008). The ability of the caregiver to understand the purpose of the growth chart and to interpret it improves their appreciation of the link between feeding, care and growth (Aden *et al*., 1990; Owusu and Lartey, 1993; Roberfroid, 2007). According to Owusu and Lartey (1993), it serves as a motivation for caregivers to participate in GMP and improve their interaction with the health worker. Studies in Zaire and Ghana showed that over 50% of caregivers knew the purpose of the growth chart (Owusu and Lartey, 1992; Gerein, 1993). Ruel and Habicht (1992) in a prospective intervention study in Lesotho observed that mothers educated with the chart scored higher on nutrition knowledge compared with the control group. This was significant among less schooled mothers, new clinic attendants and mothers of malnourished children after controlling for baseline scores and maternal and child characteristics ($p<0.05$).

Among factors influencing the ability of caregivers to comprehend the growth chart are level of education or literacy and attendance to GMP sessions (Owusu and Lartey, 1992; Senanayake *et al*., 1997; Roberfroid *et al*., 2007). In a cross-sectional study of 875 mothers in Ghana, CWC attendance and level of education had a significantly positive correlation with comprehension of charts ($p<0.05$) (Owusu and Lartey, 1992). Gerein (1993), after controlling for educational level, found a similar association between attendance and the ability to interpret the charts. In this study however, 32% of mothers

who had not attended sessions and had no growth charts were able to interpret two of the three samples and 20% of mothers who had no schooling were able to do same.

Caregivers or mothers with low level or no formal education can be taught to understand and use the child growth charts through appropriate training and education (George *et al*., 1993; Roberfroid *et al*., 2007). Aden *et al*. (1990) in a longitudinal study examined the ability of 199 predominantly illiterate rural mothers in Somalia to understand the growth chart after a period of intensive use and education. After the intervention, only 4% of mothers did not know the purpose of the chart while all others mentioned the promotion of health and/or growth as its purpose. Over 40% of mothers in the study were able to combine the growth curves with corresponding pictures of child nutritional status. Maternal literacy did not differ between those who could correctly and incorrectly combine the pictures. George *et al*. (1993) also found an increase in comprehension of growth charts in mothers from 8.8% at baseline to 85% after intervention in a population with over 60% illiterate mothers.

If health workers make an effort to educate caregivers on growth charts, it can improve caregivers' comprehension despite lags in formal education (Roberfroid *et al*., 2007), yet mothers or caregivers often receive no or marginal training on growth charts (Ruel *et al*., 1992; Valadez *et al*., 1996). Roberfroid *et al*. (2005b) in an assessment of the perceptions among an international panel of district medical officers identified that the growth chart was often given to caregivers for preservation and not for motivating them to monitor their child's growth.

2.4.2 The Use of Child Growth Patterns for Targeted Action

In GMP, positive outcomes are only realized when targeted actions relevant to the individual child are taken (Latham, 1993; Griffiths and Del Rosso, 2007). According to Latham (1993), GMP should involve discussion between the health worker and caregiver leading to strengthening positive practices and correct wrong ones. However, interpretations of child growth patterns are faulty and most often little or nothing is done in terms of effective follow-up (Brownlee, 1990; Gerein and Ross, 1991).

Charlton *et al*. (2009) in the Lusaka district of Zambia observed that although trained health workers were knowledgeable about GMP, they demonstrated poor screening for illness, individualized counselling and referral. Only 3.3% of mothers received specific nutrition counselling on feeding practices relevant to their child's situation. Comparable findings were made by Gerein and Ross (1991) in three child health programmes in Zaire, where health workers did not provide counselling in one-third of children experiencing growth faltering. Investigation into previous illness was conducted in only another one-third of such children and nutrition counselling was standardized and non-specific. Poor counselling and referral were also observed in Costa Rica (Valadez *et al*., 1996).

When caregivers receive non-specific, non-individualized counselling irrelevant of their specific conditions such as livelihoods and health seeking behaviour, the effectiveness and efficiency of the GMP programme is not realized (Roberfroid *et al*., 2005a; Griffiths

and Del Rosso, 2007; Ashworth *et al*., 2008). This poor performance on the part of health workers has been related to lack of required knowledge and skills, heavy demand relative to personnel, lack of incentives and motivation and inadequate supervision (Pelto *et al*., 2004; Roberfroid *et al*., 2005a; Ashworth *et al*., 2008; Charlton *et al*., 2009). Roberfroid *et al*. (2005a) from a review of 69 studies add that monthly anthropometric measurements could result in falsely classifying children as a consequence, counselling could be wrongly targeted. The authors suggest this may cause health workers to become discouraged to focus more time and attention on counselling.

2.4.3 Influence of GMP on Care Practices and Child Growth

GMP if well implemented has the ability to improve caregiver feeding knowledge and ultimately practices. Ruel *et al*. (1992) in an assessment of clinic-based growth monitoring in eight clinics in Lesotho found that mothers who attended regularly had a significantly higher knowledge of the appropriate time of introduction of animal source foods ($p<0.05$). This finding was much evident among mothers with primary education and those with children less than six months old. However, the researchers attributed this association to group nutrition education given at these clinics as individualized counselling was not observed. Similarly, Gerein (1993) in Zaire identified that despite the poor quality of health education at GMP sessions, the ability of caregivers to answer nutrition knowledge tests correctly was strongly related to attendance even after controlling for education. However feeding practices were not influenced in a similar manner. Mothers in this study also received group nutrition counselling similar to that observed by Ruel *et al*. (1992).

While proponents of GMP have defended its ability to improve child nutritional status, opponents have questioned its ability to bring such changes. Longitudinal studies on improvements in nutritional status of children participating in GMP have shown differing results. Charlton *et al*. (2009), in a 3-month prospective study in Zambia, identified a significantly lower decrease in WAZ in children from health facilities trained in GMP in contrast to those from untrained health facilities ($p<0.05$) and trained community posts ($p<0.001$). However on the whole, WAZ, HAZ and WHZ of children in these three facilities deteriorated over the length of the study. The inability of trained facilities to show significant difference was attributed to caregivers in untrained health facilities having a higher SES.

Qazi *et al*. (2003) and George *et al*. (1993) on the other hand found improvements in growth patterns in children participating in GMP. In a prospective observation and intervention study in Pakistan, Qazi *et al*. (2003) found that overall, infants followed up over a mean 15 month period maintained or improved in weight even in poor families. This study however had no controls, a limitation which was not found in a study by George *et al*. (1993). At the end of a four year intervention trial, the mean WAZ indicated improvements in weight among children 3 to 23 months in GMP villages ($p<0.05$) (George *et al*., 1993). A decline in severe stunting was also observed in children in the GMP villages. However improvements in growth was not the same for older children who showed relatively less improvement as wasting and stunting already existed before commencing the study. In contrast, among young children in the control group who

received other health services other than GMP, there was no improvement in nutritional status over the entire period.

Ashworth *et al*. (2008) in a systematic review of GMP pointed out that GMP is most often carried out in conjunction with other Primary Health Services such as immunizations and supplementation, and thus it is difficult to establish whether changes observed in child growth are primarily due to the programme. However George *et al*. (1993) iterate that the improved growth outcomes seen in their study was attributed primarily to GMP as the other interventions did not run concurrently with the GMP intervention.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study Area

The study was conducted in the Accra Metropolitan Area (AMA) in the Greater Accra Region of Ghana between November 2011 and January 2012. The AMA is the primary administrative, educational, industrial and commercial centre of the country (ghanadistricts, 2006a). It is the most densely populated district in the Greater Accra Region with an estimated 4.5 million people living in the capital city of Accra (ghanadistricts, 2006a). The total land area covers 200 square kilometres and is bordered on the south by the Gulf of Guinea. Residences within towns in the AMA are divided into four zones, from the 1st class residential area to the 4th class residential area based on housing characteristics and environmental conditions; with the 4th class being the least developed (ghanadistricts, 2006a). The population is employed in three sectors; primary (farming, fishing, mining and quarrying), secondary (manufacturing, electricity, gas, water and construction) and tertiary (wholesale and retail trade, hospitality, transport, communication, financial services, health, education and other social services) (ghanadistricts, 2006b). The tertiary sector employs majority of the population with the primary sector employing the least.

The district is subdivided into six health sub-metros under the health sector (Greater Accra Region Ghana Health Service, 2007), these are; Kpeshie, Osu-Clottey, Okaikoi, Ayawaso, Ablekuma and Ashiedu-Keteke. Each health sub-metro is served by multiple health facilities including public polyclinics, government and private clinics, and

government and quasi-governmental hospitals (Greater Accra Region Ghana Health Service, 2007).

3.2 Study Design

The study used a cross sectional design. Data were collected one time from a sample of 17 health workers conducting GMP and 210 caregiver-child pairs attending CWC in six selected health facilities.

3.3 Sample Size and Sampling Technique

A health facility from each sub-metro under the AMA was selected for the study. Selection of a health facility was done by random sampling; a list of all polyclinics and government hospitals in each health sub-metro was obtained from the AMA office of the GHS and the names of health facilities were then written on pieces of paper, folded and placed in a bowl. One facility per sub-metro was selected from the bowl and this was done separately for each health sub-metro, the list of selected facilities is shown in **Table 3.1**.

Table 3.1 Sub-metros and selected health facilities

Health sub-metro	Health facility
Kpeshie	La General Hospital
Okai-Koi	Achimota Hospital
Ablekuma	Mamprobi Polyclinic
Osu-Clottey	Adabraka Polyclinic
Ayawaso	Maamobi Polyclinic
Ashiedu Keteke	Princess Marie Louise Hospital

3.3.1 Sample Size for Health Workers

All health workers involved in data recording and charting and growth promotion activities on the day of the study, who agreed to participate, were included in the study. Overall, seventeen (17) health workers at the CWC in selected health facilities were included in the study. The distribution of health workers is shown in **Table 3.2** below.

3.3.2 Sample Size Estimation for Caregiver-Child Pairs

Using the formula by Cochran (1963), below, the sample size for caregiver-child pairs for the study was calculated, N_0= 187. This figure was rounded off to 210 caregiver-child pairs which came to a total of 206 after data cleaning.

Cochran sample size formula $N_0 = Z^2 p q / e^2$

N_0 = estimated sample size

p= estimated proportion of an attribute of interest present in the population; stunting in the Greater Accra Region was used- 14.2% (GDHS, 2008).

q= 1-p

e = margin of error 5% (0.05) for this study

Z = critical value of alpha <0.05 (1.96)

3.3.2.1 Weighted sample size for caregiver-child pairs in each facility

Weighted sample sizes were calculated for each health facility based on the number of children attending CWC in each of the health sub-metros as of June 2011; information obtained from the Reproductive and Child Health (RCH) unit of the AMA office of the GHS. Using the formula below, the various sample sizes were obtained (**Table 3.2**).

$$\text{Sample size per facility} = \frac{\text{No. of children attending CWC in health sub-metro}}{\text{Sum of all children attending CWC in AMA}} \times 210$$

Table 3.2 Caregivers and health workers selected from each health facility

Health facility	Caregiver-child pairs	Health workers
La General Hospital	39	2
Achimota Hospital	43	4
Mamprobi Polyclinic	60	3
Adabraka Polyclinic	13	2
Maamobi Policlinic	38	4
PML Hospital	17	2

3.3.3 Selection Criteria for Participants

3.3.3.1 Health workers

Only health workers involved in GMP activities in each of the selected facilities at time of the study were approached to participate. Those who agreed to participate were included in the study after informed consent was obtained.

3.3.3.2 Caregiver-child pairs

Eligible caregiver-child pairs were recruited from November 2011 to January 2011 at CWC in selected facilities. Those who agreed to participate were included in the study after informed consent was obtained. Only children aged 0-23 months, of normal birth weight (≥2.5kg), of singleton birth and with no obvious signs of illness were included. The age range for children in the study was so chosen because this is the critical stage associated with feeding behaviours. Caregivers included in the study were the main caregivers of the children; this was so as to assess the actual feeding practices. For children 0-5 months, only mothers of the children were included in order to assess EBF practices.

3.4 Study Tools

Observation checklists and structured interview questionnaires were used to collect data (Appendix 7.1). Observation checklists were used to assess the implementation of recommended GMP activities by health workers. Data collected using questionnaires included participants' background characteristics, infant and young child feeding knowledge and practices, comprehension of the growth chart and knowledge of GMP activities. Anthropometric instruments were used to collect anthropometric data (weight and length) of individual children. Interviews were conducted individually and in an appropriate language easily understood by the participant. Study tools were pretested in a health facility excluded from the study; this allowed for the clarification and modification of questions to better suit the study population.

3.4.1 Data Collection for Health Workers

3.4.1.1 Background data

Background data on health workers were collected using interview questionnaires and included age, sex, position in the health service, trainings attended and years of experience in conducting GMP (Appendix 7.1).

3.4.1.2 Health worker child feeding knowledge

Health workers' knowledge of recommended child feeding practices was assessed as done for the caregivers based on questions relating to the recommended length of continued breastfeeding, the appropriate age of introduction of foods and appropriate feeding frequency (Appendix 7.1).

3.4.1.3 Health worker knowledge comprehension of the growth chart and knowledge of GMP activities

Three sample growth charts same as was used for caregivers, illustrating the three patterns of growth, were used to assess health worker comprehension of the growth charts and actions they would take per each growth pattern (Appendix 7.1). Health workers were also interviewed to assess their knowledge of the importance of monthly weighing and the purpose of the growth chart.

3.4.2 Data Collection for Caregiver-Child Pairs

Observations, interviews and anthropometric measurements were carried out on each selected health facility's CWC day.

3.4.2.1 Assessment of data recording and charting, and growth promotion activities

The observation checklist (Appendix 7.1) was developed based on guidelines by the GHS as indicated in the child health records book, and WHO child feeding recommendations (PAHO/WHO, 2003; WHO, 2008a). The checklist covered sections on assessing recording and charting data and growth promotion activities carried out by health workers for individual caregiver-child pairs.

Growth promotion activities observed were targeted actions based on a child's growth pattern and included nutrition counselling, referrals, and enquiries into feeding and previous or existing illness. The researcher and data collection assistant sat in a non-obstructing position while observing caregivers as they went through CWC processes. To assess data recording and charting, a child's growth chart was observed if monthly weights were recorded to the nearest 0.1kg and recorded on the appropriate chart for the sex of the child, if all dots representing the monthly weights were connected on the growth curve and if the child's age was recorded accurately on the chart. Data on the child's growth pattern in the last two consecutive months were also collected secondarily from the child growth charts.

3.4.2.2 Background data of caregiver-child pairs

Socio-demographic data collected for caregiver-child pairs included age of the caregiver and child, sex of the caregiver and child, marital status, level of education, occupation, type of tenancy, source of cooking energy and possession of household electrical

appliances (Appendix 7.1). Morbidity history of all selected children as reported by the caregiver was also recorded. Questions assessed whether or not the child had experienced diarrhoea, fever, vomiting, cough, blocked or running nose and fast breathing or shortness of breath in the past two weeks.

3.4.2.3 Caregiver child feeding knowledge and practices

To assess caregiver knowledge of child feeding practices, a knowledge item questionnaire (Appendix 7.2) adapted from Menon and Ruel (2003) was utilized. This section included questions on caregiver knowledge of the recommended duration of continued breastfeeding, the appropriate age of introduction of foods and the appropriate feeding frequency for their child's age.

Caregiver feeding practices were assessed using a 24-hour dietary recall as part of the interview questionnaire (Appendix 7.1). This was used to assess the type of foods fed to the child, if the child was breastfed and meal frequency within the previous 24 hours before the day of the interview. In addition to the 24-hour dietary recall, caregivers were also asked about the earliest age of introduction of water and age of introduction of complementary foods.

3.4.2.4 Caregiver attendance to CWC, comprehension of the growth chart and knowledge of GMP activities

Data on caregiver attendance to CWC were obtained from the child's health records. Three sample growth chart illustrations (Appendix 7.1) adapted from Owusu (1991) suggesting rising, flattening and falling growth patterns, were used to assess caregivers' comprehension of the growth chart. Caregiver perception of the importance of monthly weighing and knowledge of the purpose of the growth chart were also recorded on the study questionnaire.

3.4.2.5 Child anthropometric data

To measure the weight of participating children, the Beurer digital scale was used. The scale was placed in an area where readings were clearly visible and on level ground. Since the scale did not have a tarring ability, the caregiver was weighed alone first. To weigh, the caregiver was asked to remove footwear and other heavy objects and to stand still over the centre of the scale with feet slightly apart while looking straight ahead. Weight was recorded to the nearest 100g (0.1kg) after which the child was handed to the caregiver and the resulting change in weight recorded. The child was weighed wearing the weighing pants used in the health facility; this is usually made of very light material. To obtain the weight of the child, the caregiver's weight was subtracted from the second weight. All weight measurements were taken in duplicate and the average recorded.

A locally manufactured infantometer with a fixed headboard and a movable footboard was used measure the recumbent length of participating children. The board was placed on a firm flat horizontal surface and the child placed on it with the top of the child's head

touching the fixed head board. Measurements were taken with support from a research assistant. It was ensured that the head of the child was positioned in the Frankfort vertical plane with the trunk flat and straight and the shoulders touching the horizontal board of the infantometer. The researcher stood at the side of the infantometer and with one hand, applied a little pressure to the knees of the child to straighten the legs and keep them down with the toes pointing upward. With the other hand, the movable foot board was quickly moved to the base of the child's feet. While the research assistant kept the child's head in the right position. In cases where the child was restless, one foot was used to estimate the length after the caregiver had calmed the child down. The length was recorded to the last completed 1cm. All measurements were duplicated and the average recorded. Child anthropometric measurements were taken according to WHO guidelines (WHO, 2008b)

3.5 Quality Assurance

A data collection assistant was trained to give support in administering the study questionnaires and taking anthropometric measurements. At the end of each day, questionnaires were audited for inconsistencies before data entry. Data were cleaned after entry.

3.6 Data Analyses

Data were analyzed using the Statistical Package for Social Sciences (SPSS, version 16.0). Descriptive statistics including means, standard deviation, frequencies and percentages were used to show the distribution of participants according to variables of interest. Chi square analysis was used to identify the relationship between caregiver CWC attendance and knowledge, practices and child nutritional status. An alpha-level of 0.05 was considered statistically significant.

3.6.1 Health Worker Scores

3.6.1.1 Health worker child feeding knowledge scores

Health worker knowledge scores were derived using the same method used for caregivers. Questions on feeding frequency however covered all age categories of child feeding (Appendix 7.2).

3.6.1.2 Health worker growth chart comprehension score

Comprehension score for the growth charts was derived similar to that for the caregivers. However for each health worker, a score of 1 was given for rightly indicating the recommended action for a particular growth pattern (Appendix 7.2).

3.6.2 Caregiver Scores

3.6.2.1 Socio-economic status

A wealth index was created using the type of tenancy, the main source of cooking energy and the possession of a radio, television, refrigerator and computer (Appendix 7.2). A score of 0.5 was given for being a caretaker and possessing one's own house obtained a

highest score of 2.5. The use of firewood gained a score of 0.5 and an electric cooker was assigned the highest score of 2.5. A score of 1 was given for the possession of an electrical appliance. The overall score from the wealth index was used to describe the SES of caregivers, which was divided into terciles of low, middle and high SES along the median.

3.6.2.2 Child feeding knowledge and practices

To assess feeding practices of caregivers with children less than 6 months, a feeding score was estimated using the WHO child feeding recommendations (PAHO/WHO, 2003; WHO, 2008a). The variables used in scoring were whether or not the child was fed breast milk or infant formula or semi-solid/solid foods in the preceding 24 hours (Appendix 7.2). A score of 0 was given for each wrong practice (feeding formula or semi-solid/solid foods or not breastfeeding) and a score of 1 was given for a good practice (not feeding formula or semi-solid/solid foods or breastfeeding). Practices were then divided into good and poor along the median utilizing SPSS version 16.

Among caregivers with children 6-23 months, dietary diversity, feeding frequency and current breastfeeding status were used to create a feeding practice score (Appendix 7.2). From the 24 hour recall, information on dietary diversity, breastfeeding and feeding frequency were obtained. Using WHO guidelines (PAHO/WHO, 2003; WHO, 2008a), seven food groups; grains, roots and tubers, legumes and nuts, dairy products, flesh foods, eggs, Vitamin A fruits and vegetables and other fruits and vegetables were used to assess dietary diversity. A score of 1 was given for a food group fed and 0 for a food

group not fed based on the FAO guidelines for measuring individual dietary diversity (FAO, 2011). A child with a score of four or more was said to have a diverse diet (PAHO/WHO, 2003; WHO, 2008a). A child fed the recommended minimum feeding frequency[1] or more per age was given a score of 1 for adequate feeding frequency and a child fed below the minimum required frequency was given a score of 0. A breastfed child received a score of 1 while a non-breastfed child received of 0. The total practice score was obtained by adding scores from all variables. With the use of SPSS version 16, feeding practice was divided into good and poor along the median score.

Knowledge of recommended child feeding practices was scored adapting that used by Menon and Ruel (2003) shown in Appendix 7.2 which was developed based on WHO child feeding recommendations (PAHO/WHO, 2003; WHO, 2008a). The measured knowledge item contained seven food groups; if a caregiver stated introduction of any food group before or after the age range 6-8 months or did not know or was not sure, the caregiver received a score of 0. A score of 1 was given for stating the recommended age. Different scores were given for the age stated for the appropriate duration of continued breastfeeding. For caregivers with children 6-23 months old, knowledge of the appropriate feeding frequency was included (Appendix 7.2). A score of 1 was given if the caregiver knew how many times their child should be fed in a day and 0 if the caregiver did not know or was not sure. Using SPSS version 16, the total score obtained from these variables was used to categorize caregiver knowledge and divided into good and poor

[1] Minimum number of recommended times /more: 2 times for breastfed infants 6–8 months, 3 times for breastfed children 9–23 months and 4 times for non-breastfed children 6–23 months (WHO, 2008)

along the median for caregivers with children less than 6 months and those with children older than 6months.

3.6.2.3 Caregiver attendance to CWC

Attendance of caregivers to CWC was categorized into regular and irregular attendance. This was defined by the proportion of the number of times a caregiver had attended CWC per the age of the child in months. A proportion ≥1 was described as regular.

3.6.2.4 Caregivers growth chart comprehension score

Knowing the purpose of the growth chart as a tool for monitoring or recording growth/weight of children received a score of 1 and a score of 0 was given for not knowing this purpose. The ability of a caregiver to interpret each growth pattern from the sample growth curves correctly, received a score of 1. Another score of 1 was given for knowing what to do for the child in each case (Appendix 7.2). The comprehension score was divided into good and poor, using the median score as a cut-off.

3.6.3 Child Nutritional Status

Child anthropometric data was expressed as age and sex appropriate z-scores for weight-for-age (WAZ), length-for-age (LAZ), and weight-for-length (WLZ) using the WHO Anthro software (version 3.2.2, January 2011). Participating children were then grouped into normal (z-scores for all indicators ≥-2 standard deviations), underweight (WAZ <-2 standard deviations), wasted (WLZ <-2 standard deviations) and stunted (LAZ <-2 standard deviations). Further, children who exhibited either one or more of the three

indicators of underweight, wasting and stunting were classified as malnourished. Child nutritional status was classified into normal and malnourished.

3.7 Ethical Considerations

Ethical clearance and approval for the study was sought from the Institutional Review Board of the Noguchi Memorial Institute for Medical Research (NMIMR-IRB). Letters for approval were sent to the AMA office of the GHS for endorsement and sent to selected health facilities. The study was carried out after permission was obtained from the administrative offices of selected facilities. Informed consent was obtained from participating caregivers and health workers.

CHAPTER FOUR

4.0 RESULTS

4.1 Background Characteristics of Health Workers

All health workers included in the study were females with most (64.7%) being community health nurses (**Table 4.1**). Only one health worker indicated not having received any training in child nutrition and/or GMP. The most common training received by most health workers was breastfeeding counselling (93.8%). Most health workers had been conducting GMP services for less than a year (35.3%) or between one to five years (35.3%).

Table 4.1 Background characteristics of health workers in the study (N=17)

Characteristics		n (%)
Age	mean ± SD	32.5± 11.51
Position		
	Student nurse	2 (11.8)
	General nurse	1(5.9)
	Community Health Nurse	11 (64.7)
	Superintendent Community Health Nurse	2 (11.8)
	Principal Community Health Nurse	1 (5.9)
Type of training received		
	Breastfeeding counselling	15 (93.8)
	Lactation management	8 (50.0)
	General counselling	12 (75.0)
	CMAM and nutrition	2 (12.6)
	Road-to-health-chart	1 (6.3)
	Breastfeeding policies	1 (6.3)
Time of last training		
	< 1 year	5 (31.5)
	1-5 years	10 (62.5)
	> 5 years	1 (6.3)
Length of conducting GMP		
	< 1 year	6 (35.3)
	1-5 years	6 (35.3)
	>5 years	5 (29.5)

4.2 Health Worker Knowledge of Infant and Young Child Feeding and Comprehension of the Growth Chart and GMP Activities

4.2.1 Knowledge of Infant and Young Child Feeding

All health workers knew the recommended length of continued breastfeeding and over 80% indicated the appropriate age for introduction of foods. However, the results presented in **Table 4.2** below show that two health workers (11.8%) indicated introduction of water/other liquids earlier than the recommended age. A similar percentage of health workers (11.8%) also stated the age of introduction of eggs, fish/poultry/meat later than recommended. Over a quarter of health workers were unable to state the recommended daily meal frequency for a 6-23 month old non-breastfeeding child in a day (**Table 4.3**). Overall, poor knowledge scores were observed among 9 (52.9%) health workers included in the study.

Table 4.2 Health worker knowledge of recommended age of introduction of foods (N=17)

Food item	Age indicated (months) (n %)		
	<6 n (%)	6-8* n (%)	>8 n (%)
Water/other liquids	2 (11.8)	15 (88.2)	0 (0.0)
Staples (cereals/roots& tubers)	0 (0.0)	16 (94.1)	1 (5.9)
Vegetables	0 (0.0)	16 (94.1)	1 (5.9)
Fruits	0 (0.0)	16 (94.1)	1 (5.9)
Dairy products	0 (0.0)	17 (100.0)	0 (0.0)
Eggs(yolk & whole)	0 (0.0)	15 (88.2)	2 (11.8)
Fish/poultry/meat	0 (0.0)	15 (88.2)	2 (11.8)

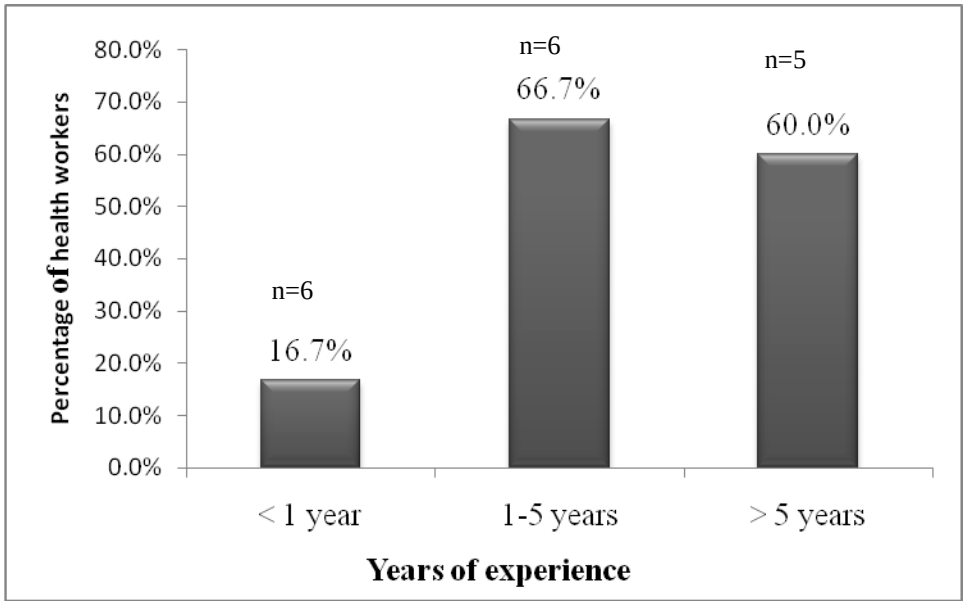
*Recommended (PAHO/WHO, 2003; WHO, 2008a)

Table 4.3 Health worker knowledge of recommended daily feeding frequency (N=17)

Child age groups	Correctly indicated frequency (n %)
6-8 breastfeeding child	15(88.2)
9-11 breastfeeding child	17 (100)
12-23breastfeeding child	16(94.1)
6-23 non-breastfed child	12 (70.6)

[1] 2 times for breastfed infants 6–8 months, 3 times for breastfed children 9–23 months and 4 times for non-breastfed children 6–23 months (PAHO/WHO,2003; WHO, 2008a)

On the whole, only about 17% of health workers who had been involved in GMP activities for less than a year had good child feeding knowledge scores whereas about 67% of those with between 1-5years experience good knowledge scores (**Figure 4.1**).



*Knowledge score based on all knowledge indicators and divided along the median score of 12

Figure 4.1 Years of experience and good child feeding knowledge scores* among health workers (N=17)

4.2.2 Comprehension of the Growth Chart and GMP Activities

All health workers in the study viewed monthly weighing of children as important and **Figure 4.2** below shows reasons given by health workers.

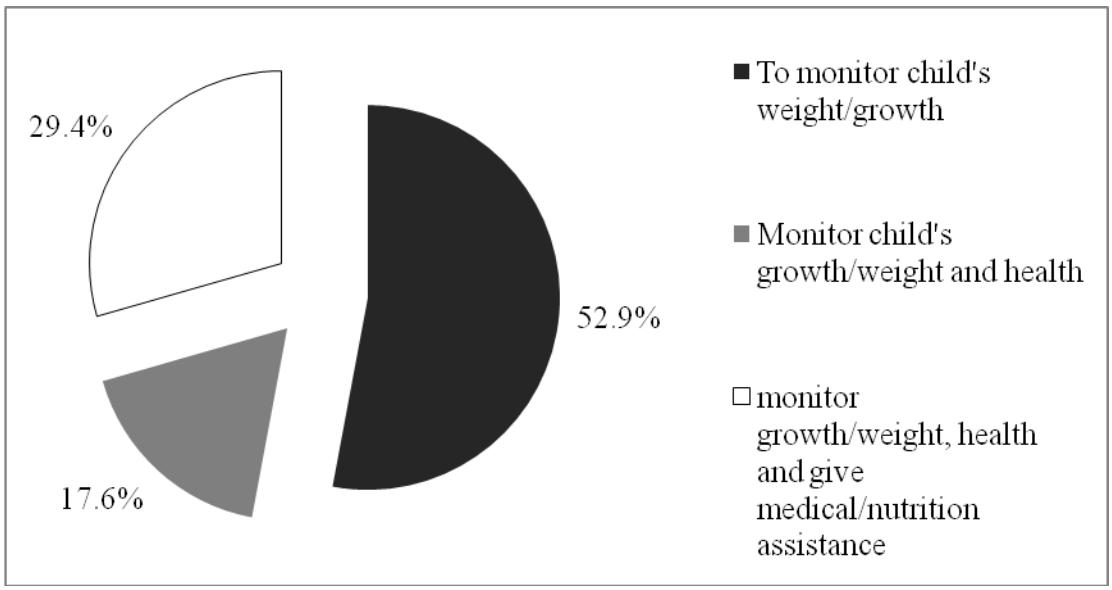


Figure 4.2 Importance of monthly weighing of children indicated by health workers (N=17)

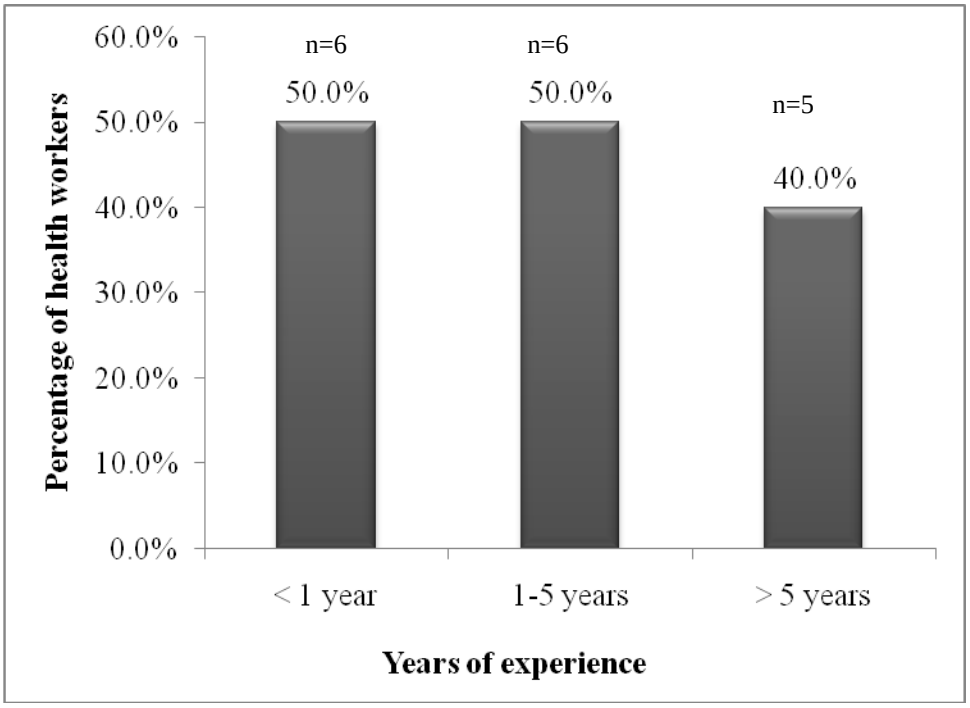
Among health workers only 2 (11.8%) stated that the growth chart was to be used as both an educational tool and for monitoring the growth of children (**Table 4.4**). The three patterns of growth as illustrated by sample growth charts were well interpreted by most health workers (94.1%). Nevertheless knowledge of recommended growth promotion actions targeted at each growth trend was less well indicated. Overall, 9 (52.9%) health workers had poor comprehension scores.

Table 4.4 Health worker comprehension of the growth chart and required action (N=17)

Indicator	n (%)
Purpose of the growth chart	
Monitoring/recording the weight/growth of children	15 (88.2)
Monitoring/recording the weight/growth of children and educating caregivers	2 (11.8)
Growth trends	
Able to identify falling trend and relates to poor growth/eating/care/sickness	16 (94.1)
Able to identify flattening trend and relates to poor growth/eating/care/sickness	16 (94.1)
Able to identify rising growth curve and relates to good growth/health/eating/care	16 (94.1)
Recommended actions[1]	
Growth curve falling once/same as previous month	
Enquire About Feeding And Illness	9 (52.9)
Counsel Caregiver	9 (52.9)
Growth curve flattening (same weight in two consecutive months)	
Enquire About Feeding And Illness	10 (58.8)
Counsel Caregiver	8 (47.1)
Refer Child To Medical/Nutrition Centre	10 (58.8)
Growth curve falling twice	
Enquire About Feeding And Illness	5 (29.4)
Counsel Caregiver	5 (29.4)
Refer Child To Medical/Nutrition Centre	12 (70.6)
Growth curve rising	
Praise caregiver	16 (94.1)
Counsel caregiver	6 (35.3)
Comprehension score[2]	
Good	8 (47.1)
Poor	9 (52.9)

[1]Based on recommendations by the GHS in the health records book
[2]Based on all indicators and divided along the median score of 9

Figure 4.3 below illustrates that, 2 (40%) health workers with over 5 years experience had good comprehension scores whiles half of those with less than a year and 1-5 years experience had good growth chart comprehension scores.



* Comprehension score based on all indicators and divided along the median score of 9

Figure 4.3 Years of experience and good growth chart comprehension score* among health workers (N=17)

4.3 Data Recording and Charting, and Growth Promotion Activities

4.3.1 Data Recording and Charting

All indicators for assessing data recording and charting on the growth chart of individual children were properly carried out in over 97% of children with the exception of connecting all the dots on the chart. The dots, which represent a child's monthly weights, were connected in only about 46% of children (**Table 4.5)**.

Table 4.5 Number of children with correctly recorded and charted data (N=206)

Indicator	n (%)
Weights recorded to the nearest 0.1kg	204 (99.0)
Weight recorded and charted on appropriate chart for sex	200 (97.1)
All dots on growth curve connected	94 (45.6)
Age recorded accurately on chart	201 (97.6)

4.3.2 Growth Promotion Activities

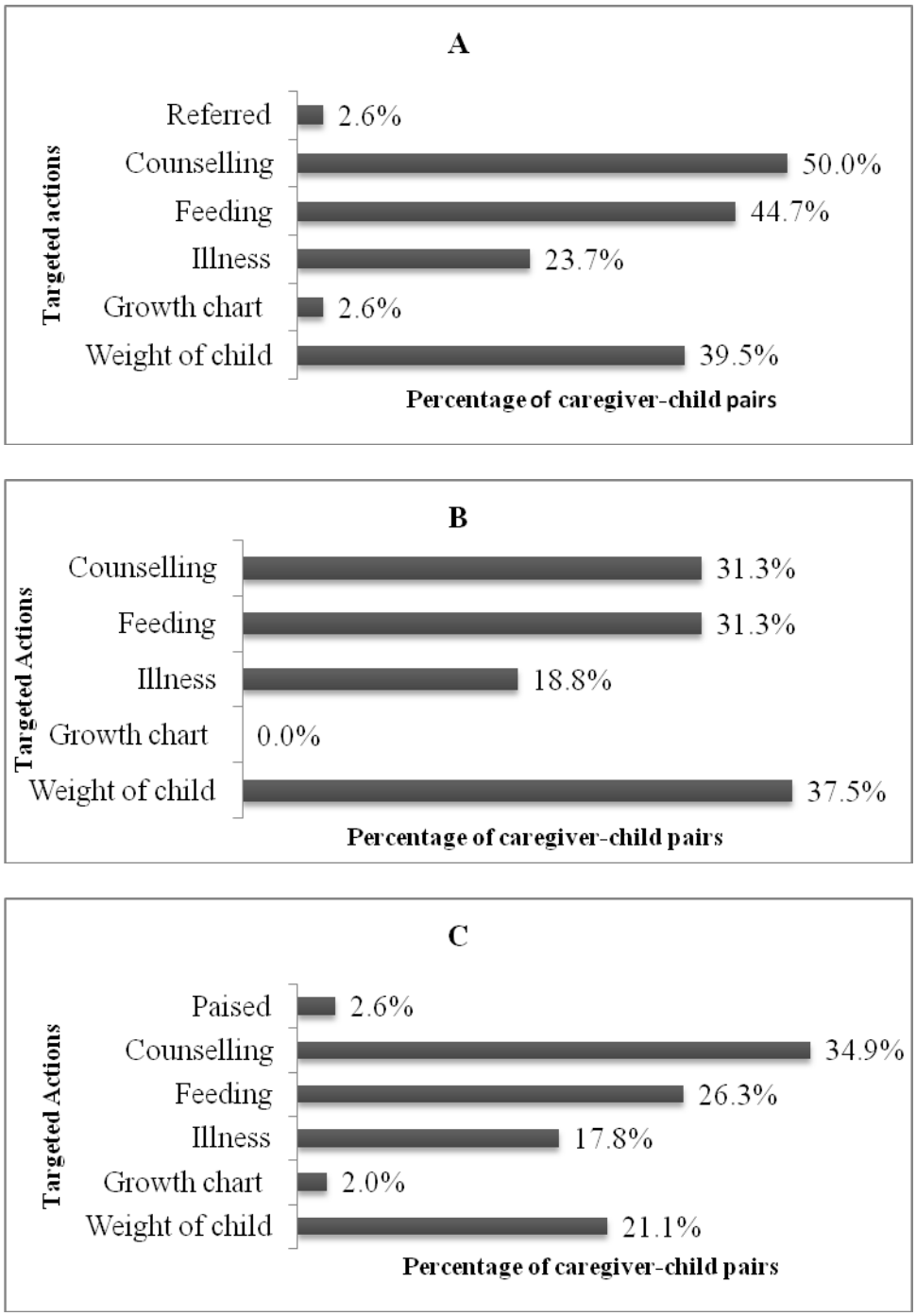
An assessment of growth promotion activities recommended during GMP indicates that less than half of caregiver-child pairs received any of such actions (**Table 4.6**). Overall, nutrition counselling was the most frequently given (37.4%) and the use of the growth chart to explain the child's growth pattern was the least utilized (1.9%).

Caregivers with children experiencing faltering growth (weight falling two consecutive months or same for two consecutive months-flattening) were more frequently given growth promotion actions **(Figure 4.4**). Close to 40% of these caregivers were told the weight of their children and half of them were given nutrition counselling. In contrast,

only 2.6% of such children with growth faltering were referred to a medical or nutrition centre. Among children at risk of growth faltering (weight falling or same in month after previous visit), only 31% received nutrition counselling and the growth chart was not used to educate any of the caregivers of these children. Of caregivers whose children were experiencing a rise in growth, only 2.6% were praised for good practices.

Table 4.6 Number of caregivers receiving targeted actions from health workers (N=206)

Actions given by health worker	**n (%)**
Informed caregiver weight of child	53(25.7)
Explained growth pattern to caregiver using growth chart	4 (1.9)
Asked about illness episodes since last visit	39 (18.9)
Asked about feeding since last visit	62 (30.1)
Counselled caregiver	77 (37.4)



†A (n=38), growth pattern flattening or falling two consecutive months; B (n=16), growth pattern falling or same in current month; C (n=152), growth pattern rising in current month or two consecutive months

Figure 4.4 Targeted actions received by caregivers with children displaying specific growth patterns (N=206)

4.3.2.1 Content of feeding counselling

Table 4.7 below shows the content of individualized feeding counselling given to caregivers. Among caregivers with children <6 months old, breastfeeding on demand was the most frequently advised. Foods that received the most attention during counselling on complementary feeding were other fruits and vegetables (20.5%) and Vitamin A rich fruits and vegetables (15.4%). In contrast, all other foods were mentioned to about less than 8% of caregivers while eggs were not mentioned to any of the caregivers in the study.

Table 4.7 Nutrition counselling given to caregivers (N=77)[1]

Feeding Practice	(n %)
Caregivers with children <6 months old (n=29)	
Importance of exclusive breastfeeding	4 (4.5)
Breastfeeding technique	2 (2.2)
Breastfeeding on demand	6 (6.7)
Expressing breast milk	3 (3.4)
Caregivers with children 6-23 months (n=48)	
Frequent feeding	9 (7.7)
Appropriate feeding frequency	2 (1.7)
Continued breastfeeding	3 (2.6)
Responsive feeding	6 (5.1)
Cereals, roots and tubers	10 (8.5)
Legumes and nuts	3 (2.6)
Flesh foods(chicken/fish/meat)	3 (2.6)
Eggs (yolk and whole)	0 (0.0)
Dairy foods	1 (0.9)
Vitamin A rich fruits and vegetables	18 (15.4)
Other fruits and vegetables	24 (20.5)
Good hygiene practices[1]	4 (1.9)
Encourages caregiver to ask questions[1]	10 (4.9)

[1]Number of caregivers given nutrition counselling

4.4 Background Characteristics of Caregiver-Child Pairs

The background characteristics of caregiver-child pairs included in the study are described in **Table 4.8**. About 97% of caregivers recruited were the mothers of the children in the study, with most being married (75.7%). A greater percentage of caregivers had secondary level education (63.6%) while less than a quarter had primary or no formal education. Over 80% of caregivers were involved in both formal and informal forms of employment. Less than 40% of caregivers were found within the low SES level. The number of male and female children in the study was similar (49.5% vs. 50.5%), and 43.2% of children were within the ages 0-5 completed months.

Table 4.5 Background characteristics of caregiver-child pairs in the study (N=206)

Characteristics	n (%)
Caregiver age (completed years)	
<24	57 (27.7)
24-28	58 (28.2)
29-32	45 (21.8)
>32	46 (22.3)
Relation to child	
Mother	199 (96.6)
Grandmother/Aunt/Sister	7 (3.4)
Marital status	
Single/Widowed	50 (24.3)
Married	156 (75.7)
Level of education	
None	13 (6.3)
Primary	35 (17.0)
Secondary	131 (63.6)
Tertiary	27 (13.1)
Employment status	
Unemployed	36 (17.5)
Employed (formal and informal)	170 (82.5)
Socio-economic status	
Low	78 (37.9)
Middle	61(29.6)
High	67 (32.5)
Sex of child	
Male	102 (49.5)
Female	104 (50.5)
Age (completed months)	
0-5	89 (43.2)
6-8	55 (26.7)
9-11	34 (16.5)
12-23	28 (13.6)
	Mean ± SD
Caregiver age (years)	28.5 ± 6.3
Child age (months)	7.0 ± 4.8
Birth weight (kg)	3.2 ± 0.4

4.4.1 Main Source of Nutrition Advice

For most caregivers (58.7%), the health worker was the main source of nutrition advice (Illustrated in **Figure 4.5** below). About a quarter of caregivers also indicated family and friends as their main source (25.2%).

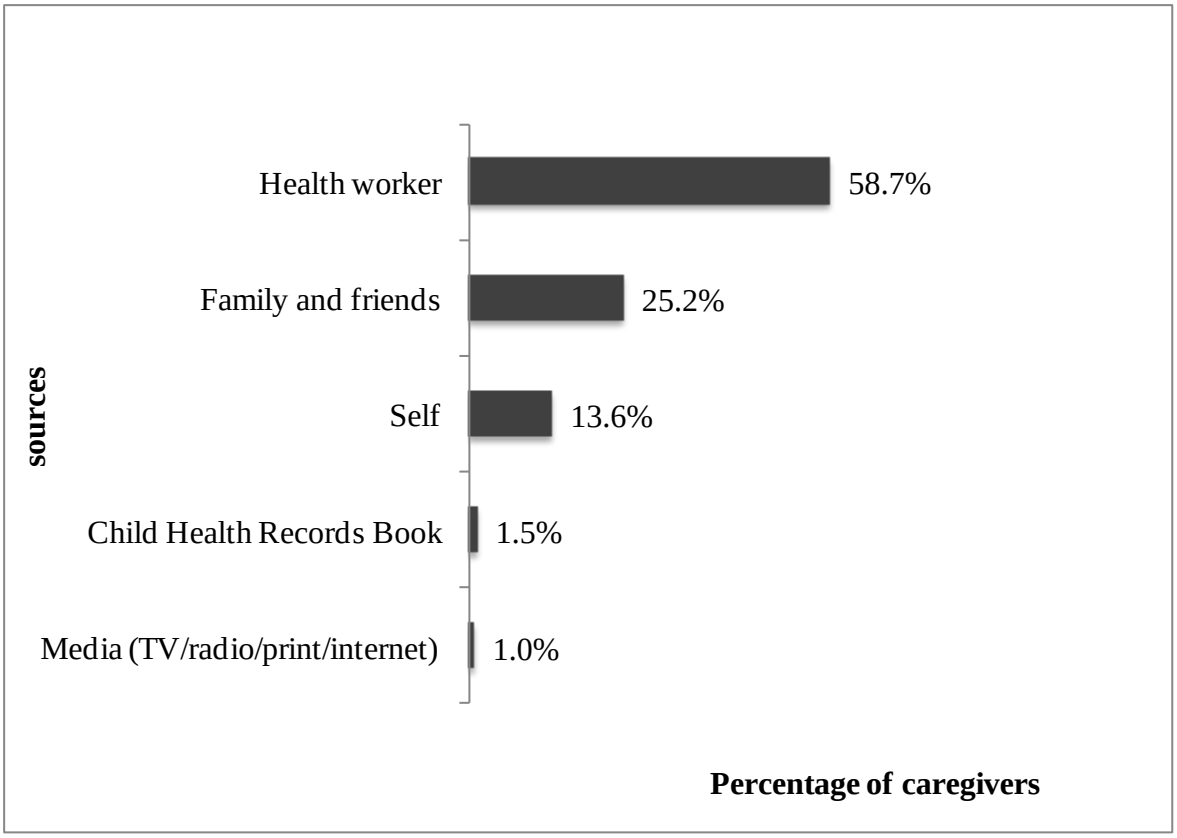


Figure 4.5 Main sources of nutrition advice among caregivers (N=206)

4.4.2 Child Growth and Morbidity

Among children in the study**,** the most frequently occurring form of undernutrition across all age groups was wasting; occurring most among children 9-11 months (20.6%), shown in **Table 4.9** below. Episodes of diarrhoea, fever and cough in the past two weeks were more frequent among older children.

Table 4.9 Child nutritional status and morbidity in the previous two weeks (N=206)

	Age category (completed months)			
Characteristic	***<6*** *(n=89)*	***6-8*** *(n=55)*	***9-11*** *(n=34)*	***12-23*** *(n=28)*
Nutritional status				
Weight-for-age				
Underweight	3 (3.4)	3 (5.5)	1 (2.9)	3 (10.7)
Normal	86 (96.6)	52 (94.5)	33 (97.1)	25(89.3)
Length-for-age				
Stunting	0 (0)	1 (1.8)	1 (2.9)	0 (0)
Normal	89 (100)	54 (98.2)	33 (97.1)	29 (13.7)
Weight-for-length				
Wasting	11 (12.4)	8 (14.5)	7 (20.6)	5 (17.9)
Normal	78 (87.6)	47 (85.5)	27 (79.4)	23 (82.1)
Morbidity(in past two weeks)[1]				
Diarrhoea	8 (9.0)	8 (14.7)	5 (14.7)	10 (35.7)
Fever	15 (16.9)	20 (36.4)	13 (38.2)	10 (35.7)
Vomiting	6 (6.7)	8 (14.5)	2 (5.9)	3 (10.7)
Cough	16 (18.0)	14 (25.5)	13 (38.2)	11 (39.3)
Blocked/running nose	34 (38.2)	24 (43.6)	14 (41.2)	15 (53.6)
Fast breathing/ shortness of breath	5 (5.6)	7 (12.7)	2 (5.9)	2 (7.1)

[1]136; number of children experienced a form of morbidity in the preceding 2 weeks

4.5 Caregiver Infant and Young Child Feeding Knowledge and Practices

4.5.1 Knowledge of Recommended Feeding Practices

Most caregivers were able to indicate the right age for introducing other foods to the child **(Table 4.10)**. However 17% indicated the age of introduction of water/other liquids to be earlier than recommended. In addition, over 20% stated the age of introduction of vegetables, eggs and meat/poultry/fish later than recommended. About 86% of caregivers stated the recommended number of times their child should be fed in a day (**Table 4.11**). On the whole, over 55% of caregiver had poor knowledge scores.

Table 4.10 Caregiver knowledge of recommended age of introduction of foods (N=206)

Food Item	Age indicated (months)			
	<6 (n %)	**6-8* (n %)**	**>8 (n %)**	**Not Sure (n %)**
Water/other liquids	35 (17.0)	168 (81.6)	0 (0.0)	3 (1.5)
Staples (cereals/roots& tubers)	14 (6.8)	179 (86.9)	10 (4.9)	3 (1.5)
Vegetables	8 (3.9)	141 (68.4)	46 (22.3)	11 (5.3)
Fruits	10 (4.9)	157 (76.2)	32 (15.5)	7 (3.4)
Dairy products	11 (5.3)	154 (74.8)	28 (13.6)	13 (6.3)
Eggs(yolk & whole)	4 (1.9)	144 (69.9)	53 (25.7)	5 (2.4)
Fish/poultry/meat	4 (1.9)	137 (66.5)	58 (28.2)	7 (3.4)

*Recommended age (PAHO/WHO, 2003; WHO, 2008a)

Table 4.11 Caregiver knowledge of recommended feeding practices (N=206)

Knowledge indicator	n (%)
Knowledge of appropriate feeding frequency[1]	
Incorrect response	17 (14.5)
Correct response[2]	100 (85.5)
Knowledge of duration of continued breastfeeding	
Incorrect response	100(48.5)
Correct response[3]	106 (51.5)
Feeding knowledge score[4]	
Good	92 (44.7)
Poor	114 (55.3)

[1]n=117; only caregivers with children 6-23 months old
[2]Twice/more for breastfed infants 6–8 months, 3 times/more for breastfed children 9–23 months and 4 times/more for non-breastfed children 6–23 months (PAHO/WHO, 2003; WHO, 2008a)
[3]≥ 24 months (PAHO/WHO, 2003; WHO, 2008a)
[4]Based on knowledge of all indicators and divided along the median score of 7.5 for caregivers with children
< 6 months and the median score of 8 for caregivers with children ≥6 months

4.5.2 Feeding Practices

Exclusive breastfeeding (EBF) in the preceding 24 hours was reported in 80.9% of caregivers with children <6 months (**Table 4.12**). In contrast, EBF since birth was identified in 64% of caregivers after assessing the age of introduction of water. Based on feeding practices in the preceding 24 hours, most of these caregivers (80.9%) had good practice scores.

Within children 6-23 months old, less than half were fed a diversified diet in the previous 24 hours (**Table 4.12**). On the other hand, most (63.2%) were fed other foods in addition to breast milk the recommended number of times in a day. The most commonly fed foods across all ages were cereals, roots and tubers with eggs being the least fed (**Table 4.13**). Significantly higher numbers of older children were fed foods made from meat/poultry/fish, Vitamin A rich fruits and vegetables and other fruits and vegetables.

Eighty-eight percent of children in this age range were breastfed in the previous day. Overall, less than 50% of caregivers with children 6-23 months had good practice scores.

Table 4.12 Feeding practices among caregivers (N=206)

Feeding Practice	n (%)
Caregivers with children <6months (n=89)	
Feeding in preceding 24 hours[1]	
Exclusive breastfeeding	72 (80.9)
Breast milk and formula	5 (5.6)
Breast milk and complementary foods	6 (6.7)
Not receiving any breast milk	6 (6.7)
Age of introduction of water	
0-3 months	22 (24.7)
4-5 months	10 (11.2)
Not yet	57 (64.0)
Feeding practice score[2]	
Good	72 (80.9)
Poor	17 (19.1)
Caregivers with children ≥6months (n=117)	
Feeding in preceding 24hours[1]	
Diverse diet[3]	51(43.6)
Adequate feeding frequency[4]	74(63.2)
Breastfed	103(88.0)
Age of introduction of complementary foods	
≤3months	10 (8.5)
4-5months	16 (13.7)
At/just after 6mos	85 (72.6)
Not yet	6 (5.1)
Age of first introduction of water	
≤3 months	27(23.1)
4-5 months	15(12.8)
≥6 months	75(64.1)
Feeding practice score[5]	
Good	57 (48.7)
Poor	60 (51.3)

[1]Based on 24 hour recall. [2]Based on breastfeeding practices in the preceding 24 hours and divided along the median score of 3. [3]Consumption of meals containing 4 or more food groups (PAHO/WHO, 2003; WHO, 2008a). [4]2 times/more for breastfed infants 6–8 months, 3 times/more for breastfed children 9–23 months and 4 times/more for non-breastfed children 6–23 months (PAHO/WHO; 2003; WHO, 2008a). [5]Based on complementary feeding practices in the preceding 24hours and divided along the median score of 4

Table 4.13 Food groups fed children in the preceding 24 hours (N=117)

	Age groups (completed months)			
	6 - 8	***9 – 11***	***12 – 23***	
Food groups	*(n=55)*	*(n=34)*	*(n=28)*	**P-value**[†]
Cereals, roots & tubers	47 (85.5)	32 (94.1)	26 (92.9)	0.350
Legumes and nuts	10 (18.2)	11 (32.4)	4 (14.3)	0.164
Flesh foods (meat/poultry/fish)	13 (23.6)	17 (50.0)	17 (60.7)	0.002[*]
Eggs	3 (5.5)	4 (11.8)	2 (7.1)	0.550
Dairy products	25 (45.5)	21 (61.8)	11 (39.3)	0.170
Vitamin A rich fruits & vegetables	12 (21.8)	14 (41.2)	13 (46.4)	0.041[*]
Other fruits & vegetables	18 (32.7)	22 (64.7)	23 (82.1)	<0.001[*]

[†]Pearson Chi-square
[*]Statistically significant at $p<0.05$

4.6 Caregiver Attendance to CWC and Comprehension of the Growth Chart and GMP Activities

4.6.1 Attendance to Child Welfare Clinics

Sixty-seven percent of caregivers attended CWC regularly. However, a significantly higher percentage (85%) of caregivers with children 0-5 months attended regularly than those with older children (**Table 4.14**). Among caregivers who were irregular, travelling was the main reason given by 45.6% as shown in **Table 4.15** below. Only 22 (10.7%) caregivers indicated they would discontinue attending CWC after their child was fully immunized.

Table 4.14 Caregiver attendance to child welfare clinics (N=206)

Attendance	Age of child (completed months)				P-value†
	0-5 (n=89)	*6-8 (n=55)*	*9-11 (n=34)*	*12-23 (n=28)*	
Irregular[1]	13 (14.6)	26 (47.3)	16 (47.10)	13 (46.4)	<0.001*
Regular	76 (85.4)	29 (52.7)	18 (52.9)	15 (53.6)	

†Pearson Chi-square test
*Significant at $p<0.05$
[1]Proportion of attendance/age of child (completed months) < 1

Table 4.15 Reasons for one or more missed child welfare clinic sessions (n=68[1])

Reasons	n (%)
Travelled	31 (45.6)
Work constraints	4 (5.9)
Child/Caregiver sick	4 (5.9)
Caregiver forgot	6 (8.8)
No reason	10 (14.7)
Distance	1 (1.5)
Did not know it was time	2 (2.9)
Other[2]	10 (14.2)

[1]Number of caregivers with one or more missed CWC attendance
[2]Includes non attendance due to personal reasons

4.6.2 Comprehension of the Growth Chart and GMP Activities

Of all caregivers, 202 (98.1%) indicated that having their children weighed monthly was important to them, with about 58% stating that it enabled them monitor the growth or weight of their child (**Table 4.16**).

The ability of caregivers to interpret the growth charts is described in **Table 4.17** below. About 39% of caregivers interviewed in the study did not know the purpose of the growth chart. When presented with three growth charts each illustrating one of the three growth patterns, the flattening growth curve was less well interpreted.

Table 4.16 Caregiver perceived benefit of monthly weighing (N=202[1])

Benefits	n (%)
Monitor child's growth/weight	117 (57.9)
Assesses health of child	18 (8.9)
Monitor child's weight/growth/health and seek medical/nutrition care where necessary	65 (32.2)
Health worker says it's necessary	2 (1.0)

[1]Number of caregivers who found monthly weighing of children important

Table 4.17 Caregiver comprehension of the growth chart (N=206)

Comprehension indicator	n (%)
Able to identify falling trend and relates to poor growth/eating/care/sickness	99 (79.2)
Knows right thing to do if growth curve is falling[1]	102 (81.6)
Able to identify flattening trend and relate to poor growth/ eating/care/sickness	76 (60.8)
Knows what to do if growth curve is flattening[1]	93 (74.4)
Able to correctly identify rising growth curve and relate to good growth/eating/care	101 (80.8)
Knows right thing to do if growth curve is rising[2]	102 (81.6)

[1]Improving care/feeding, seeking medical or nutritional care
[2]Continuing proper care/feeding practices

4.7 Relationship between CWC Attendance and Caregiver Knowledge, Practices and Child Nutritional Status

Results presented in **Table 4.18** indicate a significant relationship between regular CWC attendance and good growth chart comprehension scores among caregivers (p=0.026). Though a greater percentage of caregivers attending regularly had good feeding

knowledge and practice scores and children with normal nutritional status, the relationships were not found to be significant.

Table 4.18 Relationship between caregiver CWC attendance and growth chart comprehension, child feeding knowledge and practices and child nutritional status (N=206)

Correlates	CWC Attendance: Irregular *(n=68)* n (%)	CWC Attendance: Regular[¥] *(n=138)* n (%)	P-value[†]
Growth chart comprehension[1]			
Good	26 (38.2)	77 (55.8)	0.026[*]
Poor	42 (61.8)	61 (44.2)	
Child nutritional status			
Normal	54 (79.4)	113 (81.9)	0.707
Malnourished[2]	14 (20.6)	25 (18.1)	
Feeding knowledge			
Good	25 (36.8)	67 (48.6)	0.136
Poor	43 (63.2)	71 (51.4)	
Feeding practices			
Caregivers with children ≤ 5 months[3]			
Good	9 (69.2)	63 (82.9)	0.263
Poor	4 (30.8)	13 (17.1)	
Caregivers with children ≥ 6 months[4]			
Good	24 (43.6)	33 (53.2)	0.356
Poor	31 (56.4)	29 (46.8)	

[¥]Attendance/age of child in months score ≥ 1
[†]Chi-square; Fisher's Exact Test
[*]Significant at $p<0.05$
[1]Comprehension score divided along the median, score >3.5 constitutes a good score
[2]Expression of any of the three growth indicators: wasting, stunting and underweight
[3]n=89
[4]n=117

CHAPTER FIVE

5.0 DISCUSSION

The study examined the implementation of GMP activities by health workers in the AMA of Ghana and the knowledge and practices of caregivers attending CWC in the study area.

All caregivers in the study were women, with over 95% being the mothers of the children. This is similar to previous studies (Owusu and Lartey,1993; Sika-Bright, 2010) this may indicate that mothers are most often the primary caregivers and those most likely to take children to CWC. Majority of the women in the study were married and had secondary or higher education; these background characteristics are similar to national characteristics indicated by the GDHS (2008).

5.1 Health Worker Knowledge of Infant and Young Child Feeding and Comprehension of the Growth Chart and GMP Services

5.1.1 Knowledge of Infant and Young Child Feeding

Health workers are a major source of health information for caregivers and families in many societies (McLorg and Bryant, 1989; Pelto *et al*., 2004; Sika-Bright, 2010) and findings in this study agree with this assertion. Thus it is required that health workers be qualified and equipped to give advice and care that is total and based on recommendations (WHO/UNICEF, 2003; UNICEF, 2009). However, over 50% of health

workers encountered in this study had poor knowledge of recommended child feeding practices and this may partly explain the poor content of nutrition counselling messages observed.

Studies which have assessed the relationship between a health worker's years of experience and their level of knowledge have shown varied results (Crowder, 1981; Anderson and Geden, 1990). In this study, the lesser experienced health workers had poor knowledge scores. This is consistent with findings by Anderson and Geden (1990) who found head nurses scoring higher than registered staff nurses. It would be expected that lower level health workers who are recently coming out of school would have better knowledge scores. However, Brownlee (1990) indicates that poor knowledge and poor counselling practices may result from poor inclusion of nutrition education in the curricula of nursing schools. This trend may be detrimental to nutrition counselling given to caregivers as this group of health workers were part of those most encountered during the study. Health workers with poor knowledge are likely to give counselling that is poor in content and non-factual. Otoo *et al*. (2009) in a study in Ghana identified that health workers often used erroneous messages during counselling.

5.1.2 Comprehension of the Growth Chart and GMP Services

All health workers in this perceived monthly weighing of children to be important similar to that observed by Charlton *et al*. (2009) in Zambia. This perception may motivate health workers in carrying out their work during GMP sessions.

The comprehension of growth charts by health workers was similar to their knowledge of recommended feeding practices. Over 50% of health workers had poor comprehension scores and comprehension was particularly poor in relation to the required targeted action for each growth pattern. These observations may explain the poor carrying out of targeted actions for individual children per their growth patterns and the poor reference to the growth chart observed. In addition, 60% of health workers with over five years' experience had poor growth chart comprehension scores. This trend may be attributed to the likelihood of not keeping up with recent knowledge or a lack of continued education (Crowder, 1981). Most of these health workers with higher levels of experience are in supervisory positions and such poor knowledge may negatively influence their ability to identify poor practices among lower level staff.

5.2 Data Recording and Charting, and Growth Promotion Activities

5.2.1 Data Recording and Charting

The correct recording and charting of data on a child's growth chart allows for proper comparison of the child's growth to the reference, enabling early recognition of growth problems for appropriate action (Brownlee, 1990; Griffiths and Del Rosso, 2007; Ashworth *et al*., 2008). In this study, data recording and charting were appropriately carried out in the greater percentage of children with the exception of connecting all dots on the chart. Consistent with a study in Costa Rica by Valadez *et al*. (1996), most growth charts observed did not have all the dots connected. The dots on the growth charts represent the monthly weights of the child, and connecting them properly enables the health worker and caregiver to easily identify the child's growth trend (Brownlee, 1990).

Brownlee (1990) attributed this deficiency in performance to inadequately trained health workers and the likelihood of health workers to focus more on the current nutritional status of the child rather than the pattern of growth.

5.2.2 Growth Promotion Activities

The thrust of GMP is to positively influence individual caregiver practices. This is achieved by discussing both the information obtained from the child's growth and appropriate actions pertaining to nutrition and other health issues with the caregiver and/or family (Brownlee, 1990; Latham, 1993; Griffiths and Del Rosso, 2007; Ashworth *et al*., 2008).

When child growth data have been plotted and charted it is important that the growth chart be used as an educational tool. This helps the caregiver appreciate the link between feeding, care and growth and improve rapport with the health worker (Aden *et al*., 1990; Owusu and Lartey, 1993; Roberfroid, 2007). The chart when used as required has been found to have some positive impact on the nutrition knowledge among caregivers (Ruel and Habicht, 1992). Despite this recommendation, the growth chart was poorly used as a tool to educate caregivers on the growth pattern of their children in this study. Such minimal use of the growth chart has also been observed in studies in Lesotho and Costa Rica (Ruel *et al*., 1992; Valadez *et al*., 1996). Only two health workers indicated the growth chart as an educational tool and this may contribute to the poor reference to it. This may imply that for most caregivers, their ability to appreciate how well or poorly their children are growing may be compromised. The ability of caregivers to interact

effectively with health workers on issues relating to their child's growth in order to take effective action will also be affected.

The provision of relevant action as per a child's growth is necessary to prevent growth failure and maintain growth success. In this study, most caregivers received none of the growth promotion actions. Informing the caregiver the weight of the child, enquiries into feeding and previous illness and providing nutrition counselling were not carried out in over half of the caregiver-child pairs observed. In addition, among the few who received nutrition counselling, the content of the messages focused more on a few of the food groups and were usually generic. Such nutrition messages that are non-age specific and non-individualized have been observed in other developing countries (Gerein and Ross, 1991; Ruel *et al*., 1992; Charlton *et al*., 2009). These practices do not enable the GMP programme to effectively improve caregiver knowledge and practices for better child growth outcomes (Griffiths and Del Rosso, 2007; Ashworth *et al*., 2008).

Overall however, caregivers with children experiencing faltering growth were more frequently given growth promotion actions. This is similar to that identified by Gerein and Ross (1991) in Zaire. The implication for this may be that, health workers understand the need to take corrective actions for a child experiencing growth faltering than doing same for a child who has a normal growth trend, especially due to the large workload. Nevertheless, the main objective of GMP to refer growth falterers early enough to prevent further deterioration was inadequately carried out. As a consequence, most children experiencing growth faltering may deteriorate and the objective of rehabilitation

may not be achieved. Most caregivers whose children had experienced good growth patterns were not encouraged either and hence good practices were not reinforced.

The poor delivery of GMP objectives on the part of health workers has been attributed to a lack of required knowledge and skills, heavy demand relative to personnel, lack of incentives and motivation and inadequate supervision (Pelto *et al*., 2004; Ashworth *et al*., 2008; Charlton *et al*., 2009). Some other challenges identified during this study were uncooperative caregivers and caregivers being in a hurry to attend to other responsibilities or work. Health workers may also become discouraged to counsel due to encountering discouraged and mistrusting mothers whose children have been consistently falsely classified (Roberfroid *et al*. 2005a).

5.3 Caregiver Infant and Young Child Feeding Knowledge and Practices

The ability of caregivers to undertake recommended feeding practices has been associated with maternal nutrition knowledge (WHO, 2003; Aidam *et al*., 2005a; UNICEF, 2009; Kimani-Murage *et al*., 2011). However, similar to results found by previous studies in Nigeria and Ghana (Singh, 2010; Kimani-Murage *et al*., 2011), a contradiction was observed between caregivers' knowledge and practice of EBF. Although over 80% of caregivers knew the appropriate age for introducing water to a child, only 60% were found to be practising EBF since birth. This contrast between knowledge and practices may be attributed to barriers such as maternal employment or return to work, maternal health, cultural beliefs and practices and social pressure (Otoo *et*

al., 2008; Sika-Bright, 2010; Kimani-Murage *et al*., 2011). To enable caregivers overcome these barriers, effective individualized counselling during GMP is essential. Yet as observed, individualized counselling on breastfeeding was poorly conducted and this is likely to have a poor impact on the reversal of poor practices and reinforcing good ones.

The transition from EBF to CF is wrought with several challenges such as infrequent feeding, low energy and nutrient dense foods, and food taboos (Brabin, 2001; Dewey and Adu-Afarwuah, 2008; IYCN, 2011). These constraints make the nutritional and energy requirements of the growing child difficult to meet. To ensure that complementary feeding practices are adequate for optimal child growth after 6 months, accurate and consistent information and skilled support are essential as are for EBF (WHO/UNICEF, 2003).

It is expected that among caregivers attending CWC, GMP will provide an avenue through frequent nutrition counselling to curtail or minimize some of the difficulties associated with CF. However though most caregivers in the study knew the appropriate age for introduction of all foods in the measured knowledge item questionnaire; over half of children had non-diverse diets. These findings are similar to other studies which found foods made from cereals, roots and tubers as the most commonly fed (Ruel *et al*., 1999; Davis *et al*., 2003; GDHS, 2003; Robinson, 2009). The implication of this is that, nutrient requirements may not have been met in over half of the children in this study. Unfortunately, from the results attendance to CWC became significantly irregular as

children grew older, thus poor CF practices may not be identified early for effective action. This may also explain why EBF practices were better than CF practices assessed from the 24 hour recall.

Poor knowledge and advice on the right way to feed a child may lead to poor feeding practices and undernutrition even in areas where food security is not a limitation (Appoh and Krekling, 2005; Penny *et al*., 2005). Thus the poor feeding knowledge scores observed in most caregivers may be a likely factor for the overall poor CF practice scores among most caregivers with children 6-23 months. In areas where nutrition counselling which is age-appropriate and specific to the family environment has been offered through the health system, improvements in the knowledge of caregivers and the diets of children have been observed (Santos *et al*., 2001; Haque *et al*., 2002; Pelto *et al*., 2004; Penny *et al*., 2005; Zaman *et al*., 2008). Caregivers find it difficult to practice what they are told when messages are non-specific with less attention to a caregiver's household condition or availability of foods (IYCN, 2011). Thus for majority of caregivers in this study who received no or generic nutrition messages, nutrition counselling may not have had much impact on their feeding practices since messages were not tailored to meet their specific needs.

5.4 Caregiver Attendance to CWC and Comprehension of the Growth Chart and GMP Activities

5.4.1 Attendance to CWC

Caregivers' attendance to CWC brings them in regular contact with GMP services and the benefits the programme is expected to confer. Comparable to Owusu and Lartey (1993) in Ghana, over 60% of caregivers were found to be regular attendants. However, Owusu and Lartey used a classification of a maximum of two missed visits whiles in this study, not having any missed attendance was defined as regular. Regularity was significantly associated with a younger age of the child. Caregivers with older children tended to be less regular and this has been credited to the fact that caregivers may not find it beneficial to attend CWC after the child was fully immunized, or the deemed economic losses due to the length in waiting time (Owusu and Lartey, 1993). The main reason for irregularity identified in this study and as found by Owusu and Lartey (1991) was travel. Caregivers forgot to take the child's health records book along when they travelled or did not know CWC could be attended elsewhere. Any missed attendance may delay identification of growth failure and rehabilitation.

5.4.2 Comprehension of the Growth Chart and GMP Activities

When caregivers view GMP activities as important and comprehend what takes place, they are likely to participate more often (Brownlee, 1990; Griffiths and Del Rosso, 2007). It is thus encouraging to observe that 98% of caregivers stated that monthly weighing of their child was important to them.

Caregiver comprehension of the growth chart improves the appreciation of the link between feeding, care and growth and improves interaction with health workers (Aden *et al*., 1990; Owusu and Lartey, 1993; Roberfroid, 2007). Similar to findings by Owusu and Lartey (1992), 39% of caregivers in this study did not know the purpose of the growth charts. This could be due to the poor use of the growth chart by health workers as an educational tool. As a consequence, these caregivers may view the growth chart only as a document to be carried along to CWC for the health worker's use and not as a tool for them to recognize and appreciate their child's growth. In interpreting growth trends, the flattening growth pattern was well interpreted by fewer caregivers as compared to the rising and falling patterns. This trend was also identified by Aden *et al*. (1990) in a longitudinal study in Somali villages. This may possibly be because health workers are likely to indicate to a mother if her child's growth pattern is falling or rising. Thus caregivers may not find a flattening growth curve a cause for concern.

5.5 Relationship between CWC Attendance and Caregiver Knowledge, Practices and Child Nutritional Status

The ability of GMP to influence caregiver knowledge and practices has its strong opponents and proponents. In this study, though more regular CWC attendants had good feeding knowledge and practice scores, the relationship was not found to be significant. Nutrition counselling observed in this study was conducted in few caregivers and the content was inadequate, thus regular attendants are not likely to differ much from irregular attendants. In contrast, Ruel *et al*. (1992), though observing poor individualized

nutrition counselling, identified a significant relationship between attendance and better feeding knowledge and practices. This observation was credited to group counselling sessions offered at these clinics. In this study also, group counselling was noticed at some clinics. Overall, this could indicate that the more regular a mother is the more likely she is to encounter some nutrition advice on the proper feeding of her child even if minimal.

Gerein (1993) also identified that despite the poor quality of health education at GMP sessions, the ability of caregivers to answer nutrition knowledge tests correctly was strongly related to attendance. However the authors Gerein (1993) found ethnicity to influence practices rather than attendance in Zaire. Regular attendance in this study was on the other hand significantly associated with good growth chart comprehension scores. Again this may be attributed to the group counselling observed at some centres as poor reference was made to the charts during individualized counselling. Thus for regular attendants they may be able to better appreciate the growth of their children and effectively interact with health workers about their children's growth.

The ability of GMP participation to have a positive influence on child growth outcomes has been argued. Whereas some studies have found GMP participation to influence child growth patterns (Qazi *et al*., 2003) others have not (Charlton *et al*., 2009). In this study, regular attendants had more children being of normal nutritional status than was found among irregular attendants; however this was not significantly different. Most studies assessing child nutritional status in relation to attendance have been longitudinal in design (George *et al*., 1993; Qazi *et al*., 2003; Charlton *et al*., 2009).

5.6 Study Limitations

A limitation in this study lies in the use of a single 24 hour recall to assess feeding practices as a lack in a child's diet on a single day maybe compensated in another day. Also in assessing knowledge, caregivers may guess correct answers which will lead to having good scores. Also, data for this study were collected one time due to limited funds and thus a probable change in child nutritional status in relation to attendance over time may have been missed. The presence of the researcher and field assistant may have also had some influence on health workers carrying out GMP activities.

CHAPTER SIX

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

From the study, health workers were found to be knowledgeable about child feeding recommendations, GMP and in identifying growth trends on the growth chart. However, a sizeable number of health workers could not indicate specific recommended actions for particular growth trends. Most child data were recorded and charted accurately on the growth chart except with connecting monthly weight dots. Growth promotion activities for caregiver-child pairs were observed to be poorly carried out by health workers. While most caregivers knew recommended child feeding practices were not optimal. Whereas breastfeeding was better practiced in the preceding 24 hours, complementary feeding practices were suboptimal. Not missing any CWC sessions was significantly associated with good growth chart comprehension scores but not child feeding knowledge and practices and the nutritional status of children.

6.2 Recommendations

From the study results the following recommendations are made to the government of Ghana as policy makers and the GHS:

1. Frontline health workers should be engaged in routine training activities which address current child feeding recommendations, GMP objectives and appropriate use of GMP tools

2. Routine monitoring and evaluation of the GMP programme across the country should be undertaken to improve its effectiveness
3. CWC should be better structured to improve effectiveness by providing setups for each GMP activity during clinic sessions
4. More CWC days should be included in facilities where few days are designated for clinics; this will help reduce work load and caregiver waiting time
5. Resources such as staff and logistics should be made available and/or better channelled to needy facilities to improve the programme's effectiveness

REFERENCES

Aden, S.A., Brannstromt, I., Mohamud, A.K., Perssont, A.L. and Wall, S.(1990). The growth chart -a road to health chart? Maternal comprehension of the growth chart in two Somali villages. Paediatric and Perinatal Epidemiology 4: 340-350

Aidam, B.A., Perez-Escamilla, R., Lartey, A. and Aidam, J. (2005a). Factors associated with exclusive breastfeeding in Accra, Ghana. European Journal of Clinical Nutrition 59, 789-796.

Aidam, B.A., Perez-Escamilla, R. and Lartey, A. (2005b). Lactation counseling increases exclusive breast-feeding rates in Ghana. The Journal of Nutrition 135: 1691–1695.

Alderman, H. (1990). Nutritional status in Ghana and its determinants. Working paper No.3, Policy Analysis. The World Bank: Washington, DC.

Anderson, E. and Geden, E. (1990). Nurses' knowledge of breastfeeding. Journal of Obstetric, Gynaecologic and Neonatal Nursing 20 (1): 58-64.

Appoh, L.Y. and Krekling, S. (2005). Maternal nutritional knowledge and child nutritional status in the Volta Region of Ghana. Maternal and Child Nutrition 1: 100-11.

Arifeen, S., Black, R.E., Antelman, G., Baqui, A., Caulfield, L. and Becker, S. (2001). Exclusive breastfeeding reduces acute respiratory infection and diarrhoea deaths among infants in Dhaka slums. Pediatrics 108: E67.

Armar-Klemesu, M., Ruel, M.T., Maxwell, D.G., Levin, C.E. and Morris, S.S. (2000). Poor maternal schooling is the main constraint to good child care practices in Accra. Journal of Nutrition 130(6): 1597-1607.

Ashworth, A., Shrimpton, R. and Jamil, K. (2008). Growth monitoring and promotion: a review of evidence of impact. Maternal Child Nutrition 4: 86–117.

Bhandari, N., Bahl, R., Mazumdar, S., Martines, J., Black, R.E. and Bhan, M.K. Infant feeding study group. (2003). Effect of community-based promotion of exclusive breastfeeding on diarrhoeal illness and growth: a cluster randomized controlled trial. Lancet 361**:** 1418–23.

Black, R.E., Allen, L.H., Bhutta, Z.A., Caulfield, L.E., de Onis, M., Ezzati, M., Mathers, C. and Rivera, J. Maternal and Child Undernutrition Study Group. (2008). Maternal and child undernutrition: global and regional exposures and health consequences. Lancet 371(9608): 243-26

Brabin, B. (2001). Cultural determinants of child health and growth in developing countries: Promoting Growth and Development of Under Fives. Proceedings of the International Colloquium, Antwerp, 28, 29, 30 November, 2001.

Brownlee, A. (1999). Growth monitoring and promotion: The behavioral issues: Monograph number six prepared for the office of health U.S. agency for international development.

Charlton, E.K., Kawana, M.B. and Hendricks, K.M. (2009). An assessment of the effectiveness of growth monitoring and promotion practices in the Lusaka district of Zambia. Nutrition 25: 1035–1046.

Christian, P., Abbi, R., Gujral, S. and Gopaldas, T. (1988). The role of maternal literacy and nutrition knowledge in determining children's nutritional status. Food and Nutrition Bulletin 10: 35–40.

Cochran, W. G. (1963). Sampling Techniques. 2nd Ed., New York: John Wiley and Sons, Inc.

Crowder, D.S. (1981). Maternity nurses' knowledge of factors promoting successful breastfeeding. Journal of Obstetric , Gynaecologic and Neonatal Nursing 10:28-30.

Davis, P., Tagoe Darko, E. and Mukuria, A. (2003). Water, Koko, and Appetite: Complementary Feeding Practices in Kumasi, Ghana. Calverton, Maryland USA: ORC Macro.

de Onis, M. and Blossner, M. (2003). The World Health Organization Global Database on Child Growth and Malnutrition: methodology and applications. International Journal of Epidemiology 32:518-26.

de Onis, M., Wijnhoven, T.M.A. and Onyango, A.W. (2004). Worldwide practices in child growth monitoring. Journal of Pediatrics 144: 461–465.

Dewey, K.G. and Adu-Afarwuah, S. (2008). Systematic review of the efficacy and effectiveness of complementary feeding interventions in developing countries. Maternal and Child Nutrition 4:24–85.

Food and Agricultural Organization. (2011). Guidelines for Measuring Household and Individual Dietary Diversity.
Retrieved on 19/09/2011 from http://www.fao.org/docrep/014/i1983e/i1983e00.pdf

Garner, P., Panpanich, R. and Logan, S. (2000). Is routine growth monitoring effective? A systematic review of trials. Archives of Disease in Childhood 82:197–201.

George, S.M., Latham, M.C. and Abel, R. (1993). Successful growth monitoring in South Indian villages. Growth Promotion for Child Development. Proceedings of a colloquim held in Nyeri, Kenya, 12-13 May, 1992. Pp 150-166.

Gerein, M.N. (1993). When research does not shape programming: GMP in Zaire. Growth Promotion for Child Development. Proceedings of a colloquim held in Nyeri, Kenya, 12-13 May, 1992. Pp 129-149.

Gerein, M.N. and Ross, A. D. (1991). Is growth monitoring worthwhile? An evaluation of its use in three child health programmes in Zaire. Social Science and Medicine 32(6): 667–75.

Ghanadistricts (2006a). Retrieved on 05/09/2011 from http://ama.ghanadistricts.gov.gh/?arrow=atd&_=3&sa=3004

Ghanadistricts (2006b). Retrieved on 05/09/2011 from http://ama.ghanadistricts.gov.gh/?arrow=atd&_=3&sa=5724

Greater Accra Ghana Health service (2007). Review of Sector Performance. Retrieved on 05/09/2011 from http://www.ghanahealthservice.org/documents/Annual%20Report%202007-TOC.pdf

Ghana Health Service (2011). Nutrition and Malaria Control for Child Survival Project. Retrieved on 05/09/2011 from http://www.ghanahealthservice.org/nmccsp.php 20/10/2011

Ghana Statistical Service. (2004). Ghana Demographic and Health Survey 2003. Calverton, Maryland: GSS, NMIMR, and ORC Macro.

Ghana Statistical Service. (2009). Ghana Demographic and Health Survey 2008. Calverton, Maryland: GSS, NMIMR, and ORC Macro.

Griffiths, M. and Del Rosso, J. (2007). Revisiting growth monitoring and its evolution to promoting growth as a strategic program approach: Building consensus for future program guidance. Report of a technical consultation UNICEF Headquarters New York, USA September 25-26.

Haque, M.F., Hussain, M., Sarkar, A.K., Hoque, M.M., Anjuman Ara, F. and Sultana, S. (2002). Breastfeeding counseling and its effect on the prevalence of exclusive breastfeeding. Journal for Health and Population Nutrition 20: 312–316.

IYCN (2011). Summary of sociocultural and epidemiological findings on infant and young child feeding in 11 countries. Washington, DC. Retrieved on 16/05/2012 from http://www.iycn.org/files/IYCN_summary_sociocultural_findings_083011.pdf

Jones, G., Steketee,W.R., Black,E.R., Bhutta, A.Z., Morris, S.S and the Bellagio Child Survival Study Group. (2003). How many child deaths can we prevent this year? Lancet 362: 65–71.

Kimani-Murage, W.E, Madise, J.N., Fotso, J., Kyobutungi, C., Mutua, K.M., Gitau, M.T. and Yatich, N. (2011). Patterns and determinants of breastfeeding and complementary feeding practices in urban informal settlements, Nairobi Kenya. BioMed Central Public Health 11: 396.

Kruger, R. and Gericke, G. J. (2003). A qualitative exploration of rural feeding and weaning practices, knowledge and attitudes on nutrition. Public Health Nutrition 6(2): 217–223.

Latham, M.C. (1993). Growth promotion for child development: In Growth Promotion for Child Development. Proceedings of a colloquim held in Nyeri, Kenya, 12-13 May, 1992. Pp 5-17.

McLorg, A.P. and Bryant, A.C. (1989). Influence of social network members and health care professionals on infant feeding practices of economically disadvantaged mothers. Medical Anthropology 10 (4):265-278.

Memon, S., Shaikh, S., Kousar, T., Memon, Y. and Rubina. (2010). Assessment of infant feeding practices at a tertiary care hospital. Journal of Pakistan Medical Association 60:1010.

Menon, P. and Ruel, M.T. (2003). Child care, nutrition and health in the Central Plateau of Haiti: The role of community, household and caregiver resources. Report of the IFPRI-Cornell World Vision Baseline Survey, Haiti 2002. A report submitted to the Food and Nutrition Technical Assistance Project, Academy for Educational Development, Washington, D.C.

Ng, S.C., Dibley, J.M. and Kingsley, E. A. (2011). Complementary feeding indicators and determinants of poor feeding practices in Indonesia: a secondary analysis of 2007 Demographic and Health Survey data. Public Health Nutrition 15(5): 827–839.

Otoo, G.E., Lartey, A. and Pérez-Escamilla, R. (2009). Perceived incentives and barriers to exclusive breastfeeding among periurban Ghanaian women. Journal of Human Lactation 25(1):34-41.

Owusu, W.B. (1991). Growth monitoring and growth patterns of infants in different socio-economic groups. Unpublished thesis presented to the Department of Nutrition and Food Science University of Ghana.

Owusu, W.B. and Lartey, A. (1992). Growth monitoring: experience from Ghana. Food and Nutrition Bulletin 14: 97–100.

PAHO/WHO (2003). Guiding principles for complementary feeding of the breastfed child. Washington, D.C.
Retrieved on 12/08/2011 from http://whqlibdoc.who.int/paho/2003/a85622.pdf

Pelto, G.H., Santos, I., Goncalves, H., Victora, C., Martines, J. and Habicht, J.P. (2004). Nutrition counselling training changes physician behaviour and improves caregiver knowledge acquisition. Journal of Nutrition 134: 357–362.

Penny, M.E., Creed-Kanashiro, H.M., Robert, R.C., Narro, M.R., Caulfield, L.E. and Black, R.E. (2005). Effectiveness of an educational intervention delivered through the health services to improve nutrition in young children: a cluster-randomised controlled trial. Lancet 365: 1863–1872.

Poel, E.V., Hosseinpoor, R.A., Jehu-Appiah, C., Vega, J. and Speybroeck, N. (2007). Malnutrition and the disproportional burden on the poor: the case of Ghana. International Journal for Equity in Health 6:21.

Qazi, S.A., Khan, M.A., Rizvi, T., Khatoon, Z. and Peterson, K.E. (2003). Longitudinal growth patterns of Pakistani infants in a clinic based growth promotion program. Indian Pediatrics 40(11):1043-53.

Roberfroid, D., Kolsteren, P., Hoeree, T. and Maire, B. (2005a). Do growth monitoring and promotion programs answer the performance criteria of a screening program? A critical analysis based on a systematic review. Tropical Medicine and International Health 10(11): 1121–1133.

Roberfroid, D., Lefèvre, P., Hoerée, T. and Kolsteren, P. (2005b). Perceptions of growth monitoring and promotion among an international panel of district medical officers. Journal for Health and Population Nutrition 23(3):207-214.

Roberfroid, D., Pelto, G.H. and Kolsteren, P. (2007). Plot and see! Maternal comprehension of growth charts worldwide. Tropical Medicine and International Health 12(9): 1074-1086.

Robinson, J.L. (2009). Nutrition education in health services and other determinants of complementary feeding in the Eastern region of Ghana. Unpublished thesis presented to the School of Dietetics and Human Nutrition McGill University, Montreal.

Ruel, M.T. and Habicht, J.P. (1992). Growth charts only marginally improved maternal learning from nutrition education and growth monitoring in Lesotho. Journal of Nutrition 122(9): 1772-1780.

Ruel, M.T. and Menon, P. (2002). Child feeding practices are associated with child nutritional status in Latin America: innovative uses of the Demographic and Health Surveys. Journal of Nutrition 132: 1180-7.

Ruel, M.T., Levin, C.E., Armah-Klemesu, M., Maxwell, D. and Morris, S.S. (1999). Good care practices can mitigate the negative effects of poverty and low maternal schooling on children's nutritional status: evidence from Accra. World Development 27: 1993–2009.

Ruel, M.T., Habicht, J. and Olson, C. (1992). Impact of clinic-based growth monitoring programme on maternal nutrition knowledge in Lesotho. International Journal of Epidemiology 21:59–65.

Santos, I., Victora, C.G., Martines, J., Gonçalves, H., Gigante, D.P., Valle, N.J. and Pelto, G. (2001). Nutrition counseling increases weight gain among Brazilian children. Journal of Nutrition 131: 2866–2873.

Senanayake, P.M, Gunawardena, M.K.S. and Peiris, D.S.P. (1997). Maternal comprehension of two growth monitoring charts in Sri Lanka. Archives of Disease in Childhood 76:359–361.

Shrimpton, R., Victora, C.G, de Onis M, Lima, R.C, Blossner, M. and Clugston, G. (2001). Worldwide timing of growth faltering: implications for nutritional interventions. Pediatrics 107 (5): E75.

Sika-Bright, S. (2010). Socio-cultural factors influencing infant feeding practices of mothers attending welfare clinic in Cape Coast. Unpublished thesis presented to the Department of Sociology and Anthropology University of Cape Coast, Ghana.

Singh, B. (2010). Knowledge, attitude and practice of breastfeeding - a case study. European Journal of Scientific Research 40 (3): 404-422.

Smith, L. and Haddad, L. (2000). Explaining Child Malnutrition in Developing Countries: A Cross-Country Analysis. Research Report 111. International Food Policy Research Institute: Washington, DC.

UNICEF (1998). The State Of The World's Children. Oxford University Press, New York.
Retrieved on 12/08/2011 from http://www.unicef.org/sowc98/sowc98.pdf

UNICEF (2008). The State of World's Children: Child Survival. Oxford University Press, New York. Retrieved on 12/08/2011
from http://www.unicef.org/sowc08/docs/sowc08.pdf

UNICEF (2009) The State Of The World's Children: Maternal and Newborn Health.. Oxford University Press, New York. Retrieved on 12/08/2011 from http://www.unicef.org/protection/SOWC09-FullReport-EN.pdf

UNSCN (2010). 6th report on the world nutrition situation.
Retrieved on 14/09/2011
from http://www.unscn.org/files/Publications/RWNS6/report/SCN_report.pdf

Valadez, J.J., Brown, L.D., Vargas, W.V. and Morley, D. (1996). Using Lot Quality Assurance Sampling to assess measurements for growth monitoring in a developing country's primary health care system. International Journal of Epidemiology 25: 381–387.

WHO /UNICEF (2003). Global Strategy for Infant and Young Child Feeding. Geneva
Retrieved on 1/08/2011
from http://whqlibdoc.who.int/publications/2003/9241562218.pdf

WHO(1998). Complementary Feeding Of Young Children In Developing Countries: a review of current scientific knowledge. Pp 110-118. Geneva
Retrieved on 09/04/2012 from http://whqlibdoc.who.int/hq/1998/WHO_NUT_98.1.pdf

WHO (2008a). Indicators for assessing infant and young child feeding practices, Conclusions of a consensus meeting held 6–8 November 2007 in Washington, DC, USA. Retrieved on 12/08/2011

from http://whqlibdoc.who.int/publications/2008/9789241596664_eng.pdf

WHO (2008b).WHO child growth standards: training course on child growth assessment. Geneva. Retrieved on 12/08/2011

from http://www.who.int/childgrowth/training/module_b_measuring_growth.pdf

Yoon, P.W., Black, R.E., Moulton, L.M., Becker, S. (1996). Effect of not breastfeeding on the risk of diarrheal and respiratory mortality in children under 2 years of age in Metro Cebu, The Philippines. American Journal of Epidemiology 143: 1142–1148.

Zaman, S., Ashraf, N.R. and Martines, J. (2008). Training in complementary feeding counselling of healthcare workers and its influence on maternal behaviours and child growth: a cluster randomized controlled trial in lahore, Pakistan. Journal for Health and Population Nutrition 26(2):210-222.

APPENDICES

7.1 Study tools

Health Worker Questionnaire

Date of interview: / / 2011/ Sub-metro: .....

Facility: ..... Participant serial number: .....

SECTION A; BACKGROUND CHARACTERISTICS

(Please tick the appropriate box or fill in spaces to indicate answers where applicable)

1. Age of health worker: [ ] completed years

2. Sex of health worker: Male [1] Female [2]

3. Position of health worker:

Public health nurse [1] Community Health Nurse [2] Student nurse [3]
Head nurse/matron [4] other (specify).....

4. Which of the following training have you had and when?

Breastfeeding counselling	[1]	date: / / /
Lactation management	[2]	date: / / /
CMAM	[3]	date: / / /
General counselling	[4]	date: / / /
Other (specify)……	[5]	Date: / / /
No training	[6]	

5. How long have you been conducting growth monitoring and promotion services? [ ]years

SECTION B; INFANT AND YOUNG CHILD FEEDING

6. For how long can a child be breastfed after introducing other foods?

0-5 months [1] 6-11 months [2] 12-17 months [3] 18-23 months [4]
≥ 24 months [5] don't know/not sure [6]

Measured knowledge item

Food group	Age of introduction	For each food group introduction at 6-8 months =1. Introduction before or after this age range=0
7. Water/other liquids		[ ]
8. Staple foods (cereals, roots and tubers)		[ ]
9. Vegetables (added to food or on their own)		[ ]
10. Fruits		[ ]
11. Dairy products (milk, cheese, yoghurt etc)		[ ]
12. Eggs (yolk and whole egg)		[ ]
13. Meats (chicken , fish, meat)		[ ]
Appropriate feeding frequency		
14. No. of meals/day for 6-8 month old breastfeeding child		0-1 meal/day=0, 2 and higher=1 [ ]
15. No. of meals/day for 9-23 month old breastfeeding child		0-2 meals/day=0, 3 and higher=1 [ ]
16. No. of meals/day for 6-23 month old non-breastfed child		0-3 meals/day=0, 4 and higher=1 [ ]

SECTION E; KNOWLEDGE AND ATTITUDE TOWARDS GMP

Please fill in the spaces provided to indicate answers where applicable)

17. In your opinion do you think monthly weighing of children is important?

Yes [1] No [2]

18. If yes, what is the importance of weighing children monthly?

To monitor child's weight/growth [1] to know if child is healthy [2]
To identify growth faltering [3] to give nutritional care where necessary [4]
To give medical care where necessary other (specify) ……

Use the sample growth charts provided as illustrations to assess the health worker's comprehension from the questions below

19. What is the purpose of the growth chart?

Monitoring/recording growth/weight of children [1] other (specify)....
Don't know [2]

20. What does it mean for a child when the curve on the growth chart is falling?

Child is not growing well/has lost weight [1] child maybe sick/has been sick [2]
Child is not eating well [3] don't know [4] other (specify)……..

21. What is done for a child if the growth curve is falling once?
Enquire about feeding and illness [1] counsel caregiver [2] other (specify)…….

22. What is done for a child if the growth curve is falling twice?
Enquire about feeding and illness [1] counsel caregiver [2]
Refer to medical/nutrition centre [3] other (specify)…….

23. What does it mean for a child when the curve on the growth chart is flattening?
Child is not growing well/has not gained enough weight [1]
Child maybe sick/has been sick [2] Child is not eating well [3]
Don't know [4] other (specify)……..

24. What is done for a child if the growth curve is same as the previous month (fails to gain any weight in one month)?
Enquire about feeding and illness [1] counsel caregiver [2] other (specify)…….

25. What is done for a child if the growth curve is same for two consecutive months (fails to gain any weight in two months)?
Enquire about feeding and illness [1] counsel caregiver [2]
Refer to medical/nutrition centre [3] other (specify)…….

26. What does it mean for a child when the curve on the growth chart is rising?
Child is growing well/has gained enough weight [1] Child is healthy [2]
Child is eating well [3] don't know [4] other (specify)……..

27. What is done for a child if the growth curve is rising?
Praise caregiver [1] counsel caregiver [2] nothing is done [3]
Don't know/not sure [4] other (specify)……..

END OF INTERVIEW, THANK RESPONDENT

Observation Checklist

(A) Growth promotion action taken by health worker

(Please indicate the particular action taken by the health worker after weighing and charting the child's weight by indicating 1 for yes and 0 for no)

	Action	Yes=1	No=0
	Health worker tells caregiver weight of child	[ ]	[ ]
	Health worker explains growth pattern of child using the growth chart	[ ]	[ ]
	Health worker enquires about previous illness	[ ]	[ ]
	Health worker enquires about feeding	[ ]	[ ]
	Health worker praises caregiver	[ ]	[ ]
	Health worker counsels caregiver(record details in section	[ ]	[ ]
	Health worker refers child to medical/ nutrition centre	[ ]	[ ]

(B) Growth Pattern of child

(Please refer to child's growth chart and record details of the growth curve as indicated below)

Growth pattern	Yes=1	No=0
1. Rising	[ ]	[ ]
2. Falling once/ same as previous month	[ ]	[ ]
3. Falling two consecutive months	[ ]	[ ]
4. Flattening or same for two consecutive months	[ ]	[ ]

(C) Recording and Charting of growth chart

(Please refer to child's growth chart and record details of the growth curve as indicated below)

Procedure	Yes=1	No=0
1. Weight recorded to nearest 0.1kg	[ ]	[ ]
2. Weight recorded on appropriate chart for sex of child	[ ]	[ ]
3. Weight charted properly (dots connected)	[ ]	[ ]
4. Age recorded accurately (counts the number of months since birth and records in appropriate place)	[ ]	[ ]

(D) Nutrition Counselling given to caregiver

(Please indicate yes=1 in the relevant section if a particular counsel is given and no=0 if it is not)

(I) Counselling for mothers with infants 0-5 months old	**Yes=1**	**No=0**
1. Encourages exclusive breastfeeding	[ ]	[ ]
2. Explains the importance of breastfeeding	[ ]	[ ]
3. Teaches breastfeeding technique	[ ]	[ ]
4. Advices feeding on demand	[ ]	[ ]
5. Educates on expressing breast milk	[ ]	[ ]
6. Teaches breastfeeding technique	[ ]	[ ]
7. Counsels and encourages good hygiene practices	[ ]	[ ]
8. Encourages mother to ask questions and answers them	[ ]	[ ]
	[ ]	[ ]
(II) Counselling for mothers with children 6-23 months old		
1. Encourages complementary feeding	[ ]	[ ]
2. Encourages frequent feeding in a day *(please indicate below if the number of times is indicated)*	[ ]	[ ]
a. 1-2 times for breastfed infants 6–8 months	[ ]	[ ]
b. 3-4 times for breastfed children 9–23 months	[ ]	[ ]
c. 4 times for non-breastfed children 6–23 months	[ ]	[ ]
3. Counsels mother to generally feed a variety of foods	[ ]	[ ]
4. Counsels caregiver to specifically feed:		
a. Cereals (foods prepared from rice, millet, maize etc)	[ ]	[ ]
b. Roots and tubers(foods prepared from yam, cassava, plantain etc)	[ ]	[ ]
c. Legumes and nuts (beans, cowpea, groundnut etc)	[ ]	[ ]
d. Flesh foods (meat, poultry, fish and liver/organ meats)	[ ]	[ ]
e. Eggs	[ ]	[ ]
f. Diary foods	[ ]	[ ]
g. Vitamin-A rich fruits and vegetables (dark green vegetables, carrots, pawpaw, mangoes, palm nut)	[ ]	[ ]
h. Other fruits and vegetables	[ ]	[ ]
5. Encourages continued breastfeeding in addition to complementary foods	[ ]	[ ]
6. Counsels and encourages hygiene practices	[ ]	[ ]
7. Encourages mother to ask questions and answers them	[ ]	[ ]

Caregiver Interview Questionnaire

Date of interview: / / 20 / Sub-metro: .....
Facility: ..... Participant serial number: .....

SECTION A; BACKGROUND CHARACTERISTICS

(Please tick the appropriate box to indicate answers where applicable)

1. Age of caregiver [ ] completed years
2. Relation to child
Mother [1] Father [2] Grand mother [3] Aunt [4] other (specify)

3. Age of child: [ ]completed months ***(if mother is unsure check from health card)***
4. Birth weight of child: [ ] kg ***(check from health card)***
5. Sex of child: Male [1] Female [2]

6. Marital status of caregiver:
Single [1] Married [2] Divorced [3] Separated [4] Widowed [5]

7. Level of education of caregiver:
None [1] Primary [2] Secondary [3] Tertiary [4]

8. Occupation of caregiver:
Unemployed [1] Trader [2] Artisan [3] Businesswoman [4] Professional [5]
Other (specify)……..

9. Where do you usually get advice from on how and what to feed your child?
Family and friends [1] Media (TV/radio/print) [2] Internet [3]
Health worker [4]

10. Type of tenancy

	Yes=1	**No=0**
Caretaker	[ ]	[ ]
Company/government house	[ ]	[ ]
Rented house	[ ]	[ ]
Family house	[ ]	[ ]
Own house	[ ]	[ ]

11. Main source of energy for cooking

	Yes=1	No=0
Firewood	[ ]	[ ]
Charcoal	[ ]	[ ]
Kerosene	[ ]	[ ]
Liquefied petroleum gas (LPG)	[ ]	[ ]
Electric cooker	[ ]	[ ]

12. Household possessions (multiple response possible)

	Yes=1	No=0
Radio	[ ]	[ ]
TV	[ ]	[ ]
Fridge	[ ]	[ ]
Computer	[ ]	[ ]

SECTION B; CHILD MORBIDITY

(Please fill in appropriate box to indicate answers where applicable)

13. Has the child had any of the following in the past two weeks?

Morbidity	Yes=1	No=0
Diarrhoea (determined as perceived by the caregiver or as three or more loose stools or watery stools per day, or blood in stool)	[ ]	[ ]
Fever	[ ]	[ ]
Vomiting	[ ]	[ ]
Cough	[ ]	[ ]
Blocked/running nose	[ ]	[ ]
Fast breathing/shortness of breath	[ ]	[ ]

14. If yes to any of the above in question 13, what did you do for the child?

Took the child to the hospital [1]

purchased drugs at the pharmacy/chemical shop [2]

Home remedy [3] private medical assistance [4] Nothing [5] other (specify)

SECTION C: FEEDING PRACTICES

Caregivers with children 0-5 completed months

(Please tick or fill in the boxes provided to indicate answers where applicable)

15. Was yesterday a typical day for the child? If yes, please describe the foods (meals and snacks) that the child ate or drank yesterday during the day and night, whether at home or outside the home. Start with the first food or drink of the morning. Write down all foods and drinks mentioned including breast milk. When composite dishes are mentioned, ask for the list of ingredients. When the respondent has finished, probe for meals and snacks not mentioned.

Breakfast	Snack	Lunch	Snack	Dinner	Snack

(If child received other foods go to question 16)

16. If child was given anything other than breast milk, why?

Started work [1] breast milk insufficient [2] Child cannot suckle [3]

Painful breastfeeding [4] Maternal Illness [5] New pregnancy [6] other (specify)...

17. At what age (months) did the child receive water for the first time?

≤ 3months [1] 4-5 months [2] Not yet [3]

Caregivers with children 6-23months

(Please tick or fill in the boxes provided to indicate answers where applicable)

18. Was yesterday a typical day for the child? If yes, please describe the foods (meals and snacks) that the child ate or drank yesterday during the day and night, whether at home or outside the home. Start with the first food or drink of the morning. Write down all foods and drinks mentioned including breast milk. When composite dishes are mentioned, ask for the list of ingredients. When the respondent has finished, probe for meals and snacks not mentioned.

Breakfast	Snack	Lunch	Snack	Dinner	Snack

If child was not fed other foods in the preceding 24 hours go to question 19.

19. If child did not receive other foods at all in addition to breast milk, why?

It is not yet time to introduce other foods [1] Child refuses to eat [2] Child was sick [3] I don't know what to give [4] work constraints [5] Other (specify)..

20. At what age (months) did child receive water for the first time?
≤3 months [1] 4–5 months [2] at 6 months [3] after 6months [4]

21. At what age (months) did child receive other foods for the first time?
≤3 months [1] 4–5 months [2] at 6 months [3] after 6months [4]

SECTION D; CHILD FEEDING KNOWLEDGE

22. For how long can a child be breastfed after introducing other foods?
0-5 months [1] 6-11 months [2] 12-17 months [3] 18-23months [4]
≥ 24 months [5] don't know/not sure [6]

Measured knowledge item

Food group	**Age of introduction**	**For each food group introduction at 6-8 months =1. Introduction before or after this age range=0**
23. Water/other liquids		[ ]
24. Staple foods (cereals, roots and tubers)		[ ]
25. Vegetables (added to food or on their own)		[ ]
26. Fruits		[ ]
27. Dairy products (milk, cheese, yoghurt etc)		[ ]
28. Eggs (yolk and whole egg)		[ ]
29. Meats (chicken , fish, meat)		[ ]
Go to questions 30-32 if child is 6-23 months old		
Appropriate feeding frequency (please fill in per the age of caregiver's child)		
30. No. of meals/day for 6-8 month old breastfeeding child		0-1 meal/day=0, 2 and higher=1 [ ]
31. No. of meals/day for 9-23 month old breastfeeding child		0-2 meals/day=0, 3 and higher=1 [ ]
32. No. of meals/day for 6-23 month old non-breastfed child		0-3 meals/day=0, 4 and higher=1 [ ]

SECTION E: KNOWLEDGE AND ATTITUDE TOWARDS GMP

(Please tick the boxes provided to indicate answers where applicable)

33. Number of months attended from birth of child (refer to health card) [ ]

months

34. Number of months missed from birth of child (refer to health card) [ ]

months

35. If any months were missed, what were the barriers to your attendance?
Transport costs [1] Travelled [2] Work [3] Other (specify).....

36. Do you consider monthly weighing of your child important? Yes [1] No [2]

37. If yes, of what importance is it to you?
To monitor child's weight/growth [1] to know if child is healthy [2]
To seek medical care where necessary [3]
To seek nutritional advice where necessary [4] other (specify) ……

Use the sample growth charts provided as illustrations to assess the caregiver's comprehension from the questions below

38. What is the purpose of the growth chart?
Monitoring/recording growth/weight of children [1] don't know [2]

If caregiver does not know the purpose of the growth chart go to question 45

39. What does it mean for a child when the curve on the growth chart is falling?
Child is not growing well/has lost weight [1] child maybe sick/has been sick [2]
Child is not eating well [3] don't know [4] other (specify)……..

40. What will you do for the child in the case above (question 39)
Feed the child better/more [1] take child to hospital [2] seek nutritional help [3]
Don't know [4] other (specify)…….

41. What does it mean for a child when the curve on the growth chart is flattening?
Child is not growing well/has not gained enough weight [1]
Child maybe sick/has been sick [2] Child is not eating well [3]
Don't know [4] other (specify)……..

42. What will you do for the child in the case above (question 41)
Feed the child better/more [1] take child to hospital [2] seek nutritional help [3]
Don't know [4] other (specify)…….

43. What does it mean for a child when the curve on the growth chart is rising?
Child is growing well/has gained enough weight [1] Child is healthy [2]
Child is eating well [3] don't know [4] other (specify)…….

44. What will you do for the child in the case above (question 44)
Continue to feed and care for child well [1] don't know [4] other (specify)……

45. Do you intend to continue attending CWC after the child is fully immunized?

Yes [1] No [2]

SECTION E: CHILD ANTHROPOMETRIC DATA

46. Weight: 1st measurement [ ]kg 2nd measurement [ ]kg Average [ ]kg

47. Length: 1st measurement [ ]cm 2nd measurement [ ]cm Average[ ]cm

END OF INTERVIEW, THANK RESPONDENT

Sample Growth Charts

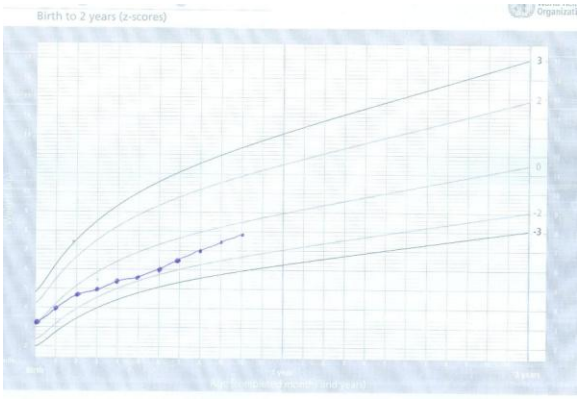


Chart A; illustrating rising growth pattern

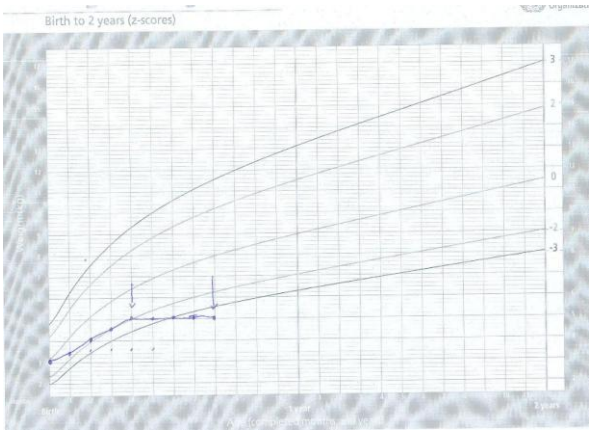


Chart B; illustrating flattening growth pattern

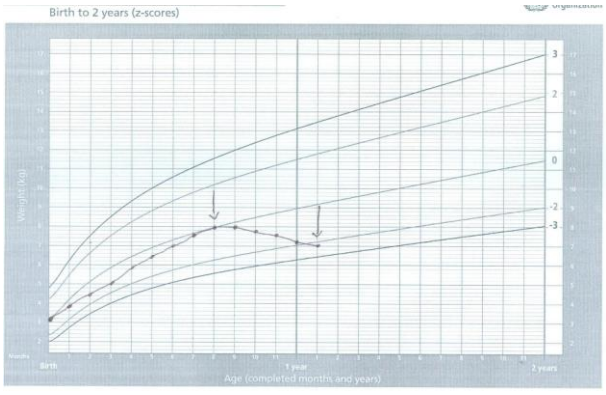


Chart C; illustrating falling growth pattern

7.2 Scoring Indices

Health Worker Child Feeding Knowledge

Knowledge Indicator	Score
Knowledge of Length of continued Breastfeeding	
Don't know/ 0-5	-2
6 to 11	0
12 to 17	0.5
18 thru 23	1
24 and beyond	2
Knowledge of appropriate age of introduction of new foods	
Water/ other liquids Staple foods (cereals, grains, roots and tubers) Vegetables (added to the food or cooked on their own) Fruits Dairy products (milk, cheese, yoghurt etc) Eggs (yolk and whole egg) Meats (chicken, fish, meat)	Introduction of any food at 6-8 mo= 1. None of the foods introduced in the period of 6-8 mo=0
Knowledge of appropriate feeding frequency for children	
If breastfed child 6–8 months	0 to 1 meal/day = 0 2 and higher =1
If breastfed child 9–11 months old	0 to 2 meals/day = 0 3 and higher =1
If breastfed child 12-23 months old	0 to 2 meals/day = 0 3 and higher =1
If non-breastfed child 6–23 months	0 to 3 meals/day= 0 4 and higher =1
Total possible score	Minimum=-2 Maximum=13

Health Worker Growth Chart Comprehension

Comprehension indicator	Score
Purpose of the growth chart	
Monitoring/recording the weight/growth of children	1
Monitoring/recording the weight/growth of children and educating caregivers	1.5
Growth trends	
Able to identify falling trend and relates to poor growth/ eating/care/sickness	
No	0
Yes	1
Able to identify flattening trend and relates to poor/ insufficient growth/poor eating/care/sickness	
No	0
Yes	1
Able to identify rising growth curve and relates to good growth/health/eating/care	
No	0
Yes	1
Recommended actions	
Growth curve falling once/same as previous month	
Enquire About Feeding And Illness	1
Counsel Caregiver	1
None	0
Growth curve flattening	
Enquire About Feeding And Illness	1
Counsel Caregiver	1
Refer Child To Medical/Nutrition Centre	1
None	0
Growth curve falling twice	
Enquire About Feeding And Illness	1
Counsel Caregiver	1
Refer Child To Medical/Nutrition Centre	1
None	0
Growth curve rising	
Praise caregiver	1
Counsel caregiver	1
Total possible score	Minimum=1 Maximum=14.5

Developed based on recommendations in GHS child health records book

Caregiver Socio-economic Status

Wealth Index	Score
Type of tenancy	
Caretaker	0.5
Company/government house	1.0
Family house	1.5
Rented house	2.0
Own house	2.5
Main source of energy for cooking	
Firewood	0.5
Charcoal	1.0
Kerosene	1.5
LPG	2.0
Electric cooker	2.5
Household possessions (multiple response)	
Radio	
TV	A score of 1 for each item possessed and 0 for none
Fridge	
Computer	
Possible total score	Minimum=1 Maximum=9

Caregiver Feeding Practices in Preceding 24 hours[1]

Feeding Practice	Score	
0-5 month old infants		
Fed infant formula	0	1
Fed semi-solid/solid food	0	1
Fed breast milk	1	0
Total possible score	Minimum=0 Maximum=3	
6-23 month old children		
Dietary diversity in preceding 24 hour		
Grains, roots and tubers	1	0
Legumes and nuts	1	0
Dairy products (milk, yogurt, cheese)	1	0
Flesh foods (meat, fish, poultry and liver/organ meats)	1	0
Eggs	1	0
Vitamin-A rich fruits and vegetables	1	0
Other fruits and vegetables	1	0
Appropriate feeding frequency		
If breastfed child 6–8 months	0 to 1 meal/day = 0 2 and higher =1	
If breastfed child 9–11 months old	0 to 2 meals/day = 0 3 and higher =1	
If breastfed child 12-23 months old	0 to 2 meals/day = 0 3 and higher =1	
If non-breastfed children 6–23 months	0 to 3 meals/day= 0 4 and higher =1	
Breastfeeding status		
Breastfeeding	1	
Non-breastfeeding	0	
Total possible score	Minimum=0 Maximum=9	

[1]Based on WHO recommendations (PAHO/WHO, 2003; WHO, 2008a) and FAO Guidelines for Measuring Household and Individual Dietary Diversity (2011)

Caregiver Child Feeding Knowledge [1]

Knowledge Indicator	Score
Knowledge of Length of continued breastfeeding	
Don't know/ 0-5	-2
6 to 11	0
12 to 17	0.5
18 thru 23	1
24 and beyond	2
Knowledge of appropriate age of introduction of new foods	
Water/ other liquids Staple foods (cereals, grains, roots and tubers) Vegetables (added to the food or cooked on their own) Fruits Dairy products (milk, cheese, yoghurt etc) Eggs (yolk and whole egg) Meats (chicken, fish, meat)	Introduction of any food at 6-8 mo= 1. None of the foods introduced in the period of 6-8 mo=0
Knowledge of appropriate feeding frequency per age of particular caregiver's child[2]	
If breastfed child 6–8 months	0 to 1 meal/day = 0 2 and higher =1
If breastfed child 9–11 months old	0 to 2 meals/day = 0 3 and higher =1
If breastfed child 12-23 months old	0 to 2 meals/day = 0 3 and higher =1
If non-breastfed child 6–23 months	0 to 3 meals/day= 0 4 and higher =1
Total possible score	Minimum=-2 Maximum=10

[1]Menon and Ruel (2003)
[2]Not included for caregivers with children 0-5 months; possible score for these was a minimum of -2, maximum 9.

***Caregiver Growth Chart Comprehension*[1]**

Comprehension indicator	Score
Purpose of the growth chart	
Don't know	0
Monitoring/recording the weight/growth of children	1
Able to identify falling trend and relates to poor growth/eating/care/sickness	
No	0
Yes	1
Knows right thing to do if growth curve is falling[2]	
No	0
Yes	1
Able to identify flattening trend and relates to poor/insufficient growth/poor eating/care/sickness	
No	0
Yes	1
Knows right thing to do if growth curve is flattening[2]	
No	0
Yes	1
Able to identify rising growth curve and relates to good growth/health/eating/care	
No	0
Yes	1
Knows right thing to do if growth curve is rising[3]	
No	0
Yes	1

[1]Modified from Owusu, 1991
[2]Improving care/feeding, seeking medical or nutritional care
[3]Continuing proper care/feeding practices

7.3 Participant Consent Forms

Health Worker Consent Form

Title of Research: Evaluation of Health Worker Roles and Caregiver Knowledge in relation to Growth Monitoring and Promotion in the Accra Metropolitan Area

Principal Investigator: Sandra Gyampoh

Address: University of Ghana

Department Of Nutrition and Food Science

P.O. Box LG 134, Legon

Accra-Ghana

Instruction to participant
You are being invited to take part in the study titled above and this form contains information explaining the study. Please take your time to read and understand what is expected of you if you decide to participate. You will be asked to sign the form or thumbprint if you agree to take part. You are free to ask questions at any time about anything you do not understand.

General Information about Research
The objective of this study is to understand how activities conducted during growth monitoring and promotion (weighing) affects child nutrition. The study will involve interviews with health workers and caregivers and an observation of activities carried out at child welfare clinics in selected hospitals.

If you agree to participate in the study, your participation will involve filling out a questionnaire, this will last about thirty minutes. The questionnaire will contain questions about the activities you conduct during growth monitoring and promotion (weighing) and information on infant and young child feeding. You are free to leave out any questions that you do not wish to answer or that make you uncomfortable. Researchers will also observe activities conducted during your work. Photographs of you will be taken during the study if you agree and this may be used in presentations to the public to help describe the study

Possible Risks and Discomforts
You are not at any form of risk by participating in this study

Possible Benefits
There are no direct benefits to you personally however; the information obtained through this study will benefit the health service and society by providing possible ways of improving child health and survival.

Confidentiality
Your personal identity will be protected and you will not be required to indicate your name or any personal information on the questionnaire. Your questionnaire will have a unique serial number instead of your name. Only researchers on this study will have access to the documents connecting your name to the serial number. This may be referred to only if we need to contact you and will be destroyed after completion of the study. All questionnaires and documents will be kept locked up safely. The results of this study will not include your name. Your pictures will only be used with your consent in result presentations and will not be linked to your name.

Compensation
A gift (2 pens) will be given to you at the end of the study, for your participation.

Voluntary Participation and Right to Leave the Research
Being part of this study is not compulsory and you are free to leave the study any time you wish to do so without any cost to you.

Contact for additional information
For more information and concerns about this research please contact:

Sandra Gyampoh
Department of Nutrition and Food Science
University Of Ghana.
P.O. Box LG 134, Legon
Accra-Ghana
Telephone: 0244823308
Email:sandragyampoh@yahoo.com

Dr. Gloria E. Otoo
Department of Nutrition and Food Science
University Of Ghana.
P.O. Box LG 134, Legon
Accra-Ghana
Telephone:0248689464
Email:
geotoo@ug.edu.gh

Dr. Richmond Aryeetey
School of Public Health
University of Ghana
P.O Box LG13, Legon
Accra-Ghana
Telephone:
0244129669
Email:
raryeetey@ug.edu.gh

Your rights as a Participant
This research has been reviewed and approved by the Institutional Review Board of Noguchi Memorial Institute for Medical Research (NMIMR-IRB). If you have any questions about your rights as a research participant you can contact the IRB Office between the hours of 8am-5pm through the landline 0302916438 or email addresses: nirb@noguchi.mimcom.org or HBaidoo@noguchi.mimcom.org. You may also contact the chairman, Rev. Dr. Ayete-Nyampong through mobile number 0208152360 when necessary.

VOLUNTEER AGREEMENT

Participant Statement and signature

I understand the purpose of this study and I am aware of the risks and benefits involved. I also understand my role in this study. I know my participation is voluntary and I have the freedom to leave it at any time without any costs to me. I understand that my privacy and anonymity will be ensured throughout the study. I have been given an opportunity to have any questions about the research answered to my satisfaction. I freely consent to be part of this study.

_____ _____

Participant name and signature/thumbprint Date

Researcher Statement

I certify that the nature and purpose, the potential benefits, and possible risks associated with participating in this research have been explained to the above individual. The participant has had all questions adequately answered and has voluntarily agreed to participate.

_____ _____

Name and signature of person who Date

obtained consent

Caregiver Consent Form

Title of Study: Evaluation of Health Worker Roles and Caregiver Knowledge in relation to Growth Monitoring and Promotion in the Accra Metropolitan Area

Principal Investigator: Sandra Gyampoh

Address: University Of Ghana

Department Of Nutrition and Food Science

P.O. Box LG 134, Legon

Accra-Ghana

Instruction to participant

You are being invited to take part in the study titled above and this form contains information explaining the study. Please take your time to read and understand what is expected of you if you decide to participate. You will be asked to sign the form or thumbprint if you agree to take part. You are free to ask questions at any time about anything you do not understand.

General Information about the study

The objective of this study is to understand how activities done during growth monitoring and promotion (weighing) affects child nutrition. The study will involve interviews with health workers and caregivers and observation of activities carried out at child welfare clinics in selected hospitals.

If you agree to participate in the study, you will be asked some questions about what foods you give your child and how you understand the activities you go through at child welfare clinics. In addition, your child will be weighed and have his/her length measured. This will last about forty-five minutes. You are free to leave out any questions that you do not wish to answer or that make you uncomfortable. Photographs of you and your child will be taken during the study if you agree and this may be used in presentations to the public to help describe the study

Possible Risks and Discomforts

You and your child are not at any risk by participating in this study. Your child may feel some discomfort however this will not harm him or her physically.

Possible Benefits

There are no direct benefits to you and your child however; the information obtained through this study will benefit the health service and society by providing possible ways of improving child health and survival.

Confidentiality

Your personal identity and that of your child will be protected and you will not be required to indicate your name, your child's name or any personal information on the questionnaire. Your questionnaire will have a unique serial number instead of your

name. Only researchers on this study will have access to the documents connecting your name to the serial number. This may be referred to only if we need to contact you and this will be destroyed after completion of the study. All questionnaires and documents will be kept locked up safely. The results of this study will not include your name or that of your child. Your pictures will only be used with your consent in result presentations and will not be linked to your name or that of your child.

Compensation
A gift (a face towel) will be given to you at the end of the study, for your participation.

Voluntary Participation and Right to Leave the Research
Being part of this study is not compulsory and you and your child are free to leave the study any time you wish to do so without any cost to you.

Contact for additional information
For more information and concerns about this research please contact:

Sandra Gyampoh
Department of Nutrition and Food Science
University Of Ghana.
P.O. Box LG 134, Legon
Accra-Ghana
Telephone:0244823308
Email:sandragyampoh@yahoo.com

Dr. Gloria E. Otoo
Department of Nutrition and Food Science
University Of Ghana.
P.O. Box LG 134, Legon
Accra-Ghana
Telephone:0248689464
Email: geotoo@ug.edu.gh

Dr. Richmond Aryeetey
School of Public Health
University of Ghana
P.O Box LG13, Legon
Accra-Ghana
Telephone: 0244129669
Email: raryeetey@ug.edu.gh

Your rights as a Participant
This research has been reviewed and approved by the Institutional Review Board of Noguchi Memorial Institute for Medical Research (NMIMR-IRB). If you have any questions about your rights as a research participant you can contact the IRB Office between the hours of 8am-5pm through the landline 0302916438 or email addresses: nirb@noguchi.mimcom.org or HBaidoo@noguchi.mimcom.org. You may also contact the chairman, Rev. Dr. Ayete-Nyampong through mobile number 0208152360 when necessary.

VOLUNTEER AGREEMENT

Participant Statement and signature

I understand the purpose of this study and I am aware of the risks and benefits involved. I also understand my role and that of my child in this study. I know my participation is voluntary and I have the freedom to leave it at any time without any costs to me or my child. I understand that the privacy and anonymity of my child and I will be ensured throughout the study. I have been given an opportunity to have any questions about the research answered to my satisfaction. I freely consent for my child and I to be part of this study.

_____ _____

Participant name and signature/thumbprint Date

If volunteer cannot read the form themselves, a witness must sign here:

I was present while the benefits, risks and procedures were read to the volunteer. All questions were answered and the volunteer has agreed to take part in the research.

_____ _____

Participant name and signature/thumbprint Date

Researcher Statement

I certify that the nature and purpose, the potential benefits, and possible risks associated with participating in this research have been explained to the above individual. The participant has had all questions adequately answered and has voluntarily agreed to participate.

_____ _____

Name and signature of person who Date

obtained consent