EFFECTIVENESS OF MOTHER-TO-MOTHER-SUPPORT GROUPS IN PROMOTING EXCLUSIVE BREASTFEEDING IN IGEMBE SOUTH SUB-COUNTY, MERU COUNTY, KENYA: A RANDOMIZED CONTROLLED TRIAL

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MAY, 2015

DECLARATION

"This PhD thesis is my original work and has not been presented for a degree in any other university".

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DEDICATION

I dedicate this thesis to my loving wife Zeddy Jelimo and my children Faith and Jason for their love, patience and sacrifice; my mother Lucy M'Liria for moral and financial support.

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DEFINITIONS OF TERMS

Exclusive Breastfeeding: Means that the baby takes no other food or drinks but breast milk-not even water; with exception of prescribed vitamins, oral rehydration solution, minerals and medicine (WHO, 2014).

Partial Breast-feeding: Breastfeeding where mothers breastfeed their children sometimes but also give them some form of feed e.g. formula milk or diluted cereals, tea, fruit juice or other fluids (WHO, 2005).

Initiation of Breast-feeding: Refers to putting the baby on the breast and assisting it to start sucking to get milk.

Mother-to-Mother Support Groups: These are support groups composed of mothers (pregnant or lactating or care givers) of different ages who come together to support one another as well as learn more on issues of nutrition and health care for children below 2 years.

Pre-Lacteal Feeds: Feeds that are given to the baby before the breastfeeding is started.

OPERATIONAL DEFINITIONS

Cumulative exclusive breastfeeding: Defined as breastfeeding rates reported on 24 hour recall based interviews for all months from first month to sixth month. In this study, the rates were determined by analyzing proportions of infants breastfed continuously at months 1 to 6.

Cross-sectional exclusive breastfeeding: Defined as breastfeeding rates based on reported infant breastfeeding practices during the preceding 24 hours without considering infant feeding practices during the other months. In this study, the proportion of infants exclusively breastfed each month was determined by 24-hour recall.

Income Generating Activity: An activity other than promotion of exclusive breastfeeding practice introduced to ensure sustainability of MTMSGs by motivating the mothers to consistently attend the MTMSG meetings. The activity was intended to motivate the participants to attend the meetings regularly because of the additional income generation benefit accrued from the income generating activity.

LIST OF ABBREVIATIONS AND ACRONYMS

ABM	Artificial Baby Milk
AED	Academy of Education and Development
AFASS	Acceptable, Feasible, Affordable, Sustainable and Safe
AIDS	Acquired Immune Deficiency Syndrome
ANC	Ante-Natal Clinic
BFHI	Baby-Friendly Hospital Initiative
CBO	Community Based Organization
CDC	Centres for Disease Control and Prevention
CEBF	Continuous Exclusive Breastfeeding
CG	Control Group
CHWs	Community Health Workers
CONSORT	Consolidated Standards of Reporting Trials
DHS	Demographic and Health Survey
EBF	Exclusive Breastfeeding
HDI	Human Development Index
HIV	Human Immune Deficiency Syndrome
IGAs	Income Generating Activities
FGDs	Focus Group Discussion
IYCF	Infant and Young Child Feeding
IYCN	Infant Young Child Nutrition
KAP	Knowledge Attitudes and Practices
KCSE	Kenya Certificate of Secondary Education

KPC	Knowledge Practices Coverage Assessment
LAM	Lactation Amenorrhea Method
MCH	Maternal and Child Health
MDG	Millennium Development Goals
MES	MTMSG with Education Support
MESIGA	MTMSG Education Support with Income Generating Activity Group
MOH	Ministry of Health
MOPH	Ministry of Public Health and Sanitation
MTCT	Mother-to-Child Transmission (of HIV-AIDS Infection)
MTMSG	Mother-to-Mother Support Groups
NGO	Non-Governmental Organizations
Non-EBF	Non-Exclusive Breastfeeding
PMCT	Prevention of Mother-to-Child Transmission (of HIV-AIDS Infection)
RDA	Recommended Dietary Allowances
RAs	Research Assistants
SPSS	Statistical Package for Social Sciences
UNICEF	United Nations Children's Fund
USA	United States of America
USAID	United States Development Agency
WBW	World Breast-feeding Week
WHO	World Health Organization

ABSTRACT

Exclusive breast-feeding (EBF) is recognized globally as the best way of ensuring child survival, growth and development because it reduces infant morbidity, mortality and ensures better nutrition outcomes. The major challenge has been the low rates of EBF globally (36%) despite the gradual increase in EBF rates in recent years. Prevalence of EBF is 32% and 18.6% in Kenya and Igembe South Sub-County the study site, respectively. Mother-to-mother support groups (MTMSGs) is a strategy used in Kenya and other countries to promote of EBF. There is scarcity of data on the effectiveness of MTMSGs in promotion of EBF in Kenya. The aim of this study was to assess the effectiveness of MTMSGs in promoting EBF in Igembe South Sub-County, Meru County, Kenya. The study adopted a cluster randomized controlled trial design in which the 3 health centres were randomly allocated on a 1:1:1 ratio to 3 study groups; 2 treatment groups and one control group (CG). In one treatment group (MES), the mothers in the MTMSGs received education support whereas in the second treatment group (MESIGA) the mothers were engaged in an income generating activity (IGAs) in addition to receiving education support. In both groups, the mothers held 7 monthly meetings, one pre-natally and six post-natally. The mothers in the control group received no education support from the research team but followed the usual irregular nutrition/health education at the health centre. The sample sizes for each group were: MES 88; MESIGA 82; and the control group 79 mothers. The determination of infant feeding practices was done on a monthly basis from months 1 to 6. Observations of infant feeding practices were carried out on a10% of the study sample to verify maternal self-reported information at the interviews. Data on infant morbidity and weight measurements was collected on a monthly basis. Six focus group discussions were held to collect in-depth information on the rationale for maternal choices of infant feeding methods. The study outcome was EBF prevalence at 6 months as defined by cross-sectional data based on 24-hour recall and cumulative or continuous EBF to six months. Data was entered using Epi-Enfo 3.5 software (CDC), cleaned using SPSS software Version 17.0 and analysed using SAS 9.3 software. Mothers in MESIGA and MES were two times more likely to exclusively breastfeed at 6 months compared to mothers in CG {RR=2.42; CI(1.36-4.28); (p=0.004}and {RR=1.89; CI(1.02-3.49); (p=0.033)} respectively using cross-sectional 24-hr recall data. There was no significant difference between EBF rates at 6 months in MES and MESIGA. The median duration of cumulative EBF for the CG was significantly lower at 0.68 months as compared with MES at 2.8 months and MESIGA at 3.36 months (p=0.001). IGAs significantly ($p<0.001$) improved the rates of attendance to MTMSG meetings. The predictors of EBF were: not giving infants post-lacteal feeds (OR=0.17(0.05-0.55); (p=0.003)}, infants not falling sick {OR=0.27(0.12-0.63); (p=0.002) and receiving breastfeeding information from a health facility {OR=2.45(1.24-4.87); (p=0.010)}. The major barriers to EBF were: pressure from partners/relatives, cultural infant feeding practices such as giving of pre- and post-lacteal feeds, heavy maternal workload, and maternal separation from infants for long periods. The study findings show that MTMSGs, a community-based intervention is an effective strategy in promoting EBF and should therefore be strengthened in the promotion of EBF programmes by Ministry of Health (Kenya) and its partners.

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

Breastfeeding is the single most effective intervention for growth, health, development and survival of infants. Exclusive breastfeeding (EBF) provides infants with optimal nutrition requirements. Furthermore, EBF protects infants against respiratory diseases, gastrointestinal problems such as diarrhoea, allergies, asthma and other chronic diseases such as obesity and HIV infection (UNICEF, 2013). Exclusive breastfeeding intervention alone can help in reducing under-five child mortality by up to 13%. Early initiation to breastfeeding within one hour of birth, which is a critical indicator of EBF, saves 22% of infants from neonatal deaths. Combined with EBF, they would reduce neonatal mortality by 35% (Lauer, 2005; WHO, 2014).

Recent evaluation of Millennium Development Goals (MDGs) highlighted that timely initiation of breastfeeding within the first 30 minutes of birth and EBF for the first six months of life as the two most effective ways of achieving MDG-4. The fourth Millennium Development Goal (MDG4) aims at improving the lives of children across the world. Specifically, it targets reduction of mortality rate by two thirds for children below five years between 1990 and 2015 (United Nations, 2011). WHO recommends initiation of breastfeeding within the first one hour of infant's birth (WHO, 2014).

Globally the rates of EBF have been increasing over the last few years to the current 36% according to the Status of the World Children Report (UNICEF, 2014b). Currently, according to the UNICEF Progress Report on the breastfeeding status of children, 38% of

the world's newborns are exclusively breastfed for six months. This is a 20% global increase from 1995 to 2011 (UNICEF, 2014a). Exclusive breastfeeding rates in developing countries increased by an impressive nearly 100% during the same period from 22% to 41% according to UNICEF analysis of Demographic Health Survey (DHS) and Multi Indicator Cluster Survey (MICS) reports (UNICEF, 2012).

Kenya is among the countries with the lowest EBF rates in Sub-Saharan Africa. The most recent national survey in Kenya indicated an EBF rate of 32% which is lower than the world average rate of 38% and that of Sub-Saharan Africa (36%) (UNICEF, 2014b). Nevertheless, this has been a great improvement following a widespread campaign by the Kenyan Government and WHO to promote breastfeeding. This led to an increase from 13% to 32% between 2003 and 2007 (Kenya National Bureau of Statistics & ICF Marco, 2010). Exclusive breastfeeding provides protection to the infants against illnesses and death (Kramer & Kakuma, 2004). Exclusive breastfeeding is one of the cardinal components of the Baby Friendly Hospital Initiative (BFHI) aimed at protecting, promoting and supporting breastfeeding for optimal maternal and child health globally.

Several studies show that there are a number of short-term and long-term nutrition, health, economic and social benefits associated with breastfeeding. Children who have been breastfed exclusively have less risk of obesity than those who are not (Singhal, 2006). Besides, Kramer (2009) demonstrated that there is a direct relationship between obesity, overweight and chronic illnesses and the duration of EBF. Other health benefits of EBF include; low incidences of respiratory diseases, higher cognitive ability and less

diarrhoea cases in children. In a study to promote breastfeeding in Belarus by Kramer and others, showed that children who were exclusively breastfed for between three to six months of life were found to have fewer episodes of diarrhoea, respiratory tract infections and atopic eczema in their first 12 months of life than those who were not (Kramer et al., 2001).

Exclusive breastfeeding offers some health benefits to the mother too. Women who exclusively breastfeed have delayed onset of menstrual periods hence better child spacing. In addition, they are at less risk of breast and ovarian cancer and many experience better self-confidence and bonding with their children (Brown, 2011). Also, exclusive breastfeeding helps in reducing maternal postpartum haemorrhage which is a common cause of maternal deaths (LINKAGES, 2003; Bhandari et al., 2003). Benefits of EBF to the family include: less economic stress, low birth rates and overall better nutrition status for all members. A direct economic gain is less cost in feeding of the infants as artificial milk is expensive to most mothers especially in third world countries where there are no government subsidies (Dyson, McCormick &Renfrew 2005). In a study carried out in USA to evaluate the benefits of optimal breastfeeding, it was demonstrated that medical expenditure was less by 20% for fully breastfed children than those who were not (Hoey &Ware, 1997). Similarly, the Department of Agriculture's Economic Research Services estimates that at least $3.1 billion could be saved if the infants were optimally breastfed (Weimer, 2001).

Despite these numerous benefits, the rates of exclusive breast-feeding are very low in most communities. In Gambia for instance, a study carried out by Semega-Janneh (2001) found out that there was widespread delay in initiation of breastfeeding, use of pre-lacteals and promotion of bottle feeding. In Kenya, some mothers have reported that breast milk is insufficient to satisfy their infants, while others claim it does not have enough nutrients to meet their nutrition demands hence the infant should learn to feed on other foods (Ochola et al., 2012). This situation is brought by lack of knowledge on optimal breastfeeding which is a major barrier to exclusive breastfeeding (Cherop et al., 2009). Lack of knowledge on benefits of exclusive breastfeeding, inadequacy of breast milk to the infant, heavy maternal workload and maternal health have been reported as some other reasons for low breastfeeding rates (Ochola et al., 2012).

Different approaches have been used in promotion of EBF. Mother-to-Mother Support Groups (MTMSGs) is one of the community-based approaches to improving optimal breastfeeding rates. Community-based approaches are cited as the 10^{th} step of Baby Friendly Hospital Initiative-(BFHI) which has been widely promoted across the world (WHO/UNICEF, 2009a). MTMSGs like other community-based interventions, improve the rates of EBF by increasing the length of maternal support before delivery and after delivery. MTMSGs are composed of pregnant, lactating mothers as well as care-givers who come together to support one another as well as learn more on infant and young child feeding practices. Grandmothers and partners are also encouraged to participate in the meetings. Usually a professional facilitator or one member of the group is trained to facilitate group activities. All group members interact at both group and individual levels

as they discuss their problems in a participatory manner in a peer group approach. Members of the group share their experiences, doubts, difficulties, popular beliefs, myths as well as information on optimal breastfeeding usually in an atmosphere of trust and respect among the members (LINKAGES, 2004).

In Kenya, there is paucity of information on the role breastfeeding MTMSGs in improving infant and young child feeding despite the fact that the Ministry of Health (MOH) and UNICEF are promoting their use (Child, 2011). The MOH and many non-Governmental Organizations are implementing breastfeeding MTMSGs with support from UNICEF in several places in Kenya. However, no scientific study, to the knowledge of the researcher has investigated the effectiveness of the MTMSGs in promoting exclusive breastfeeding in Kenya.

1.2 Statement of the problem

Baby Friendly Hospital Initiative is initially successful in improving the rates of exclusive breastfeeding at hospital level for those who deliver in health facilities. However, only 39% of the health facilities in Kenya have 'ever been certified as baby-friendly' (Labbok, 2012). According to Kenya Health Demographic Survey of 2008-9, only 43% of the Kenyan women deliver in health facilities (Kenya National Bureau of Statistics & ICF Marco, 2010). Therefore, the majority of women in Kenya do not benefit from the services provided by these health facilities. Even for those who benefit, drop outs from exclusive breastfeeding is high. In any case, BFHI has been demonstrated not to promote or support exclusive breastfeeding beyond the hospital set-up (Ochola et al.,

2012). Community-based strategies are interventions that target promotion of breastfeeding at community level by improving maternal support before and after delivery.

Community-based strategies by peer-counselling have demonstrated that the frequency of the counselling sessions received from trained breastfeeding counsellor significantly influences the length of exclusive breastfeeding. In Kenya, a study in an informal settlement in Nairobi demonstrated the positive impact of using trained peer counsellors to promote EBF (Ochola et al, 2012). In a study in Ghana, the intervention group with the longest period of EBF maternal support pre-, peri- and post-natally was found to have the highest rate of EBF at 6 months (90.4%) followed by the intervention group who received EBF maternal support pre- and peri-natally only (74.4%) (Aidam, 2005).

The goal of the community-based approaches is to increase the length of infant breast-feeding support the mother gets before and after delivery. In spite of the fact that there are several MTMSGs in Kenya; no studies have been conducted to test their impact on EBF in the country. However, some studies have shown the effectiveness of similar community groups in improving the rates of exclusive breast-feeding (Muruka & Ekisa, 2013; Dearden, 2002; LINKAGES, 2004. In Ghana, the intervention communities recorded a significant improvement in exclusive breast-feeding rates from 68% to 79% in intervention areas; but the study did not have a control group (LINKAGES, 2004). These community-based interventions however did not follow the MTMSG approach. In a case study of MTMSGs conducted by Muruka and Ekisa (2013) on impact of mother-to-mother support groups (MTMSGs) on maternal, infant and child nutrition (MIYCN) in

Wajir and Habaswein districts in Kenya, exclusive breastfeeding rate improved from 21.1% to 53.7% while initiation to breastfeeding within one hour improved from 45.3% to 67.3% after one year intervention period. The study, unlike the current one, used multiple approaches to improve EBF including IGAs, hygiene and sanitation activities as well as mass breastfeeding campaigns in the study area. Furthermore, the design of this study neither had a control group nor was it randomized.

One of the major challenges identified in MTMSGs is the sustainability of such groups. Therefore, it has been suggested that there may be need to introduce an activity or activities other than promotion of appropriate infant young child nutrition (IYCN) practices to motivate women to consistently attend the meetings (Cotrell, 2012). In the study area (Igembe South Sub-County) there were no breastfeeding MTMSGs as evidenced by a preliminary study to the area by the researcher in 2011. The rate of exclusive breastfeeding in the study area was 18.6% (Kenya National Bureau of Statistics, 2009) which was much lower than the national average of 32% (Kenya National Bureau of Statistics and ICF Marco, 2010). There was need therefore, to introduce and investigate the impact of MTMSGs (with and without IGA) in improving the practice of EBF in the study area.

1.3 Purpose of the study

The purpose of the study was to assess the effectiveness of community-based Mother-to-Mother Support Groups (MTMSGs) with and without income generating activity in promoting exclusive breastfeeding in Igembe South Sub-County in Meru County, Kenya.

1.4 Specific objectives

1. To determine the effectiveness of MTMSGs (with IGAs and without IGAs component) on the prevalence and duration of EBF among mothers of infants aged 0-6 months in Igembe South Sub-County, Meru County.

2. To evaluate the effectiveness of income generating activities in increasing the attendance of MTMSG meetings by MTMSG members in Igembe South Sub-County, Meru County.

3. To establish the effectiveness of MTMSGs (with IGAs and without IGAs component) on nutrition outcomes (weight gain) of infants aged 0-6 months whose mothers are members of these groups Igembe South Sub-County, Meru County.

4. To identify the barriers to exclusive breastfeeding in Igembe South Sub-County, Meru County.

1.5 Study hypotheses

H_{01}: There is no significant difference in the prevalence of exclusive breastfeeding among mothers in MTMSGs with a IGAs component and those in MTMSGs without IGAs.

H_{02}: There is no significant difference in attendance of meetings between mothers in MTMSGs with IGAs and those without IGAs.

H_{03}: There is no significant difference between nutrition outcomes of infants aged <6 months in MTMSGs with IGAs and those without IGAs.

1.6 Significance of the study

The study provides information that may be useful to the Ministry of Health and NGOs on the implementation of MTMSGs for the support and promotion of breastfeeding practices. The results of this study will also contribute to the ongoing research efforts on the promotion of EBF.

1.7 Delimitation of the study

Only mothers attending ante-natal clinics (ANCs) in three health facilities participated in the study hence the results of the study can only be generalized to mothers attending ANCs in similar circumstances as those in the study site.

1.8 Limitations of the study

The findings may be different for those mothers who do not attend ANC clinic since such mothers are likely to hear the messages on EBF less frequently and may also be under more cultural influence from relatives and friends.

1.9 Conceptual framework

Figure 1.1 shows the conceptual framework for this study adapted from Lutter, 1997.

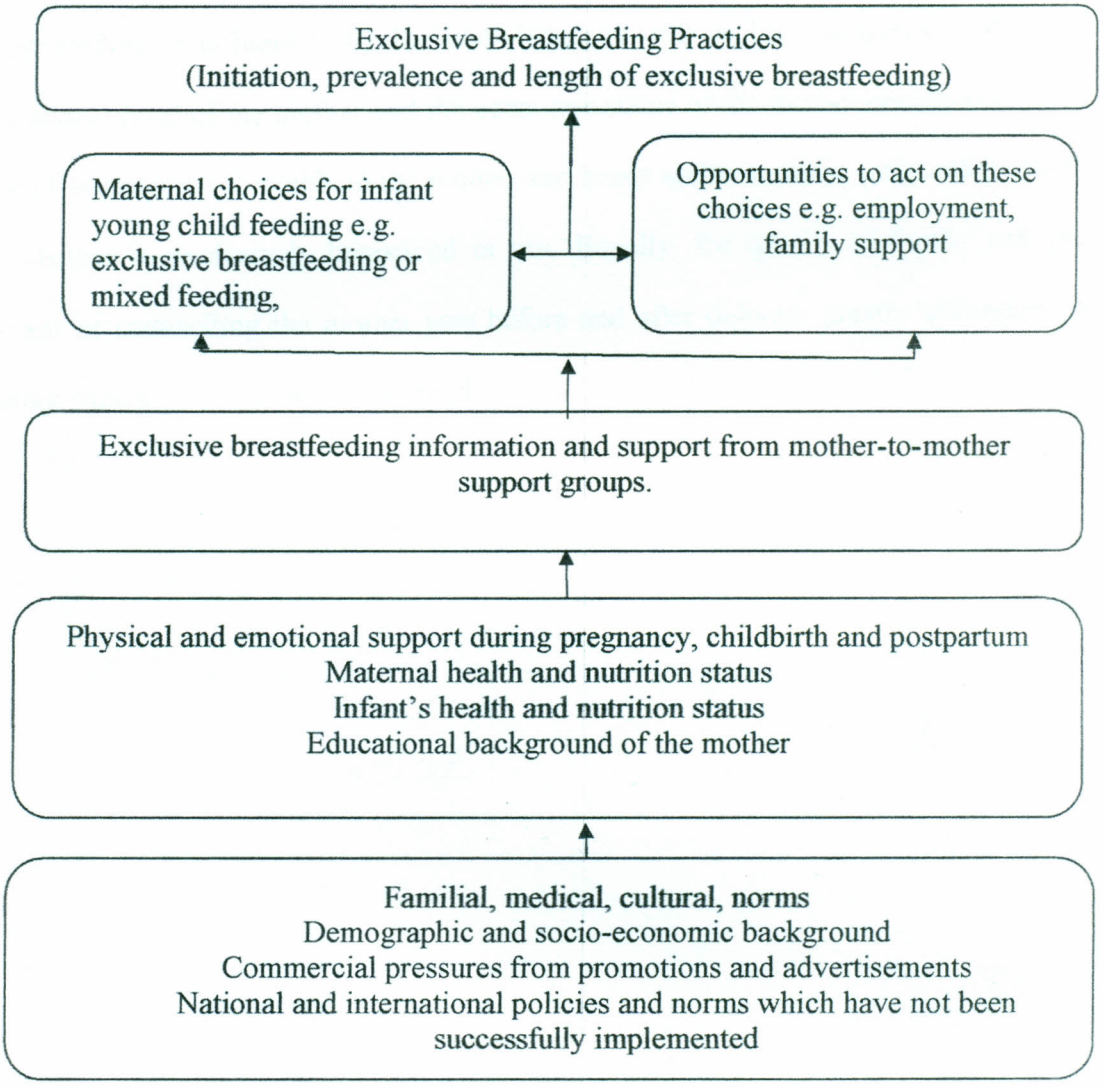

Figure 1.1: Conceptual framework of EBF and complementary feeding practices
Source: Adapted from Lutter, 1997)

This study was based on the conceptual framework adopted from Lutter (1997). In the framework, factors affecting the mother's breastfeeding options are stipulated. Exclusive breastfeeding may be influenced by maternal choices to infant feeding, information received on infant feeding, education; maternal support, infant nutrition status, cultural

and familial norms. This study therefore sought to investigate the effectiveness of MTMSGs on promotion of exclusive breastfeeding in the study area. Maternal choice of infant feeding is influenced by her knowledge as well as her occupation status. The educational level of the mother and the economic status of the mother also determine the kind of information available to the mother and hence ability to make informed decisions on whether to exclusively breastfeed or not. Equally, the quality of family and peer support or counselling the mother gets before and after delivery greatly influences the mother choice to exclusively breastfeed.

CHAPTER TWO: LITERATURE REVIEW

2.1 Importance of breastfeeding to the infant

World Health Organisation (WHO) and United Nations Children Fund (UNICEF) recommend that children be breastfed exclusively until they reach the age of six months (WHO/UNICEF, 2013). It is recommended that at the age of six months the child should be given appropriate complementary foods accompanied by continuation of breastfeeding up to 24 months and beyond. This stand by the two major United Nations organs is supported by a detailed body of evidence which has been derived from extensive research studies by various institutions, governments and individuals (WHO/UNICEF, 2009b).

Exclusive breastfeeding for the first six months and introduction of complementary foods with continued breastfeeding up to two years is recognised globally as the best way of ensuring child survival. This preventive intervention alone can help reduce child mortality rate by up to 13% (Jones et al., 2003) hence greatly contributing to the Millennium Development Goal 4 (MDG4). Improvement of breastfeeding is one of the major infant young child feeding (IYCF) strategies that greatly help in achieving this goal given that over 60% of child deaths are attributable to poor infant and young child feeding practices (Lomazzi et al., 2014).

The Human Development Index (HDI) is a composite measure of life expectancy, adult literacy education and standard of living indicators. Countries with high HDI have lower rates of infant young child mortality rate (UNDP, 2013). Therefore, breastfeeding increases the overall human development in different aspects. It's the most important

indicator of child care practice because of its impact on child survival, morbidity and nutritional outcomes (UNICEF, 2010). Even with these known benefits of breastfeeding, many more women continue to start complementary feeding as early as the first month of the infant's life (Ochola et al., 2012).

2.2 Prevalence of exclusive breastfeeding

Globally, exclusive breastfeeding rates are extremely low. Nonetheless, there has been a modest improvement from 34% to 43% in global exclusive breastfeeding between 1995 and 2011(UNICEF, 2013). In the developing world, only 25% of the babies are exclusively breastfed up to six months hence exposing them to high risks of infections and mortality (Hall, 2011) (Figure 2.1).

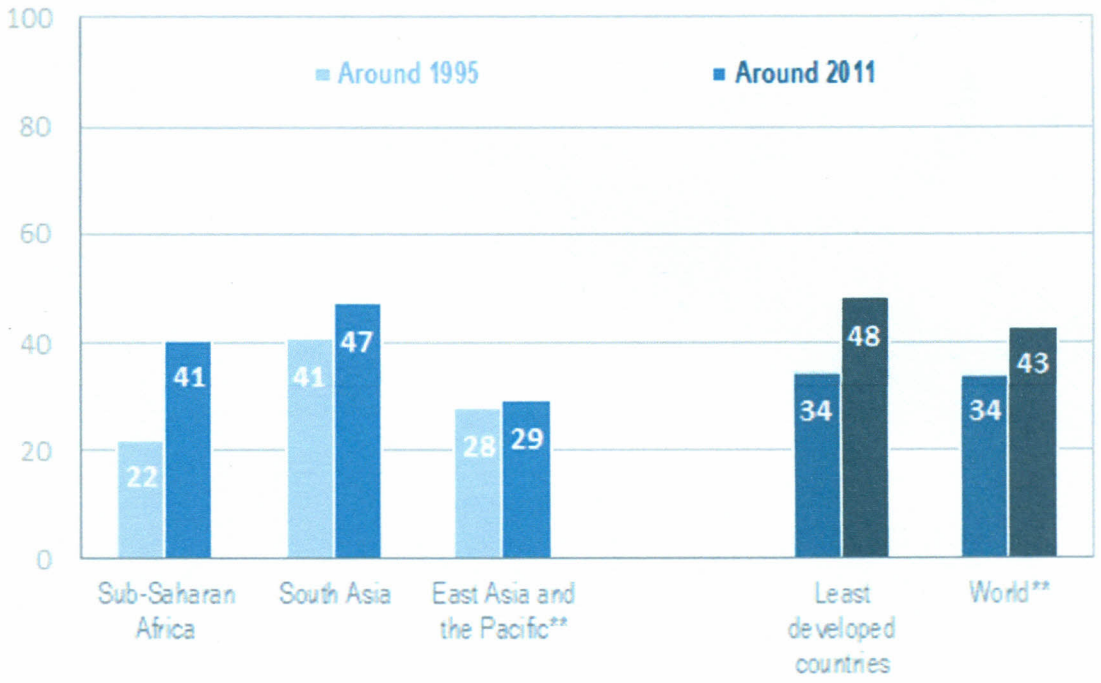

Figure 2.1: Regional exclusive breastfeeding rates (%)
**Excluding China due to lack of data
Source: UNICEF global databases 2011, from MICS, DHS and other national surveys.

In Sub-Saharan countries, the increase in exclusive breastfeeding rate was nearly 100% within the same period pushing the rate from 22% to 41% (UNICEF, 2013). Currently, sub-Saharan Africa has exclusive breastfeeding rate of 36% which is slightly lower than the global figure of 38%. These rates are still far below the 90% recommended by WHO (WHO/UNICEF, 2009b) as well as lower than 80% target for 2017 set by the MOH in Kenya (Republic of Kenya, 2012). This notwithstanding, exclusive breastfeeding rate in Kenya has improved from 13% in 2003 to 32% in 2009 (Kenya National Bureau of Statistics & ICF Marco, 2010). Eastern and Southern Africa have a higher (52%) EBF rate compared to rest of the global rates. In East and Central Africa, the rates are slightly higher (47%) but Kenya is among the countries with the lowest national rate (32%) in the region (UNICEF, 2014b) (Table 2.1).

Table 2.1: Global exclusive breastfeeding rates

Indicators (%)	Countries or regions									
	World	Sub-Saharan Africa	East and Southern Africa	**Kenya**	Tanzania	Uganda	Burundi	Rwanda	DRC	Ethiopia
Early Initiation to Breastfeeding	43	45	60	**58**	49	53	74	71	43	52
EBF for <6 months	38	36	52	**32**	50	63	69	**85**	37	52
Breastfeeding at Age 2 years	58	50	61	**54**	51	46	79	**84**	53	82

Source: UNICEF, 2014b

2.3 Health benefits of exclusive breastfeeding

Infants who are exclusively breastfed for six months have far more health and nutrition advantages than those exclusively breastfed for 3-4 months (WHO, 2011). Exclusive breastfeeding is the best way to reduce incidences of diarrhoeal diseases among infants aged less than six months. Several studies have shown that exclusively breastfed babies have lower incidences of diarrhoea than non-exclusively fed infants (LINKAGES, 2003; Bhandari et al., 2003). In a study carried out in Dhaka, Bangladesh to investigate the association between neonatal mortality risks arising from acute respiratory infections (ARI) and diarrhea in exclusively breastfed and non-exclusively breastfed infants indicates this clearly. Compared with exclusively breastfed infants, non-exclusively breastfed or partially breastfed infants had a 2.40 and 3.94-fold high risk of infant death from ARI and diarrhoea respectively at six months (Arifeen et al., 2001).

Exclusive breastfeeding has been shown to protect infants from many immune related diseases. Several studies and meta-analysis of morbidity among exclusive breastfed babies and non-exclusive breast fed babies showed that the latter has higher rates of bronchial asthma, type 1 diabetes mellitus, allergic rhinitis, colitis and atopic dermatitis (Benn et al., 2004 &Klement et al., 2004). This may be explained by the presence of immunological factors in human breast milk (Figure 2.2).

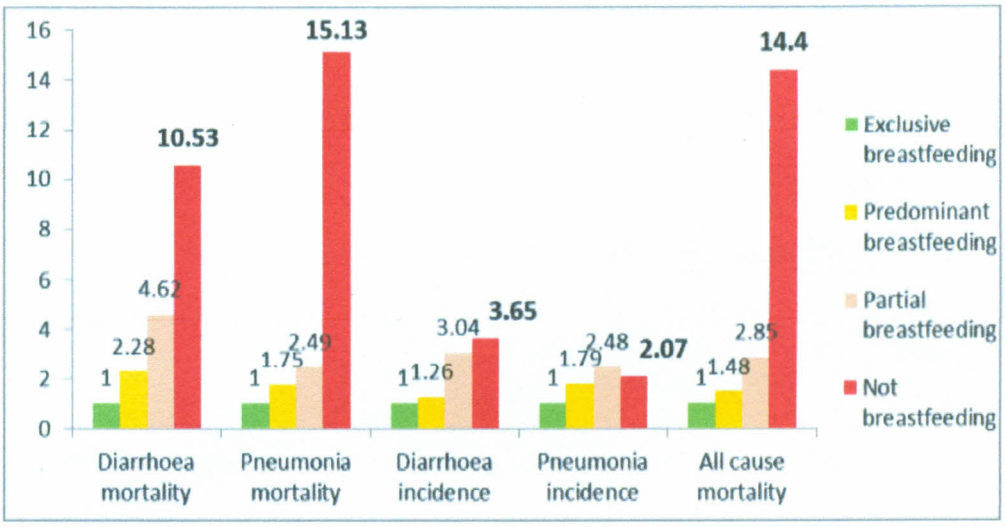

Figure 2.2: Relative risk of not breastfeeding for infections and mortality compared to EBF from 0-5 months. *Source: WHO, 2014*

Furthermore, breast milk promotes growth of beneficial microflora (*bifidobacteria* and *lactobacillus*) in human gastro-intestinal system due to presence of oligosaccharides in the milk which reduces growth of harmful bacteria in the infant's gut (GronLund et al., 2007). Exclusively breastfed babies have been shown to have greater growth rates from 6-12 months when compared to non-exclusively breastfed babies (Kramer et al., 2003 & Gunnarsdottir, et al., 2010). Predominant breastfeeding has been shown to reduce the rates of gastro-intestinal infections in infants 0-6 month old (18%) compared to non-predominantly breastfed (partially breastfed) infants combined with those who are formula fed (33%) (Monterrosa, 2008). Infants who have been exclusively breastfed for longer duration have greater mental (motor) development than those who have been exclusively breastfed for shorter periods (Dewey et al., 2001).

Besides, exclusive breastfeeding for six months protects infants from risk of maternal transmission of HIV. In three large studies done separately in Africa, the risk of infection

was reduced by 3-4 times as compared to mixed feeding (Coovadia et al., 2007; Becquet et al., 2005; Iliff et al., 2005). Shortening the duration of breastfeeding reduces the cumulative risk of HIV transmission, but this cannot overcome the benefits of reduced mortality, morbidity and malnutrition associated with cessation of exclusive breastfeeding before six months (WHO, 2008)

On the other hand, exclusive breastfeeding is beneficial to the mother. Mothers who exclusively breastfeed are less likely to resume their menstrual periods before six months due to lactation amenorrhea. This allows them to have better child spacing; less risk of breast and ovarian cancer and many experience better self-confidence and bonding with their children (Brown, 2011). In addition, EBF helps in reducing postpartum hemorrhage which is a common cause of maternal deaths (LNKAGES, 2003; Bhandari et al., 2003) and postpartum depression (Chung et al., 2007). Maternal weight reduction has also been shown to be higher in mothers who exclusively breastfeed than for mothers who practice mixed feeding (Dewey et al., 2001).

Furthermore, exclusive breastfeeding is not only beneficial to the infant and the mother but also to the other family members. Benefits of exclusive breastfeeding to the family includes: less economic stress, low birth rates and overall better nutrition status for all members. According to a study carried out in the USA to compare the benefits of optimal breastfeeding, medical expenditure was less by 20% for fully breastfed children than those who were not (Hoey & Ware, 1997). Similarly, the Department of Agriculture's

Economic Research Services estimates that at least $3.1 billion could be saved if infants were optimally breastfed (Weimer, 2001) (Figure 2.3).

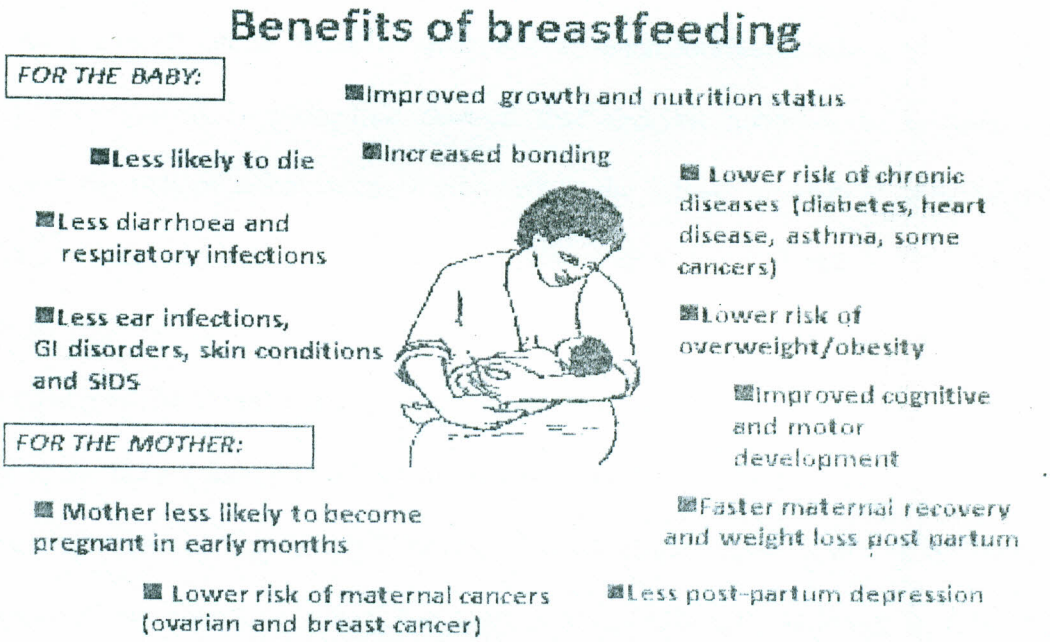

Figure 2.3: Summary of the benefits of breastfeeding.
Source: WHO/UNICEF Integrated IYCF, 2008.

2.4 Benefits of early initiation of breastfeeding

Breastfeeding should be started within one hour of birth (WHO, 2014). Exceptions to this case are women who are HIV/AIDS positive who do not wish to breastfeed (Muchina, 2010). However, the time between birth and initiation of breastfeeding is also influenced by type of birth. Time to initiate breastfeeding can vary between mothers who undergo vaginal to those of caesarean deliveries (Boccolini et al., 2008). In Kenya, an urban study on patterns and determinants of breastfeeding in Nairobi, found that only 37% of the babies were initiated to breastfeeding within the first one hour of birth from a sample of

4299 infants (Kimani-Murage et al., 2011). Early initiation increases chances of breastfeeding success and generally lengthens the duration of breastfeeding (Ochola et al., 2012 and Mullany et al., 2008).

In a study carried out in Nepal to determine neonatal mortality risks associated with timely initiation of breastfeeding showed that delayed initiation to breastfeeding increased the risk of infant death. Compared to the infants initiated to breastfeeding within one hour of birth, those who were initiated after day 1, 2 and 3 after birth had mortality risk of 2.80, 4.08, and 4.19 times higher respectively. Late initiators to breastfeeding (≥24 hours) were 1.74 (at 95%, confidence interval (CI) =1.39, 2.19) more likely to die during infanthood than those started early (≤24 hours). The same study in Nepal, demonstrated that about 19% and 17% of infant deaths could be avoided by initiation of breastfeeding within one hour and day one after delivery in that order (Mullany et al., 2008).

2.5 Exclusive breastfeeding and nutrition status of infants

Acute malnutrition in children is a global public health issue especially in developing countries and may lead to serious health and socio-economic consequences to individuals and communities. Globally, using the WHO standards, it is estimated that there are about 3 million infants under six months of age who are severely malnourished and an additional 2.5 million who are moderately malnourished (Manary & Sandige, 2008; Victora et al., 2008). Under-nutrition is said to be associated with about 35% of the more than 10 million deaths annually among children under age of five years in the developing

countries. It is one of the direct factors of mortality and lack of optimal development and performance from surviving children (Quin, 2005)

There have been a lot of efforts in identification and treatment of malnourished children from 6 months to less than 5years old as well as community-based strategies to address the problem. However, malnutrition among the infants (infants less than 6 months of age) has been often neglected by both researchers and policy makers (Schulz, Altman &Moher, 2010). Therefore there is paucity of data and information on the prevalence of acute malnutrition among infants less than 6 months of age. Underweight is defined as weight-for-age indicator expressed as standard deviation (z-scores) from the mean of international reference population according to WHO standards. Any child with a z-score from -2.0 to -3.0 is classified as moderately underweight while those with z-scores below -3.0 are classified as severely underweight. Infants with z-score of between -2.0 and 2.0 are classified as well nourished and those with z-score of 2 and above as over-weight (WHO/ UNICEF, 2009c).

Studies have shown that exclusively breastfed infants gain weight rapidly from first to third month and then the rate of weight gain slows down at the fifth and sixth months (Ochola, 2008; Hautvast et al., 2000). In the study by Hautvast et al. (2000) the rates of underweight remained constant from 1 to 3 months (19%) and then suddenly dropped and continued to decline up to 6 months (28%). This trend of weight does not negatively affect the infant's growth and development in later years as observed by (Skugarevsky et al., 2014).

A recent review of studies involving effects of exclusive breastfeeding up to six months by the WHO found no clearly demonstrated adverse effects in later stages of development (Horta & Victora, 2013). A review of literature on nutrition status of exclusively breastfed infants shows that there is direct effect of EBF on weight gain. In a study by Hunsberger et al. (2013) which showed that EBF has protective effect against overweight at 4-5 months with increased protection at 6 months. While another study found that protective effect against overweight was only significant at 5 months (Gunnarsdottir, Schack-Nielsen & Thorsdottir, 2010).

Additionally, Kramer and Kakuma (2007) found that there is no significant relationship between EBF and body mass index (BMI) or any other form of adiposity in children at 6.5 years as a result of exclusive breastfeeding. However, in a cross-sectional study carried out in Nairobi, Kenya by Muchina and Waithaka (2010), discontinuation of EBF before six months was found to be significantly related with underweight $P \leq .05$ (odds ratio 4.5).

2.6 Factors influencing exclusive breastfeeding rates

Exclusive breastfeeding rate in Kenya has improved from 13% in 2003 to 32% in 2009 (Kenya National Bureau of Statistics & ICF Marco, 2010). However, Kenya still has the lowest levels of EBF (32%) compared to Tanzania (50%) and the entire East Africa region which has an overall prevalence of 47% (UNICEF, 2011). Worse still, this rate is short of 90% set by UNICEF and 74% set by MOH (Kenya). Nearly two thirds of

Kenyan babies do not receive optimal EBF. This is despite various efforts by the government to improve infant young child feeding through introduction of Infant Young Child Feeding Guidelines, Breast Milk Substitute Law of Kenya and implementation of the Baby Friendly Hospital Initiative in Kenyan hospitals. The various factors affecting EBF are discussed in the following sub-sections:

2.6.1 Maternal knowledge on exclusive breastfeeding

Various studies have found out that mother's knowledge on breastfeeding positively influences her infant feeding practices related to exclusive breastfeeding (Mauricio et al., 2008; Shirima et al., 2001; Damstra, 2012; Barria, Santander, & Victoriano, 2008; Mututho, 2013). However, some other studies (Ertem, Votto, & Leventhal, 2001;Velpuri, 2004; Kimwele, 2014; Ochola, 2008) did not find any association. Unfortunately, it has been established that most mothers do not have adequate knowledge on optimum breastfeeding (Subedi et al., 2012). A study in Kenya (Ochola, 2008) reported that maternal knowledge about breastfeeding, culture of infant young child feeding as well as work and other family responsibilities affected rates of exclusive breastfeeding but no association was found to exist between maternal knowledge and duration of exclusive breastfeeding.

2.6.2 Maternal attitudes

Several studies have found that breastfeeding practices are influenced by maternal attitude (Chezem, Friesen, & Boettcher, 2003; Dennis, 2002; Haider, Ashworth & Huttly, 2000; Holbrook, White & Wojcicki, 2013; Sikorski, 2003). Mothers who have breastfed previous infants are more likely to breastfeed. In a cohort study of Latina mothers by

Holbrooke White and Wojcicki, (2013), previously breastfeeding an infant was associated with breastfeeding initiation (OR 8.29 [95% CI 1.00, 68.40] p = 0.05) and continuous exclusive breastfeeding up to 6 months (OR 18.34 [95% CI 2.01, 167.24] p = 0.01). Other studies have found that mothers who decide to exclusively breastfeed their infants sometime before delivery are more likely to practise exclusive breastfeeding (Chezem, Friesen, & Boettcher, 2003; Dennis, 2002).

Early initiation to breastfeeding (within first hour of birth) has been associated with exclusive breastfeeding as found earlier by Haider and others (Haider, Ashworth &Huttly, 2000). It has also been reported that mothers who initiated their infants to breastfeeding within the first one hour of birth are more likely to exclusively breastfeed than those who did so later. There has been a lot of emphasis on the role played by the health officials on the success of breastfeeding (Sikorski, 2003). Health care staff usually makes the first contact with mothers when they get pregnant during the ANC clinics. However, the health professionals have been shown to have insufficient skills to provide breastfeeding support to nursing mothers to change their attitudes (Whelan, 2010).

2.6.3 Cultural and religious practices

Scientific evidence demonstrates an association between cultural practices and the practice of exclusive breastfeeding (Hizel et al., 2006; Kakute et al., 2005; Lipika, 2009; Ochola et al., 2012). A study carried out in Turkey found that 23.4% of the mothers' believed that babies should start breastfeeding at least after three prayer sessions (12 hours). The aforementioned authors, also reported that 30% of the mothers believed in discarding colostrum because it was watery or unclean (Hizel et al., 2006). Elsewhere,

family support has been shown to have a significant positive relationship with quality and length of exclusive breastfeeding. Mothers who had better family support exclusively breastfed for longer duration (Lipika, 2009).

In Kenya, the perception of insufficient breast milk has been cited by mothers as one of the reasons for discontinuing exclusive breastfeeding. Excessive family and community pressure to start complementary feeding, competing household demands for maternal time as well as mothers being away from infants for long hours are some of the reasons cited by mothers for discontinuation of EBF (Ochola et al., 2012). Similarly, Kakute and others (2005) in another study in Cameroon, reported that mothers cited cultural pressure from relatives and friends to start mixed feeding; the cultural belief that breast milk is inadequate food to increase the weight of an infant. The role of culture was further demonstrated by Mututho (2013) in a study conducted at Molo, Kenya. She reported that traditional birth attendants who performed majority of the deliveries in the rural areas believed that a mother should not breastfeed for six months without other feeds and that it is a taboo to express human milk. Cessation to breastfeeding has also been related to mothers' ethnicity (Kimani-Murage et al., 2011). However, this study did not carry out a qualitative analysis of the various cultural factors affecting breastfeeding since it was a quantitative study.

2.6.4 Infants' characteristics

Infant's age has also been shown to influence exclusive breastfeeding (Desalegn et al., 2012; Seidu, 2007; Weiqi, 2010). In a study on the factors influencing breastfeeding patterns in China, it was found that at four months 75.4% of the mothers were still

breastfeeding. Only 6.2% of the infants who were being breastfed were being exclusively breastfed and this rate fell to 2.2% by 6 months (Weiqi, 2010). As the infant grows older there is less likelihood of association with exclusive breastfeeding practices (Kristiansen et al., 2010; Ochola, 2008). In a study carried out in Norway, exclusive breastfeeding at 5.5 months was found to be positively associated with maternal age but it was not positive at 6 months (Kristiansen et al., 2010).

2.6.5 Mothers' socio-economic status

A review of several studies has shown that mother's marital status, education, employment and family economic background affects exclusive breastfeeding outcomes (Kristiansen et al., 2010; Mauricio et al., 2008; Ochola et al., 2012; Weiqi, 2010; Wuthrich-Reggio, 2007). In a related study in Chile (Mauricio et al., 2008), single maternal marital status has been positively associated (OR: 2.49) with withdrawal from EBF. Maternal education beyond eight years of schooling was also found to have a significant effect on length of exclusive breastfeeding (Mauricio et al., 2008). In a related study by Wuthrich-Reggio in Utah USA, breastfeeding support effect on breastfeeding was found to be significantly different across different age groups of the breastfeeding mothers (Wuthrich-Reggio, 2007).

2.7 Interventions to promote exclusive breastfeeding

2.7.1 Baby friendly hospital initiative (BFHI)

The Baby Friendly Hospital Initiative is a global effort spearheaded by UNICEF and WHO (WHO/UNICEF, 2009a) to improve the role of maternity services to enable

mothers to exclusively breastfeed babies for the first six months after birth and thereafter continue breastfeeding for 2 years after they introduce complementary foods. The goal of BFHI is improving the care of newborns, mothers, and pregnant women at health facilities that provide health and maternity services for promoting, supporting, and protecting breastfeeding (Pilloton, 2012).

World governments and organizations also need to adhere to the International Code of Marketing of Breast Milk Substitutes to strengthen breastfeeding regulation (DiGiralamo et al., 2001). They need to educate all the hospital staff on promotion and support for breastfeeding, inform all pregnant women about the benefits and management of breastfeeding, supporting early initiation of breastfeeding within the first hour, show mothers how to breastfeed and how to maintain lactation even if they should be separated from their infants. The ten steps of BFHI (Figure 2.4) have been shown to increase the rate of breastfeeding. Termination to EBF has been shown to be 8 times more for mothers who do not experience equally similar services to BFHI (DiGiralamo et al., 2008).

Ten steps to successful breastfeeding

Ten steps to successful breastfeeding

- ***Have a written breastfeeding policy that is routinely communicated to all health care staff.***
- ***Train all health care staff in skills necessary to implement this policy.***
- ***Inform all pregnant women about the benefits and management of breastfeeding.***
- ***Help mothers initiate breastfeeding within a half hour of birth.***
- ***Show mothers how to breastfeed, and how to maintain lactation even if they should be separated from their infants.***
- ***Give newborn infants no food and drink other than breast-milk, unless medically indicated.***
- ***Practise rooming-in by allowing mothers and infants to remain together 24 hours a day.***
- ***Encourage breastfeeding on demand.***
- ***Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants.***
- ***Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.***

Figure 2.4: Ten steps to successful breastfeeding.
Source: Baby Friendly Hospital Initiative-BFHI (WHO/UNICEF, 2009a).

Several studies have shown the effectiveness of hospital-based interventions whether they are singly implemented or as part of the *Baby Friendly Hospital Initiative-BFHI* (Kramer, 2001; Philip, 2001; Merten et al., 2005; Taveras et al., 2004). In a national survey in Switzerland on effectiveness of BFHI at national level carried out by Merten and others; the rates of exclusive breastfeeding were found to be greater (42%) in BFHI implemented hospitals than in those hospitals not implementing BFHI (34%) (Merten, Dratva &Ackermann-Liebrich, 2005). Mothers usually indentify themselves with the early assistance or help received from the health professionals as the single most important intervention that could have offered them help during breastfeeding (Taveras et al., 2004).

Despite the potential to positively influence EBF, many health professionals are not trained in lactation management and hence they are poorly equipped to perform this role (Khoury &Hinton, 2002). In a study by Coutinho et al. (2005) in Brazil, a significant increase in early initiation of breastfeeding as well as EBF was realized in BFHI health facilities. Coutinho and others also noted that the hospital based initiatives need to be supported by community-based mother support to foster exclusive breastfeeding. According to KHDS (Kenya National Bureau of Statistics & ICF Marco, 2014), 61% of the women delivered in health facilities in Kenya and therefore, 29% of the mothers do not benefit from BFHI hospital based initiatives. Hence, there is need to support community-based initiatives to prolong the period of maternal support. These are the care practices which are related to the intra-partum stay of the mother at the hospital. They include care given to the mother during: pre-natal, labour, delivery and post-partum periods. Hospital stay is usually short but it makes a lasting impression on the mother and thus it is a critical period in breastfeeding.

2.7.2 Community-based interventions to promote exclusive breastfeeding

Community-based interventions have been shown to increase prevalence and duration of EBF in low and middle income countries especially in developing countries. In a systematic review of randomized controlled trials of community-based interventions involving breastfeeding by Sikorski and others (2003), it was shown that extra maternal support was beneficial in reducing the cessation of any breastfeeding before six months (RR [95% CI] 0.88 [0.81, 0.95]; 15 trials). The risk to stopping EBF was greatly reduced than any breastfeeding (RR 0.78 [0.69, 0.89]; 11 trials). In studies involving professional support the risk of any breastfeeding stoppage was significantly reduced (RR 0.89 [0.81,

0.97]; 10 trials) but not in the case of cessation to exclusive breastfeeding (RR 0.90 [0.81, 1.01]; 6 trials). Community-based interventions with lay support for breastfeeding mothers are shown to lower the risk of cessation of exclusive breastfeeding (RR 0.66 [0.49, 0.89]; five trials) (Sikorsi et al., 2003).

In a mother support group (MSG) study in Lalitpur in India by Kushwaha and others (2014), the prevalence of exclusive breastfeeding at six months significantly improved in intervention group compared to the control group{(50% vs 7%) AOR: 13.6(CI: 7.6-25.0), p=<0.0001)} at the in the second evaluation within one year {(60% vs 7%) AOR: 20.5 (CI: 11.3-37.2), p=<0.0001)}. In this study, the Mother Support Group (MSG) members visited mothers at home to promote and support optimal infant and young child feeding. The MSG made - 10 visits in the first 6 months, 6 in next 6 months and 3 in 2nd year. This was a quasi-experimental study involving a mother support group (MSG) with three trained members (a traditional birth attendant (TBA), community health/nutrition worker and an experienced mother) who gave one-to-one peer counselling to mothers at their households (Kushwaha et al., 2014).

Moreover, a study by Anderson and others (2005) in Low-income predominantly Latina community in USA showed that intensive community-based peer counselling has a significant effect on the rates and duration of exclusive breastfeeding. Mothers in the control group had a significantly higher risk (RR = 1.24; 95% CI, 1.09-1.41) of non-exclusive breastfeeding at 3 months compared to mothers in the intervention group (Anderson, 2005). In a different cluster randomized controlled trial in Belarus by Kramer

and others (2009), lactation support was given to mothers both pre- and post-natal period to promote exclusive breastfeeding. It was demonstrated that mothers in intervention clusters were more likely to exclusively breastfeed up to 3 months (43.3% vs 6.4%; $P<.001$) and up to 6 months (7.9% vs 0.6%; $P = .01$). The infants of mothers in intervention clusters were at significantly lower odds to suffer from gastro-intestinal infections compared to mothers in the control group (9.1% vs 13.2%; adjusted OR, 0.60; 95% CI, 0.40-0.91) (Kramer et al; 2001).

In another study done in Dhaka, Bangladesh by Haider and others (2000), it was shown that 70% of the mothers in the intervention groups exclusively breastfed their infants up to 5 months as compared to only 6% in control group. A study based on WHO/UNICEF Baby Friendly Hospital Initiatives by Kramer and others in Belarus (2009), a significantly ($p<.001$) higher prevalence (43.3%) of infants in the intervention group were exclusively breastfed compared to 6.4% in the control group at 3 months and the trend continued throughout infancy.

In a separate study done by Tylleskar and others in Burkina Faso and using a community-based randomized controlled trial, at six months, intervention clusters had 73% EBF rate while the control cluster had 22% EBF rate in Burkina Faso, 59% in intervention group and 15% in control group in Uganda (Tylleskär et al., 2011) using 24-hour recall method. In a related study in Malawi intervention groups with women groups and peer counsellors had a significant increase in EBF with infants having 5 times odds of being exclusively breastfed (5·02, 2·67–9·44) compared to the control groups (Lewycka et al., 2013) .

However, a systematic review of the impact of peer support using randomized cluster controlled trials has been shown to have a significantly greater effect on reduction of the risk of non-exclusive breastfeeding in low or middle income countries than in high income countries; 37% (0.63, 0.52 to 0.78) compared with 10% (0.90, 0.85 to 0.97) P=0.01 (Jolly et al., 2012). In a study conducted in Kibera informal settlement, Kenya; Ochola et al. (2012) established that mothers in the home-based intensive counselling group had a fourfold increased likelihood of exclusively breastfeeding their infants than those in the control group at six months after delivery.

2.7.3 Breastfeeding mother-to-mother support groups (MTMSGs)

A breastfeeding MTMSG is a peer support group composed of breastfeeding or pregnant mothers who meet on regular basis to '*provide emotional, appraisal and informational assistance by a created social network of members who possess experiential knowledge of a specific behaviour or stressor and has similar characteristics as the target population*' (Dennis, 2002). These groups may have the support of trained mothers or nutrition/health professionals. The 10th step of BFHI which is endorsed by WHO/UNCEF (2009a), recommends the formation and support of such breastfeeding support groups or peer support groups where mothers are referred to for breastfeeding support upon discharge from the hospital. This step forms a crucial link between initiation of breastfeeding at the hospital and continuation at the community (Kushwaha et al., 2014).

The goal of breastfeeding MTMSGs is to support pregnant and lactating mothers at the work place and at the community level. Intensive peer support implemented through individual or group counselling at prenatal stage with extension to postpartum through community counsellors and support groups has been shown to be effective in increasing rates of optimal initiation, exclusive breastfeeding and sustenance of breastfeeding (Chapman, 2004; Anderson, 2005). The support is usually given by pregnant or lactating mothers or those who have had earlier experience in breastfeeding. The support is usually provided in form of individual counselling or mother-to-mother support linkages.

Breastfeeding MTMSGs provides platform through which mothers can share experiences, learn from others as well receive counselling on breastfeeding, advantages of EBF and how to handle day to day challenges. In case of MTMSGs for HIV positive breastfeeding mothers, they help them fight stigma as a group (UNICEF, 2013). The facilitators for the MTMSGs should be trained so as to work individually or in groups through telephone, clinics, hospitals or institutions. They provide psycho-emotional support, encouragement, lessons on breastfeeding and help the mothers when they encounter problems related to breastfeeding. This has proved to be an efficient method as mothers usually rely on other mothers for information on breastfeeding and bringing up of the children (Shields, 2004).

In a case study conducted by Muruka and Ekisa (2013) on the impact of mother-to-mother support groups on maternal, infant and child nutrition (MIYCN) in Wajir and Habaswein districts in Kenya showed improvement in EBF. Exclusive breastfeeding rate in this study improved from 21.1% to 53.7% while initiation to breastfeeding within one

hour improved from 45.3% to 67.3% after one year intervention period. However, this study did not have a control group and it was not randomized. Generally, a review of available scientific literature on randomized controlled trials shows that so far no study of this kind has been done in promotion of EBF using MTMSGs in combination with IGAs and trained facilitators in Kenya. Given the importance of breastfeeding MTMSG interventions currently being advocated by UNICEF, NGOs and the MOH, lack of research in this field warranted this study (Republic of Kenya, 2012).

2.8 Summary of literature review

There has been slow progress in the improvement of the rates of exclusive breastfeeding worldwide despite various efforts to address the low rates. Even in the best performing countries, the rates fall short of the WHO recommendation of 90% exclusive breastfeeding rate. Studies have shown that BFHI has greater success at the hospital but not at the community level. Hence the need for community based initiatives such as breastfeeding MTMSGs. Despite the fact that studies have shown that community-based approaches are effective in increasing EBF rates, there is paucity of information on the impact of MTMSG in Kenya and elsewhere in the world. In addition, there is paucity of data on the effectiveness of MTMSGs in improving EBF rates. There is also no documentation on the effectiveness of IGAs in improving breastfeeding MTMSG attendance. This study therefore, investigated the effectiveness of the MTMSGs with IGAs and those without IGAs in promoting exclusive breastfeeding in Igembe South Sub-County, Meru County, Kenya.

CHAPTER THREE: METHODOLOGY

3.1 Research design

A cluster randomized controlled trial research design (Schulz et al., 2010) was used to assess the effectiveness of community-based MTMSGs in promoting exclusive breast-feeding. Randomization of clusters (health facilities) rather than individual participants was chosen to reduce the risk of contamination of information between mothers from different study groups because of close proximity to one another. The study adopted both qualitative and quantitative approaches to achieve its objectives. The study duration was 13 months with each participant being followed for a period of seven months.

3.2 Study variables

Dependent variable:

- Primary outcome: EBF during the first six months as determined by cross-sectional data (based on 24-hour recall) on a monthly basis and EBF determined by continuous/ cumulative EBF from birth to 6 months.
- Secondary outcome: MTMSG meetings attendance by members.

Independent variables:

- Maternal age was determined by the number of completed years since birth of the mother.
- Maternal membership to mother-to-mother support groups (MTMSGs).
- Maternal parity was determined by the number of children born before the index infant.
- Infant and maternal morbidity status was determined by two-week recall period.

- Education level of the mother was determined by highest education level attained
- Socio-economic status was determined by occupation, income sources, and size of land or animals owned or household items such as Television, cell phones or radio.
- Infant's nutrition status was determined based on weight-for-age index.

3.3 Location of the study

The study was conducted in Igembe South Sub-County in Meru County, Kenya. The Sub-County has mixed climatic conditions; highlands and arid zones. The Sub-County is part of the former Meru North District which suffers from periodic famine and has high malnutrition rate of 21% underweight and a high childhood mortality of 35 deaths per 1000 live births. The area has low levels of education with 86.9% of the people having only primary education or none at all. Majority of the people are peasant farmers according to Multi-Indicator Cluster Survey- MICS (Kenya National Bureau of Statistics, 2009).

There are two hospitals; Maua Methodist Hospital which is a mission hospital and Nyambene District Hospital which serves the former Meru North District. In Kenyan health system, a level 4 hospital (district hospital) is a health facility which provides curative and preventative health care services as well as being a referral hospital for all Kenya Primary Health (KEPH) care institutions such as health centres, dispensaries or private clinics. All the three health centres in the Igembe South Sub-County (Kangeta, Kanuni and Kiegoi) were involved in the study. In the Kenya, a health centre is a primary

health facility which mainly deals with preventive and promotive health care but it also carries out some curative, maternity and referral services to district hospital (Republic of Kenya, 2010). Before this study started, a field visit to the Sub-County by the researcher established that there were no breastfeeding MTMSGs at the 3 study sites or elsewhere in Igembe South Sub-County.

3.4 Sample size determination

The sample size for this study was derived using the following formulae by Kelsey and others (1996) and Fleiss (1997)

$$n_1 = \frac{(Z_{\alpha/2} + Z_{1-\beta})^2 \bar{p}\bar{q}(r+1)}{r(p_1 - p_2)^2}$$

and

$$n_2 = r n_1$$

Where n_1 = Number in control group

n_2 = Number in the intervention groups

$Z_{\alpha/2}$ = Standard normal deviate for two-tailed test based on alpha level (relates to the confidence interval level)

Z_{β} = Standard normal deviate for one-tailed test based on beta level (relates to the power level)

r = ratio of intervention groups to control group

p_1 = proportion of infants in control group being exclusively breast-fed and $q_1 = 1-p_1$

p_2 = proportion of infants in intervention groups being exclusively breast-fed and

$q_2 = 1-p_2$

$$\bar{p} = \frac{p_1 + rp_2}{r+1} \quad \text{And } \bar{q} = 1-\bar{p}$$

The sample size formula without the correction factor by Fleiss is:

$$n_1 = \frac{\left[z_{\alpha/2}\sqrt{(r+1)\bar{p}\bar{q}} + z_{1-\beta}\sqrt{rp_1q_1 + p_2q_2}\right]^2}{r(p_1 - p_2)^2}$$

$$n_2 = rn_1$$

For the Fleiss method with the correction factor, take the sample size from the uncorrected sample size formula and place into the following formula:

$$n_{1c} = \frac{n_1}{4}\left[1 + \sqrt{1 + \frac{2(r+1)}{n_1 r|p_2 - p_1|}}\right]$$

$$n_{2c} = r\,n_{1c}$$

In-putting the parameters in the Table 3.1 into this formula using a sample size calculator (StatCalc, CDC) yielded a sample size of 180 participants (Table 3.1)

Table 3.1: Sample size determination for the randomized controlled trial

Two-sided significance level(1-alpha):	95
Power (1-beta, % chance of detecting):	80
Ratio of sample size, intervention/control ratio	2
Percent with control EBF outcome:	19
Percent of intervention expected with EBF outcome:	40
Odds Ratio:	2.8
Risk/Prevalence Ratio	2.1
Risk/Prevalence difference:	21

	Kelsey (1996)	**Fleiss (1981)**	**Fleiss with CC**
Sample Size – control	52	53	60
Sample Size- intervention (2 groups)	103	106	120
Total sample size:	155	159	180

The total sample was inflated by 23% to take care of possible attrition, giving a total of 222 subjects with 74 in each of the three study groups (the control group and the two interventions groups).

3.5 Randomization

Three health centres were randomly assigned into the three study groups: mother-to-mother support groups (MTMSG) with education support (MES), MTMSG with education nutrition/health education support and income generating activity (MESIGA) and control group (CG). Health centres rather than the pregnant women were randomized. This type of randomization minimized contamination of the expected results if mothers from the same health centre were assigned different study groups. Randomization was computer generated on a 1:1:1 ratio using Micro-soft Excel 2003 software and it was done by the researcher assisted by an independent biostastician without knowledge of the study area. The researcher provided the biostastician with a list of 3 health centres and the 3 treatment groups.

3.6 Target population

The target population was pregnant mothers in their third trimester (33-37 weeks) gestation age, registered at ANC clinics at any of the three health centres. The total number of mothers was estimated to be 300 mothers (from hospital records) in the three study sites (average for a 3 month period retrospectively) from the field visit carried out in April, 2011.

3.6.1 Inclusion criteria

Mothers who were in their third trimester of pregnancy (33-37 weeks gestation) and HIV negative were included in the study. The gestation age and HIV status were determined from their mother and child health booklets and hospital records respectively. Another inclusion criterion was that one ought to have been resident in the study areas for at least six months before the study and planned to stay in the study site for at least seven months from the time of recruitment into the study.

3.6.2 Exclusion criteria

Mothers with a history of pregnancy complications such as diabetes, eclampsia, hypertension or hyperemesis gravidum based on medical records were excluded from the study.

3.7 Recruitment of mothers into the study groups

Mothers were recruited and registered into the study groups based on the health facility attended during ANC clinics. The researcher explained to the MCH/ANC nurses the purpose of the study, the procedures as well as their role in the study. Their role was essentially to assist the researcher in recruitment and registration of the mothers who met the inclusion criteria into the various study groups. Before registration, the nurses explained the procedures of the study to the mothers. The researcher together with a nurse carried out the registration of the mothers for the first 3 days at each station to ensure consistency in the process. Thereafter, the nurses registered all the women who met the inclusion criteria and gave them a meeting date with the researcher.

The researcher assisted by the nurse-in-charge, verified that all the women met the inclusion criteria by checking their mother and child booklets. The information was verified with the mothers before the researcher recruited them by requesting them to sign the consent forms (Appendix B). After recruitment, mothers were grouped into six MTMSG groups of up to 15 mothers each to allow for easy facilitation according to MTMSG Facilitators' Manual (PATH/UNICEF, 2011). The above procedure was repeated on a weekly basis for the three study groups until the sample size was achieved. All MTMSG meetings by the two treatment groups were scheduled on monthly basis at respective health centres on different dates to allow the researcher to attend them. No MTMSGs were formed in the control group. Mothers in this group were assigned a return date for MCH clinic and data collection by the researcher

3.8 Blinding of the study

The nurses at the three health centres involved in the study and mothers were blinded to the study hypotheses but not to the intervention at their sites. The mothers and the nurses were informed that the objective of the study was to promote breastfeeding in Igembe South Sub-County in Meru County. The enumerators whose responsibility was data collection at the three study sites were also blinded to the study hypotheses. There was no interaction between the enumerators and the MTMSG facilitators to avoid bias during data collection. The MTMSG facilitators were aware of the interventions in each treatment group because they were supposed to promote and support EBF. The researcher alone was aware of the study hypotheses.

3.9 Description of the interventions

Control Group (CG) Mothers in this study group received the standard infant and young child nutrition/health education offered at the three health facilities. These were composed of nutrition/health education sessions usually given at the ANC/MCH clinics by the nurse-in-charge of ANC. Each session lasted 40 minutes with about 10 minutes spent on nutrition issues, sometimes nothing was mentioned on exclusive breastfeeding. The sessions were conducted at the same time to all present mothers and due to under-staffing in most health facilities, the education sessions were not conducted regularly but inconsistently depending on availability of health staff and time. The schematic flow chart (Figure 3.1) shows the details of recruitment, MTMSGs formation and the interventions carried out during the study. Mothers in this study group did not receive any support from the study team.

Treatment Group 1: (MTMSG with education support only- **MES**) received exclusive breastfeeding education and support from the research team. The treatment group was composed of six MTMSGs to facilitate easy sharing of breast-feeding information and support for each other. Each MTMSG was composed of up to 15 mothers for easy interaction and coordination. Groups were formed according to where the members resided with women from same or neighbouring villages joining one group for easy sharing of information, support and mobilization for meetings. All MTMSG groups chose health facility where they were recruited as their meeting venue. The date of each MTMSG meeting was arranged to coincide with the MCH clinic day so that mothers were able to attend to the two activities on the same day. Mothers attended the meetings

after the clinic. The duration of the meetings was one hour as per session and the MTMSG Facilitator's Manual was used as a standard for all MTMSGs (PATH/UNICEF, 2011). The MTMSGs groups met on a monthly basis; once during prenatal period and during postnatal period up to the sixth month after delivery.

During the MTMSGs meetings, members sat in a semi-circle facing one another to allow for eye contact and facial expressions among mothers. The facilitator moderated the meetings to ensure each mother freely contributed to the breastfeeding topic being discussed. Each opinion was considered by the others and none of the mothers dominated the meeting. During the different meetings a different topic on infant young child feeding was introduced by the facilitator and discussed by the mothers. The topics covered various aspects of exclusive breastfeeding such as: advantages of exclusive breastfeeding, breastfeeding myths, early initiation and sustenance of breastfeeding, breastfeeding techniques-proper positioning and attachment of the infant to the breast. The mothers also discussed prevention, symptoms and management of common breastfeeding difficulties such as breast engorgement, low milk output, cracked/sore nipples, mastitis and breast milk expression (Appendix S).

The members of the group with specific problems such as lack of breastfeeding confidence received individual support from the group members as well as the facilitator. The members interacted freely and shared experiences on exclusive breastfeeding and their coping strategies to the challenges they faced. The meetings and the content of the discussions were more specific to exclusive breastfeeding and tailored to ensure

maximum support for breastfeeding unlike the general health/nutrition talks given to mothers in CG. Unlike the health/nutrition talks offered in control group, mothers in the two treatment groups sought clarification on pertinent issues affecting their breastfeeding, supported one another after the meetings and sought the assistance of the facilitator whenever it was necessary. All mothers in a MTMSG shared their mobile phone contacts. Mothers who did not have a phone gave a phone number of their closest neighbour. The mothers were thus able to communicate with the facilitator for urgent assistance. The researcher attended each of the MTMSG meetings and followed the proceedings to ensure the MTMSG facilitation guidelines (PATH/UNICEF, 2011) were followed and clarified issues on the topic of discussion raised by the mothers concerning exclusive breastfeeding.

Treatment Group 2 (MESIGA- MTMSGs with breastfeeding education support and income generating activities). The recruitment and formation of MTMSGs in this study group was carried out in the same way as the MTMSGs in treatment group 1. The study group had 6 MTMSGs made up of up to 15 members who originated from same neighbourhoods. All MTMSGs were formed during the first month after recruitment before mothers delivered. The participants decided on their meeting dates and venues as health facility closest to them. They conducted their meetings with trained facilitators moderating in a similar fashion and for a similar duration as in MES. The content of each session was similar to that in MES. They conducted their meetings for the same number of times and duration as their colleagues in Treatment Group 1. The researcher attended each of the meeting with the facilitator to ensure standardization of frequency, content

and duration of meetings in the two study groups. Mothers in this study group received the same education support (Appendix S) including regular and close interaction with peers at community level; close and individualized attention from peers and facilitator for specific breastfeeding challenges. Like in MES, mothers in this study group shared their phone numbers for regular communication and support from peers and the facilitator.

Unlike their counterparts in MES, mothers in MESIGA had longer meetings. After the stipulated one hour meeting was over, mothers in this study group carried out an income generating activity (IGA). Initial capital for IGA was provided by the researcher with funding from National Council of Science and Innovation (NACOSTI) which supports research activities in Kenya. All MTMSGs in MESIGA took another one hour after their breastfeeding discussion to make liquid soap which had earlier been identified as their preferred income generating activity. During the second month, a-one day training for liquid soap making was carried out in the 6 MTMSGs in MESIGA study group by the researcher. The content of the training involved practical mixing of soap ingredients; packing of the soap and utilization of the soap; sales and marketing of the soap and sustainability of the income generating activity (Figure 3.1).

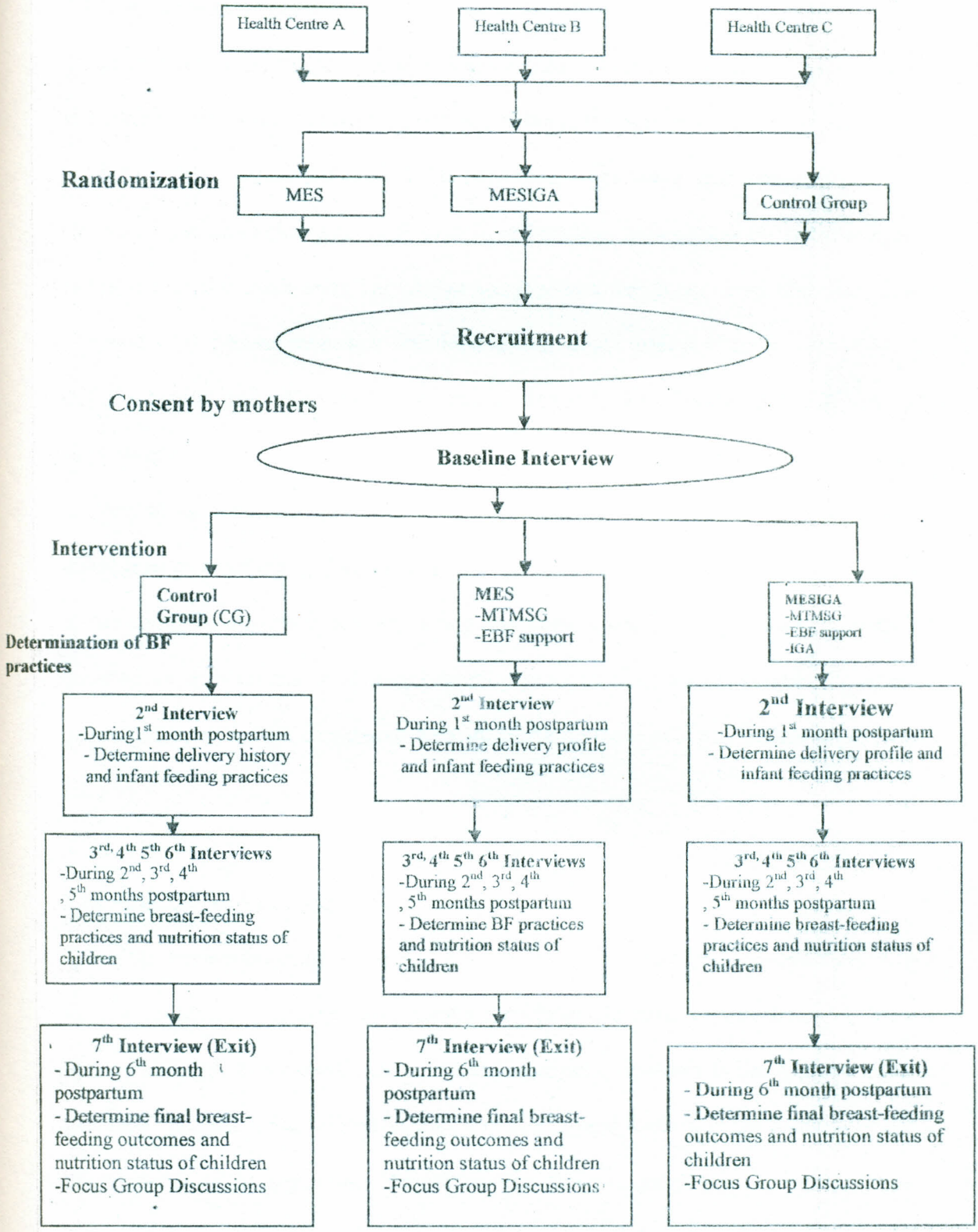

Figure 3.1: Schematic representation of study design, intervention and data collection

3.10 Research instruments

Three research instruments were used during data collection: focused group discussion guidelines, semi-structured questionnaires and breastfeeding observation guidelines were used to collect data on maternal breastfeeding knowledge and practices. A semi-structured questionnaire was used to collect baseline information on socio-economic status, maternal breastfeeding knowledge and practises within one week after recruitment (Appendix D). Second interview was done at first month after delivery to collect data on delivery profile and infant feeding practices (Appendix E). The third, fourth, fifth and sixth interviews were done at second, third, fourth and fifth months respectively after delivery using the same interview questionnaire to collect quantitative data on maternal infant feeding practices and infant weight (Appendix F). The seventh interview was done at the sixth month after delivery using the same interview questionnaire to collect quantitative data on maternal infant feeding practices and infant weights. A different questionnaire to collect qualitative data on IGAs performance was included (Appendix G).

3.11 Selection and training of data enumerators

Two data enumerators were selected per site by the researcher. The selection criteria were; a minimum qualification of Kenya Certificate Secondary Education (KCSE) and fluency in English, *Kiswahili* and *Kimeru* languages. Kiswahili is the Kenyan national language, English is the official language in Kenya and *Kimeru* is the local language of the residents of the study site. Preference was given to those who had participated in surveys before. Three-day training was conducted for all the enumerators using FANTA

Anthropometric Guidelines (2008). The training was conducted by the researcher. During the training, the objectives of the study were explained to the enumerators but they were blinded to the study hypotheses.

The participants were trained on data collection techniques, interviewing techniques such as how to ask the questions to get information on infant feeding practices; maternal breastfeeding knowledge and practices through demonstrations and role plays. The enumerators were also trained on how to take infant anthropometric measurements through practical demonstrations and step by step practical exercise in calibration of infant scales, taking and recording infant anthropometric measurements. To ensure that all the measurements were standardized during the training, a standardization test was carried out by the researcher on all the enumerators. Before the standardization test, the infant weighing scales were calibrated to accuracy of 0.01kg. The researcher measured 10 infants aged 0-6 months. The infants were weighed with light vests using standard procedures; the weight of the vest was subtracted from the infant weight. Infants' weights were taken using infant weighing scales (Baby Weighing Scale Pan Type. Model GPS070). The infants were laid down at the middle of the pan and weight taken. The infant weights were taken and recorded twice at an accuracy of 0.01kgs and the average calculated to give infant's weight.

The researcher weighed every infant with the same infant weighing scale while concealing the values from the enumerators. Same procedure was used by the enumerators to take weight of the same infants. The enumerators were paired, but each of

them carried out the measurements in turn. Each pair of enumerators started with a different infant and each weighed the infant once and recorded the weight in a pre-prepared standard form for the 1st weight.

The researcher observed how measurements are being taken by each enumerator. When every one of the enumerators had weighed first infant they moved on to the next infant. When the 10 infants had been weighed once by all enumerators, the filled forms were given to the researcher and second standard forms were given to them by the researcher. Enumerators repeated the above process without being allowed to check their first measurements and recorded the weights in the 2nd form. The researchers' measurement values were used as the reference. Correlation coefficients of the two sets of results were determined using Essential Nutrition Actions (ENA) software. A precision value of less than twice the correlation coefficient of the researcher was considered adequate; an accuracy of less than 3 times the correlation coefficient of the researcher was considered adequate. All enumerators' results showed correlation coefficients of less than two for precision and less than three for accuracy.

3.12 Selection and training of MTMSG facilitators

Five MTMSG facilitators were selected by the researcher. The selection criteria were; local females who had completed a minimum of secondary school education (12 years) and attained a Kenya Certificate Secondary Education (KCSE), fluent in English, *Kiswahili* and *Kimeru*. The researcher together with a lactation management consultant in breastfeeding training (a university graduate in nutrition sciences with 5 year experience

in breastfeeding training) trained the facilitators. All the MTMSG facilitators underwent forty hours of training. The training was conducted at Nyambene District Hospital (central to all the study sites but not involved in the study). The aim of the training was to ensure that the facilitators understood the objectives of the study, they knew their roles and responsibilities in MTMSG facilitation; they got adequate knowledge and skills in breastfeeding and attained adequate facilitation and counselling skills to manage MTMSGs. The content of the training included: advantages of exclusive breastfeeding; breastfeeding myths; early initiation and sustenance of breastfeeding; breastfeeding techniques-proper positioning and attachment of the infant to the breast; prevention, symptoms and management of common breastfeeding difficulties; breast milk expression, breastfeeding in the context of HIV/AIDS and MTMSG facilitation skills (Appendix V).

At the beginning of the training, the facilitators were given a pre-test to determine their level of knowledge in breastfeeding. The training was carried out through power point presentations, discussions and brainstorming. Facilitation skills were imparted through lectures, role plays and demonstrations during a pre-testing exercise carried out at a site similar to study sites but not involved in the study itself. At the end of the training, they were given a post-test to evaluate if they had gained adequate knowledge and skills to competently facilitate MTMSGs in their assigned study sites. Each of the participants was given a chance to act as a facilitator in role play with colleagues forming a mock MTMSG and during pretesting with a group of pregnant and lactating mothers. The researcher carefully followed the proceeding, advised and corrected the participants to

ensure they were competent enough to handle MTMSGs at their study sites. All the facilitators passed post-test at the end of the training (Appendix U).

3.13 Pretesting of research tools

Training of the data enumerators was followed by pretesting of the tools at a site with similar conditions but not involved in the study. Laare Health Centre in the neighbouring Igembe North Sub-County was selected for this exercise. All data enumerators were involved in the pretesting of the tools. During the pretesting, all enumerators interviewed one mother each and recorded the responses. They also took anthropometric measurements of one infant each. The results from each enumerator were compared to the researcher measurements and each enumerator advised on how to improve performance. To ensure that the data collected was standardized, all enumerators took turns to interview one mother and weigh one infant. The results were compared with the researcher results of the same mothers. Those with varying results repeated the exercise. After the pre-testing, the participants were asked for feedback on their understanding of the questionnaire and corrections were done before the main study to enhance accuracy of the information collected.

During the pretesting exercise, each of the trainee MTMSG facilitator was given a chance to act as a facilitator in a mock MTMSG group composed of pregnant and lactating mothers mixed together. Each of proceedings was tape-recorded separately. Immediately after the meetings, mothers were asked for feedback on how the meetings can be

improved. Following the mock MTMSGs, the tape-recordings and notes on feedback from the mothers were reviewed and discussed with the facilitators.

3.14 Validity and reliability of the questionnaires

The content of questionnaires used in this study was validated using indicators for exclusive breastfeeding from WHO/UNICEF (2009a) and Ochola (2008). The content of the questionnaires were further validated by qualified specialists in nutrition from the Department of Food, Nutrition and Dietetics at Kenyatta University. The research tools were also reviewed and approved by an ethical review committee from Kenyatta National Hospital and University of Nairobi. They were face-validated and therefore the process of content validation at the field was shortened. The questionnaires were pre-tested on 20 mothers (10 pregnant in their third trimester and 10 lactating mothers with infants below six months) at Laare Health Centre. This health centre had similar characteristics with study health facilities but it was not included in study. The questionnaires were pre-tested for length, question wording, content and language. This allowed for correction of errors in wording and removal of any ambiguous questions to ensure clarity and for mothers to provide the required information.

During pre-testing, all enumerators interviewed one mother twice on two different days and recorded the responses on two questionnaires. Each enumerator calibrated one infant scale twice under supervision of the researcher. They also weighed and recorded the weight of one infant twice. Correlation coefficients of the two sets of results were determined using SPSS software (version 17.0). All participants had a score of above

0.91(anthropometric measurements) and above 0.85 (questionnaires) which was an acceptable level of reliability.

3.15 Data collection techniques

3.15.1 Determination of infant feeding practices

A baseline interview was conducted for the three study groups; two treatment groups (MES and MESIGA) and the control group (CG) within one week after recruitment at the health facility. This interview was to determine the maternal socio-economic status, breastfeeding knowledge and practices. A semi-structured questionnaire was used for the baseline interview and it was administered by the trained data enumerators to all the mothers in the three study groups to determine their socio-economic and demographic indicators (Appendix D). The second interview was conducted using a different structured questionnaire administered during the first month postpartum to all mothers in the three study groups to determine mothers' delivery profiles and maternal infant feeding practices at first month after delivery (Appendix E).

During the second month after delivery, a third interview was administered to mothers in all the three study groups to determine maternal infant feeding practices at two months postpartum (Appendix F). At third, fourth and fifth months after delivery; fourth, fifth and sixth interviews were conducted respectively with all the mothers in the three study groups using similar questionnaires as the one used for the third interview. These interviews solicited information on maternal infant feeding practices at 3rd, 4th and 5th months respectively after delivery. The final interview (seventh interview) was conducted

at six months postpartum using the seventh interview questionnaire and it was administered to all mothers in the three study groups (Appendix G). During each interview, the weights of the infants were taken. The researcher supervised all data collection activities to ensure they were reliable (Figure 3.2)

Determination of infant feeding practices: Schematic presentation

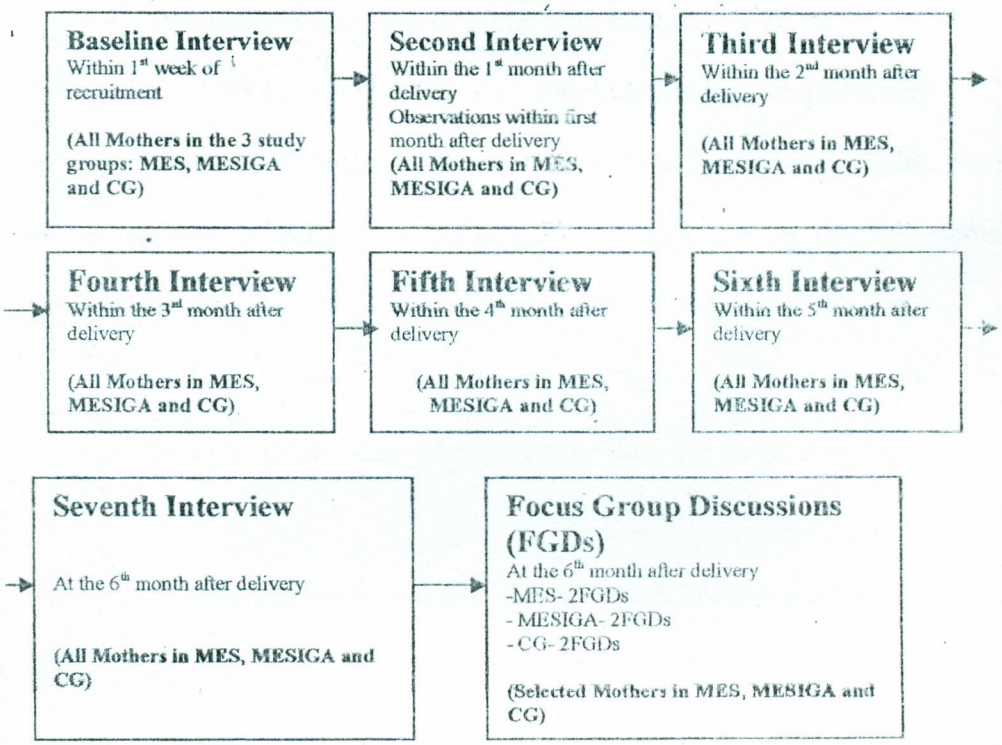

Figure 3.2: Schedule of interviews, observations and FGDs

3.15.2 Focus group discussions

The participants for the focus group discussions were randomly selected from each of the three study groups during the seventh month of participation in the study. Each group comprised of 6-12 members. For each study group; two focus group discussions were conducted. One FGD for those who exclusively breast-fed for six months after delivery

and another FGD for those who did not exclusively breast-feed for six months after delivery. This made a total of 6 focus group discussions distributed across the three study groups as follows:

- Control group:

  One FGD for mothers who exclusively breastfed for six months.

  One FGD for mothers who did not exclusively breastfeed for six months.

- Mother-to-mother support group with education support:

  One FGD for mothers who exclusively breastfed for six months.

  One FGD for mothers who did not exclusively breastfeed for six months.

- Mother-to-mother support group with education support and income generating activity:

  One FGD for mothers who exclusively breastfed for six months.

  One FGD for mothers who did not exclusively breastfeed for six months.

The FGDs were conducted using FGD guidelines (Appendices M-R). Members of each FGD group were randomly selected to represent various socio-demographic status, age groups as well as level of education. Appropriate venues to all participants were selected by the members of each FGD. The Researcher conducted all FGDs assisted by recorder and an observer who took notes. The FGD proceedings were tape-recorded with permission from the participants.

FGDs were conducted in a similar way to ensure all responses were standardized. The following procedure was followed in all meetings:

- Each meeting was conducted by the Researcher assisted by a recorder and an observer.
- The researcher introduced the recorder (enumerator) and the observer (facilitator) and then invited the mothers to individually introduce themselves.
- The Researcher explained the roles of the project staff to members. He also announced the purpose of the meeting and the rules to be followed.
- The FGD guidelines were followed careful during the discussion to ensure the various issues highlighted were addressed.
- The Researcher moderated the meeting to ensure all mothers participated and their opinions were considered in the discussion.
- When the last issue on the list was addressed, the Researcher allowed mothers to raise any issue on the project which they thought had not been addressed during the meeting.
- The recorder took notes and tape-recorded the proceedings of the meetings while the observer noted any non-verbal cues.

3.15.3 Anthropometric measurements of the infants

Weights of the infants were taken during the monthly MTMSG meetings at the health facilities. Infants were undressed to near nudity and weighed using the Infant Weighing Scale (at accuracy of 0.1kg). All measurements were taken twice and the average determined. The difference between two readings was less than 0.1kg (weight) for

measurements to be accepted. Infant's age was determined from the mother and child health booklets. To further ensure reliability and validity of the data collected, the researcher supervised the enumerators on: calibration of the equipments, conducting measurements and recording. Calibrations of equipments were done on daily basis in the morning. Standardization procedure for protocols of calibration, measurements and recording was repeated after every two months during the study period.

3.15.4 Key informant interviews

Key informant interviews were conducted at the end of the study to collect information on operational constraints and challenges of MTMSGs. These were done with the 5 MTMSG facilitators as well as the 3 nurses-in-charge of ANC/MCH clinics involved in the study. The interviews were carried out at the end of the study period at the health facilities by the researcher. The purpose of the key informant interviews was to validate the information received from the FGDs on challenges faced by mothers in the practice of exclusive breastfeeding. The facilitators also provided an overview of the challenges faced in operating MTMSGs in their specific study sites.

3.15.5 Observations of maternal breastfeeding practices

Observations on maternal breastfeeding practices in households were done to verify the exclusive breast-feeding practices of the mothers. The indicators were: exclusive breast-feeding (main indicator), positioning of the infant on the breast, bottle feeding, the length and frequency of breast-feeding as well as other feeds given to the infant. These observations were carried out by the researcher assisted by enumerators for 8 hours a day

during unannounced home visits. A sub-sample of 10% was selected randomly using random table numbers by the researcher from each of the study groups for observation. All mothers who were randomly selected were available for the whole day starting from 8.00am to 5.00pm. Two observations were conducted in each study group: first observation was done within a fortnight after delivery and the second observation during the fifth month after delivery (Appendix H). The observations were conducted to verify the reported maternal breastfeeding practices as well as verify information given during focus group discussions (Figure 3.3).

Maternal infant feeding practices observation schedule

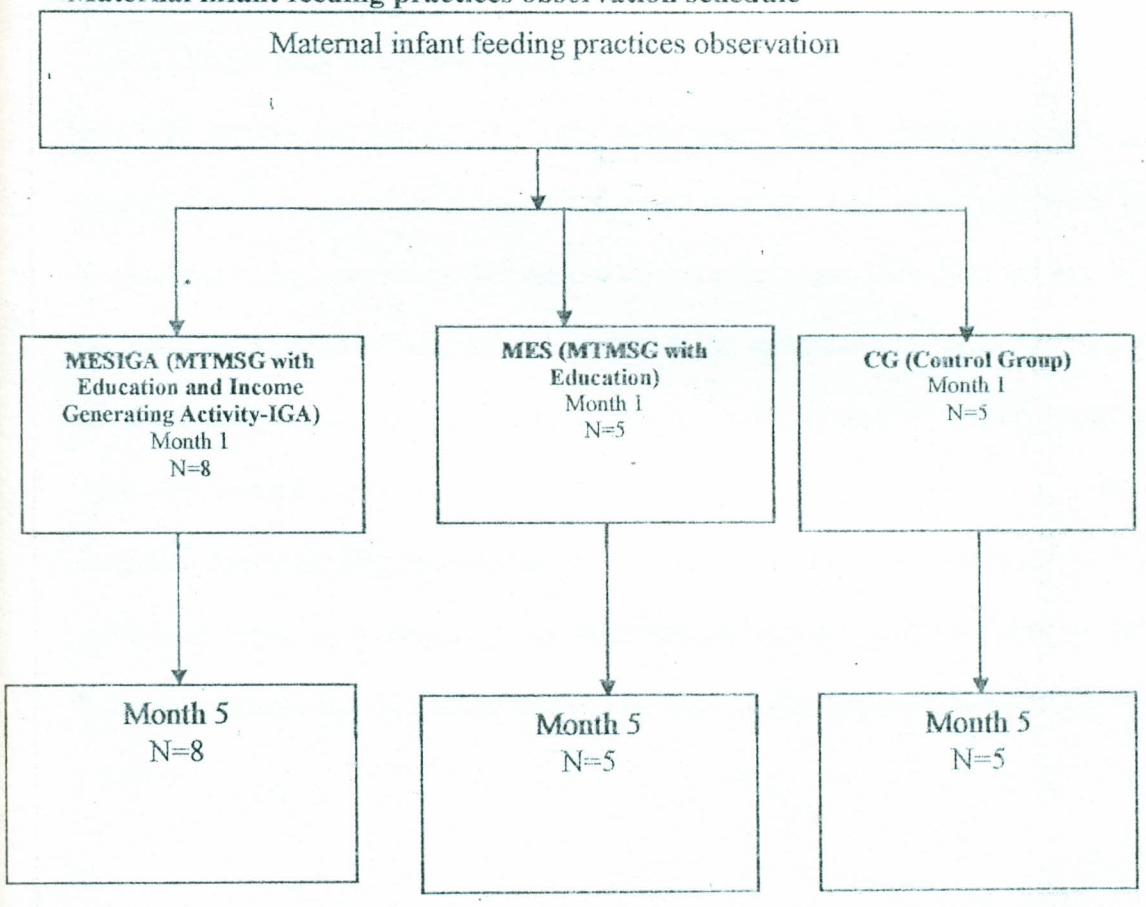

Figure 3.3: Maternal infant feeding practices observation schedule

3.16 Data analysis

Data was entered, cleaned and coded before being analysed using Epi-Info 3.5 software (Centers for Disease Control and Prevention (CDC). Data was run for exploratory analysis using SPSS software (SPSS Statistics for Windows, Version 17.0. Chicago: SPSS Inc.). Further analysis was carried out using SAS 9.3 software (Statistical Analysis System, version 9.3, Cary, NC). Descriptive statistics: frequencies, percentages, means, standard deviations and medians were used to summarize the socio-economic and demographic characteristic of the population, exclusive breast-feeding prevalence rates, maternal breast-feeding knowledge and practices.

Kruskal-Wallis tests were used to analyse for differences between means of continuous data with non-normal distribution. They were further used to check for differences in means of the two treatments groups and the control group. Chi-square tests were applied to determine any association between socio-economic and demographic factors with exclusive breast-feeding practices as well as other maternal and infant characteristics. Bivariate and multivariate logistic regression was used to identify various predictors of exclusive breast-feeding practice such as parity, infant's age, mother's age, maternal exclusive breast-feeding knowledge and practices. Median test was used to analyze differences between medians of the different continuous variables between the two treatments groups and the control group. The level of significance was set at a p-value of <0.05.

Nutrition status was analysed using WHO Anthro 2005 Beta Version software. WAZ z-score was used to determine the nutrition status of the infants. Prevalence of underweight was determined as (<-2 z-score), moderate underweight as (<-2 z-score and >=-3 z-score) and severe underweight as (<-3 z-score) and categorising the results using the WHO Child Growth Standards cut-off points (WHO/UNICEF, 2009c). Qualitative data from FGDs and key informant interviews were transcribed, coded and then summarised into indentified infant young child feeding practices themes then inferences made on each theme. The findings were used to complement quantitative findings during the discussion.

3.17 Logistical and ethical considerations

The research proposal was approved by the Graduate School of Kenyatta University and authority to conduct the research was given by the National Commission for Science, Technology and Innovation (NACOSTI). Ethical clearance was obtained from Kenyatta National Hospital/University of Nairobi (KNH/UoN) Ethical Review Committee. Women were recruited upon their informed written consent or by thumb print for those who were illiterate. All the information collected from the study subjects was kept confidential and was only used for the study purposes. Questionnaires were coded to avoid entry of names of those interviewed. All questionnaires were secured by data enumerators and handed over to the Researcher in person. The researcher ensured all the data was entered and hard copies stored safely for future reference. Sick or malnourished infants in the control group were referred to health facility for specialised attention.

CHAPTER FOUR: RESEARCH FINDINGS

4. 1 Study participants' enrolment into the study

A total of 1,537 pregnant mothers attending ANC clinics at the three sampled health centres in Igembe South Sub-County, Meru County during an 8-month recruitment period were screened. Screening and recruitment of mothers into the three study groups started in December 2012 and ended in July 2013 when the required study sample size was achieved. Nearly equal numbers of study participants per group were recruited

Of the screened mothers, a total of 390 met the inclusion criteria of whom 141 did not want to participate in the study resulting into a 63.8% response rate. However, not all the mothers who met the inclusion criteria were recruited into the study. A total of 249 mothers were recruited into the study. The rest of the mothers (141) did not want to be included for the following reasons: long distance from home (24.4%), husband did not offer consent for participation in the study (5.6%) and those who expected to relocate within the study period (6.2%). Of the 249 mothers recruited into the study, 88 (35.6%) were in the MESIGA, 82 (32.9%) were in MES and 79 (31.5%) were in CG) (Figure 4.1).

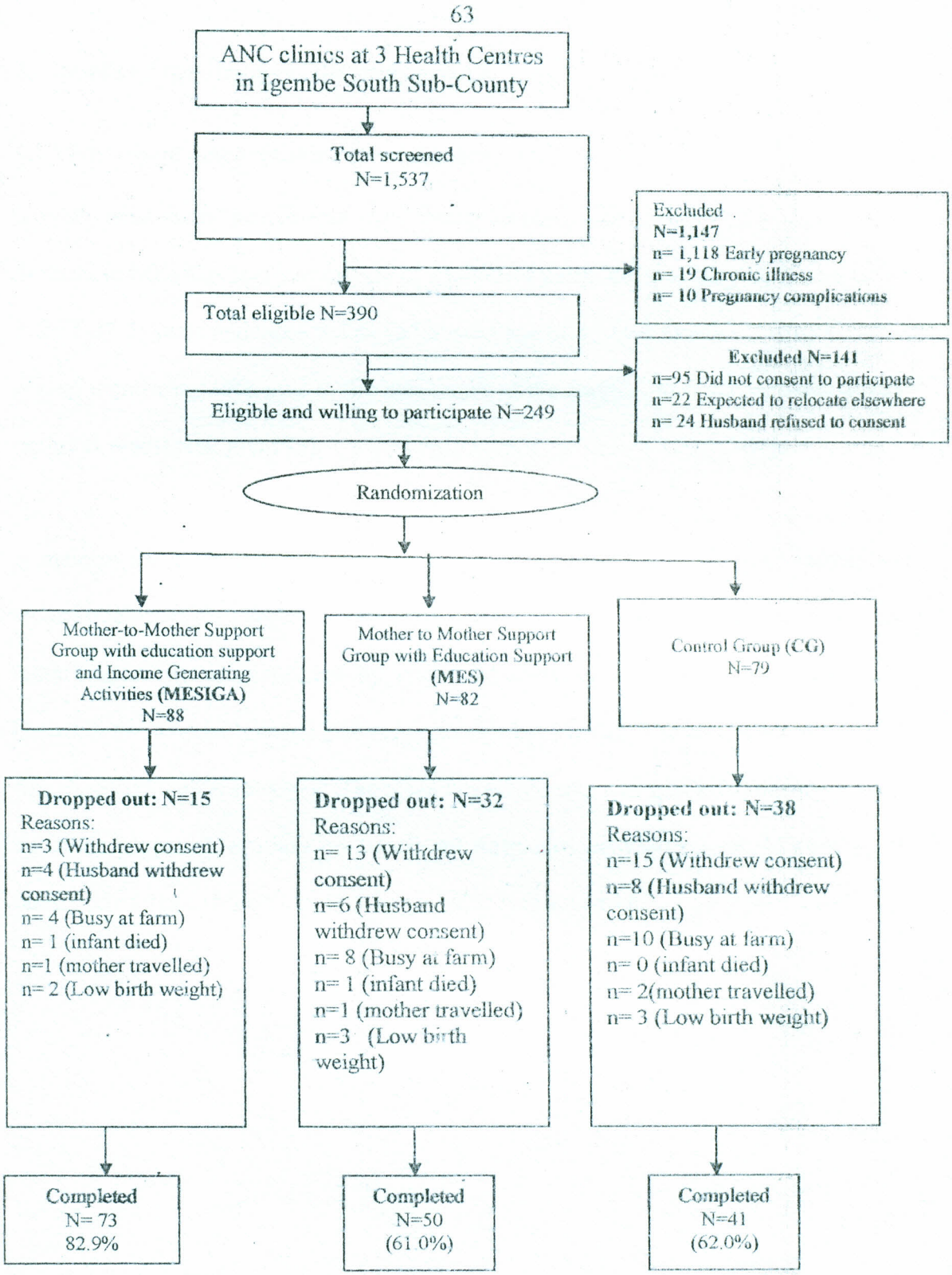

Figure 4.1: Trial profile

4.2 Baseline comparisons of the study groups

4.2.1 Household demographic characteristics

Overall, most study participants were young women with some in their adolescence. Mothers in MESIGA had a mean age of 23.4(±5.0) years, those in MES had a mean age of 23.7(±5.3) years and those in CG had a mean age of 23.7(±4.4) years (Table 2). There was no significant difference in the mean ages of the mothers in the three study groups (Kruskal Wallis test; p=0.973).

A majority of the mothers in the study were married (91.6%) with only 8.4% of the mothers being single (Table 2). The Meru community is predominantly patriarchal with most households being headed by males. Majority of households were headed by husbands (92.4%) with only 5.6% being headed by females. The rest of the households were headed by other relatives. The mean household size was 4.0 (1-10) members for all the study groups. There was no significant difference between household sizes in the three study groups (Mood's median test; p=0.625) (Table 4.1).

Table 4.1: Household demographic characteristics

Characteristics	Study groups MESIGA (N=88) n(%)	MES (N=82) n(%)	CG (N=79) n(%)	Total (N=249) n(%)	Chi-square & KW test Median test p-value
Maternal Age					
Below 20yrs	25(28.4)	22(26.8)	14(17.7)	61(24.5)	0.541
20-24yrs	31(35.2)	30(36.6)	36(45.6)	97(39)	
25-34yrs	27(30.7)	25(30.5)	27(34.2)	79(31.7)	
35yrs and above	5(5.7)	5(6.1)	2(2.5)	12(4.8)	
Mean Age (SD)	23.4 (5.0)	23.7 (5.3)	23.7 (4.4)	23.6 (4.9)	0.664
Marital status					
Married	80(90.9)	74(90.2)	74(93.7)	228(91.6)	0.709
Single	8(9.1)	8(9.8)	5(6.3)	21(8.4)	
Household-head					
Husband	80(90.9)	75(91.5)	75(94.9)	230(92.4)	0.716
Wife (self)	6(6.8)	4(4.9)	4(5.1)	14(5.6)	
Other male person	2(2.3)	2(2.4)	0(0)	4(1.6)	
Other female person	0(0)	1(1.2)	0(0)	1(0.4)	
Parity					
0	31(35.2)	29(35.4)	33(41.8)	93(37.3)	0.076
1	17(19.3)	22(26.8)	26(32.9)	65(26.1)	
2	20(22.7)	17(20.7)	16(20.3)	53(21.3)	
3	12(13.6)	11(13.4)	3(3.8)	26(10.4)	
4	8(9.1)	3(3.7)	1(1.3)	12(4.8)	
Median Household-size (Range)	4.0 (1-8)	4.0 (2-10)	4.0 (2-9)	4.0 (1-10)	0.625

KW= Kruskal Wallis test

4.2.2 Mother's education level and occupation by study groups

Majority of the mothers (83.9 %,) had completed 8 years of primary school education. Only 3.2% had college or university level of education. A very small percentage (2.0%) of the mothers reportedly had no formal education at all. Most (77.9%) of the study participants' partners/spouses had completed primary school education (chi-square test;

p=0.667). Few of the partners had attained secondary school education (12.4%) and only 2.4% (6) of them had college or university education. Notably, 7.2% of the husbands had never attended school (Table 3). There was no significant difference in the level of education of mother/partners by study groups (chi-square test; p=0.520).

Majority of the mothers were subsistence farmers (63.5%). More than a quarter of the mothers were self employed (15.3%) while a number of them (10.0%) were engaged in casual labour in order to earn a living. Very few of the mothers were formally employed (7.2%). Many of the mothers' partners/spouses were farmers (63.1%) while (18.5%) of them were involved in casual labour mostly *miraa* (Khat) picking or crop farming. Only 10.0% of the men were formally employed and a few others were self employed with most of them dealing in *miraa* (Khat) trade. Some were farmers and part-time *miraa* (Khat) businessmen. There was significant differences in occupation between the 3 groups (chi-square test; p<0.001) (Table 4.2).

Table 4.2: Mothers'/partners level of education by study groups

Characteristics	Study group MESIGA (N=88)	MES (N=82)	CG (N=79)	Total (N=249)	Chi-square p-value
	n(%)	n(%)	n(%)	n(%)	
Husband/partner's level of education					
No School	10(11.4)	4(4.9)	4(5.1)	18(7.2)	0.520
Primary	68(77.3)	64(78.0)	62(78.5)	194(77.9)	
Secondary	8(9.1)	11(13.4)	12(15.2)	31(12.4)	
College/University	2(2.3)	3(3.7)	1(1.3)	6(2.4)	
Mother's level of education					
No School	3(3.4)	2(2.4)	0(0)	5(2.0)	0.667
Primary	75(85.2)	68(82.9)	66(83.5)	209(83.9)	
Secondary	7(8.0)	9(11.0)	11(13.9)	27(10.8)	
College/University	3(3.4)	3(3.7)	2(2.5)	8(3.2)	
Mother's main occupation					
Subsistence farmer	65(73.9)	51(62.2)	42(53.2)	158(63.5)	<0.001**
Casual labourer	8(9.1)	17(20.7)	0(0)	25(10)	
Formal employment	2(2.3)	5(6.1)	11(13.9)	18(7.2)	
Self-employed	9(10.2)	8(9.8)	21(26.6)	38(15.3)	
Other	4(4.5)	1(1.2)	5(6.3)	10(4.0)	

***p-value significant at p<0.001*

4.2.3 Household socio-economic status by study groups

Land was owned by majority of the households (74.7%). The median land acreage was 1.0 (range 0.5-5.0) acres per household. Majority of the families owned small plots inherited from parents or bought from their neighbours. Majority of the households owned radios (70.7%) and phones (78.7%). Slightly less than a quarter (22.9%) of the households had televisions with many participants citing lack of electric power as main

reason for not acquiring one. Few of the households owned motor cycles (6.8%) or cars (1.2%). Most (78.3%) of the study participants owned houses they lived in with only a few (21.7%) of the study participants renting their homes. The median number of rooms was 2 (range 1-7) rooms. The median rent for those who rented houses was KShs. 1,500 (range KShs. 300-4,000). More than a half (51.4%) of the study households owned chicken with the median number of chicken being 2 (range 1-10). Over a third (38.6%) of the study households owned cows with median number of cows per household being 2 (range 1-12). Similarly, 35.3% of the study households owned goats. The median number of goats per households was 2 (range 1-10). There were no significant difference in various household assets' ownership in the three study groups (Mood's median test; p=0.270) (Table 4.3).

Table 4.3: Household socio-economic characteristics by study groups

Characteristics	Study Groups MESGA (N=88)	MES (N=82)	CG (N=79)	Total (N=249)	Chi-sq, KW & Median test p-value
	n(%)	n(%)	n(%)	n(%)	
Household Assets					
Radio	58(65.9)	66(80.5)	52(65.8)	176(70.7)	0.059
Television	13(14.8)	23(28)	21(26.6)	57(22.9)	0.077
Phone	67(76.1)	62(75.6)	67(84.8)	196(78.7)	0.276
Car	2(2.3)	1(1.2)	0(0)	3(1.2)	0.776
Motorcycle	5(5.7)	6(7.3)	6(7.6)	17(6.8)	0.867
Mean land acreage	1.2(1)	1.1(1)	1(0.8)	1.1(0.9)	0.845
Median land acreage	1(0.2-5)	1(0.1-5)	0.8(0.1-4)	1(0.1-5)	0.566
Mean number cows	2(2.1)	2(1)	1.5(0.8)	1.8(1.3)	0.166
Median number cows	2(1-12)	2(1-4)	2(1-4)	2(1-12)	0.301
Mean number goats	4.3(3.1)	3.7(2.1)	3.9(2.6)	4(2.6)	0.888
Median number goats	3(1-10)	4(1-9)	3.5(1-14)	3.5(1-14)	0.819
Mean number chicken	2.5(1.8)	2.3(1.4)	2.8(1.4)	2.6(1.6)	0.168
Median number chicken	2(1-8)	2(1-6)	3(1-8)	2(1-8)	0.179
House ownership type					
Owned	72(81.8)	63(76.8)	60(75.9)	195(78.3)	0.606
Rented	16(18.2)	19(23.2)	19(24.1)	54(21.7)	
Number of rooms					
Mean	2(1)	2.1(1.2)	2.1(0.9)	2.1(1)	0.416
Median (Range)	2(1-4)	2(1-7)	2(1-5)	2(1-7)	0.337
House Rent (Kshs.)					
Mean	921.4(588.6)	1326.3(983.1)	1417.6(561.5)	1244(769.9)	0.142
Median rent in KShs. (Range)	500 (400-2000)	1500 (300-4000)	1500 (500-2500)	1500 (300-4000)	0.288

KShs=Kenya Shillings (1 US Dollar=Ksh 85 in 2013); Chi-sq=Chi-Square test; KW=Kruskal Wallis test; N= Total number; n=frequency

4.2.4: Household income sources by study groups

Majority (88.2%) of the study households planted *Miraa* (Khat) as their main cash crop. Some households grew food crops (maize-4.8%, bananas-3.8%, black beans-1.6%, and potatoes-0.5%) for sale with majority of these households being those living in semi-arid areas. Few households grew coffee (0.5%) or tea (0.5%) (Chi-square test; 0.067). The median value of the household monthly income was Ksh.5000 with a range of Ksh.500-55000.

Over two thirds (69.5%) of the households' main source of food was from own production. The rest (30.5%) depended on purchase as main source of food. Majority (81.9%) of the study households grew maize as their main food crop. Other households grew bananas ((3.6%) or beans (3.4%). The median monthly food expenditure was 3,000 (range KSh.3, 000-5,000) per study household. There were no significant differences in food expenditure among households in the three study groups' households (Mood's median test; p=0.07 (Table 4.4).

Table 4.4. Household income sources by study groups

Characteristics	MESIGA (N=88)	MES (N=82)	CG (N=79)	Total (N=249)	Chi-square, & Median test p-value
	n(%)	n(%)	n(%)	n(%)	
***Main cash crops grown**					
Bananas	1(1.4)	6(10.3)	0(0)	7(3.8)	
Black beans	0(0)	0(0)	3(5.3)	3(1.6)	
Coffee	0(0)	0(0)	1(1.8)	1(0.5)	0.067
Maize	2(2.8)	1(1.7)	6(10.5)	9(4.8)	
Miraa (Khat)	68(95.8)	50(86.2)	46(80.7)	164(88.2)	
Potatoes	0(0)	0(0)	1(1.8)	1(0.5)	
Tea	0(0)	1(1.7)	0(0)	1(0.5)	
Monthly value of the harvest in KShs.					
Median (Range)	5000 (500-35000)	5000 (500-55000)	5000 (2000-20000)	5000 (500-55000)	0.092
Main source of food consumed in the household					
Own Production	62(70.5)	56(68.3)	55(69.6)	173(69.5)	0.954
Purchase	26(29.5)	26(31.7)	24(30.4)	76(30.5)	
***Main food crops grown on the land**					
Bananas	0(0)	8(13.7)	1(1.8)	9(3.6)	
Beans	5(4.2)	0(0)	4(7.1)	4(3.4)	
Maize	66(91.6)	50(86.2)	50(88.0)	204(81.9)	0.059
None	1(1.4)	0(0)	0(0)	1(0.5)	
Total	71(100)	58(100)	57(100)	186(100)	
Food expenditure					
Median (Range)	3000 (400-6000)	3000 (300-5500)	2350 (300-7000)	3000 (300-7000)	0.070

*KShs=Kenya Shillings (1 US Dollar=85 KShs in 2013) *Multiple Responses*

4.2.5: Maternal reproductive health by study groups

The median time in minutes spent by study participants on travel to the nearest health centre was not significantly different at 30 (6-120) minutes for MESIGA, 30 (5-120) minutes for MES and 30 (3-180) minutes for CG (Mood's median test; p=0.1098). The

mean gestation age at which mothers were recruited into the study was significantly different at 35.4 (2.) weeks (MESIGA), 34.9(1.9) weeks (MES) and 35.3 (2.3) weeks (CG) (Kruskal Wallis test; p<0.001). Majority of the mothers attended their first ANC clinic while in their 3rd trimester. The mean gestation period at the first ANC clinic attendance was 30.3 (3.4) weeks (MESIGA), 29.2 (4.5) weeks and 31.4 (2.6) weeks (CG) (Kruskal Wallis test; p=0.005). The mean number of ANC visits was not significantly different in the study groups. In the MESIGA group, the mean number of times was 2.2 (0.9) times in MESIGA, 2.3(0.8) times in MES and 2.5 (1.0) times in the CG (Kruskal Wallis test; p=0.327) (Table 4.5).

Table 4.5: Maternal reproductive health characteristics by study groups

Characteristics	Study Groups MESIA (N=88)	MES (N=82)	CG (N=79)	Total (N=249)	KW/ Median test, p-value
	n(%)	n (%)	n(%)	n(%)	
Time (min) to the nearest HF					
Median	30	30	30	30	0.101
Range	(6-120)	(5-120)	(3-180)	(3-180)	
Gestation age at enrolment					
Mean	34.8(2.1)	34.9(1.9)	36.4(2.3)	35.3(2.2)	<0.001**
Gestation at 1st ANC visit					
Mean	30.3(3.4)	29.2(4.5)	31.4(2.6)	30.3(3.7)	0.005*
Number of ANC Visits					
Mean	2.2(0.9)	2.3(0.8)	2.5(1)	2.3(0.9)	0.327

**p-value significant at p<0.05; **p-value significant at p<0.001; KW=Kruskal Wallis test*

4.2.6: Baseline comparison of maternal knowledge towards breastfeeding by study groups

Over half of the mothers (56.6%) had reportedly received information on breastfeeding from health facilities while the rest received it from relatives (14.5%), friends (10.8%), and from television or radio (8.9%). There was no significant difference between the groups on the source of knowledge on breastfeeding at baseline (chi-square test; p=0.698). Nearly all the mothers (99.2%) reported that an infant's first feed after a normal delivery should be breast milk.

Majority of the mothers (90.2%) knew that an infant should be breastfed within one hour after normal safe delivery. The percentage of mothers who reported they would feed their infant within one hour was significantly higher for the control group (94.9%) than for MES (87.8%) and MESIGA (88.6%) (chi-square test; p<0.001). Nearly all mothers in the three study groups (98.9% (MESIGA), 98.8% (MES) and 97.5% (CG) indicated they would exclusively breastfeed their infants for the first six months after delivery (chi-square test; p=0.694). Majority of the mothers (94%) knew that a infant should be breastfed for a period of 2 years or more and there was no significant differences on this aspect of knowledge between the groups (chi-square test; p=0.214). A majority (97.3%) of the mothers reported they would give their unborn babies colostrum. A majority of the mothers (78.3%) in MESIGA compared to 72% in MES and 73% in CG stated that a pregnant mother should not breastfeed her baby. This meant that most of the mothers would stop breastfeeding if they became pregnant (chi-square test; p=0.053) (Table 4.6).

Table 4.6: Maternal knowledge of breastfeeding by study groups

Breastfeeding knowledge	Study Groups MESIGA (N=88) n(%)	MES (N=82) n(%)	CG (N=79) n(%)	Total (N=249) n(%)	Chi-Square p-value
***Source of knowledge**					
Health Facility	50(56.8)	55(67.1)	36(45.6)	141(56.6)	0.698
Relative	5(5.7)	6(7.3)	25(31.6)	36(14.5)	
Friends	12(13.6)	9(11.0)	6(7.6)	27(10.8)	
Radio/Television	8(9.1)	5(6.1)	7(8.9)	20(8.0)	
School	6(6.8)	5(6.1)	2(2.5)	13(5.2)	
First feed after delivery					
Breast milk	88(100)	81(98.8)	78(98.7)	247(99.2)	0.310
BF initiation					
Within 1 hour	78(88.6)	72(87.8)	75(94.9)	225(90.3)	0.001**
EBF period					
6 months	87(98.9)	81(98.8)	77(97.5)	245(98.4)	0.694
Less than 6 months	1(1.1)	1(1.2)	2(2.5)	4(1.6)	
Breastfeeding period					
2years	37(42.0)	40(48.8)	37(46.8)	114(45.8)	0.214
More than 2 years	42(47.7)	41(50.0)	37(46.8)	120(48.2)	
Infant should be fed on colostrums					
Yes	86(97.7)	79(96.3)	77(97.5)	242(97.2)	0.089
Breastfeeding during pregnancy					
No	78(88.6)	59(72.0)	58(73.4)	195(78.3)	0.053

***p-value significant at p<0.001; BF= Breastfeeding; N= total sample size and n = frequencies; *Multiple Responses*

4.2.7 Maternal infant feeding intentions for the unborn baby by study groups

Majority of the mothers reported that they would introduce plain water to the unborn baby at a mean age of 4.1 (±1.9) months; cow's milk at a mean age of 5.8 (±2.5) months, porridge at a mean age of 5.2 (±1.4) months, mashed fruit at a mean age of 5.6(±1) months and mashed potatoes with bananas at a mean age of 5.7(±0.6) months. There was no significant difference in the mean ages of introduction of water (Kruskal Wallis test; p=0.383), cow's milk (Kruskal Wallis test; p=0.163), porridge (Kruskal Wallis test; p=0.540), mashed fruit (Kruskal Wallis test; =0.105) and mashed potatoes with bananas to the baby (Kruskal Wallis test; p=0.343) across the 3 study groups (Table 4.7).

Table 4.7: Comparison of the maternal infant feeding intentions for the unborn baby and by study groups' comparison

Infant feeding practices	Study groups MESIGA (N=88)	MES (N=82)	CG (N=79)	Total (N=249)	KW test p-value
	n(%)	n(%)	n(%)	n(%)	
Age of introduction of water					
Mean number of months	4.3(1.9)	4(1.7)	3.9(2)	4.1(1.9)	0.383
Age of introduction of cow milk					
Mean number of months	5.6(1.5)	5.5(2.1)	6.3(3.6)	5.8(2.5)	0.163
Age of introduction of porridge					
Mean number of months	5.2(1.3)	5.2(1.4)	5.3(1.4)	5.2(1.4)	0.541
Age of introduction of fruit					
Mean number of months	5.8(0.7)	5.4(1.3)	5.5(1)	5.6(1)	0.105
Age of introduction of mashed potatoes and bananas					
Mean number of months	5.8(0.5)	5.7(0.7)	5.8(0.7)	5.7(0.6)	0.343

All values are percentages unless indicated otherwise

As a whole, there were no differences in the baseline characteristics of the groups implying that randomization was successful.

4.3 Baseline comparison of participants who were lost to follow-up and those who completed the study

Analysis of baseline characteristics of the mothers who were lost to follow-up during the study and those who completed the study was conducted to determine if those who dropped out may have been different from those who completed the study. There were no differences between the two groups in terms of baseline characteristics except in terms of maternal education level (Table 4.8). This meant that there were no differences in the outcomes of the interventions because of the attrition.

Table 4.8: Baseline comparison of participants who were lost to follow-up and those who completed study

Characteristics	Lost to Follow up (n=85)	Completed Study (n=164)	Chi-sq/KW tests p-value
Maternal Age			
Mean Age (SD)	23.3(4.7)	23.8(5)	0.556
Marital status			
Married	77(90.6)	151(92.1)	
Single	8(9.4)	13(7.9)	0.689
Household-head			
Husband/partner	78(91.8)	152(92.7)	
Wife (self)	5(5.9)	9(5.5)	
Other person	2(2.4)	3(1.8)	0.805
Mother's level of education			
No School	2(2.4)	3(1.8)	
Primary	69(81.2)	140(85.4)	
Secondary	14(16.5)	13(7.9)	
College/University	0(0)	8(4.9)	0.044*
Mother's main occupation			
Subsistence farmer	48(56.5)	110(67.1)	
Casual labourer	8(9.4)	17(10.4)	
Formal employment	9(10.6)	9(5.5)	
Self-employed	20(23.5)	28(17.1)	0.284
Household-Size			
Mean household-size (SD)	4.2(1.6)	3.9(1.7)	0.118

*KW-Krusal Wallis test; *p-value significant at p<0.05*

4.4 Findings at first month after delivery

4.4.1 Maternal delivery profile

Mothers arranged their deliveries individually in either public or private health facilities. Nearly half (48.1%) of the mothers in all the study groups delivered in public health facilities while 42.1% delivered in private health facilities. Only 9.8% of the mothers

delivered at home. Over half (50.7%) of the mothers in MESIGA and a third (30.0%) of mothers in MES delivered in health centres while less than 10.0% of the CG delivered in health centres. There was a significant difference between place of birth among study groups (chi-square test; $p<0.001$).

The lowest number of deliveries took place in district public hospital with most of them being referrals. The highest percentage of women who delivered in district public hospital (30.0%) were from MES, while MESIGA and CG reported a low score of 5.5% and 9.8% respectively of deliveries in district public hospital. Majority (68.3%) of the mothers in CG delivered in private health facilities while only 40.0% and 28.8% of the mothers in MES and MESIGA respectively delivered in private health facilities. The place of delivery was significantly difference between the three study groups (chi-square test; $p<0.001$).

Nearly all mothers (98.4%, 94.0%, and 88.9%) in MESIGA, MES and CG respectively shared beds with their infants at the health facilities. However, there was a significant difference in bed sharing with infants at home among the mothers in the study groups who delivered at health facility. All mothers in MESIGA and MES shared beds with infants at home and a majority (82.9%) of mothers in CG shared beds with infants at home (chi-square test; $p=0.002$).

Mothers in CG and MES spent shorter period in hospital 3.1(1.8) and 3.2 (1.2) days respectively and highest in MESIGA with a mean of 3.5 (1.2) days. There was a

significant difference in health facility stay period among the mothers in the three study groups (Kruskal Wallis test; p=0.020). Majority of the mothers in the three study groups had normal delivery (93.5%, 90.0% and 88.9% in MESIGA, MES and CG respectively (Kruskal Wallis test; p=0.680) (Table 4.9).

Table 4.9: Maternal delivery profiles by study groups

Characteristics	Study Groups MESIGA n(%)	MES n(%)	CG n(%)	Total n(%)	Chi-sq/ KW test p-value
Place of Delivery					
Health centre	37(50.7)	15(30.0)	4(9.8)	56(34.1)	<0.001**
District hospital	4(5.5)	15(30.0)	4(9.8)	23(14)	
Private health Facilities	21(28.8)	20(40.0)	28(68.3)	69(42.1)	
Home	11(15.1)	0(0)	5(12.2)	16(9.8)	
Total	73(100)	50(100)	41(100)	164(100)	
Home deliveries					
Person who attended to mother during delivery					
Family member	7(63.6)	0(0)	2(40.0)	9(56.3)	0.166
Nobody	4(36.4)	0(0)	1(20.0)	5(31.3)	
Traditional birth Attendant	0(0)	0(0)	2(40.0)	2(12.5)	
Total	11(100)	0(0)	5(100)	16(100)	
Health Facility deliveries					
Type of delivery in health Facilities					
Normal	58(93.5)	45(90.0)	32(88.9)	135(91.2)	0.685
Caesarean	4(6.5)	5(10.0)	4(11.1)	13(8.8)	
Total	62(100)	50(100)	36(100)	148(100)	
Length of stay(days) in health facility after delivery					
Mean (SD)	3.5(1.2)	3.2(1.2)	3.1(1.8)	3.3(1.4)	0.020*
Bed sharing with infant					
Mother Shared bed with infant at the health facility	61(98.4)	47(94)	32(88.9)	140(94.6)	0.095
Mother shared bed with infant at home	73(100)	50(100)	34(82.9)	157(95.7)	0.002*

**p-value significant at p<0.05; **p-value significant at p<0.001; KW-Krusal Wallis test N=Number*

4.4.2 Infant characteristics at first month by study groups.

At one month after delivery, there were nearly equal number of boys and girls (49.4% and 50.6% respectively) in the three study groups. MESIGA had a slightly higher but not significantly different number of boys (54.8%) than girls (45.2%) while it was opposite in CG where girls were more (61.0%) than the boys (39.0%) (chi-square test; p=0.106). MES had equal numbers of boys and girls (50%).

Majority (98.6%, 90.0% and 95.1% for MESIGA, MES and CG respectively) of the infants in the three study groups were of normal nutrition status using weight-for-age z-scores. At month 1, MESIGA had the lowest prevalence of under nutrition at 1.4% followed by CG at 4.8% and the highest was MES with a prevalence rate of 10.0% (chi-square test; p=0.130) (Table 4.10).

Table 4.10: Infant characteristics at month one by study groups

Characteristics	Study Groups MESIGA N=73 n(%)	MES N=50 n(%)	CG N=41 n(%)	Total n(%)	Chi-sq /KW test p-value
Sex					
Female	33(45.2)	25(50.0)	25(61.0)	83(50.6)	0.269
Male	40(54.8)	25(50.0)	16(39.0)	81(49.4)	
Total	73(100)	50(100)	41(100)	164(100)	
Age in days					
Mean (SD)	18.1(6.7)	18.4(6.6)	20.8(5.8)	18.8(6.5)	0.106
Nutrition status					
Weight-for-Age Z-score					
Severe (<-3SD)	0(0)	1(2.0)	1(2.4)	2(1.2)	0.130
Moderate (<3-<-2SD)	1(1.4)	4(8.0)	1(2.4)	6(3.7)	
Normal(>-2SD)	72(98.6)	45(90.0)	39(95.1)	156(95.1)	
Total	73(100)	50(100)	41(100)	164(100)	

KW-Krusal Wallis test

4.4.3 Early breastfeeding practices by study groups

Early breastfeeding practices in the context of this study are defined as initial infant feeding practices within the first two days after delivery. Such practices include initiation of breastfeeding, giving of colostrum and pre-lacteals. All the mothers from MESIGA who delivered at home gave breast milk as the first feed to the baby while 80.0% of the mothers who delivered at home from CG gave their infants sugar solution. Giving infants sugar solution as the first feed after delivery was significantly associated with mothers in CG (chi-square test; p=0.003). There was no mother from MES who delivered at home. A significant majority (90.9%) of the infants in MESIGA who were born at home were fed on colostrum while only 20.0% of those in CG who delivered at home gave colostrum to their infants (chi-square test; p=0.013) (Table 12).

All mothers in MESIGA and MES who delivered at the health facilities gave breast milk as the first feed to their infants. A significant majority of those in CG (89.0%) who delivered at health facilities also gave breast milk as first feed to their infants. Only a few mothers (11.0%) in CG gave sugar solution as first feed to their infants (chi-square test; p=0.003). Nearly all the mothers in MESIGA (95.0%) and MES (96.0%) who delivered in health facilities initiated breastfeeding within the first one hour as recommended. A majority (86.0%) of the mothers in the CG who delivered in health facilities likewise initiated their infants to breastfeeding within one hour as recommended. Only 4.8% of the mothers in MESIGA, 4% of mothers in MES and 13.9% of mothers in CG who delivered at health facilities did not initiate breastfeeding with one hour. There was a significant

difference in initiation time of breastfeeding among the three study groups for mothers who delivered in the health facilities (chi-square test; (p=0.289) (Table 4.11).

Notably, all mothers who delivered in health facilities in MESIGA and MES fed colostrum to their infants as compared to a majority (97.2%) of the mothers in CG. There was no association between feeding colostrum to infants and the study groups (chi-square test; p=0.243). Among the infants who were born at health facilities, all infants in MESIGA and MES were not given any other feed besides breast milk by interview date. However, 11.1% of the infants in CG who were born in health facilities were given other feeds besides breast milk. All CG mothers who gave post-lacteals gave sugar solution. There was a significant association between giving post-lacteals to infants and study groups (chi-square test; p=0.003). Among all the mothers in the three study groups, more mothers in CG (39%) gave their infants pre-lacteals as compared to 2.7% of mothers in MESIGA and 8% of mothers in MES. Giving infants pre-lacteals was significantly associated with the study groups (chi-square test; p<0.001) (Table 4.11).

Table 4.11: Early breastfeeding practices by study groups

Early infant feeding practices	Study Group MESIGA n(%)	MES n(%)	CG n(%)	Total n(%)	Chi-square p-value
Home deliveries: (N=11)					
First feed given to baby after birth:					
Breast milk	11(100)	0(0)	1(20.0)	12(75.0)	0.003*
Sugar solution	0(0)	0(0)	4(80.0)	4(25.0)	
Giving of colostrum:					
Gave colostrums	10(90.9)	0(0)	1(20.0)	11(68.8)	0.013*
Did not give colostrums	1(9.1)	0(0)	4(80.0)	5(31.3)	
Total	11(100)	0(0)	5(100)	16(100)	
Health facility deliveries: (N=62)					
First feed given to baby after birth					
Breast milk	62(100)	50(100)	32(88.9)	144(97.3)	0.003*
Sugar solution	0(0)	0(0)	4(11.1)	4(2.7)	
Initiation of breastfeeding:					
Within 1 hour	59(95.1)	48(96)	31(86.1)	59(95.2))	0.289
After one hour	3(4.8)	2(4)	5(13.9)	3(4.8)	
Total	62(100)	50(100)	36(100)	148(100)	
Feeding on colostrum:					
Gave infant colostrums	62(100)	50(100)	35(97.2)	147(99.3)	0.243
Did not give infant colostrums	0(0)	0(0)	1(2.8)	1(0.7)	
Total	62(100)	50(100)	36(100)	148(100)	
Feeding on Pre-lacteals:					
Gave pre-lacteals	2(2.7)	4(8.0)	16(39.0)	22(13.4)	<0.001**
Gave no pre-lacteals	71(97.3)	46(92.0)	25(61.0)	142(86.6)	
Total	73(100)	50(100)	41(100)	164(100)	

**p-value significant at p<0.05; **p-value significant at p<0.001*

4.5 Findings after interventions

4.5.1 Schedule of interviews to collect information on maternal feeding practices from one to six months postpartum

Information on infant feeding practices was collected from the participants on a monthly basis from the first to sixth month of post partum in all the three study groups. During the first month, data was collected at a mean of 18.1(±6.7) days, 18.4(±6.6) days and

18.8(±6.5) days from MESIGA, MES and CG respectively. In subsequent months (second to sixth months), data was collected on a monthly basis as shown in (Figure 4.2).

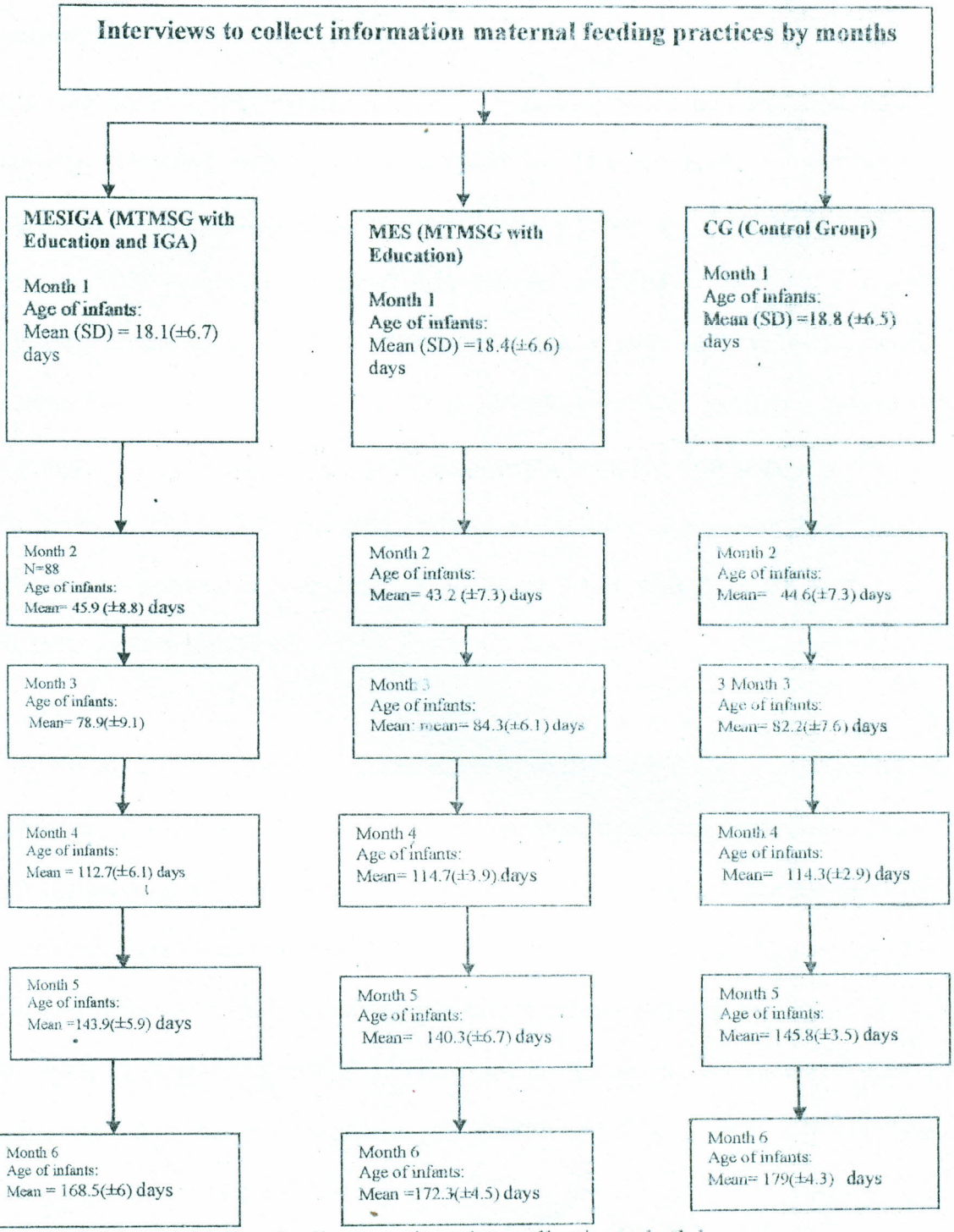

Figure 4.2: Maternal infant feeding practices data collection schedule

MTMSG: Mother-to-mother support group; IGA: Income generating activity

4.5.2 Effectiveness of the interventions on exclusive breastfeeding practice

4.5.2.1 Effectiveness of the interventions on the cross-sectional exclusive breastfeeding rates

Cross-sectional exclusive breastfeeding rate was defined as the proportions of infants exclusively breastfed each month determined by 24-hour recall. At first month postpartum, a significantly higher proportion of the mothers in MESIGA (95.9%) and 90.0% in MES exclusively breastfed their infants compared to 46.3% in CG who exclusively breastfed. Infants in MESIGA were two times more likely to be exclusively breastfed than those in CG {RR=2.1; CI (1.48-2.89) p=<0.001}. Similarly, infants in MES were two times more likely to be exclusively breastfed than infants in the CG {RR=1.94; CI (1.38-2.73); p<0.001}. Infants in MESIGA were more likely to be exclusively breastfeed as compared to infants in MES {RR=1.07 CI (0.96-1.18); p=0.232} (Table 4.12).

At the second month, significantly higher percentages (84.9% and 78.0% respectively) of mothers in MESIGA and MES practised exclusive breastfeeding as compared to 34.1% in CG. Mothers in MESIGA were two and half times more likely to practise exclusive breastfeeding than mothers in CG {RR=2.5; CI (1.61-3.85); p<0.001}. Mothers in MES were two times more likely to exclusively breastfeed as compared to mothers in CG {RR=2.28; CI (1.46-3.58); P<0.001}. There was no significant difference in exclusive breastfeeding rates between the infants in MESIGA and those in MES {RR=1.09; CI (0.91-1.3); p=0.343} (Table 4.12).

At the third month after delivery, significantly higher percentages (72.6% and 66.0% respectively) of the mothers in MESIGA and MES compared to 31.7% of the mothers in CG exclusively breastfed their infants. Mothers in MESIGA were two times more likely to practise exclusive breastfeeding as compared to those in the CG {RR= 2.3; CI (1.43-3.67); (p<0.001)}. Infants in MES were two times more likely to be exclusively breastfed than infants in CG {RR=2.08; CI (1.27-3.4), (p<0.001)}. There was no significant difference in exclusive breastfeeding rates between the infants in MESIGA and those in MES {RR= 1.1; CI (0.86-1.4); (p=0.443)} (Table 4.12).

At month four, 53% of the infants in MESIGA as compared to 33% in MES and 11% in CG were exclusively breastfed. Infants in MESIGA were about three times more likely to be exclusively breastfed as compared to infants in CG {RR= 2.71; CI (1.6-4.57); (p<0.001)}. Infants in MES were two and a half times more likely to be exclusively breastfed compared to infants in CG {RR= 2.46; CI (1.43-4.23); (p=0.002)}. There was no significant difference in exclusive breastfeeding rates between the infants in MESIGA and those in MES {RR= 1.1; CI (0.86-1.4); (p=0.443)} (Table 4.12).

At the fifth month, fewer infants in all the three study groups were exclusively breastfed than previous months. Significantly higher percentages (61.6% and 64.0% respectively) of infants in MESIGA and MES were exclusively breastfed than in CG (24.4%). Infants in MESIGA were two and a half times more likely to be exclusively breastfed than infants in CG {(RR=2.53; CI (1.43-4.46); p<0.001}. When compared to CG, infants in MES were almost three times more likely to be exclusively breastfed than those in CG

{(RR=2.62; CI (1.47-4.68); p=0.002}. There was no significant difference in the exclusive breastfeeding rate between infants in MESIGA and those in MES (0.73-1.27); p=0.790} (Table 4.12).

At sixth month, significantly higher percentages (58.9% and 46.0% respectively) of infants in MES and MESIGA were exclusively breastfed as compared to those in CG (24.4%). Compared to mothers in CG, mothers in MESIGA were two times more likely to exclusively breastfeed their infants {RR=2.42; CI (1.36-4.28); p=.0004}. When compared to infants in CG, infants in MES were about two times more likely to exclusively breastfeed their infants {(RR=1.89; CI (1.02-3.49); p=0.033}. There was no significant difference in the exclusive breastfeeding rate between infants in MESIGA and those in MES {RR= 1.28 CI (0.9-1.83); (p=0.174)} (Table 4.12).

Table 4.12: Effectiveness of the interventions on the cross-sectional exclusive breastfeeding rates

Month	EBF status	Study groups MESIGA N=73 n(%)	MES N=50 n(%)	CG N=41 n(%)	p-value	Ref=CG MESIGA vs CG RR;(95%CI)	p-value	Ref=CG MES vs CG RR;95%CI	p-value	Ref=MES MESIGA vs MES RR;95%CI	p-value
1	EBF	70(95.9)	45(90)	19(46.3)							
	Non-EBF	3(4.1)	5(10)	22(53.7)	<0.001	2.1(1.48-2.89)	<0.001	1.94(1.38-2.73)	<0.001	1.07(0.96-1.18)	0.232
2	EBF	62(84.9)	39(78)	14(34.1)							
	Non-EBF	11(15.1)	11(22)	27(65.9)	<0.001	2.5(1.61-3.85)	<0.001	2.28(1.46-3.58)	<0.001	1.09(0.91-1.3)	0.343
3	EBF	53(72.6)	33(66)	13(31.7)							
	Non-EBF	20(27.4)	17(34)	28(68.3)	<0.001	2.3(1.43-3.67)	<0.001	2.08(1.27-3.4)	0.001	1.1(0.86-1.4)	0.443
4	EBF	53(72.6)	33(66)	11(26.8)							
	Non-EBF	20(27.4)	17(34)	30(73.2)	<0.001	2.71(1.6-4.57)	<0.001	2.46(1.43-4.23)	0.002	1.1(0.86-1.4)	0.443
5	EBF	45(61.6)	32(64)	10(24.4)							
	Non-EBF	28(38.4)	18(36)	31(75.6)	0.001	2.53(1.43-4.46)	0.001	2.62(1.47-4.68)	0.002	0.96(0.73-1.3)	0.790
6	EBF	43(58.9)	23(46)	10(24.4)							
	Non-EBF	30(41.1)	27(54)	31(75.6)	0.002	2.42(1.36-4.28)	0.004	1.89(1.02-3.49)	0.033	1.28(0.9-1.83)	0.174

EBF= Exclusive breastfeeding; Non-EBF=Non-exclusive breastfeeding

4.5.2.2 Effectiveness of the interventions on cumulative exclusive breastfeeding rates

Cumulative exclusive breastfeeding rates were determined by analyzing proportions of infants breastfed continuously from month 1 to 6. At one month MESIGA and MES had significantly higher percentages (95.9% and 90.0% respectively) of infants who were cumulatively exclusively breastfed than CG (46.3%). When compared to CG, infants in MESIGA were two times more likely to be cumulatively exclusively breastfed {RR=2.07;CI (1.48-2.89); p<0.001} and when CG was compared to MES, mothers in MES were two times more likely to cumulatively exclusively breastfeed their infants for one month {RR= 1.94; CI (1.38-2.73); p<0.001}. Mothers in MESIGA were more likely to cumulatively exclusively breastfeed their infants as compared to mothers in MES {RR=1.09; CI (0.89-1.33) p=0.232} but this difference was not significant (Table 4.13).

At two months cumulative exclusive breastfeeding rates were 80.8% and 74.0% for mothers in MESIGA and MES respectively as compared to 14.6% in CG. Compared to infants in CG, infants in MESIGA were five times more likely to be cumulatively exclusively breastfed {RR=5.5; CI (2.62-11.66); p<0.001}. Compared to infants in CG, infants in MES were five times more likely to cumulatively exclusively breastfeed {RR=5.06: CI (2.37-10.78); p<0.001}. Mothers in MESIGA were more likely to cumulatively exclusively breastfeed their infants as compared to mothers in MES {RR=1.09 CI (0.89-1.33); p=0.384} but the difference was not significant (Table 4.13).

By the third month after birth, 60.3% of infants in MESIGA, 50.0% of infants in MES and only 5.0% of the infants in CG were cumulatively exclusively breastfed since birth. When CG was compared to MESIGA, mothers in MESIGA were twelve times more likely to cumulatively exclusively breastfeed their infants {RR=12.36; CI (3.16-48.35); p<0.001}. When compared to CG, mothers in MES were ten times more likely to cumulatively exclusively breastfeed their infants {RR=10.25; CI (2.58-40.73); p<0.001}. Mothers in MESIGA were more likely to cumulatively exclusively breastfeed their infants as compared to mothers in MES. {RR=1.21(0.86-1.68); p=0.273}, again this difference was not significant (Table 4.13).

By the fourth month, significantly higher percentages (54.8% and 40.0% respectively) of infants in MESIGA and MES compared to CG (2.4%) were cumulatively exclusively breastfed. When compared to CG, mothers in MESIGA were twenty-two times more likely to cumulatively exclusively breastfeed their infants {RR=22.5; CI (3.2-157.4); p<0.001}. When CG was compared to MES, infants in the latter were sixteen times more likely to be cumulatively exclusively breastfed to the fourth month {RR=16.4 CI (2.3-117.1); p<0.001}. Mothers in MESIGA were more likely to cumulatively exclusively breastfeed their infants as compared to mothers in MES {RR=1.37 CI (0.92-2.04); p=0.122} but this difference was not significant (Table 4.13).

During the fifth month, 43.8% of the mothers in MESIGA and 26.0% in MES were still cumulatively exclusively breastfeeding their infants. None of the mothers in CG had practised cumulative exclusively breastfeeding up to 5 months. Mothers in MESIGA

were nearly twice more likely to cumulatively exclusively breastfeed when compared to mothers in MES for five months {RR= 1.69 CI (0.99-2.88); p=0.056}, showing a significant trend. At six months, mothers in MESIGA were significantly more likely to cumulatively exclusively breastfeed their infants as compared to mothers in MES {RR= 2.74 CI (1.1-6.82) p=0.03} (Figure 4.3 and Table 4.13).

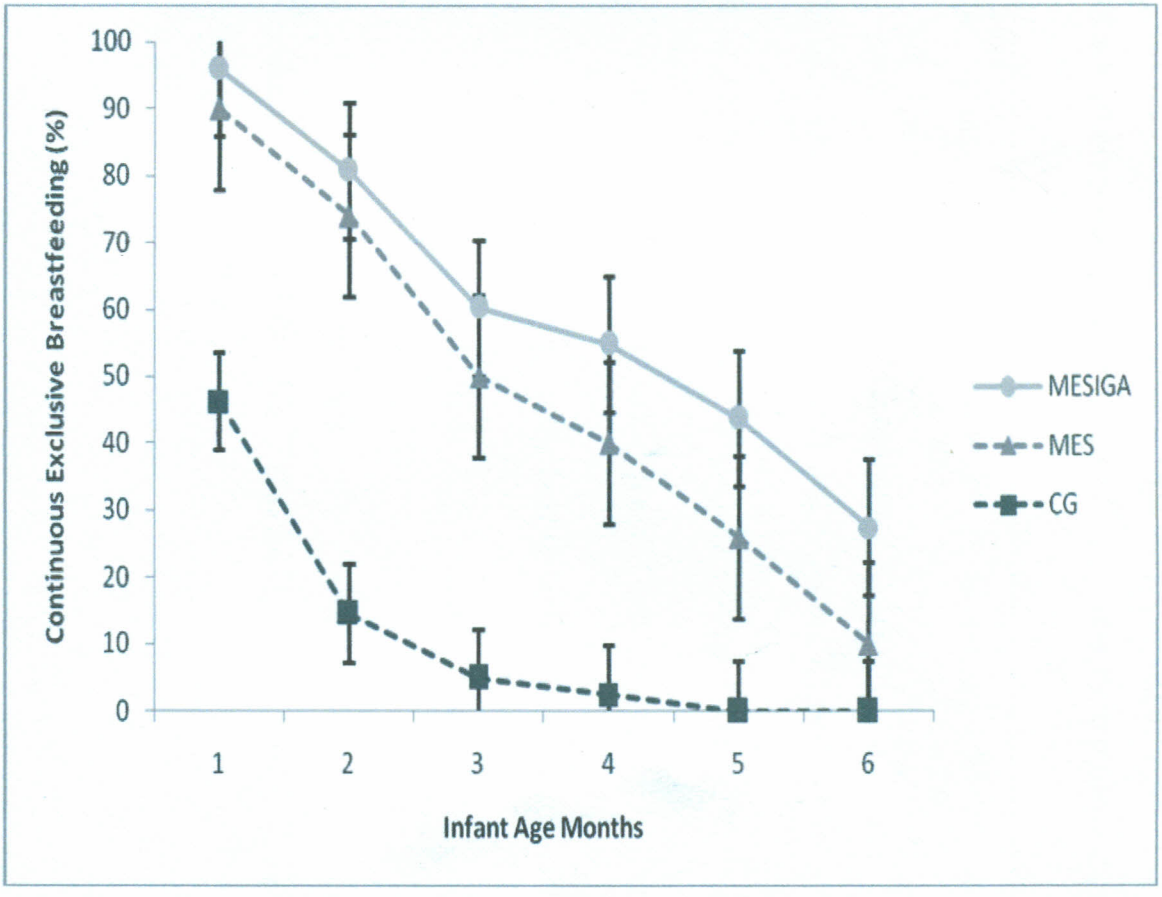

Figure 4.3: Impact of the interventions on cumulative EBF rates since birth to 6 month

Table 4.13: Effectiveness of the interventions on cumulative exclusive breastfeeding (since birth) practices by month and study groups

Month	Cumulative exclusive Breastfeeding	Study Groups MESIGA N=73 n(%)	MES N=50 n(%)	CG N=41 n(%)	p-value	Ref=CG MESIGA vs CG RR;(95%CI)	p-value	Ref=CG MES vs CG RR;95%CI	p-value	Ref=MES MESIGA vs MES	p-value
1	CEBF	70(95.9)	45(90)	19(46.3)	<.001	2.07(1.48-2.89)	<.001	1.94(1.4-2.73)	<.001	1.07(0.96-1.18)	0.232
	Non-CEBF	3(4.1)	5(10)	22(53.7)							
2	CEBF	59(80.8)	37(74)	6(14.6)	<.001	5.5(2.62-11.66)	<.001	5.1(2.4-10.78)	<.001	1.09(0.89-1.33)	0.384
	Non-CEBF	14(19.2)	13(26)	35(85.4)							
3	CEBF	44(60.3)	25(50)	2(4.9)	<.001	12.4(3.2-48.4)	<.001	10.3(2.6-40.7)	<.001	1.21(0.86-1.68)	0.273
	Non-CEBF	29(39.7)	25(50)	39(95.1)							
4	CEBF	40(54.8)	20(40)	1(2.4)	<.001	22.5(3.2-157.4)	<0.001	16.4(2.3-117.1)	<.001	1.37(0.92-2.04)	0.122
	Non-CEBF	33(45.2)	30(60)	40(97.6)							
5	CEBF	32(43.8)	13(26)	0(0)	<.001	N/A	<.001	N/A	<.001	1.69(0.99-2.88)	0.056
	Non-CEBF	41(56.2)	37(74)	41(100)							
	Total	73(100)	50(100)	41(100)							
6	CEBF	20(27.4)	5(10)	0(0)	0.002	N/A	<.001	N/A	<.001	2.74(1.1-6.82)	0.030*
	Non-CEBF	53(72.6)	45(90)	41(100)							

CEBF=Cumulative exclusive breastfeeding; Non-CEBF=Not Cumulatively exclusively breastfed; N/A=Not applicable

4.5.2.3 Effectiveness of the interventions on the duration of exclusive breastfeeding

Mothers in CG cumulatively exclusively breastfed their infants for a shorter period compared to mothers in the two intervention groups in the study. The mean duration of cumulatively exclusively breastfed was 0.7(0.15) months for CG. No infants were cumulatively exclusively breastfed for six months in CG. A higher percentage of mothers in MESIGA (27%) as compared to MES (10%) cumulatively exclusively breastfed for six months. The mean duration of cumulative exclusive breastfeeding for the MES was shorter at 2.8 (0.24) months compared to MESIGA at 3.4 (0.2) months (Wilcoxon test: $p<0.001$) (Table 4.14 and Figure 4.4).

Table 4.14: Mean and median months of cumulative EBF by study group

Study groups	N	Mean (SD)	Median (range)	Proportion cumulative EBF at 6months	Wilcoxon p-value
MESIGA	73	3.4(0.2)	4.0(2-5)	27.4%	<0.001**
MES	50	2.8(0.24)	2.5(2-4)	10.0%	
CG	41	0.7(0.15)	0 (0-1)	0.0%	

***Significant association (p<0.001)*

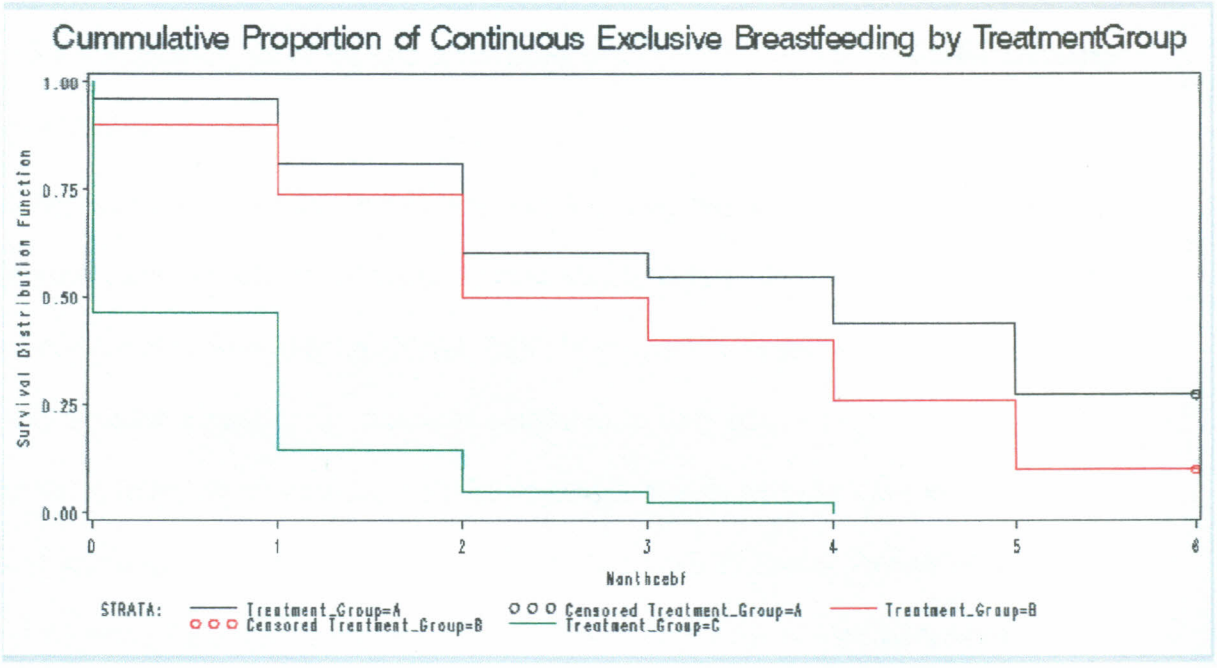

Figure 4.4: Cumulative exclusive breastfeeding by study groups over 6-month period
Study group A =MESIGA; Study group B = MES; Study group C= Control group

4.5.2.4 Effectiveness of income generating activities (IGAs) on MTMSGs meetings' attendance

When mothers were asked how many meetings they had attended since the project was started; over half (50.7%) of the mothers in MESIGA had attended all the seven meetings as compared to none in MES. Nearly half (46.6%) of the remaining mothers in MESIGA had attended a total of six meetings compared to only 6% in MES. Only 2.7% of the mothers in MESIGA attended a total 5 meetings. Nearly half (48%) of mothers in MES attended a total of 4 meetings while 46% of MES mothers attended a total of 5 meetings. There was a significantly higher total attendance of meetings in MESIGA as compared to MES (chi-square test; $p<0.001$) (Figure 4.5) and (Appendix 23).

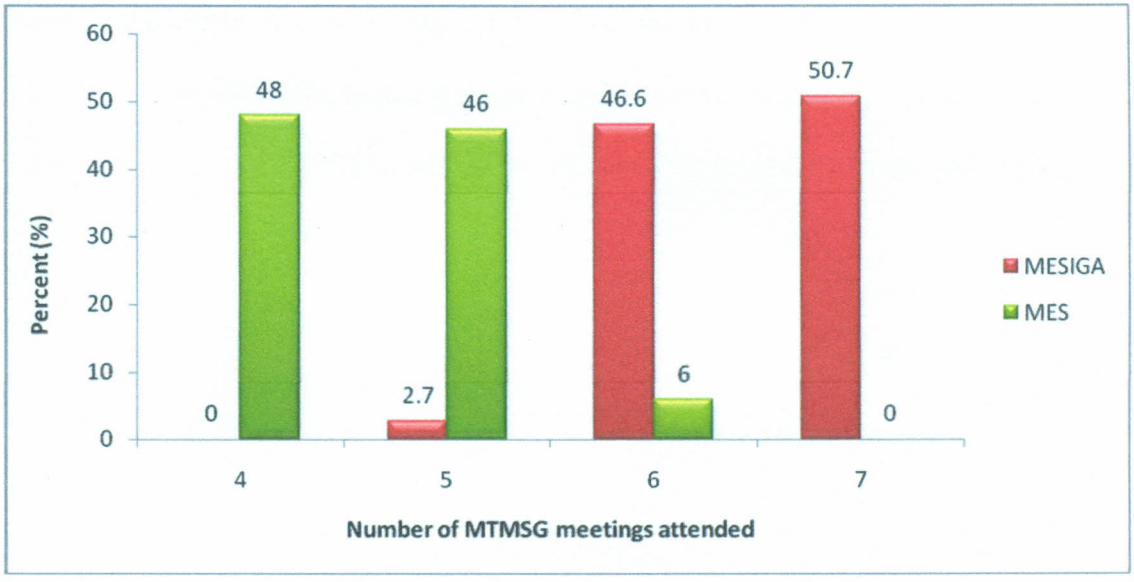

Figure 4.5: Total number of meetings attended by mothers in each group

4.6 Prevalence of infant morbidity

4.6.1 Prevalence of infant morbidity by study groups

Mothers in the three study groups were asked about their infants' illness in the preceding two weeks on monthly basis. At first month after delivery, significantly more infants in CG (46.3%) than in MESIGA (13.7%) and MES (16.0%) were sick (chi-square test; p=0.001). At the second month after birth, 63.4% of the infants in CG as compared to a significantly lower percentages in MESIGA (19.1%) and MES 20.0%) were ill (chi-square test; p<0.001) (Table 4.14).

During the third month, a significantly higher percent (46.3%) of infants in CG as compared 26.0% in MES and only 11.0% in MESIGA were ill in the preceding two weeks (chi-square test; p<0.001). At four months after delivery the same trend was observed, a significantly higher percent (43.9%) of the infants in CG as compared to 22.0% in MES and 17.0% in MESIGA had been ill (chi-square test; p=0.004) (Table 4.15)

Table 4.15: Prevalence of infant morbidity by study groups over the 6-month period

Months	Infant sickness 2-Weeks Recall	Study Groups MESIGA n(%)	MES n(%)	CG n(%)	Total n(%)	Chi-sq; p-value
1	Sick	10(13.7)	8(16.0)	19(46.3)	37(22.6)	
	Not sick	63(86.3)	42(84.0)	22(53.7)	127(77.4)	0.001*
	Total	73(100)	50(100)	41(100)	164(100)	
2	Sick	14(19.2)	10(20.0)	26(63.4)	50(30.5)	
	Not sick	59(80.8)	40(80.0)	15(36.6)	114(69.5)	<0.001**
	Total	73(100)	50(100)	41(100)	164(100)	
3	Sick	8(11.0)	13(26.0)	19(46.3)	40(24.4)	
	Not sick	65(89.0)	37(74.0)	22(53.7)	124(75.6)	0.001*
	Total	73(100)	50(100)	41(100)	164(100)	
4	Sick	13(17.8)	11(22.0)	18(43.9)	42(25.6)	
	Not sick	60(82.2)	39(78.0)	23(56.1)	122(74.4)	0.004*
	Total	73(100)	50(100)	41(100)	164(100)	
5	Sick	12(16.4)	22(44.0)	25(61.0)	59(36.0)	
	Not sick	61(83.6)	28(56.0)	16(39.0)	105(64.0)	<0.001**
	Total	73(100)	50(100)	41(100)	164(100)	
6	Sick	12(16.4)	11(22.0)	12(29.3)	35(21.3)	
	Not sick	61(83.6)	39(78.0)	29(70.7)	129(78.7)	0.274
	Total	73(100)	50(100)	41(100)	164(100)	

**Significant association ($p<0.05$); **Significant association ($p<0.001$)*

4.6.2 Trends in the types of illness the infants suffered from by study groups over the 6-month period

During the first month after delivery there was a significantly higher percentage (68.4%) of the infants in CG suffering from diarrhoea compared to 21.1% in MES and 10.5% in MESIGA. More infants in MESIGA (58.3%) suffered from acute respiratory infections (ARIs) compared to 16.7% in MES and 25% in CG (chi-square test; p=0.008). At two months, a significantly higher percentage (90%) of the infants who were sick from diarrhoea was from CG and 10% from MESIGA, no infants in MES had diarrhoea. Among the infants who suffered ARI from the three groups, more infants were from CG (45%) as compared to 29.7% from MESIGA and 24.3% from MES (chi-square test; p=0.025). At three months, a higher percentage (44.8%) of infants in CG suffered from ARI as compared to 27.6% in MES and 27.6% in MESIGA. Equal proportions of those who suffered from diarrhoea were from MES and CG. None of the infants in MESIGA had diarrhoea during the same period (chi-square test; p=0.285) (Table 4.15).

A similar trend was observed at the fourth month; a higher proportion of the infants were at risk of diarrhoea and ARI were from CG as compared to MESIGA and MES. In the fifth month, a significantly higher percentage (65.4%) of the infants who suffered from diarrhoea were from CG as compared to 19.2% in MES and 15.4% in MESIGA. A higher proportion (46.4%) of the infants who suffered from ARI were from MES as compared to 28.6% who came from MESIGA and 25% from CG (chi-square test; p=0.018). At six months, a higher proportion of the infants who suffered from diarrhoea (54.5%) were from CG as compared to 27.3% from MES and 18.2% from MESIGA. MESIGA had a higher percentage (39.1%) of the infants who

suffered from ARI as compared to 34.8% from MES had and 26.1% from CG (chi-square test; p=0.299) (Table 4.16).

Table 4.16: Infant morbidity by study groups

Months	Type of illness	Study groups MESIGA n(%)	MES n(%)	CG n(%)	Chi-square test p-value
1	**ARI**	7(58.3)	2(16.7)	3(25)	
	Diarrhoea	2(10.5)	4(21.1)	13(68.4)	
	Eye infection	1(33.3)	2(66.7)	0(0)	0.008*
	Others	0(0)	0(0)	3(100)	
	Total	10(27)	8(21.6)	19(51.4)	
2	**ARI**	11(29.7)	9(24.3)	17(45.9)	
	Diarrhoea	1(10)	0(0)	9(90)	0.025*
	Fever	1(100)	0(0)	0(0)	
	Others	1(50)	1(50)	0(0)	
	Total	14(28)	10(20)	26(52)	
3	ARI	8(27.6)	8(27.6)	13(44.8)	
	Diarrhoea	0(0)	5(50)	5(50)	0.285
	Eye infection	0(0)	1(100)	0(0)	
	Others	0(0)	1(50)	1(50)	
	Total	8(19)	15(35.7)	19(45.2)	
4	ARI	7(29.2)	3(12.5)	14(58.3)	
	Diarrhoea	5(33.3)	4(26.7)	6(40)	
	Eye infection	1(100)	0(0)	0(0)	0.086
	Fever	0(0)	2(100)	0(0)	
	Others	0(0)	2(66.7)	1(33.3)	
	Total	13(28.9)	11(24.4)	21(46.7)	
5	**ARI**	8(28.6)	13(46.4)	7(25)	
	Diarrhoea	4(15.4)	5(19.2)	17(65.4)	0.018 *
	Eye infection	0(0)	2(100)	0(0)	
	Others	0(0)	2(50)	2(50)	
	Total	12(20)	22(36.7)	26(43.3)	
6	**ARI**	9(39.1)	8(34.8)	6(26.1)	
	Diarrhoea	2(18.2)	3(27.3)	6(54.5)	0.299
	Others	1(100)	0(0)	0(0)	
	Total	12(34.3)	11(31.4)	12(34.3)	

**Significant association ($p<0.05$); ARI=Acute respiratory infections; others=malaria, ear infections*

4.6.3 Infant morbidity by exclusive breastfeeding status and age

At the first month after delivery, most (89.5%) of the infants who were sick from diarrhoea had not been exclusively breastfed as compared to 10.5% of the infants who had been exclusively breastfed. However, more (91.7%) of the infants who had been exclusively breastfed were sick from ARIs as compared to 8.3% who had not been exclusively breastfed (chi-square test; $p<0.001$). At second month, a higher proportion (51.4%) of infants who suffered from ARI had been exclusively breastfed as compared to 48.6% who had not been exclusively breastfed (chi-square test; $p=0.019$). At third month, similar trend of diarrhoea prevalence was observed with all infants who were sick from diarrhoea being those who had not been exclusively breastfed. A higher proportion (58.6%) of the infants who were sick from ARI had not been exclusively breastfed as compared to 41.4% who had been exclusively breastfed but not significantly different (chi-square test; $p=0.057$) (Table 4.16).

At the fourth month, all infants who had diarrhoea had not been exclusively breastfed. A higher proportion (70.8%) of the infants who had suffered from ARIs had not been exclusively breastfeed as compared to 29.2% who had been exclusively breastfed (chi-square test; $p=0.006$). At fifth month, all infants who were ill from diarrhoea had not been exclusively breastfed. Nevertheless, higher proportion (53.6%) of the infants who suffered from ARIs were from the group of those who had been exclusively breastfed while 46.4% had not been exclusively breastfed (chi-square test; $p<0.001$). At sixth month again, all infants who suffered from diarrhoea had not been exclusively breastfed. Majority (87%) of the infants who were ill from ARIs were those who had not been exclusively breastfed as compared to only 13% who had been exclusively breastfed (chi-square test; $p<0.001$) (Table 4.17).

Table 4.17: Infant morbidity by exclusive breastfeeding status

Month	Illness	Exclusive breastfeeding		Chi-square test
		EBF	Non-EBF	p-value
		n(%)	n(%)	
1	ARI	11(91.7)	1(8.3)	0.001**
	Diarrhoea	2(10.5)	17(89.5)	
	Eye infection	2(66.7)	1(33.3)	
	Others	2(66.7)	1(33.3)	
	Total	17(45.9)	20(54.1)	
2				
	ARI	19(51.4)	18(48.6)	0.019*
	Diarrhoea	0(0)	10(100)	
	Fever	1(100)	0(0)	
	Others	1(50)	1(50)	
	Total	21(42)	29(58)	
3				
	ARI	12(41.4)	17(58.6)	0.057
	Diarrhoea	0(0)	10(100)	
	Eye infection	0(0)	1(100)	
	Others	0(0)	2(100)	
	Total	12(28.6)	30(71.4)	
4				
	ARI	7(29.2)	17(70.8)	0.006*
	Diarrhoea	0(0)	15(100)	
	Eye infection	1(100)	0(0)	
	Fever	2(100)	0(0)	
	Others	1(33.3)	2(66.7)	
	Total	11(24.4)	34(75.6)	
5				
	ARI	15(53.6)	13(46.4)	<0.001**
	Diarrhoea	0(0)	26(100)	
	Eye infection	2(100)	0(0)	
	Others	2(50)	2(50)	
	Total	19(31.7)	41(68.3)	
6				
	ARI	3(13)	20(87)	0.425
	Diarrhoea	0(0)	11(100)	
	Others	0(0)	1(100)	
	Total	3(8.6)	32(91.4)	

**Significant association ($p<0.05$); **Significant association ($p<0.001$); ARI=Acute respiratory infections; others=malaria, ear infections; EBF= Exclusive breastfeeding; Non-EBF=Non-Exclusive breastfeeding*

4.7 Infant nutrition outcomes by study groups

4.7.1 Trends in infant weight over time by study groups

At delivery, infants' birth weights were significantly different in the three study groups with those born of mothers in MESIGA having the highest mean birth weight of {3.8(±0.3kg)} followed by CG {3.7(±0.5) kg} and MES having the lowest mean

infant weight {3.6(±0.5) kg} (Kruskal Wallis test; p=0.032). By second month, infants in MESIGA were significantly heavier with a mean weight of 4.6(±0.4) kg, followed closely by MES with 4.4(±0.5) kg and CG with a mean weight of 4.3(±0.4) kg (Kruskal Wallis test; p=0.001) (Figure 4.6).

At third month, the infants mean weight had increased to 5.6 (±0.5) kg in MESIGA, 5.0(±0.5) kg in CG and 4.6(±0.5) kg in MES (p<0.001). At the fourth month, infant mean weights {6.3kg and 6.1 kg respectively} in the two intervention groups MESIGA and MES were significantly higher than in the CG {5.6(±0.5) kg}(p<0.001). A similar trend was observed at the fifth month (MESIGA-6.9(±0.4) kg, MES-6.8(±0.4) kg and CG-6.5(±0.4) kg (p<0.001) and sixth (MESIGA-7.5(±0.4) kg, MES-7.3(±0.3) kg and CG-6.9(±0.4) kg (p<0.001) month where the mean weights were higher in the two intervention groups than CG group (Figure 4.6).

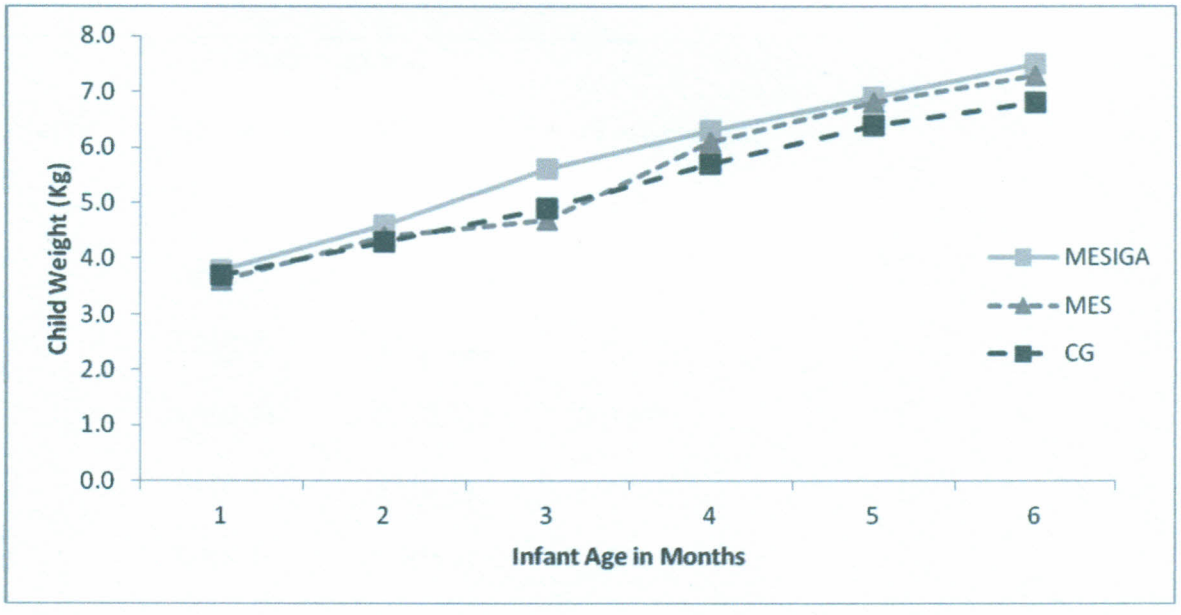

Figure 4.6: Infant monthly weight by age and study groups

4.7.2 Trends in infant mean monthly weight over time by intervention groups

The mean monthly weight of infants in the two intervention groups (MES and MESIGA) were compared to determine whether there were any differences between them. At month one, infants in MESIGA were significantly heavier than infants in MES (3.8kg and 3.7kg respectively) (Wilcoxon Two-Sample Test; p=0.007). Similar trends were observed at second and third months (Wilcoxon Two-Sample Test; p<0.009 and p<0.001 respectively). At fourth month, infants in MESIGA were heavier (6.3kgs) than infants in MES (6.1kgs) but the difference was not significant (Wilcoxon Two-Sample Test; p<0.105). At fifth month, infants in MESIGA were significantly heavier (6.9kgs) than infants in MES (6.8kgs) (Wilcoxon Two-Sample Test; p<0.036). Similarly, at the sixth month; infants in MESIGA had a significantly higher mean monthly weight of 7.5kg when compared to infants in MES (7.3kgs) (Wilcoxon Two-Sample Test; p=0.003) (Table 4.18).

Table 4.18: Trends in mean monthly infant weight over time by intervention groups

	Intervention groups		
Month	MESIGA (N=73) Mean (SD)	MES (N=50) Mean (SD)	Wilcoxon test: p-value
1	3.8(0.3)	3.6(0.5)	0.007*
2	4.6(0.4)	4.4(0.5)	0.009*
3	5.6(0.5)	4.6(0.4)	<0.001**
4	6.3(0.4)	6.1(0.5)	0.105
5	6.9(0.4)	6.8(0.4)	0.036*
6	7.5(0.4)	7.3(0.3)	0.003*

**Significant association (p<0.05); ** Significant association (p<0.001)*

4.7.3 Infant weight gain by exclusive breastfeeding (cross-sectional) status and age

The monthly mean infant weight gains in exclusively breastfed infants were compared with non-exclusively breastfed infants. At the second month after delivery, infant monthly mean weight gain in exclusively breastfed infants was higher (0.8kg) than weight gain in non-exclusively breastfed infants (0.7kg) (t-test; p=0.069). At the third month, monthly mean weight gain was equal in both groups. At the fourth month, monthly mean weight gain was higher (1.0kg) in exclusively breastfed infants as compared to non-exclusively breastfed infants (t-test; p=0.047) however, this difference was not significant. At the fifth month, exclusively breastfed infants had a higher monthly mean weight gain at 0.8kg as compared to non-exclusively breastfed infants at 0.7kg (t-test; p=0.086) but this difference was not significant . Similarly, a higher monthly mean weight gain of 0.6kg was recorded in exclusively breastfed infants as compared to 0.5kg in non-exclusively breastfed infants (t-test; p=0.434) again it was not significant (Figure 4.7).

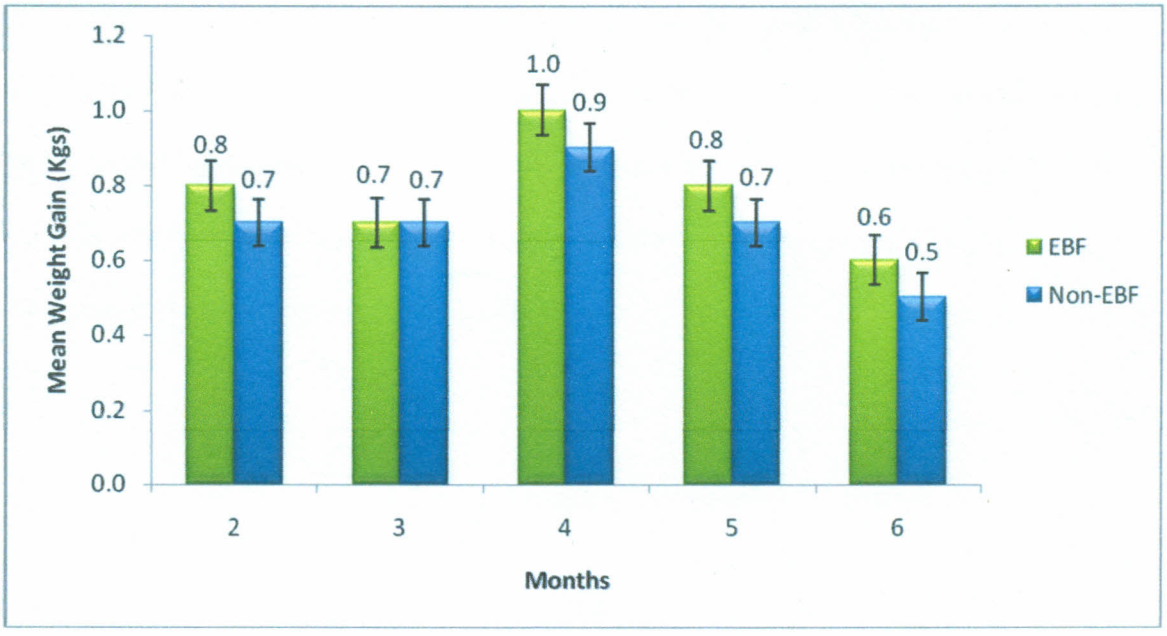

Figure 4.7: Infant mean weight gain by exclusive breastfeeding status
EBF- Exclusively breastfed infants; Non-EBF- Non- exclusively breastfed infants

4.7.4 Infant monthly weight by cumulative breastfeeding status and age

The monthly weights of cumulatively exclusively breastfed (CEBF) infants were compared to the monthly mean weights of non-cumulatively exclusively breastfed (non-CEBF) infants to determine whether there was any difference between the two groups. At the first month, cumulatively exclusively breastfed infants were significantly (Wilcoxon Two-Sample Test; $p=0.014$) heavier than non- cumulatively exclusively breastfed infants (3.8kg and 3.7kg respectively). Similar trend was observed at second month and third months. Significantly ($p<0.001$, $p<0.001$ and $p<0.001$ respectively for second, third and fourth months respectively) higher weights (4.6kg, 5.3kg and 6.2kg for second, third and fourth months respectively in CEBF) and (4.4kg, 5.0kg and 6.0kg respectively for second, third and fourth months for non-cumulatively exclusively breastfed infants.

At the fifth month, cumulatively exclusively breastfed infants had a significantly different monthly mean weight of 6.9kg when compared to non-cumulatively exclusively breastfed infants' monthly mean weight of 6.7kgs (Wilcoxon Two-Sample Test; $p<0.001$). Similarly, at six months; cumulatively exclusively breastfed infants had a significantly different monthly mean weight of 7.4kg when compared to non-cumulatively exclusively breastfed infants' monthly mean weight of 7.1kgs (Wilcoxon Two-Sample Test; $p<0.001$) (Table 4.19).

Table 4.19: Monthly mean infant weights by cumulative exclusive breastfeeding status

Months	Cumulatively exclusively breastfed (n) Mean weight (kg) (SD)	Non-cumulatively exclusively breastfed (n) Mean weight (kg) (SD)	Wilcoxon Two-Sample Test; p-value
1	(n=134) 3.8(0.4)	(n=30) 3.7(0.5)	0.014*
2	(n=115) 4.6(0.4)	(n=49) 4.4(0.5)	<0.001**
3	(n=99) 5.3(0.6)	(n= 65) 5(0.6)	<0.001**
4	(n=97) 6.2(0.5)	(n=67) 6(0.5)	<0.001**
5	(n=87) 6.9(0.4)	(n=77) 6.7(0.4)	<0.001**
6	(n=76) 7.4(0.4)	(n=88) 7.1(0.5)	<0.001**

**Significant association ($p<0.05$); ** Significant association ($p<0.001$)*

4.7.5 Infant nutrition status by study groups

At month one after delivery, a higher percentage of infants in MES (10.0%) compared to CG (4.9%) and MESIGA (1.4%) were malnourished (chi-square test; p=0.075). At the second month, a higher percent in CG (14.6%) as compared to MES (6.0%) and MESIGA (4.1%) of the infants were malnourished (chi-square test; p=0.141). At three months, no infant in MESIGA was underweight but a significantly higher percent in MES (30.0%) compared to CG (22.0%) were underweight (chi-square test; p<0.001). At the fourth month, a higher percentage of infants in CG (9.8%) were underweight compared to MES (6.0%) MESIGA (1.4%) (Chi-square test; p=0.141). At fifth month no infant in MES was underweight, however, a significantly higher percentage of infants in CG (9.8%) were underweight compared to MESIGA (1.4%) (Chi-square test; p=0.017). At sixth month, a lower percent of infants in CG (2.4%) compared to

MESIGA (2.7%) were underweight but none of the infants in MES was underweight (chi-square test; p=0.611) (Table 4.20).

Table 4.20: Infant nutrition status by time and study group

Months	Weight-for-Age Z-scores	Study Group MESIGA	MES	CG	Total	Chi-sq; p-Value
		N=73 n(%)	N=50 n (%)	N=41 n(%)	n(%)	
1	Malnourished	1(1.4)	5(10)	2(4.9)	8(4.9)	0.075
	Normal weight	72(98.6)	45(90)	39(95.1)	156(95.1)	
	Total	73(100)	50(100)	41(100)	164(100)	
2	Malnourished	3(4.1)	3(6)	6(14.6)	12(7.3)	0.141
	Normal weight	70(95.9)	47(94)	35(85.4)	152(92.7)	
	Total	73(100)	50(100)	41(100)	164(100)	
3	Malnourished	0(0)	15(30)	9(22)	24(14.6)	<0.001**
	Normal weight	73(100)	35(70)	32(78)	140(85.4)	
	Total	73(100)	50(100)	41(100)	164(100)	
4	Malnourished	1(1.4)	3(6)	4(9.8)	8(4.9)	0.114
	Normal weight	72(98.6)	47(94)	37(90.2)	156(95.1)	
	Total	73(100)	50(100)	41(100)	164(100)	
5	Malnourished	1(1.4)	0(0)	4(9.8)	5(3)	0.017
	Normal weight	72(98.6)	50(100)	37(90.2)	159(97)	
	Total	73(100)	50(100)	41(100)	164(100)	
6	Malnourished	2(2.7)	0(0)	1(2.4)	3(1.8)	0.611
	Normal weight	71(97.3)	50(100)	40(97.6)	161(98.2)	
	Total	73(100)	50(100)	41(100)	164(100)	

***Significant association (p<0.001)*

4.7.6 Infant nutrition status by exclusive breastfeeding status and age

At first month after delivery, a higher percent (77.8%) of exclusively breastfed infants were malnourished compared to 22.2% non-exclusively breastfed. The difference was however, not significant (chi-square test; p=0.729). At second month, a higher percent (53.8%) of non-exclusively breastfed infants were malnourished as compared to 46.2% of exclusively breastfed. Likewise, the difference was not significant (chi-square test; p=0.062). At third month, a significantly higher percent (58.3%) of non-

exclusively breastfed infants were malnourished compared to 41.7% exclusively breastfed (chi-square test; p=0.043) (Table 4.19).

Similarly, at the fourth month, a higher proportion (75%) of non-exclusively breastfed infants were malnourished as compared to 25% exclusively breastfed. The difference was however, not significant (chi-square test; p=0.064). At the fifth month after delivery, significantly all (100%) malnourished infants were non- exclusively breastfed (chi-square test; p=0.021). At six months, a higher percent (66.7%) of non-exclusively breastfed infants were malnourished as compared to 33.3% of exclusively breastfed. However this difference was not significant (chi-square test; p=0.999) (Table 4.21).

Table 4.21: Infant nutrition status and exclusive breastfeeding status

Months	**Weight-for-Age Z-score	Exclusive breastfeeding N (%)	Non-exclusive breastfeeding N (%)	Chi-sq; p-value
1	Normal	127(81.9)	28(18.1)	0.729
	Malnourished	7(77.8)	2(22.2)	
	Total	134(81.7)	30(18.3)	
2	Normal	109(72.2)	42(27.8)	0.062
	Malnourished	6(46.2)	7(53.8)	
	Total	115(70.1)	49(29.9)	
3	Normal	89(63.6)	51(36.4)	0.043*
	Malnourished	10(41.7)	14(58.3)	
	Total	99(60.4)	65(39.6)	
4	Normal	95(60.9)	61(39.1)	0.064
	Malnourished	2(25.0)	6(75.0)	
	Total	97(59.1)	67(40.9)	
5	Normal	87(54.7)	72(45.3)	0.021*
	Malnourished	0(0)	5(100)	
	Total	87(53)	77(47)	
6	Normal	75(46.6)	86(53.4)	0.999
	Malnourished	1(33.3)	2(66.7)	
	Total	76(46.3)	88(53.7)	

**Significant association (p<0.05); **Malnourished: Both moderate (<-2) and severe (<-3) infant malnutrition*

4.8 Factors associated with exclusive breastfeeding over the 6-month period

The study sought to determine the factors associated with exclusive breastfeeding of the infants in the study area at different months during the intervention period. Maternal socio-economic characteristics, pre-natal, peri-natal and infant feeding practices during the first month after delivery were investigated in relation to exclusive breastfeeding from second to sixth month.

4.8.1 Association between maternal socio-economic status and exclusive breastfeeding

Household wealth index scores were computed using principal component analysis (PCA) model. Household assets such as radios, televisions, motor cycles, phones, housing and land were considered. Ownership of animals such as cows, goats and chicken were also included.

Wealth index scores obtained were not associated with exclusive breastfeeding at all months (Appendix X).

4.8.2 Association between early infant feeding practices and the practice of exclusive breastfeeding

At first month after delivery, initiating infants to breastfeeding within one hour of birth and giving infants colostrum were all significantly associated with exclusive breastfeeding (chi-square test; $p<0.001$). At second month, only giving breast milk as first feed after birth was significant (chi-square test; $p=0.008$) while at the third month the only practice significantly associated with exclusive breastfeeding was giving infants colostrum after birth (chi-square test; $p=0.023$) (Table 4.22).

At fourth month, two infant feeding practices were significantly associated with the practice of exclusive breastfeeding. Giving infant breast milk as first feed and giving colostrum after birth were significantly associated with exclusive breastfeeding (chi-square test; $p=0.022$ and chi-square test; $p=0.026$ respectively). At fifth month, the results showed that the only variable significantly associated with exclusive breastfeeding was the giving breast milk to infants as the first feed after birth. There

were no infant feeding practices which were significantly related with exclusive breastfeeding at six months (chi-square test; p=0.039) (Table 4.22).

Table 4.22: Early infant feeding practices and their association with EBF

Month	Early infant feeding practices		EBF	Non-EBF	Chi-sq; p-value
			N (%)	N (%)	
1					
	Initiation of breastfeeding within 1hr of safe delivery	Yes	127(85.8)	21(14.2)	<.001**
		No	7(43.8)	9(56.3)	
	Colostrum given after birth	Yes	134(83.8)	26(16.3)	<.001**
		No	0(0)	4(100)	
2	Breast-milk as first food after delivery	Yes	106(71.1)	43(28.9)	0.008*
		No	9(60.0)	6(40.0)	
3	Colostrum given after birth	Yes	99(61.9)	61(38.1)	0.023*
		No	0(0)	4(100)	
4	Breast-milk as first food after delivery	Yes	93(62.4)	56(37.6)	0.022*
		No	4(26.7)	11(73.3)	
5	Colostrum given after birth	Yes	97(60.6)	63(39.4)	0.026*
		No	0(0)	4(100)	
6	Breast-milk as first food after delivery	Yes	84(56.4)	65(43.6)	0.039*
		No	3(20.0)	12(80.0)	

**Significant association (p<0.05); *Significant association (p<0.001);*
EBF= exclusive breastfeeding; Non-EBF= Not exclusively breastfed

4.8.3 Association between infant morbidity and breastfeeding status and age

Analysis was done to find out whether exclusive breastfeeding was associated with infant morbidity at different stages of growth between 0-6 months. Results showed that at first month, a significantly higher proportion (66.7%) of infants who fell ill were not exclusively breastfed as compared to 12.7% of the infants who were exclusively breastfed (chi-square test; p<0.001). At second month, still a significantly higher percent (58%) of infants who fell ill were not exclusively breastfed as compared to 42% of those who were exclusively breastfed (chi-square test; p<0.001).

Similarly, at three months with 71.3% of the infants who fell ill were not exclusively breastfed as compared to 28.7% exclusively breastfed infants (chi-square test; $p<0.001$).

At the fourth month, 75.6 % of infants who got sick were not exclusively breastfed compared to 24.4% of the infants who were exclusively breastfed (chi-square test; $p<0.001$). At the fifth month, 68.3% of the infants who got sick were not exclusively breastfed as compared to 31.7% of the infants who were exclusively breastfed (chi-square test; $p<0.001$) while at six months 91.4% of the infants who got sick were not exclusively breastfed as compared to 8.6% of the infants who were exclusively breastfed (chi-square test; $p<0.001$) (Table 4.23).

Table 4.23: Relationship between infant morbidity and breastfeeding status

Month	Infant morbidity	EBF N (%)	Non-EBF N (%)	Chi-sq; p-value
1				
	Infant was ill	17(12.7)	20(66.7)	<0.001**
	Infant was not ill	117(87.3)	10(33.3)	
	Total	134(100)	30(100)	
2	Infant was ill	21(42.0)	29(58.0)	
	Infant was not ill	94(82.5)	20(17.5)	<0.001**
	Total	115(70.1)	49(29.9)	
3	Infant was ill	12(28.6)	30(71.4)	
	Infant was not ill	87(71.3)	35(28.7)	<0.001**
	Total	99(60.4)	65(39.6)	
4	Infant was ill	11(24.4)	34(75.6)	
	Infant was not ill	86(72.3)	33(27.7)	<0.001**
	Total	97(59.1)	67(40.9)	
5	Infant was ill	19(31.7)	41(68.3)	
	Infant was not ill	68(65.4)	36(34.6)	<0.001**
	Total	87(53.0)	77(47.0)	
6	Infant was ill	3(8.6)	32(91.4)	
	Infant was not ill	73(56.6)	56(43.4)	<0.001**
	Total	76(46.3)	88(53.7)	

***p-value significant at p<0.001;*
EBF= exclusive breastfeeding; Non-EBF= Not exclusively breastfed

4.9 Predictors of the practice of exclusive breastfeeding over the 6-month period

Multiple logistic regression analysis of all factors associated with the practice of exclusive breastfeeding on a monthly basis was conducted to establish factors that predict mothers to exclusively breastfeed infants in the study area. At month one, there were no factors that predicted exclusive breastfeeding. At two months, infants who got sick had 27.0% odds of being exclusively breastfed compared to those who did not fall ill {OR=0.27; 95% CI (0.12-0.63), p=0.002}. Lack of infant illness was a predictor of EBF. At the third month, infants who had been given other feeds other than breast milk since delivery had 17.0% odds of being exclusively breastfed compared to infants who were not given other feeds other than breast milk since delivery {OR= 0.17(CI:0.05-0.55); p=0.003}. At the fourth month, infants who were given other feeds other than breast milk since delivery had 35.0% odds of exclusive breastfeeding their infants compared to infants who were not given other feeds other than breast milk since delivery {OR=0 35; 95% CI; (0.17-0.69), p= 0.003}. (Table: 4.24). Hence, giving infants only breast milk was a predictor of EBF.

At the fifth month, mothers who received breastfeeding information at a health facility were more than two times more likely to exclusively breastfeed their infants compared to mothers who received breastfeeding information from elsewhere {OR=2.45; 95% CI; (1.24-4.87), p=0.030}. Mothers receiving breastfeeding information from health facilities was a predictor of EBF. At the sixth months, infants who were given other feeds other than breast milk since delivery had 5.0% odds of being exclusively breastfed as compared to infants who were not given other feeds other than breast milk since delivery {OR: 0.05(CI:0.01-0.28); p=0.001}. Hence, giving infants only breast milk was a predictor of EBF (Table 4.24).

Table 4.24: Multiple logistic regression analysis of predictors of exclusive breastfeeding

Month	Independent Variables	Odds Ratio (95%CI)	P-value
2	Baby been sick	0.27(0.12-0.63)	0.002*
3	Given anything to drink other than breast milk since delivery	0.17(0.05-0.55)	0.003*
4	Given anything to drink other than breast milk since delivery	0.25(0.08-0.77)	0.015*
5	Health facility as a source of breastfeeding information	2.45(1.24-4.87)	0.010*
	Given anything to drink other than breast milk since delivery	0.26(0.08-0.88)	0.030*
6	Given anything to drink other than breast milk since delivery	0.05(0.01-0.28)	0.001*

**Significant association ($p<0.05$)*

4.10 Barriers to exclusive breastfeeding- Findings from focus group discussions (FGDs)

Focus group discussions were held to collect qualitative information on breastfeeding practices from the mothers to validate the quantitative information collected using questionnaires. Any discrepancies in the findings from the FGDs and the quantitative information have been highlighted in the discussion. For each study group, two FGDs were conducted; one FGD for mothers who exclusively breastfed for 6 months and one FGD for mothers who did not exclusively breastfeed for 6 months. A total of 6

FGDs were conducted for the 3 study groups. The information from each of the FGDs was analysed and presented separately as follows.

4.10.1 Results of FGD with mothers in CG who exclusively breastfed for six months

4.10.1.1. Sources of infant feeding information in the community

The FGD participants reported that they received information on exclusive breastfeeding from health care providers especially nurses and community health workers. Mothers reported that family members gave information to mothers when they delivered with particular attention to new mothers. Also they indicated that friends advised them depending on their previous breastfeeding experiences. The participants were in agreement that the information they received was inadequate to enable them exclusively breastfeed for the recommended six months.

4.10.1.2. Breastfeeding practices among the community members

The FGD participants reported that breastfeeding was common for infants because breast milk contained all of the nutrients required for the infants' growth. Mothers also reported that breast milk was cheaper than infant formulas and that breastfeeding allowed mothers to be psychologically attached to their infants. Moreover, mothers responded that they did not give their infants other feeds apart from breast milk since it was adequate for proper growth and development. They were equally in agreement that when the infant is sick, breastfeeding should continue and the infant should be taken to the hospital.

4.10.1.3. The benefits of exclusive breastfeeding

The FGD participants reported that exclusive breastfeeding is feeding the infant with breast milk only without giving any other feeds until six months after delivery.

Mothers also reported that their babies who were exclusively breastfed gained weight better than their counterparts who gave other feeds. Mothers also reported that their infants did not get sick as often as the infants of their friends who were not exclusively breastfed. '*Breast milk contains water, proteins and it protects the infant from viruses and bacteria*' one participant reported.

4.10.1.4. Barriers to the practice of exclusive breastfeeding

The FGD participants reported that: maternal work load especially farm work away from home separated them with their infants and lack of adequate knowledge on exclusive breastfeeding due to insufficient health staff at health facilities. Mothers also cited early pregnancies (before six months after delivery) reduced time to exclusively breastfeed their infants since pregnant mothers are not allowed to continue breastfeeding.

4.10.1.5. Views on exclusive breastfeeding promotion using MTMSGs

The FGD participants suggested that there was need for promotion of exclusive breastfeeding in the entire community. They recommended that this could be done through regular dissemination of breastfeeding information at the health centres, during ANC clinics and MCH clinics. They further suggested that breastfeeding promotion could also be carried out through regular road shows and poster campaigns at markets, churches and villages. They suggested that community health workers should have regular mother-to-mother support group meetings with all pregnant and lactating mothers.

4.10.2 Results of FGD with mothers from the CG who did not exclusively breastfeed for six months

4.10.2.1 Sources of breastfeeding information in the community

The FGD participants reported that they received breastfeeding information from health facility staff and relatives especially grandmothers or mothers-in-law. Mothers reported that the information given from all sources was inadequate to exclusively breastfeed their infants for six months. However, they reported that breastfeeding information from the health facilities was more useful than all the other sources.

4.10.2.2. Exclusive breastfeeding and its benefits

The FGD participants reported that they had inadequate knowledge on exclusive breastfeeding for the recommended six months period. The FGD participants understood that exclusive breastfeeding was feeding infants with breast milk for six months. '*Exclusive breastfeeding is giving the infant only breast milk without giving anything else from birth to six months of age*', said one mother. The FGD participants reported that it was not possible to breastfeed exclusively for up to six months because their infants also required other foods and drinks like water, fruits, cereals and mashed food. They also reported that breast milk produced was not adequate for their infants' growth. Majority of the mothers also reported that they did not produce enough milk to satisfy needs of their infants. Mothers further reported that although breastfeeding is commonly practiced in the community exclusive breastfeeding is rare.

4.10.2.3. Breastfeeding practices in the community

The FGD participants reported that when an infant is born in their community, first feed given is honey. They reported that most of the mothers did not practice exclusive

breastfeeding due to maternal work load. Mothers also cited that infants required water because they gave water to the infants when thirsty. Although the women in the focus group discussion reported they had fed colostrum to their infants, they reported that some mothers in the community did not feed colostrum to their infants. They considered colostrum as dirty milk that should be discarded.

4.10.2.4. Barriers to exclusive breastfeeding in the community

The FGD participants reported that inaccessibility to health centres for nutrition services and poor infrastructure contributed to failure to exclusively breastfeed. Family disagreements led to break up of families and according to local practices; the infant is left with grandmother hence cessation of breastfeeding. *'Married women have little authority in this community and they have no power to choose which feeds to give their infants'* a mother said.

4.10.2.5. Perceptions on exclusive breastfeeding promotion using MTMSGs

The FGD participants reported that there was need to promote exclusive breastfeeding in the district through dissemination of breastfeeding information through MTMSGs. They also suggested that community health workers should mobilize all mothers into mother-to-mother breastfeeding support groups. They further suggested that exclusive breastfeeding promotion should also be done through radios, televisions and local dailies for greater coverage.

4.10.3 Results of FGD with mothers in MES who exclusively breastfed for 6 months

4.10.3.1. Exclusive breastfeeding and its benefits

The FGD participants reported that exclusive breastfeeding is giving only breast milk to the infants without giving any other feeds for six months after delivery. They

reported that giving water to infants was not necessary since breast milk provided all the water the infant required. They also reported that they exclusively breastfed their infants up to six months and that they gave their infants colostrum. The FGD participants still reported that they had enough breast milk for six months. They also reported that their infants had healthy weight gain and fell sick less often compared to those who were not exclusively breastfed. One participant said; *'the exclusively breastfed infants are very strong and clever'*. Moreover, they reported that their infants bonded well especially when breastfeeding. They also added that their infants played more often and were always lively. They pointed out that breast milk was free, readily available and it did not need any preparation before giving to their infants.

4.10.3.2. Breastfeeding practices in the community

The FGD participants reported that breastfeeding up to 2 years was common in the community but exclusive breastfeeding was rarely practised. They reported that according to their culture, infants should not be fed on colostrum because the milk is expired and hence not good for the infants. They reported that according to their culture colostrum should be expressed onto clothes if baby is alive and to the floor if the infant had died. Although mothers reported that this is the tradition, they said they did not practise it anymore. They reported that they fed colostrum to their infants because they knew it was good for infants' and provided immunity against diseases. The mothers reported that exclusive breastfeeding up to six months was uncommon because: mothers lacked adequate knowledge about its benefits; mothers think that exclusive breastfeeding up to six months was impossible because infants needed other feeds for proper growth; some mothers produced inadequate breast milk hence their babies cried often due to hunger, while others thought breast milk was inadequate for the infants growth up to six months. The FGD participants also reported that some

mothers believe that their infants needed water to quench thirst which often made them cry.

4.10.3.3. Barriers to exclusive breastfeeding in the community

The FGD participants reported that some of the factors that hinder exclusive breastfeeding were; separation of mothers and infants due to family disputes; heavy maternal workload and lack of adequate food for the family. They also reported that they were under great pressure from other family members to start giving their infants other feeds. They also found it difficult to exclusively breastfeed because their infants cried when they were not satisfied with breast milk.

4.10.3.4. Perceptions on exclusive breastfeeding promotion using MTMSGs

The FGD participants suggested that MTMSG project on exclusive breastfeeding should be expanded to all ANC/MCH clinics to give breastfeeding support to all mothers. They reported that the discussions held during the meetings assisted them to exclusively breastfeed their infants for six months. Some of the information the that was helpful to the mothers as they reported was: positioning and attachment of the infants; breastfeeding on demand, rooming in and breast milk expression for infants. Mothers also said they benefitted from the MTMSG meetings because they discussed their challenges with their peers and the facilitators.

4.10.4 Results of FGD with mothers in MES who did not exclusively breastfeed for six months

4.10.4.1. Exclusive breastfeeding and its benefits

The FGD participants reported that exclusive breastfeeding is giving only breast milk to the infants excluding all other drinks and feeds up to the age of six months. They responded that colostrum should be given to the babies because it contains water,

proteins, fats and it protects the baby from viruses and bacteria. They also reported that infants can survive on breast milk for six months without any other foods or drinks. Besides, they reported that breast milk contains all the nutrients required for the infant's growth such as proteins, vitamins and water. '*Breast milk boosts immunity of the infant*' one mother added.

4.10.4.2. Breastfeeding practices in the community

The FGD participants reported that a pregnant mother should not breastfeed because the breast milk will have expired and hence it is not good for the infant. Culturally, when an infant is born, it is given some honey and some bitter herbs to indicate good and bad times in future. Mothers reported that breastfeeding is commonly practised in their community for up to 2 years, but exclusive breastfeeding was rare despite health staff recommendations. Mothers further reported that due to inadequate knowledge, most mothers cannot convince their partners that breast milk alone was adequate for the infant for a period of six months. They reported that the crying of the infant signalled that they were hungry despite being breastfed and hence they are given other feeds such as porridge. *'If the mother does not produce enough breast milk, other feeds are given to the infant'*, one participant reported.

4.10.4.3. Barriers to exclusive breastfeeding in the community

Most of the mothers in the FGD reported that they came from poor background. Thus they had to work on farms to feed their families hence they had no time to exclusively breastfeed their infants. They reported that negative cultural practises such as giving honey and bitter herbs to infants negatively affected breastfeeding. Mothers also reported that their husbands and mothers-in-law think when infants cry, they are thirsty and should be given water.

4.10.4.4. Views on exclusive breastfeeding promotion using MTMSGs

The FGD participants suggested that health workers should mobilize all mothers into MTMSGs where support is given for exclusive breastfeeding. Mothers also added that fathers and grand-mothers should be included in the meetings. They suggested that they needed some income generating activity apart from infant feeding discussions.

4.10.5 Results of FGD with mothers in MESIGA who exclusively breastfed for six months

4.10.5.1. Breastfeeding practices in the community

One FGD participants reported that: '*the first feed given to the infant should be 'ikandu'* (a local bitter herb)*, then honey, so that the infant tastes the bitterness and sweetness in future*'. Another participant reported: '*When the infant cries a lot after breastfeeding, a sheep's ear lobe is cut to remove bad omen and stop the crying*'. Mothers reported they still continue breastfeeding even if the infants were sick and they took them to the hospital for treatment.

4.10.5.2. Exclusive breastfeeding and its benefits

The FGD participants reported that, exclusive breastfeeding is feeding of the infant with only breast milk up to six months after delivery. Mothers reported that despite the challenges involved in exclusive breastfeeding they had chosen it because of its numerous benefits. They added that their infants had better weight gain than their older siblings when they were at the same age. Moreover, they reported that the infants were more active, very alert and rarely fell ill. They also reported that stomach upsets (locally referred to as '*mililí*') which is a major reason why infants are given

water was not experienced. Furthermore, they reported that proper positioning and attachment of their infants when breastfeeding safeguarded them from this problem.

4.10.5.3. Barriers to exclusive breastfeeding in the community

The FGD participants reported that: heavy maternal workload involving farming, fetching water, collecting firewood and taking care of the other siblings ended up limiting breastfeeding time. Family disputes also led to separation of the mother and the infant for a long period.

4.10.5.4. Views on exclusive breastfeeding promotion through MTMSGs

The FGD participants reported that MTMSG program was more detailed, informative and practical than the usual health talks they received at the health facility. They also indicated that their exclusively breastfed infants were less ill, so they spent less money on hospital bills and saved it for food for other siblings. They reported that they did not need to buy special food for the infant, cook separately or buy extra cooking pots or utensils. They still reported that the soap made at MTMSGs was used at home. They sold some of the soap for fare to attend MCH clinic and MTMSG meetings. They also suggested that the government and development partners should set up more MTMSGs in other villages to take services closer to the people.

4.10.6 Results of FGD with mothers in MESIGA who did not exclusively breastfeed for six months

4.10.6.1. Exclusive breastfeeding and its benefits

One FGD participant reported that exclusive breastfeeding is '*giving the infant only breast milk for six months after delivery*'. Mothers reported they had enough breast milk for their infant's nutrition needs for six months. They reported that breast milk

contains all nutrients required for infant growth to six months. Mothers also cited that they learnt the importance of exclusive breastfeeding to the infants. They cited that it enables the infants to have a well developed brain, prevents diarrhoea, and promotes overall growth by providing immunity. However, pressure from the husband and relatives made them give other feeds apart from breast milk to their infants.

4.10.6.2. Effect of MTMSG activities on the meetings' attendance

The FGD participants reported that soap making contributed to their attendance since mothers knew they would get soap to use at home and also make a little money to meet transport costs. Mothers also reported that they could afford to eat some snacks during the meetings. One FGD participant reported that: *'I have learnt proper positioning and attachment of the infant to the breast when breastfeeding unlike before the beginning of MTMSGs.* Yet another FGD participant reported: *'MTMSGs have really changed our lives as a result of the many powerful discussions we have held, practical demonstrations and moral support from friends in our MTMSGs'.*

Generally, they were in agreement that MTMSGs helped them in attending the (MCH) clinics for growth monitoring and immunisation since they were held on the same day as MTMSG meetings. Another FGD participant reported, *'I have learnt how to make and use liquid soap.'* They suggested that they would like to add other activities like making of bead necklaces and start a 'Merry-Go Round' to raise capital for grocery shop to sell their farm produce. However, none of the participants had any suggestions to improve infant feeding, their main interest was entrepreneurship.

4.10.6.3 Breastfeeding practices in the community

The FGD participants reported that breastfeeding was common in the community and nearly all infants were breastfed with some up to 2 years. However, they reported that the practice of exclusive breastfeeding and expressing milk were not common since the mothers were always close to their infants. They further revealed that pregnant mothers did not continue breastfeeding because it would lead to poor health of the mother and the un-born baby. Nonetheless, they added that mothers continued breastfeeding even if they or their infants got sick. They also reported that experienced family members assisted them in ensuring they initiated and maintained breastfeeding of their infants.

4.10.6.4. Barriers to exclusive breastfeeding in the community

The FGD participants reported that those who tried to exclusively breastfeed faced pressure from mothers-in-law or husbands to give other feeds. Mothers also reported that maternal workload restricted them from getting enough time to exclusively breastfeed their infants. Mothers also reported that they were forbidden to express breast milk because it is culturally not acceptable. Mothers also cited that producing adequate breast milk for the infants was not possible and infants often cried due to hunger or thirst hence the need for other feeds. Participants also reported that mothers who became pregnant before six months after delivery stopped breastfeeding. '*If the mother gets pregnant and the infant is still breastfeeding, breastfeeding will be stopped because the breast milk will no longer have vitamins*', said one participant. '*The unborn will be affected and therefore he/she will not thrive,* 'another mother added.

4.10.6.5. Perceptions on exclusive breastfeeding promotion using MTMSGs

The FGD participants suggested that the programme should include fathers, grand-mothers and community leaders so that mothers get support at home to exclusively breastfeed their infants. They suggested that exclusive breastfeeding should be promoted through expansion of MTMSG programme and also mass media should be employed for broader coverage. The findings from the participants from the various FGDs were not very different and therefore have been summarized and presented in Table 4.25.

Table 4.25: Summary of FGD meetings with study groups

Summary of FGD themes discussed by study groups	Summary of findings from the FGDs for all the study groups
Infant feeding information Sources	• Health facilities and especially nurses gave them information on breastfeeding but it was not adequate to enable them exclusively breastfeed for 6 months. • Family members especially partners and mothers-in-laws have a critical role to play in infant feeding.
Infant feeding practices in the study community	• The practice of expressing milk is not culturally acceptable. • Colostrum is considered to be dirty milk and should not be fed to the infants. • Mothers continue breastfeeding even when they fall sick or their infants fall ill. • Mothers stop feeding when they become pregnant
Exclusive breastfeeding and its benefits	• Majority of mothers in the intervention groups understood exclusive breastfeeding and its benefits • They also understood that mothers produced enough milk for the infant. • Few mothers in the control group understood fully the meaning of exclusive breastfeeding.
Challenges to exclusive breastfeeding in the community	• Heavy maternal workload involving farming, fetching water, fetching firewood, taking care of the other siblings is a major limitation to exclusive breastfeeding. • Separation of mother and infant after family disagreement also contributed to lack of exclusive breastfeeding. • Pregnancy before six months of breastfeeding coupled with local culture of restricting pregnant mothers from breastfeeding makes mothers to stop breastfeeding.
Views on exclusive breastfeeding promotion through MTMSGs	• Mothers expressed need for expansion of MTMSGs to other villages for easy access. • Information on exclusive breastfeeding should be spread through other channels like mass media, chiefs' *barazas* and promotion campaigns. • Mothers reported that it is important to include income generating activities (IGAs) so that they can learn some trade to support other children.
Topics covered during MTMSG meetings which were most helpful in the practice of exclusive breastfeeding	• Initiation of breastfeeding within first one hour of delivery • Correct positioning and attachment of the infant to the breast during breastfeeding • Breastfeeding on demand

CHAPTER FIVE: DISCUSSION

5.1 Introduction

This was a cluster-randomised trial to compare the effect of MTMSGs with and without income generating activity (IGA) component on promoting exclusive breastfeeding (EBF). The study also investigated the influence of IGA on the MTMSGs attendance rates. Many of the previous intervention trials have determined infant feeding practices based on maternal self-reports. Few studies (Ochola, 2008) have verified maternal self-reported feeding practices through observation as was done in this study. FGDs were conducted to collect qualitative information which was used to give an in-depth understanding of maternal infant feeding practices. The findings on infant feeding practices, maternal self-reports and the qualitative data from the FGDs were on the whole similar. Randomization process was successful because the study groups were similar in baseline characteristics.

5.2 Effectiveness of MTMSG intervention strategies on exclusive breastfeeding

In this study, cross-sectional exclusive breastfeeding rate was defined as the proportions of infants exclusively breastfed each month determined by 24-hour recall. Cumulative exclusive breastfeeding rates were determined by analyzing proportions of infants breastfed continuously from months 1 to 6. Cross-sectional breastfeeding rates are useful in monitoring trends in infant feeding whereas cumulative exclusive breastfeeding rates offer a clear picture of the true magnitude of exclusive breastfeeding which can give crucial scientific evidence for policy changes and programme implementation.

Exclusive breastfeeding promotion interventions using community-based peer counselling models have demonstrated significant positive impact on rates and duration of exclusive breastfeeding. Several community-based cluster randomized controlled trials have shown significant impact of peer counselling on exclusive breastfeeding and reduced infant morbidity (Bhandari et al., 2003; Haider et al., 2000; Kushwaha et al., 2014: Lewycka et al., 2013; Ochola et al., 2012; Rozga et al., 2014; Tylleskär et al., 2011). Unlike in the present study, many of these studies have used peer-counsellors in face-to-face individualized counselling.

In Africa, in a study carried out by Tylleskar and others in Burkina Faso, Uganda and South Africa, prevalence of exclusive breastfeeding at 6 months in intervention clusters were significantly higher than control groups in Burkina Faso (RR=3.33, 1.7-6.38); Uganda (RR=3.83, 2.97-4.95) and South Africa (RR=5.7, 1.33-24.26) (Tylleskär et al., 2011). In the above three studies, only cross-sectional exclusive breastfeeding rates were reported. A recent study in Lalitpur, India on the effectiveness of mother support group (MSG) in promoting breastfeeding practices (Kushwaha et al., 2014), showed higher prevalence of exclusive breastfeeding than the current study. Unlike the current study which used a randomized trial study design, the study in India utilised a quasi-experimental design and employed a one-to-one peer counselling sessions to mothers at household level by trained mother support groups. In a study carried out in an informal settlement in Nairobi, Kenya (Ochola et al., 2012) found that cumulative exclusive breastfeeding was 15.6% in home-based intensive counselling group and 6.9% in facility-based semi-intensive counselling group; but reported a low of 3.2% in control group. Even in the earlier studies

(Bhandari et al., 2003; Haider et al., 2000, Ochola et al., 2012) on the promotion of EBF, the rates attained fall short of the WHO recommended level of 90%.

In a study by Haider and others in Dhaka, Bangladesh; prevalence of exclusive breastfeeding at 3 and 5 months were reported to be 83% and 70% respectively in intervention clusters while in the control clusters the rates were 18% and 16% (Haider et al., 2000). In another study in India by Bhandari and others, volunteer peer counsellors were used instead of paid counsellors in Dhaka study. In India study, the prevalence of exclusive breastfeeding at 3 months was reported to be 79% in intervention clusters compared to 48% in control clusters. At 6 months, the rates of exclusive breastfeeding had dropped to 42% in intervention clusters and 4% in control clusters (Bhandari et al., 2003).

In all the four studies mentioned herein, one-on-one peer counselling approach was employed at household level unlike the current study which utilized MTMSG approach. In MTMSG study, mothers formed groups of 15 mothers per group and they met on regular basis at a health centre nearest to them. There is scarcity of published studies on the promotion of exclusive breastfeeding using mother-to-mother support groups in Kenya despite its wide application in different health and nutrition programmes. MTMSGs are one of the strategies recommended for the promotion of EBF by MOH (Kenya) and therefore included in the Kenya National Nutrition Plan (Republic of Kenya, 2012).

In the current study, two intervention strategies were used: mother-to-mother support group with education and income generating activity (MESIGA) and mother-to-

mother support groups with education (MES). Unlike in the other studies already mentioned, mothers met regularly at the health facilities and regular MTMSG discussions were held with the assistance of trained peer facilitators. During each meeting, the mothers discussed breastfeeding topics such as proper attachment and positioning, difficulties they experienced in breastfeeding exclusive breastfeeding and management of breast problems. MTMSG approach has been implemented by La Leche League since 1956 to assist breastfeeding mothers in several countries. This is enshrined in their mission statement "***To help mothers worldwide to breastfeed through mother-to-mother support, encouragement, information, and education, and to promote a better understanding of breastfeeding as an important element in the healthy development of the baby and mother***" (La Leche League, 2014).

However, unlike in La Leche League, MTMSGs where mothers interconnect to get breastfeeding support from others through moderated online forums and telephones linkages, the current study utilized the 'self-help women groups' model commonly known as *'Chamas'* in Kenya. Face-to-face regular meetings were found to be more applicable since majority of the mothers did not have telephones or internet connection. This MTMSGs model has also been advocated for by UNICEF (UNICEF, 2013) in Comprehensive Care Centres (CCC) as a community approach to support people living with HIV/AIDS to overcome social stigma and live positively (WHO, 2014).

In the current study, both intervention strategies (MESIGA and MES) significantly increased the prevalence and rates of exclusive breastfeeding. However, the prevalence of exclusive breastfeeding was not significantly different between the two

intervention groups. The cross-sectional exclusive breastfeeding at 6 months was significantly higher in intervention groups- mother-to-mother support group with education support (MES) at 46% and 58.9% in mother-to-mother support group with education support and income generating activity (MESIGA) compared to control group (CG) at 24%. Lack of difference in the two intervention strategies showed that although income generating activities (IGAs) improved attendance in MESIGA, the increased attendance did not have any impact on prevalence of exclusive breastfeeding.

Rates of exclusive breastfeeding intervention groups in the current study were lower than those obtained by Victoria and others (2005) in a study conducted in Bolivia, Ghana and Madagascar using MTMSG strategy. In the aforementioned study, authors reported that the prevalence of exclusive breastfeeding during the first six months after delivery improved from 68% to 79% in Ghana, 54% to 65% in Bolivia and 46% to 75% in Madagascar. Exclusive breastfeeding rate remained the same in areas that were not under intervention. In contrast, the MTMSG strategy used in this study had a greater impact in improving EBF rates compared to an earlier study conducted by Ochola et al., (2012) in the Kibera informal settlement in Nairobi, Kenya. This may be due to several factors; maternal breastfeeding information particularly in terms of the benefits and the duration of EBF. Secondly, there have been a lot of activities to promote EBF by MOH and partners including the MTMSGs as part of implementation the High Impact Nutrition Interventions (HINI) and the Scaling Up Nutrition movement of which Kenya is a member.

In the present study only MTMSGs were used to disseminate information, whereas the studies in Ghana, Bolivia and Madagascar employed multiple channels for dissemination of information in promoting exclusive breastfeeding which included MTMSGs, radio broadcasts and advertisements in local dailies; social clubs, local music stars and road campaigns to pass breastfeeding messages (Victoria et al., 2005). Whereas the study in Ghana, Bolivia and Madagascar provided a good model for community-based programme implementation, its effectiveness on large scale was not determined since the evaluation was not based on scientific randomized design and it did not have any control clusters.

Overall, in the current study, there was no significant difference in prevalence of exclusive breastfeeding between the two intervention strategies. Therefore, the null hypothesis that there is no significant difference in exclusive breast-feeding rates among those mothers in MTMSGs with IGAs and those who belong to MTMSGs without IGAs is accepted.

5.3 Effectiveness of IGAs on attendance of MTMG meetings

The results of the current study indicated that IGAs played a big role in encouraging attendance among the MTMSG members. Mothers in MESIGA group attended meetings significantly more meetings than mothers in MES ($p<0.001$). In this study, a mother was expected to attend a meeting once a month over a 7-month period translating to a total of 7 meetings during the study period. The major challenge was the high rate of absenteeism during the study period for each of the MTMSG groups. Slightly more mothers than the sample size were recruited due to high attrition rates expected in the three study groups.

All MTMSGs experienced absenteeism over the seven months period; however, MES had a higher rate of absenteeism than MESIGA. The major reasons for absenteeism during meetings as reported during the FGDs were: a) some of the members being from far villages without means of transport to the meeting centres; b) the study setting was a poor district which is mainly semi-arid hence mothers complained about lack of transport; c) during the rainy seasons, roads become impassable and the fare by motor bikes which are the main mode of transport off the tarmac roads is increased several times; d) Many mothers would be absent so as to tend their crops or for paid labour in farms during the rainy seasons. To reduce these rates of absenteeism, mothers were asked to decide on the most appropriate dates for their meetings.

Although mothers in MESIGA attended significantly higher number of meetings as compared to MES, this did not result in better performance of this group in terms of prevalence of exclusive breastfeeding. The higher rate of attendance could have been influenced by the benefits the members accrued from the income generating activity as opposed to increased interest in exclusively breastfeeding their infants as demonstrated by the participants' responses during the focus group discussions. Similar findings have been reported in another community-based cluster randomized trial with multiple interventions by Lewyka and others (Lewycka et al., 2013) in Malawi involving women groups and breastfeeding promotion using peer counsellors. However, in this study, members of women groups who had infants were counselled on one-on-one basis at home. The rest of the members of the women groups met on monthly basis but received no breastfeeding counselling. They performed other health

related activities. The study in Malawi did not report on the rates of absenteeism like the current study where the rates are reported.

Therefore, this study rejects the null hypothesis that there is no significant difference in attendance of meetings between mothers in MTMSGs with and those without IGAs.

5.4 Barriers to exclusive breastfeeding

World Health Organization (WHO) and UNICEF recommend that infants be introduced to complementary feeding from the sixth month after delivery (WHO, 2014). The study sought to determine various factors that undermine exclusive breastfeeding in the target community. Results from the FGDs showed that among the mothers who did not exclusively breastfeed, culture played an important role. Mothers reported that; their mothers-in-law instructed them to give infants other feeds a part from breast milk, their relatives and peers advised them that breast milk was not enough and that their husbands demanded they feed infants with other feeds when they cried.

In an earlier study by Ochola and others in Nairobi, Kenya (Ochola, 2008) found that introduction of post-lacteals before six months after delivery was a major cause of cessation of exclusive breastfeeding. Cultural infant feeding practices involving giving of pre-lacteals such as honey, bitter herbs and sugary water negatively affected initiation and exclusive breastfeeding period because it affects breast milk flow which is stimulated by sucking on the breasts by the infant.

In the current study, heavy maternal workload was also reported as a major hindrance to exclusive breastfeeding. Mothers cited that they were not able to dedicate adequate time to exclusively breastfeed their infants since it was a full time job. They reported that they were required to attend to other household chores, farms as well as fetch water. Similar findings were reported in Kibera, Kenya (Ochola, 2008). The Kibera study noted that reducing maternal workload would leave mothers with more time to be with the infant and hence ensure breastfeeding on demand.

Mothers who exclusively breastfed their infants reported that they did not follow the advisories from grandmothers or relatives because they had learnt the benefits of exclusive breastfeeding from the MTMSG meetings. They reported that they knew infants required only breast milk and medicines before six months after delivery. Programme promoting exclusive breastfeeding should lay greater emphasis on strategies that increase mothers' knowledge and offer continuous support to overcome the pressure from peers and relatives to give infants post-lacteals before six months after delivery. The findings are in agreement with other exclusive breastfeeding studies under different settings (Ochola, 2008); Kristiansen et al., (2010); Barria et al., (2008).

5.5 Exclusive breastfeeding and infant outcomes

Findings from the current study show that the monthly mean weights of cumulatively breastfed infants were significantly higher than those not cumulatively exclusively breastfed from first to six months. These findings were similar to those arrived by Gunnarsdottir in a study carried out in Sweden and Iceland (Gunnarsdottir et al., 2010). Exclusively breastfed infants gained weight rapidly at first to second month

and then the rate of weight gain slowed down at third month when the weight gain was similar in both exclusively and non-exclusively breastfed infants. Earlier studies (Fewtrell et al., 2007) have shown that exclusively breastfed infants gain weight more rapidly in the first three months compared to non-exclusively breastfed infants who are formula fed.

However, this drop in weight gain has been shown to have no apparent negative effect on future infant growth (Fewtrell et al., 2007). However, the weight gain drops at the fourth to fifth month and is at its lowest at six months. Infants in the control group were significantly underweight at fourth and fifth month. The results agree with earlier observations from other randomized trials studies carried out in Kenya (Ochola et al., 2012), and Zambia (Hautvast et al., 2000).

This trend of increase in weight gain does not negatively affect the infant's growth and development in later years as observed by Skugarevsky et al., (2014). A review of all studies involving effects of exclusive breastfeeding up to six months by the WHO found no clearly demonstrated adverse effects in later stages of development (Horta & Victora, 2013). Recent review of literature on nutrition status of exclusively breastfed infants shows that there is direct effect of exclusive breastfeeding on weight gain (Gunnarsdottir et al., 2010; Hunsberger et al., 2013). In one such study carried out by Hunsberger and others (2013) in eight European countries results showed that exclusive breastfeeding has a protective effect against overweight at 4-5 months with increased protection at 6 months. In another study in Sweden by Gunnardottir and others (2010) it was found that exclusive breastfeeding has protective effect against overweight but the results were significant at 5 months only.

In the current study, infants in MESIGA intervention group had lower proportions of infants who were underweight from first to fourth months as compared to infants in MES and CG. However, the proportions were only significant at third and fourth months. This study showed comparable findings with those of Hautvast et al., (2000) on prevalence of underweight where the rates of underweight remained constant from 1 to 3 months (19%) and then suddenly dropped and continued to decline up to 6 months (28%).

Therefore, this study rejects the null hypothesis that there is no significant difference between nutrition outcomes of infants aged 6 months in MTMSGs with IGAs and those from MTMSGs without IGAs.

5.6 Prevalence of infant morbidity during the six month period

It has been previously reported that exclusive breastfeeding reduces infants' sickness from gastro-intestinal related infections and hence increases their chances of survival (UNICEF, 2014a; WHO, 2014; Bener, Ehlayel, & Abdulrahman, 2011; Kline, 2009). In a systematic review of efficacy and intervention studies aimed at reducing mortality among children under 5 years by Jones (2003), it was reported that promotion of breastfeeding prevented 13% of the child deaths.

Findings from the current study showed that infants who were exclusively breastfed were at a lower risk of suffering from diarrhoea than the infants who were non-exclusively breastfed. There was a strong association between morbidity especially gastrointestinal infections and exclusive breastfeeding. The current study findings

concur with findings from several other studies on infant morbidity and exclusive breastfeeding (Bhandari et al., 2003; Carreira et al., 2014; Kalanda, Verhoeff & Brabin, 2005; Klement et al., 2004; Lamberti et al., 2011; Monterrosa et al., 2008; Mwiru et al., 2011; Ochola, 2008). The current study findings add to the body of scientific evidence on the importance of exclusive breastfeeding in reduction of infant morbidity especially diarrhoeal diseases.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary of the study findings

Findings from the MTMSG study showed that both cross-sectional and cumulative exclusive breastfeeding significantly improved at all months in the intervention groups (MES and MESIGA) when compared to the control group. Overall, there was no significant difference in EBF rates between the two intervention groups. The attendance rate was significantly higher in MESIGA compared to MES. Nonetheless, the high meeting attendance did not translate to better EBF and therefore it is likely that the high attendance rate was as a result of the benefits accrued from the IGA component. Infants in the two intervention groups were less likely to be malnourished than infants in the Control Group. Infants in MESIGA and MES had lower prevalence of illness was associated with higher exclusive breastfeeding rates in the two groups. The study showed that the major barriers faced by mothers who want to exclusively breastfeed include; heavy maternal workload, lack of adequate information on breastfeeding, family disputes and cultural infant feeding practices that are not in agreement with scientific-based information on breastfeeding practices.

The MTMSG study findings provide further scientific evidence for the implementation and strengthening of community-based strategies for promoting exclusive breastfeeding. The study findings will further strengthen and compliment the already existing initiatives in the promotion of breastfeeding such as the Baby-Friendly Hospital Initiative (BFHI) by UNICEF and WHO (WHO/UNICEF, 2009a) and community-based strategies.

6.2 Conclusions

From this study, the following conclusions are drawn:

- The MTMSGs had a significantly positive impact in promoting exclusive breastfeeding rates throughout the 6 months period. Nonetheless, there was no significant difference in the impact of the two MTMSG strategies in promoting EBF and therefore both strategies can be considered in the promotion of EBF.
- Despite the continued support offered to mothers throughout the seven months period, only a modest proportion of them in both intervention groups exclusively breastfeed their infants continuously until the recommended six months.
- Monthly MTMSG meetings attendance rates were significantly higher in MESIGA than in MES meetings due to incorporation of an income generation activity which encouraged attendance. However, this did not lead to better rates of exclusive breastfeeding when compared to MES.
- Infants in the two intervention groups were less likely to be malnourished than infants in the control group.

This study established the following barriers to exclusive breastfeeding in the community:

- Negative cultural influence on exclusive breastfeeding since the culture does not support exclusive breastfeeding up to six months. The community beliefs that an infant cannot survive on breast milk alone for six months; and the crying of the infant is always taken to indicate hunger.

- Heavy maternal workload soon after delivery does not give the mother adequate time with the baby to exclusively breastfeed.

- Mothers cited lack of early support on breastfeeding and follow-up support in initiating and maintaining breastfeeding.

The factors enhancing the practice of EBF included:

- MTMSG support through improving knowledge on exclusive breastfeeding and its benefits, new skills of breastfeeding such as positioning and attachment of baby to the breast during breastfeeding and management of breast problems.
- The health benefits (better weight gain and reduced incidences of illnesses) experienced by infants who were exclusively breastfed also encouraged the mothers to continue with the practice.
- Family support especially from husbands, mothers-in-law and grandmothers by encouraging the mothers to exclusively breastfeed as well as provision of adequate food and assisting with other infants and farm work.

6.3 Recommendations

6.3.1 Recommendations for practice

The Ministry of Health and partners in the health sector should strengthen implementation and support MTMSGs to supplement hospital-based strategies such as baby-friendly hospital initiative. Programmes implementing MTMSGs should be cautious on inclusion of IGAs to avoid shifting of emphasis from exclusive breastfeeding to income generation.

Local barriers to exclusive breastfeeding need to be adequately addressed during the MTMSG meetings, breastfeeding counselling, couple counselling, road shows, breastfeeding week as well as public Barazas (meetings). The messages on exclusive

breastfeeding can also be disseminated through radio broadcasts, advertisements in local dailies and poster campaigns at health centres and other public places.

6.3.2 Recommendations for policy

In terms of policy, the Kenyan government and its development partners should strengthen formation of breastfeeding MTMSGs through linkages with existing health and social infrastructure such as women groups through policy changes. Overall, the Kenyan government and the partners in health sector should make it a policy to strengthen and sustain breastfeeding MTMSGs in the community. The current study findings could also be used to advocate for a policy on provision of amenities such as lactation rooms at workplace to support mothers to conveniently breastfeed their infants at intervals when they resume work after maternity leave. This would reduce the period of mothers' separation from their infants which has negative impact on period of exclusive breastfeeding.

6.3.3 Recommendations for further research

- It is suggested that further research be done to establish the cost-effectiveness of MTMSGs as a breastfeeding promotion strategy. The cost-effectiveness of the MTMSGs as a community-based strategy was not analysed in this study since it was not part of the objectives.
- Similar studies should be done to establish the effectiveness of MTMSGs under different socio-economic conditions in Kenya and elsewhere in Africa.

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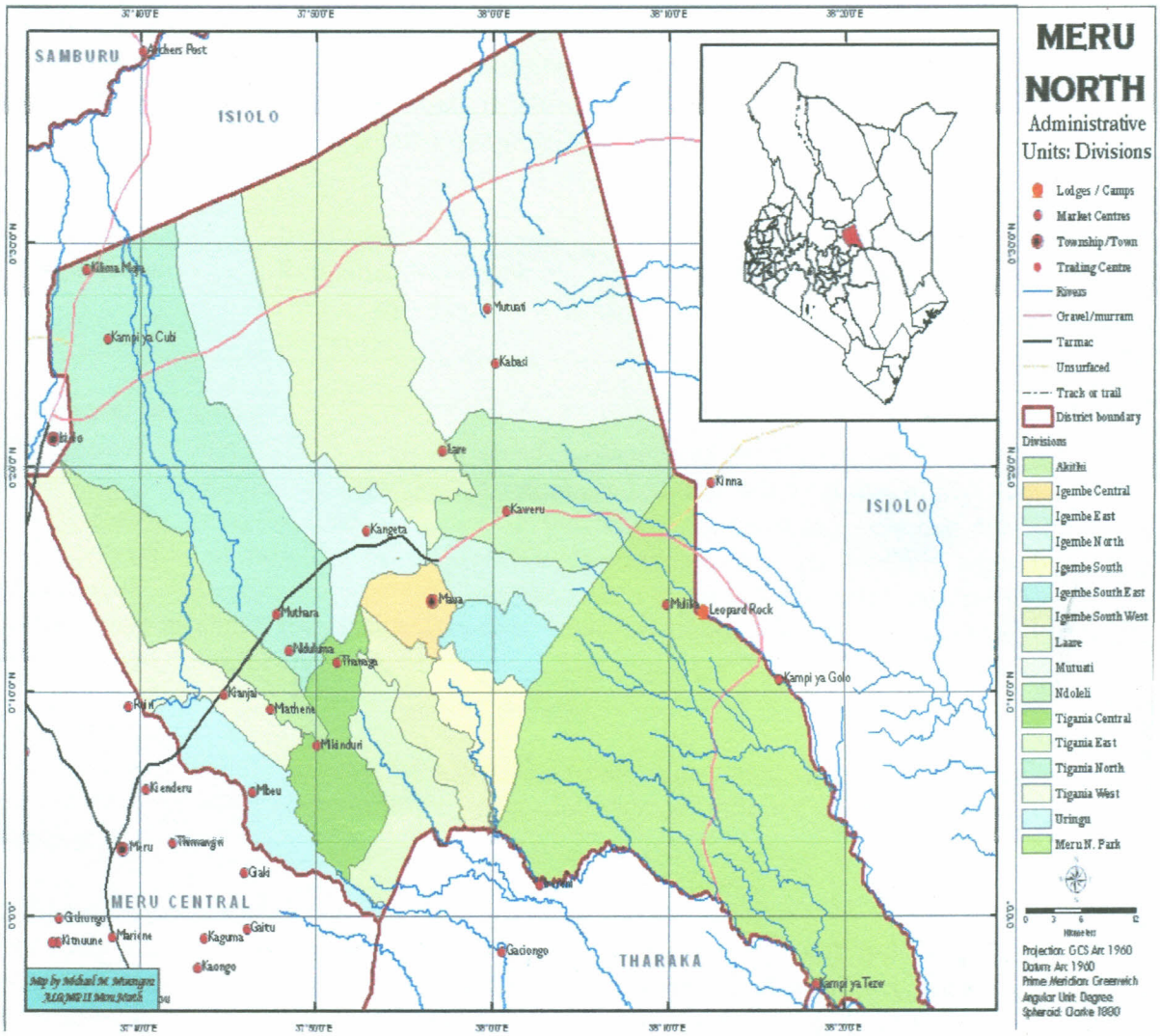
APPENDICES

Appendix A: Map of former Meru North District



Source: Arid Lands and Resource Management Project- Meru North District, 2008

Appendix B: Informed consent form

This consent form gives you information about the study and the risks involved will be explained to you. Once you understand the study, and if you agree to take part, you will be asked to write your name and sign or make your mark on this form. You can ask any questions you have at any time.
Before you learn about the study, it is important that you know the following:

- Your participation in this study is entirely voluntary
- You may decide not to answer questions or even withdraw from the study at any time.

Researcher	Institution	Contact
Joseph Kobia	Kenyatta University Dept. of Food, Nutrition & Dietetics	+254 -722359925 E mail: mwitiliria@yahoo.com

Purpose of the study
The purpose of this study is to assess the effectiveness of Mother-to-Mother Support groups in promoting exclusive breastfeeding in Igembe South Sub-County, Meru County-Kenya. You will be recruited to participate in mother-to-mother support group meetings on monthly basis. Interviews shall be done on monthly basis by trained data collectors. Infants will weighed on monthly basis. The groups shall discuss ways in which they can ensure their children are exclusively breastfed for six months to get the full benefits of breast milk. The project will take eight months only.

Study groups
The study will include mothers who are 33-37 weeks pregnant who will be followed for six months with their children after delivery to monitor their breastfeeding practices.

Risks and Benefits of the study
The study has health risks related to study subjects. Participants will only spare some at most 2 hours for the meetings per month. The findings of this project will be used to improve the nutrition status of children of all communities in the country.

Costs to you
There is no cost to you for participating in the study.

Data security and Confidentiality
All the information gathered by the research team will be used in confidence for the sole purpose of this research only. No names of individuals will be written down at any time. No one will have access to the interviews except the researchers and supervisors. Strict data management procedures are intended to ensure confidentiality of the study subjects.

Study findings
Results will be disseminated to the university, collaborators, relevant health ministries in Kenya, the districts from where the information has been collected and other stakeholders in need of this information for purposes of instituting interventional programs in the country.

Problems and questions
If you ever have questions about this study, you should contact: Joseph Kobia, Chief researcher (Mobile: +254 -739-267936)

Your rights as a study participant
This research has been reviewed and approved by the Ethical Review Committee of the Kenyatta National Hospital and the University of Nairobi (KNH/UoN ERC), if you have any questions about your rights as a research participant you may contact

Prof. Guantai,
The secretary of the KNH/UoN ERC
Telephone: 020-272-6300 ext. 44102

NOTE: You are not giving up any of your legal rights by signing this informed consent document.

Your statement of consent and signature
If you have read the informed consent or had it read and explained to you and you understand the information and voluntarily agree to join this study, please carefully read the statements below and think about your choice before signing your name or making your mark below. No matter what you decide, it will not affect your rights in anyway:

- I have been given the chance to ask any questions I may have and I am content with the answers to all of my questions.
- I know that my records will be kept confidential and that I may leave this study at any time
- The name, phone number and address of whom to contact in case of an emergency has been told to me, and has also been given to me in writing.
- I agree to take part in this study as a volunteer and will be given a copy of this informed consent form to keep.

.....	.....
Participant's name (print)	Participant's signature and date
.....	.....
Study staff conducting	Study staff signature and date
.....	.....

Appendix C: Idhini ya kujulisha kushiriki

Fomu hii ya idhini inakupa habari kuhusu utafiti na madhara yoyote zitafafanuliwa kwako. Ukielewa kuhusu utafiti huu, na ukubali kushiriki, utaulizwa kutia sahihi kwa jina lako au kutia alama yako ya vidole kwenye fomu hii. Unaweza uliza maswali yoyote wakati wowote. Kabla ya kusoma kuhusu utafiti huu, ni muhimu kujua yafuatayo:

- Kushiriki kwako katika utafiti huu ni kujitolea.
- Unaweza kuamua kutojibu maswali, kutotoa sehemu yoyote au sampuli ya kupima au pia kujiondoa kwenye utafiti huu wakati wowote.

Anwani ya Madhumuni: Umuhimu wa madini ya vinyunyizio kwa chakula ikilinganishwa na mchanganyiko wa unga wa mahindi na soya kwa kuninua kiasi cha madini ya zinki kwa watoto wa umri wa miezi kumi na miwili hadi thelathini na sita katika kitongoji duni cha kiandutu, wilaya ya Thika.

Muda wa Utatifi: Miezi sita

Mtafiti mkuu	Shirika / chuo	Anwani
Joseph Kobia	Chuo kikuu cha Kenyatta, Idara ya vyakula, lishe bora na afya.	+254 -722359925 E mail: mwitiliria@yahoo.com

Madhumuni ya Utafiti

Madhumuni ya utafiti huu ni kukadiria manufaa ya akina mama kujiunga na vikundi vya wenzao wanaonyonyesha ili kuongezea muda wa unyonyeshaji wa watoto hadi miezi sita bila chakula au maji katika kaunti ndogo ya Igembe ya Kusini, Kaunti ya Meru, Kenya.

Utajiunga na kikundi cha akina mama wakati ungali mja mzito. Utakuwa ukishiriki katika mkutano wa kikundi hicho mara moja kila mwezi na baadaye kuendelea kujumuika na kushiriki katika mikutano ya hicho kikundi hadi miezi sita baada ya kupata mtoto. Vikundi hivi vitakuwa vinakutana siku moja kila mwezi na wanachama watakuwa wanajadiliana njia za kuboresha unyonyeshaji wa watoto hadi miezi sita na umuhimu wake kwa afya ya watoto. Kila mwezi, maswali yataulizwa juu ya utafiti huu na mchunguzi aliyeshiriki kwa mafunzo ya utafiti huu. Wakati huo huo, kila mwezi, mtoto wako atapimwa uzito na urefu ili kufuatilia ukuaji wake. Utafiti huu utachukua muda wa miezi saba pekee.

Vikundi vya Utafiti

Utafiti huu utahusisha akina mama waja wazito kwa muda wa wiki thelathini na tatu hadi thelathini na saba hadi kuzaliwa kwa watoto wao. Baadaye, hawa mama watajumuika na vikundi hivi wakiwa na watoto wao hadi watoto wao wafikie miezi sita wakiwa wananyonyesha.

Manufaa na Madhara ya Utafiti huu

Utafiti huu hauna madhara yoyote kwa afya ya washiriki. Hata hivyo, washiriki watahitaji kujitolea kwa muda wa takribani masaa mawili kila mwezi kuhudhuria vikao vya mkutano wa vikundi. Matokeo ya mradi wa utafiti huu yatatumika kuimarisha hali ya malisho na afya ya watoto wa jamii zote nchini Kenya kupitia wizara zinazohuzika.

Gharama kwa Mshiriki
Hakuna gharama yoyote utakayopata kwa kushiriki kwenye utafiti huu.

Usalama na Usiri wa Utafiti
Habari yote iliyokusanywa na timu ya utafiti itatumiwa kisiri kwa ajili ya utafiti huu pekee. Hakuna majina ya mtu yoyote ambayo yataandikwa na hakuna yeyote atakaye karibia au kushiriki katika mahojiano isipokuwa watafiti na wasimamizi. Utaratibu kamili wa usimamizi wa habari unanuiwa kuhakikisha usiri wa hoja za utafiti.

Matokeo ya Utafiti
Matokea yatatawanywa kwa chuo kikuu, washiriki, wizara husika za afya Kenya, wilaya ambako habari zimekusanywa na washika dau wengine wanao hitaji habari hii kwa madhumuni ya kuweka utaratibu mwafaka nchini.

Matatizo na Maswali
Ukiwa na maswali kuhusu utafiti huu, wasiliana na Joseph Kobia, mtafiti mkuu.
(simu ya rununu: +254 -722359925)

Haki zako kama Mshiriki
Utafiti huu umekaguliwa na kuidhinishwa na kamati ya kukagua mambo ya adili ya Hospitali Kuu ya Kenyatta na Chuo Kikuu Cha Nairobi (KNH/UoN ERC).

Prof. Guantai,
Karani Mkuu; KNH/UoN ERC
Telephone: 020-6300 ext. 44102

Maelezo : Hautaenda kinyume na haki zako za kisheria kwa kutia sahihi hii

Taarifa yako ya Idhini na Sahihi.
Ikiwa umesoma fomu hii ya idhini, au imesomwa na kufafanuliwa kwako, umeelwa habari na umekubali kwa ihari yako kujiunga na utafiti huu, tafadhali soma kwa utaratifu taarifa ifuatayo na fikiria kuhusu uamuzi wako kabla ya kuandika jina lako au kutia sahihi yako hapo chini. Chochote uamuacho, hakitaadhiri haki zako kwa vyovyote.

- Nimepewa fursa ya kuuliza maswali yoyote na nimeridhika na majibu kwa maswali yangu yote.
- Najua kuwa habari yangu itakuwa ya siri na ninaweza kuacha uchunguzi huu wakati wowote.
- Jina, nambari ya simu na anwani ya yeyote yule nitakaye wasiliana naye iwapo kutatokea swala la dharura.
- Naitikia kuhusika katika uchunguzi huu kama mchagua na nitapewa nakala ya fomu hii nijiwekee.

.....	.....
Jina la anayeshiriki	Sahihi ya anayeshiriki na tarehe
.....	.....
Jina la mfanyi kazi wa uchunguzi	Sahihi na tarehe mfanyi kazi wa uchunguzi

Appendix D: Baseline interview questionnaire

(These questionnaires were adopted from Ochola S. (2008) and UNICEF/WHO (2009a)

Baseline interview questionnaire to be administered to all participants in the 3 study groups during the first week after enrolment. Insert the options that match mothers responses in the box

A:ADMIN					
QNR Number		Division:		Health Centre	
Sub-location:		Village:		Study Group	
Name of interviewer		Date of visit:		MTMSG number	
QNR checked		QNR check date		QNR checked by	

B: MOTHER'S BIODATA	
Mother's Code:	
Mother's age:	Completed Years

C: OTHER CHILDREN				
	Child 1 Child ID=1	Child 2 Child ID=2	Child 3 Child ID=3	Child 4 Child ID=4
Male/Female				
Child's Code				
Child's Age (in completed months)				
Confirm the information given using their clinic cards.				

D: DEMOGRAPHIC AND SOCIO-ECONOMIC DATA	**Enter response options below**	
1. How many people live in your household?		
2. Marital status of the mother. 1= Married 2= Single		
3. Who is the head of the household? 1=Husband, 2=Wife (self), 3=Other male person, 4=Other female person		

4. 1. What is your husband's highest level of education? 1= Primary 2= Secondary 3=College/University		
5 What is your highest level of education? 1= Primary 2= Secondary 3=College/University		
6 What your current occupation? 1=housewife 2=casual laborer 3= Formal employment 4=Self-employed 5= Retired 6=other (specify).....		
7 What is the occupation of the mother's partner/husband? 1=businessman 3= Formal employment 2=casual labourer 4=Retired 5=other (specify).....		
8 Does your family have the following possessions? 1= Radio 2=Tv 3= Phone 4= Car 5=Motorcycle 6= Land Give acreage..... 7=Cows Give number..... 8= Chicken Give number..... 9= Goats Give number.....		
9 What are the main cash crops grown on the land?.....		
10 What is the monthly value of the harvest in KSh?		
11 What was the main source of the food consumed in this household? 1=Own production, 4=Food aid, 2=Purchase, 5=Borrowed, 3=Gift from relatives, friends, 6=Wild foods, 7=Others(specify).....		
12 How much money is spent on food purchase per month? KSh.....		
13 What is the main food crop grown on the land?.....		
14 Does the family own or rent their current house? 1= Owned 2 =Rented 4=Others		

(specify).....		
15 IF QN 8 is rented: How much rent does the family pay per month if rented? Amount in KShs.....		
16 How many rooms are in your house?		
17 What is your main source of cooking fuel? 1=Firewood, 2=charcoal 3=Kerosene 4=Electricity 5= Gas 6=Others(specify).....		
18 What is your main source of lighting? 1 =Kerosene 2= Firewood, 3 =Solar 4=Electricity 5= Gas 6=Others(specify).....		
19 What is your main source of cooking fuel? 1=Firewood, 2=charcoal 3=Gas 4=Electricity 5=Others(specify		
20. What is the source of water that you use at home? 1= River 4=Well/Spring 2=Tap 5=Roof catchments 3= Dam 6=Other (specify) Please give me the distance or time taken to the water sources and back	Distance (Km)	Time (min)
21. What is the source of cooking fuel that you use at home? 1=Firewood 4=Gas 2= kerosene 5=Electricity 3=Charcoal 6= Others (specify).....		
21. How do you travel to the nearest government health facility? 1=Walk, 5=Taxi, 2=Bicycle, 4=Matatu, 3=Bus, 6=Other, specify		
23. How long does it take you to get to the nearest government health facility?	Hrs	Min
24. What is the age of the mother's pregnancy in weeks? **(confirm with clinic card and date of the last monthly period)**	Wks	
25. At what age of your pregnancy did she start attending antenatal clinic? **(confirm with ANC clinic card)**	Wks	
26. How many times has the pregnant mother attended ANC		

clinic? 1=once 4=four times 2=twice 5=five times 3=thrice 6=others (Specify)		
27 Have you been having any pregnancy related complications? 1=Yes 2=NO If any (specify).....		
D: KAP BREAST-FEEDING		
1. What is the source of your knowledge on breast-feeding? 1= Relative 5=Radio/TV 2=TBA 6= Friends 3=Health Facility 7=Others (Specify 4=School		
2. What should be given to the baby immediately after safe normal delivery? 1= Water 4=Breast milk 2= sugar solution 5=Formula Milk 3=Honey 6= Others (specify)		
3. How long after a normal safe birth should the baby be first put to the breast? 1= Within 30 min of birth, 2=within 1 hour, 3=within first day. 4=within first3 days. 5= Any other. Specify. 4. If response is 1 or 2 in qn 3, why is it important to put the baby on the breast within this period **Probe for different reasons and enter all responses in the box** 1=To stimulate milk production 2=Baby is hungry after birth 3=to give the baby colostrums for immunity 4=To bond with the mother 5=I do not know 6=Others (specify)..... 5. If answer to qn 3 is not 1 or 2, ask the mother why the baby is put at the breast at the stated time. 1=The baby needs to be cleaned 2= Mother has no milk 3=Mother is too tired to breast-feed		

4=Colostrums is bad to the baby 5= others (specify)……		
6. Should the baby be breast-fed the first milk from the breasts? 1= Yes 2=No 3=discarded 7. If no to qn 6, what was the reason? 1=The first milk is not good for the baby, 2=milk is too watery 3=not culturally acceptable 4=other, specify…… 8a) If YES to Qn6. Is this practice common in your community? 1=Yes 2=No 3=Other, specify…… 8b) Why do you think it is important to give the baby the first milk?		
9. Do you believe a baby can survive on breast milk alone without even water for the first six months? 1=Yes 2=No If YES, for how long……		
10. If Yes to QN9, for how long do you think it is feasible to exclusively breast-feed your child from birth without giving anything else including plain water? 1=Less than 1week 4= 1month 2=1 to 2 weeks 5=1-3 months 3=Less than 1 month 6= 4-6 month 7=other (specify)……		
11. How often should a baby be breast-fed? 1=3 times a day 2= 4 times a day 3=On Demand 4=specific hours of the day 5=other (specify)……		
12. For how many months should a mother breast-feed her baby? 1= 1 month or less 5=1 year 2= 1-2 months 6=2years 3=3-4 months 7=more than 2 years 4=4-6 months 8=other, specify……	months	

13. Do you think a pregnant mother should breast-feed her baby? 1=Yes 3=Do not know 2=No 4= other, specify……		
14. If no to qn 13, why do you think the pregnant mother should not breast-feed? 1=It will hurt the unborn baby 2=the milk becomes watery 3=breast milk not good for the child 4=mother will stop producing milk 5=Baby must stop breast-feeding before the other sibling is born 6=Other, specify……		
15. Would you feed a baby anything to drink with a bottle with a nipple? 1=Yes 2=No 3=Other, specify		
16. After how many days or months would you introduce the following foods and drinks to your baby and why?	Months	Days
a) Plain water…..Reason……		
b) Cow milk……Reason……		
c) Porridge…… Reason ……		
d) Honey… Reason ……		
e) Sugary water…… Reason ……		
f) Mashed fruit… Reason ……		
g) Mashed food h) Other foods/drinks (Specify age)		
17.. What would make you not breast-feed your child when born? 1=work 2=sickness 3=others, specify……		
18. Do you plan to breast-feed the unborn child? 1=Yes 2=No 3= Not sure 19. If Yes, for how long?…… 20. If No to Qn 18, what is your reason?……	Months	Years
21. When do you intend to start giving water to your baby when born?	Days	Months

22. When do you intend to start giving other foods to your baby when born?	days	Months
Thank you for your sparing time for the interview and answering my questions.		

Appendix E: Second interview questionnaire

Second interview questionnaire for all participants in the 3 study groups. Done within first month of delivery.

A: ADMIN					
QNR Number		Division:		Health Centre	
Sub-location:		Village:		Study Group	
Name of interviewer		Date of visit:		MTMSG/CG number	
QNR checked		QNR check date		QNR checked by	

B:BABY'S BIODATA			M1	M2	Average
Child's Code		Child's Weight			
Child's Date birth		Child's Length			
Child's Age (days)		Child's Card Number			
Child's Sex		Child's Delivery Place			

C: DELIVERY INFORMATION		
1. Where did you give birth to (Name) 1=Health Centre 2=District Hospital 3=Private clinic 4=Home 5= Others (specify)……		
Qn 2-9 For mothers who delivered at home 2. Who assisted you during the delivery? 1= Family member 4=Traditional Birth Attendant 2=Doctor/nurse 5= Other (specify) 3=Nobody 3. Do you share the same bed with (Name)? 1= Yes 3=Not always 2=No 4=Others (specify)		
4. What was the first feed given to (Name) after birth? 1=breast milk 4=Plain boiled water 2=sugar solution 5= cow/goat milk 3= Formula milk 6= Others ((specify)……		
5. If answer to question 4 is 1 (breast milk) how long after birth was (Name) put to the breast? 1=Within 30 minutes	hrs	Min

2= Within 1 hour 3= Within 2 hours 4= After I day 5=Others (specify).....		
6. Did you give the first milk that came from your breast (colostrums) to your baby? 1=Yes 2=No 3=Some 4=Other (specify)..... 7. If no, why didn't you give this milk to the baby? 1= Dirty milk 4= culturally unacceptable 2= Bad milk 5=Others (specify) 3=its watery		
8. If yes, why did you give this milk to the baby? 1= makes baby strong 2= Stops baby from crying 3=Its good for the baby 5=Others (specify).....		
9. Immediately after delivery, did anybody talk to you about how to feed your baby? 1= Yes 2= No If **Yes**, who talked to you? 1=TBA 2=Relative 3=Friend 3=MTMSG member 4=others.....		
Qn 10-16 For mothers who delivered at health facility 10. Where did you give birth to (Name)? 1=Public health facility. Name..... 2=Private health facility. Name.....		
11. What type of birth did you have? 1=Normal 2=Caesarean 3=other (specify)		
12. How long did you spend at the health facility after birth? ...		Days
13. Did you share the same bed with (Name) at the health facility? 1=Yes 2=No 3=same room but different beds 4=others (specify).....		

If go to14 *If yes skip to 16* 14. Do you continue to share the same bed at home? 1=Yes 2=No 3=sometimes 15. Why don't you share bed with baby.....		
16. What was the first feed given to (Name) after birth? 1=breast milk 2=sugar solution 3= Formula milk 4=Plain boiled water 5= cow milk 6= Others (specify).....		
17. How long after birth was (Name) put to the breast? 1=Within 30 minutes 2= within 1 hour 3= 1-2 hours 4= More than 2 hours 5= others (specify).....		
18. What made you put (Name) on the breast for the first time? 1= The baby cried 2= Its normal in our culture 3= I was told by the nurse/midwife 4= Others.....		
19. Did you give the first milk that came from your breast (colostrums) to (Name)? 1=Yes 2=No 3=some 4=Other (specify) 20. If no to qn 20, why didn't you give this milk to (Name)? 1= Dirty milk 4= culturally unacceptable 2= Bad milk 5=Others (specify) 3=It's watery		
21. Did anybody from health facility talk to you about how to feed (Name)? 1= Yes 2= No 22. If yes, who talked to you at the health facility? 1=Medical staff 2=Non medical staff 3=others specify.....		
QNS From 23- To be asked to all mothers 23. Since delivery has (Name) been given anything to drink other than breast milk? 1=Yes 2=No		

24. If **Yes**, what has (Name) been given?
    1=sugar solution 5= cow's milk
    2= Formula milk 6=Honey
    3=Plain boiled water 7= Others (specify).....

25. When did you start giving (Name) the different foods/drinks? Indicate the foods/drinks and age when mother started to give them.

Food/drinks	Age (days)	Amounts given
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....

26. For foods/drinks given in qn 26, how did you feed the baby?
    1= By bottle
    2= by cup with teat
    3= open cup
    4=others (specify).....

D: 24-HR RECALL BREAST-FEEDING PRACTICES

1. From yesterday morning to today morning (last 24 hours), have you breast-fed (Name)?
   1=Yes
   2=No
   If no ask questions 2 and 3,
   if yes, skip to qn4
2. Why have you not breastfed?
   1= I am unwell
   2=Baby is sick
   3=I have been at work
   4=others (specify).
3. Do you intend to resume breast-feeding?
   1= No
   2=Yes Others (specify).....
4. Did you give (Name) anything to drink other than breast milk yesterday during the day or at night (last 24 hours?
   1=Yes
   2=No

   If Yes go to qn 5 and 6
   If no, skip to qn 7
5. What has (Name) been given?
   1=sugar solution 4= cow's milk
   2= Formula milk 5=Honey
   3=Plain boiled water 7= Others (specify).....

6. Why did you give the baby the liquid? 1=Baby was crying 2=Baby was hungry 3=Baby was having stomach problems 4=Advised by relatives/friends 5=Advised at clinic 6=others (specify).....		
7. Has (name) been sick since birth? 1=Yes 2=No		
If yes, go to qn 8-13 ***If no skip to qn 14*** 8. What sickness was (Name) suffering from? 1= diarrhoea 5=eye infection 2=malaria 6=Common cold 3=pneumonia 7=vomiting 4=,fever 8=Cough 9. What did you do when (Name) was sick? 1=Nothing 2=brought child to health care facility 3= brought child to traditional health provider 4=bought drugs at pharmacy 5=used medication from previous sickness 6=other, specify 10. If you did not do anything, why not? 1= Not severe enough to see health facility 2=No money to go to health facility 3= No time to go to health facility 4=No nearby facility 5= Family member did not permit to go 6=didn't previously like practices of health personnel		
11. Is (Name) still on treatment? 1=Yes 2=No 12. Has this sickness affected (Name)'s breast-feeding? 1=Yes 2=No		
13. How has the sickness affected (Name)'s breast-feeding		
14. Are there any problems you are encountering with breastfeeding (Name)? 1=Yes 2=No		
If yes go to qn 15-18 ***If no skip to qn 19*** 15. Please give the problems you are having 1=I am sick		

2=breast have problems 3= baby not breastfeeding 4=No enough milk 5= others (specify)		
16. Have these problems interfered with your breast-feeding? 1=Yes 2=No 17. Please explain how have they affected your breastfeeding?..... 18. What have you so far done about the problem? 1= Nothing 2= Attended clinic 3= Sought advice from relative/friend 4= Bought drugs from pharmacy 5= Others (specify).....		
19. Have you been sick since delivery? 1= Yes 2= No		
If yes go to qn 20-23 ***If No END INTERVIEW*** 20. For how long were you sick 1=Less than week 2=1 week 3=1-2 weeks 3=2-3 weeks 4=3-4 weeks		
21. What have you been suffering from?.....		
22. Did the sickness affect your breast-feeding of (Name)? 1=No 2=Yes 3=sometimes 4=others (specify)		
23. Please explain how it affected the breast-feeding.....		
Thank you for your sparing time for the interview and answering my questions		

Appendix F: Third to sixth interviews

Third to sixth interview questionnaire for all participants in the study groups

A: ADMIN					
QNR Number		Division:		Health Centre	
Sub-location:		Village:		Study Group	
Name of interviewer		Date of visit:		MTMSG/CG number	
QNR checked		QNR check date		QNR checked by	

B: CHILD'S BIODATA			M1	M2	Average
Child's Code		Child's Weight			
Child's Date of birth		Child's Length			
Child's Age		Child's Card Number			
Child's Sex		Child's Delivery Place			

C: 24-HOUR RECALL BREASTFEEDING PRACTICES		
1. Did you breastfeed (name) yesterday during the day or at night (last 24 hour)? 1=Yes 2=No		
If Yes skip to qn 4 ***If no ask questions 2 and 3,*** 2. Why have you not breast-fed (name)? 1= I am unwell 2=Baby is sick 3=I have been at work 4=others (specify). 3. When do you intend to resume breast-feeding? 1= No 2=Yes 3= Others (specify)		
4. Did you give (Name) anything liquid or semi-solid other than breast milk yesterday during the day or at night? 1=Yes 2=No ***If Yes go to qn 5-7*** ***If no, skip to qn 8*** 5. What was (name) given?		

1=sugar solution 6=Honey 2= Formula milk 7= Plain boiled water 3=porridge 8=mashed food 4= cow's milk 9=Fruit pulp 10=Others (specify)…… 6. Why did you give (Name) the liquid/semi-solid? 1=Baby was crying 4=Advised by relatives/friends 2=Baby was hungry 5=Advised at clinic 3=Baby had stomach problems 6=Others (specify).....		
7. When did you start giving (Name) the different foods/drinks? Indicate the foods/drinks and age when mother started to give them. Food/drinks number of times Amount given …… …… …… …… …… …… …… …… …… …… …… …… …… …… …… …… …… ……	Age in days	
8. Has (Name) been sick in last two weeks? 1=Yes 2=No		
If yes, go to qn 9-14 ***If no skip to qn 15*** 9. What sickness was (Name) suffering from? 1= diarrhea 5=eye infection 2=malaria 6=Common cold 3=pneumonia 7=vomiting 4=,fever 8=Cough 9= Others (specify)…… 10. What did you do when (Name) was sick? 1=nothing 2=brought child to health care facility 3= brought child to traditional health provider 4=bought drugs at pharmacy 5=used medication from previous sickness 6=other, specify…… 11. If you did not do anything, why not? 1= Not severe enough to see health facility 2=No money to go to health facility 3= No time to go to health facility		

4=No nearby facility 5= Family member did not permit to go 5=Didn't previously like practices of health personnel		
12. Is (Name) still on treatment? 1=Yes 2=No 13. Has this sickness affected (Name) breast-feeding? 1=Yes 2=No		
14. How has the sickness affected (Name) breast-feeding.....		
15. Are there any problems you are encountering with breast-feeding (Name)? 1=Yes 2=No		
If yes go to qn 16-19 ***If no skip to qn 20*** 16. Please give me the problems you are facing when breast-feeding (Name) 1=I am sick 2=breast have problems Explain..... 3= baby not breast-feeding 4=No enough milk 5= Others (specify.....		
17. Have these problems interfered with your breast-feeding practices? 1=Yes 2=No 18. Please explain how they have affected your breastfeeding?..... ..... 19. What have done you so far about the problem? 1=Nothing 2= Attended clinic 3=sought advice from relative/friend 4=bought drugs from pharmacy 5= others (specify).....		
20. Have you been sick any time during the last two weeks? 1=Yes 2=No		
If Yes go to qn 21-24 ***If No End interview*** 21. What have you been suffering from?.....		
22. Did the sickness affect how you breast-feed your baby? 1=No		

2=Yes 3=sometimes 4=others (specify)		
23. Please explain how it affected the breast-feeding.....		
24. For how long were you sick 1=Less than week 3=2-3 weeks 2=1 week 4=3-4 weeks 3=1-2 weeks		

Appendix G: Seventh interview

Seventh interview questionnaire for all participants in the two Study groups

A: ADMIN					
QNR Number		Division:		Health Centre	
Sub-location:		Village:		Study Group	
Name of interviewer		Date of visit:		MTMSG number	
QNR checked		QNR check date		QNR checked by	

B: CHILD'S BIODATA			M1	M2	Average
Child's Code		Child's Weight			
Child's Date of birth		Child's Length			
Child's Age		Child's Card Number			
Child's Sex		Child's Delivery Place			

C: 24-HOUR RECALL BREAST-FEEDING PRACTICES		
1. Did you breast-feed (Name) yesterday during the day or at night (last 24 hour)? 1=Yes 2=No		
If Yes skip to qn 4 ***If no ask questions 2 and 3,*** 2. Why have you not breast-fed (Name)? 1= I am unwell 2=Baby is sick 3=I have been at work 4=others (specify). 3. When do you intend to resume breast-feeding? 1= No 2=Yes 3= Others (specify)		
4 .Did you give (Name) anything liquid or semi-solid other than breast milk yesterday during the day or at night? 1=Yes 2=No ***If Yes go to qn 5*** ***If no, skip to qn 7*** 4. What was (name) given?		

1=sugar solution 6=Honey 2= Formula milk 7= Plain boiled water 3=porridge 8=mashed food 4= cow's milk 9=Fruit pulp 10=Others (specify)…… 5. Why did you give the baby the liquid/semi-solid? 1=Baby was crying 4=Advised by relatives/friends 2=Baby was hungry 5=Advised at clinic 3=Baby had stomach problems 6=others (specify).....		
6. When did you start giving (name) the different foods/drinks? Indicate the foods/drinks and age when mother started to give them. Food/drinks number of times/day Amounts given …… …… …… …… …… …… …… …… …… …… …… …… …… …… …… …… …… ……	Age in days	
7. Has (name) been sick in last two weeks? 1=Yes 2=No		
If yes, go to qn 8-14 ***If no skip to qn 15*** 8. What sickness was he suffering from? 1= diarrhoea 5=eye infection 2=malaria 6=Common cold 3=pneumonia 7=vomiting 4=fever 8=Cough 9=others, specify…… 9. What did you do when (Name) was sick? 1=Nothing 2=brought child to health care facility 3= brought child to traditional health provider 4=bought drugs at pharmacy 5=used medication from previous sickness 6=other, specify…… 10. If you did not do anything, why not? 1= Not severe enough to see health facility 2=no money to go to health facility 3= no time to go to health facility 4=no nearby facility 5= family member did not permit to go 6=didn't previously like practices of health personnel		

11. Is (Name) still on treatment? 1=Yes 2=No 12 Has this sickness affected (Name) breast-feeding? 1=Yes 2=No		
13. How has the sickness affected (Name) breast-feeding.....		
14. Are there any problems you are encountering with breast-feeding your baby? 1=Yes 2=No		
If yes go to qn 15-18 ***If no skip to qn 19*** 15. What is the nature of the problem/s? 1=I am sick 2=breast have problems 3= baby not breast-feeding 4=No enough milk 5= others (specify		
16. Have these problems interfered with your breast-feeding? 1=Yes 2=No 17. Please explain how these problems have affected your breast-feeding practices?..... 18. What have you done so far about the problem? 1=Nothing 2= Attended clinic 3=sought advice from relative/friend 4=bought drugs from pharmacy 5= others (specify).....		
19. Have you been sick since delivery? 1=Yes 2=No		
If Yes go to qn 20-23 ***If No go to section D (MES &MESIGA), End Interview for CG*** 20. What have you been suffering from?		
21. For how long were you sick 1=Less than a week 3=2-3 weeks 2=1 week 4=3-4 weeks 3=1-2 weeks		
22. Did the sickness affect how you breast-feed your baby? 1=No		

2=Yes 3=sometimes 4=others (specify)		
23. Please explain how it affected the breast-feeding.....		
D: For Mothers in Mother-to-Mother Support Groups with Education Support (MES) and Mother-to-Mother Support Groups with Education as well as Income Generating Activities (MESIGA.) **Knowledge and Practices of the Mothers Regarding Breastfeeding Mother-to-Mother Support Groups**		
1. What are your sources of breast-feeding information? 2. Have you ever been in any other breast-feeding MTMSG before the start of this project? 1=Yes 2=No		
3. Have you received breast-feeding information from any other sources before the MTMSG project? 1=Yes 2=No		
4. How many MTMSG meetings did you attend since the project started?		
5. How do you rate the breast-feeding support and information you got during the meetings? 1=Excellent 2=Very Good 3=Good 4=Fair 5=Poor		
6. How would you rate the breast-feeding support and information coverage by the MTMSG meetings? 1= Adequate 2=Fairly Adequate 3= Inadequate		
7 Please explain the difference in information received from other sources and from the MTMSG meetings.		
8 Did you get any breast-feeding support in the MTMSG meeting? 1=Yes 2=No		
9 If yes, what breast-feeding support did you get from these MTMSG meetings?		

10 During the MTMSG meetings, did you benefit from the activities or the discussions? 1=Yes 2=No If **YES** how?.....		
11 From what activities/discussions did you benefit most during the MTMSG meetings? 12 Please explain how you benefitted from these activities.....		
13 What activities/information did you like least during MTMSG meetings..... 14 Please explain why.....		
15 Have the MTMSG meetings helped you to change your breast-feeding practices? 1=Yes 2=No 16 Please explain how the MTMSG meetings have helped you change your breast-feeding practices.....		
17 Did you have any difficulty practicing the breast-feeding practices learnt during the MTMSG meetings? 1=Yes 2=No		
18 IF yes, what breast-feeding practices learnt from MTMSG meetings did you find hard to follow?..... 19 Please explain why they were hard.....		
20 Do you think that exclusive breast-feeding is beneficial to the infants? 1=Yes 2=No 3= Not sure		

21 What is your feeling about the way the MTMSG meetings were facilitated? 1= Very Good 2=Good 3=Fair 4= Poor		
22 What changes would you like in your future meetings?.....		
23 Will you continue to attend MTMSG meetings with subsequent pregnancies? 1=Yes 2=No 3=May be		
24 Please explain your reasons (for above answer).....		
25 Do you think MTMSG meetings should be promoted in other places to improve breast-feeding practices among mothers? 1=Yes 2=No		
26 Please explain why you think so.....		
End Interview for mothers in MTMSG with Education Support ***Continue Interview for mothers in MTMSG with Education Support and Income Generating Activities (MESIGA)***		
E: For Only Mothers in MESIGA. **Knowledge and Practices of the Mothers Regarding IGAs during MTMSG.**		
1. Did you participate in any IGA activity during your MTMSG meetings? 1=Yes 2=No		
2. What type of activities did you participate in during the meetings? ***(List)*****.....**		
3. Did you manage to sell the products you made during MTMSGs? 1=Yes 2=No		

4. Do you think the IGAs were beneficial during the MTMSG meetings? 1=Yes 2= No 3=Not sure		
5. Please explain your answer ……		
6. Do you feel that the IGAs encouraged you to attend the MTMSG meetings? 1=Yes 2=No		
7. Please explain your answer……		
8. Did you like the IGAs you participated in during the MTMSG meetings? 1=Yes 2= sometimes 3=No		
9. Please explain your response……		
10. Which activities would you have added to your MTMSG meetings? ……		
11. Do you feel the IGAs were well managed during the MTMSG meetings 1=Yes 2=Sometimes 3=No		
12. Please explain your answer……		
Thank you for your sparing time for the interview and answering my questions		

Appendix H: Breast-feeding observation guidelines

Observation Guidelines for 10% participants in each of the 3 study groups. Done within first and third months of delivery. Observations to be done between 8 am to 5 pm

A: ADMIN					
OBS. Number		Division:		Health Centre	
Sub-location:		Village:		Study Group	
Name of Interviewer		Date of Visit:		MTMSG Number	
QNR Checked		QNR check date			

B:BABY'S BIODATA			**M1**	**M2**	**Average**
Baby's Code		Baby's Weight			
Baby's Date birth		Baby's Length			
Baby's Age (days)		Baby's Card Number			
Baby's Sex		Delivery Place			
QNR Checked by		QNR Check Date			

C: OBSERVATION GUIDELINES	
1. Proper positioning 1=Yes 2=No	
2. Proper attachment to breast 1=Yes 2=No	
3. Frequency of breast-feeding per day. Give number of times.....	
4. Breast-feeding on demand. 1=Yes 2=No	
5. Breast-feeding on both breasts per breast-feeding session. 1=Yes 2=No	
6. Mother relaxed and confident when breast-feeding. 1=Yes 2=No	
7. Problems mother is facing during breast-feeding and how she deals with them, (List).....	

8. Complementary foods given.
   List types and frequency.....

Food/Drink	Frequency given	Amounts given
.....	.....	
.....	.....	
.....	.....	
.....	.....	
.....	.....	
.....	.....	
.....	.....	
.....	.....	

Appendix I: MTMSG reporting form

Facilitator's name: Nearest health facility: MTMSG number: Topic covered: Date:

Challenges:

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Questions:

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Success stories if any:

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Appendix J: MTMSG attendance form

Facilitator's name:

Nearest health facility:

MTMSG number:

Topic covered:

Date:

S/NO	Participant's Code	Village	Landmark and Sub-chief	Phone number	Sign/Thumb Print

Appendix K: Observation Guide for MTMSG Meetings

Community: _____ **Place:** _____
Date: _____ **Time:** _____ **Theme:** _____
Group facilitator:
_____
_____

Indicate Yes or No to questions below.

1. The facilitators introduce themselves to the group.
2. The facilitator clearly explains the day's theme.
3. The facilitator asks questions that generate participation.
4. The facilitator motivates the quiet women to participate.
5. The facilitator applies communication skills.
6. The facilitator adequately manages content.
7. The facilitator adequately distributes the tasks between the members.
8. Mothers share their own experiences.
9. The participants sit in a circle.
10. The facilitator fills out the information sheet on their group.
11. The facilitator invites women to attend the next mother-to-mother support group (place, date and theme).
12. The facilitator thanks the women for attending the mother-to-mother support group.
13. The facilitator asks the mothers to talk to a pregnant woman or breast-feeding mother before the next meeting, share what they have learned, and report back.

13. Is there a productive discussion taking place?
14. Is the knowledge being passed correct?.
15. How does the facilitator handle the misconceptions if any correctly?
17. Are the women interested in breast-feeding issues being discussed?

Comments

.....

.....

Appendix L: Letter of introduction to FGD groups

Hello. My name is Mr. Joseph Kobia, a PhD student at Kenyatta University and my Research Assistant is..... I am conducting a research project that seeks to establish the effectiveness of Mother-to-Mother Support groups in promoting exclusive breast-feeding in Igembe South Sub-County, Meru County-Kenya. I would very much appreciate your participation in this focus group discussion (FGD) to get in depth information on how Mother-to-Mother Support Groups have affected breast-feeding in this community. The findings from the study may contribute to knowledge on child nutrition and in particular, exclusive breast-feeding in this study area and any other with similar characteristics as you were earlier informed at the beginning of the project. The findings may be used in formulating policies that will help improve exclusive breast-feeding rates as well as nutrition status of infants in Kenya.

Please feel free to make your contributions as well as ask questions which your group members can discuss. My assistant will be recording this meeting. We shall be here for only two hours. Whatever information you provide during these FGD will be kept confidential and will not be shared with anyone other than my research supervisors who are authorized by government and Kenyatta University. Thank you for coming and feel welcome.

Yours Sincerely,

Joseph Kobia
P. O Box 100387,
Nairobi

Appendix M: FGD control group guidelines (EBF)

1. Who are the sources of infant feeding information in this community? [Probe for TBAs, CHWs, health facilities, NGOs/CBOs, family, friends, and media]. *(Rank in order of importance. Probe for comments on adequacy of information)*

2. Please describe the breast-feeding practices in this community.

3. What are the beliefs/traditional practices regarding breast-feeding in this community?

4. Please describe the common breast feeding practices for sick children in this community.

5. Is exclusive breast-feeding common in this community? If YES for how long? If NO, why not?

6. Who are the major decision makers in the choice of infant feeding practice in your community?

7. Would you say it is appropriate to express milk for the baby if you will be away for long?

8. What are the challenges to exclusive breastfeeding in this community? *(Probe for cultural, socio-economic, food accessibility, maternal workload, pregnancy)*

9. How does your community view exclusive breast-feeding?

10. What are your views on encouraging women to exclusively breastfeed? *(Probe for suggestions on how best to promote exclusive breast-feeding)*

Appendix N: FGD control group guidelines (non-EBF)

1. Who are the sources of infant feeding information in this community? [Probe for TBAs, CHWs, health facilities, NGOs/CBOs, family, friends, and media].

2. Who are the major decision makers in the choice of infant feeding practice in your community?

3. What role can the community play in improving infant and young child feeding practices?

4. What are the beliefs/traditional practices regarding breast-feeding in this community?

5. Please describe the common breast-feeding practices for sick children in this community.

6. Please explain what you understand by exclusive breast-feeding? Is exclusive breast-feeding common in this community?

7. Do you think it's possible to exclusively breast-feed children up to six months? (*Probe for reasons)*

8. Is breast-feeding commonly practiced in this community? If NOT, why? If YES, for how long do most women breast-feed their children?

9. Should babies be given colostrums/liquid that comes from the breast in the first three days after delivery? If YES, why and if NO why?

10. What are the challenges to exclusive breast-feeding in this community? (*Probe for cultural, socio-economic, food accessibility, maternal workload, pregnancy)*

Appendix O: FGD MES (EBF) guidelines

1. Please explain how your mother-to-mother support group was formed.
2. What are the objectives of your mother-to-mother support groups
3. What discussions/activities do you perform as a group? ***(Probe for key messages, experiences, and challenges)***
4. If the child was sick, what would you do about his/her breast-feeding?
5. Who are the major decision makers in the choice of infant feeding practice among the different communities?
6. Should babies be given colostrum/liquid that comes from the breast in the first three days after delivery? If YES, why and if NO why?
7. Please explain what you understand by exclusive breast-feeding?
8. What are the challenges to exclusive breast-feeding in this community? (*Probe for cultural, socio-economic, food accessibility, maternal workload, pregnancy)*
9. How did the mother-to-mother support group assist you in ensuring you practice exclusive breast-feeding?

Appendix P: FGD MES (non-EBF) guidelines

1. Please explain how your mother-to-mother support group was formed.

2. What are the objectives of your mother-to-mother support groups?

3. Have you any training for this group or some of its members?

   If YES, what training have you received. ***(Probe for contents of the training)***

4. What activities do you perform as a group? ***(Probe for key messages, experiences, and challenges)***

5. Please give me other sources of breast feeding information in this community. *[Probe for TBAs, CHWs, health facilities, NGOs/CBOs, family, friends, media]. RANK in order of importance.* Are they adequate? *Probe for reasons*

6. Is breast-feeding commonly practiced in this community? If NOT, why? If YES, for how long do most women breast-feed their children?

7. Are there women here who do not breast-feed? If YES, why? Probe for reasons such as culture, presence of diseases, occupation?

8. Should babies be given colostrum/liquid that comes from the breast in the first three days after delivery? If YES, why and if NO why?

9. Please explain what you understand by exclusive breast-feeding?

10. Do you think it's possible to exclusively breast-feed children up to six months? *Probe for reasons*

11. What are the challenges to exclusive breast-feeding in this community? (*Probe for cultural, socio-economic, food accessibility, maternal workload, pregnancy)*

Appendix Q: FGD MESIGA (EBF) guidelines

1. Please explain how your mother-to-mother support group was formed.
2. What are the objectives of your mother-to-mother support groups?
3. Have you any training for this group or its members?

   If YES, what training have you received. ***(Probe for contents of the training)***
4. What discussions/activities do you perform as a group? ***(Probe for key messages, experiences, and challenges)***
5. Did you enjoy those activities you participated in during the MTMSG sessions?
6. Did those activities encourage you to attend the meetings?
7. What are the beliefs/traditional practices regarding breast-feeding in this community?
8. If the child was sick, what would you do about his/her breast-feeding?
9. Would you express breast-milk for your child (less than 6 months) if you expect to be away for a long time?
10. What are the challenges to exclusive breast-feeding in this community? (*Probe for cultural, socio-economic, food accessibility, maternal workload, pregnancy)*

Appendix R: FGD MESIGA (non-EBF) guidelines

1. Please explain how your mother-to-mother support group was formed.
2. What are the objectives of your mother-to-mother support groups?
3. Have you any training for this group or its members?
4. What activities do you perform as a group? ***(Probe for key messages, experiences, and challenges)***
5. What income generating activities were you involved during the MTMSG sessions? Did you like them?
6. Did those activities encourage you to attend the meetings?
7. Are there other activities you would like to have added?
8. What are the beliefs/traditional practices regarding breast-feeding in this community?
9. If the child was sick, what would do about his/her breast-feeding?
10. Who/what are other sources of infant feeding information in this community apart from MTMSGs? ***Rank in order of importance.***
11. What are the beliefs/traditional practices regarding breast-feeding in this community?
12. Please explain what you understand by exclusive breast-feeding?
13. Do you think it's possible to exclusively breast-feed children up to six months? *Probe for reasons*
14. What are the challenges to exclusive breast-feeding in this community? *(Probe for cultural, socio-economic, food accessibility, maternal workload, pregnancy)*
15. What are your views on encouraging women to exclusively breast-feed? *(Probe for suggestions on how best to increase rates of exclusive breastfeeding*

Appendix S: MTMSG detailed schedule of project activities

Phase	Component	Activities	Site	Duration
Pretesting study	Pretesting tools	Training research assistants and pre-test tools	Health Facilities/Meeting points	December, 2012
Phase 1 Baseline	Training of trainers	-MTMSGs formation and facilitation. -Benefits of breast-feeding -Breast-feeding beliefs, doubts and difficulties -Breast-feeding options -Initiation of breast-feeding -EBF/BF support	Home/Health Facilities	December 2012
Phase 2 interventions	Baseline interview	Collection of baseline data Recruitment of mothers into groups	Health facilities/Meeting points	December 2012-August, 2013
	MTMSG training	-MTMSGs formation -Benefits of breast-feeding -Initiation of breast-feeding -EBF/BF support	Health facilities/meeting points	Starting December, 2013
	MTMSGs IGA workshop	Liquid soap making	Health Facilities/Meeting points	December, 2013
	MTMSG meetings I	MES and MESIGA groups: -Breast-feeding options -Hygienic practices -BF Initiation IGA activities (MESIGA only)	Health facilities/school/ church/agreed meeting point	December, 2013
	Second Interview	All Groups (Postpartum)	Home/Health facilities	End of January 2013
	MTMSG meetings II	MES and MESIGA groups: BF Initiation Breast-feeding myths Nutrition during lactation IGA activities (MESIGA only)	Health Facilities/school/ church/agreed meeting point	January 2013
	Third Interview	MES and MESIGA only	Home/health facilities	End of February 2013
	MTMSG meeting III	MES and MESIGA groups: Lactation amenorrhea Method Breast-feeding support IGA activities (MESIGA only)	Health Facilities/school/ church/agreed meeting point	February 2013
	Fourth Interview	MES and MESIGA only	Home/Health Facilities	End of March 2013

	MTMSG meeting IV	MES and MESIGA Breast milk expressing Cup feeding Hygienic storage of b/milk IGA activities (MESIGA only)	Health facilities/school/ church/agreed meeting point	March 2013
	Fifth Interview	MES and MESIGA only	Home/Health Facilities	End of April 2013
	MTMSG meeting V	MES and MESIGA Breast-feeding in pregnancy Complementary feeding Extension of BF support IGA activities (MESIGA only)	Health facilities/school/ church/agreed meeting point	April 2013-
	Final Interview	MES and MESIGA only	Home/Health Facilities	End of May 2013-
	FGD Meetings	All groups (2 FGDs per study group)	Health facilities/school/ church/agreed meeting point	February 2014

Appendix T: MTMSG activity plan

(Done by Researcher supported by facilitators)

Facilitator's name: Health facility: District:			Name of group: Sub-location:	
Goal:				
Objective:				
Activity	Dates	Resources Required	Measure of Success	Comments

Appendix U: MTMSG training of facilitators' pre-test/post-test

(Done before and after the training)

Instructions: Answer Yes or No to Questions and True or False for statements

1. Should a mother begin to breast-feed immediately after birth?
2. A mother needs to breast-feed on schedule in order to have sufficient milk?
3. Beginning at 4 months, a baby needs to eat and drink other feeds?
4. A baby between 6 – 8 months needs to eat 5 times a day.
5. The first milk cleans the baby's stomach and is the first vaccination of the baby.
6. A mother-to-mother support group is the same as an educational talk.
7. In the first 6 months a baby should drink water and be breastfed.
8. A mother can use lactation amenorrhoea method to prevent pregnancy as long as she is breast-feeding.
9. After 6 months a baby should be given food on his/her own plate.
10. In a mother-to-mother support group, mothers help other mothers.
11. Many difficulties in breast-feeding can be resolved by proper positioning and attachment of the baby to the breast.

Appendix V: Schedule for training facilitators.

(Done by Researcher assisted by lactation expert)

Training of Facilitators: Training Schedule	
Objective/content/messages	*Materials/times/activities*
Learning **objectives:** By the end of this session, participants will be able to: • Train community facilitators in MtMSG methodology. • Facilitate a breast-feeding MtMSG in a community setting. **Day 1** **Key messages:** 1. Pre-test 2. Brainstorming on the local health situation 3. Characteristics of a MtMSG 4.Brainstorming advantages of breast-feeding 5. Ten steps of BFHI 6. Initiation of breast-feeding 7. How the breast makes milk	**Materials:** • Flipchart paper, markers, masking tape • **Time:** 8 hours **Activity:** • Form groups of participants from the training who will act as facilitators, with other participants acting as observers • Discussions • Pretest • Power point presentations
Day 2	
Key messages: 1. Positioning and attachment of the baby correctly at the breast 2. Breast-feed exclusively for the first 6 months, 3. Breast-milk contains enough water. 4. Breastfeed frequently day and night (on demand). 5. Continue to breastfeed baby on demand. 6. With information and support, all women can overcome breast-feeding difficulties.	**Materials:** • Flipchart paper, markers, masking tape **Time:** 8 hours **Activity:** • Form small groups of participants from the training who will act as facilitators of the mother-to-mother support groups, with other participants of the training who will act as observers • Demonstration on positioning and latching • Guided discussion
Day 3	
Key messages: 1. Lactation amenorrhea method in exclusive breast-feeding (baby<6 months) 2. At 6 months, besides breast-feeding, begin to give other foods. 3. Continue to breast-feed for up to 2 years and beyond.	**Materials:** • Flipchart paper, markers, masking tape • **Time:** 8 hours **Activity:** 1. Role play as MTMSG Facilitator 2. Songs to review key messages
Day 4	
Key messages • Role of IGAs in MTMSGs	**Materials:** • Flipchart paper, markers, masking tape

• Selection of IGA • Discuss sources of funding • Training of members • Marketing of the products •	• Raw materials, equipments **Time:** 8 hours Activity Demonstration of IGA

Appendix W: MTMSG meetings attendance

MTMSG meetings attendance	Treatment Group A n(%)	B n(%)	Total n(%)	Chi-sq/Fisher test; P-value
Number of MTMSG meetings attended				
4	0(0)	24(48)	24(19.5)	<.0001
5	2(2.7)	23(46)	25(20.3)	
6	34(46.6)	3(6)	37(30.1)	
7	37(50.7)	0(0)	37(30.1)	
Total	73(100)	50(100)	123(100)	
Breast-feeding support rating				
Excellent	47(64.4)	22(44)	69(56.1)	0.0253
Very Good	26(35.6)	28(56)	54(43.9)	
Total	73(100)	50(100)	123(100)	

Appendix X: Association between wealth index and EBF by month

Association between wealth index and EBF by month

Month	Wealth Quintile	EBF=Yes	EBF=No	P-value
1	1	32(23.9%)	2(6.7%)	0.2589
	2	26(19.4%)	9(30%)	
	3	26(19.4%)	6(20%)	
	4	23(17.2%)	5(16.7%)	
	5	27(20.1%)	8(26.7%)	
	Total	134(100%)	30(100%)	
2	1	26(22.6%)	8(16.3%)	0.4444
	2	22(19.1%)	13(26.5%)	
	3	25(21.7%)	7(14.3%)	
	4	17(14.8%)	11(22.4%)	
	5	25(21.7%)	10(20.4%)	
	Total	115(100%)	49(100%)	
3	1	24(24.2%)	10(15.4%)	0.3617
	2	20(20.2%)	15(23.1%)	
	3	19(19.2%)	13(20%)	
	4	19(19.2%)	9(13.8%)	
	5	17(17.2%)	18(27.7%)	
	Total	99(100%)	65(100%)	
4	1	25(25.8%)	9(13.4%)	0.3725
	2	21(21.6%)	14(20.9%)	
	3	18(18.6%)	14(20.9%)	
	4	15(15.5%)	13(19.4%)	
	5	18(18.6%)	17(25.4%)	
	Total	97(100%)	67(100%)	
5	1	20(23%)	14(18.2%)	0.8378
	2	16(18.4%)	19(24.7%)	
	3	17(19.5%)	15(19.5%)	
	4	16(18.4%)	12(15.6%)	
	5	18(20.7%)	17(22.1%)	
	Total	87(100%)	77(100%)	
6	1	17(22.4%)	17(19.3%)	0.1215
	2	19(25%)	16(18.2%)	
	3	11(14.5%)	21(23.9%)	
	4	17(22.4%)	11(12.5%)	
	5	12(15.8%)	23(26.1%)	
	Total	76(100%)	88(100%)	

1 =Poorest quintile; 2 =Second poorest quintile; 3 =Middle quintile; 4 =Second highest quintile; 5=Highest quintile

Appendix Y: Kenyatta University approval of research proposal

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: kubgs@yahoo.com
dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

Internal Memo

FROM: Dean, Graduate School DATE: 6th May, 2012

TO: Mr. Joseph Kobia M'Iiria REF: H87/13609/09
C/o Foods, Nutrition & Dietetics Dept.

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that the Graduate School Board, at its meeting of 30th April, 2012, approved your research proposal for the Ph.D. degree entitled "Effectiveness of Mother-To-Mother-Support Groups in Promoting Exclusive Breastfeeding in Meru County, Kenya: A Randomized Controlled Trial".

You may now proceed with your data collection.

Thank you.

JOSEPHINE K. NJAGI
FOR: DEAN, GRADUATE SCHOOL

c.c. Chairman, Foods, Nutrition & Dietetics Department

Supervisors:

1. Prof. Judith Kimiywe
   Foods, Nutrition & Dietetics Department
2. Dr. Sophie Ochola
   Foods, Nutrition & Dietetics Department

JKN/cww

Appendix Z: Kenyatta University research approval

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: kubgs@yahoo.com
dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

Our Ref: H87/13609/09 Date: 6th May, 2012

The Permanent Secretary,
Ministry of Higher Education, Science & Technology,
P.O. Box 30040,
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION
MR. JOSEPH KOBIA M'LIRIA - REG. NO. H87/13609/09

I write to introduce Mr. Joseph Kobia M'liria who is a Postgraduate Student of this University. He is registered for a Ph.D. degree programme in the Department of Foods, Nutrition & Dietetics in the School of Applied Human Sciences.

Mr. M'liria intends to conduct research for a Thesis entitled, "Effectiveness of Mother-To-Mother-Support Groups in Promoting Exclusive Breastfeeding in Meru County, Kenya: A Randomized Controlled Trial".

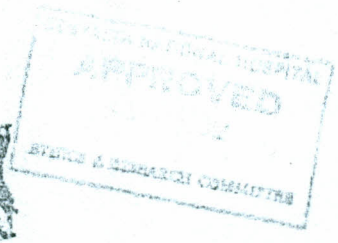
Any assistance given will be highly appreciated.

Yours faithfully,

MRS. LUCY N. MBAABU
FOR: DEAN, GRADUATE SCHOOL

LNM/cww

Appendix AA: Ethical clearance from KNH/UoN



UNIVERSITY OF NAIROBI
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KNH/UON-ERC
E-mail: mmbuh_erc@uonbi.ac.ke
Website: www.uonbi.ac.ke
Link:www.uonbi.ac.ke/activities/KNHUoN

KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300 9
Fax: 725372
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/343

13 December 2012

Joseph Kobia M'Iiria
H87/13609/09
Dept .of Food, Nutrition and Dietatics
Kenyatta University

Dear Mr. Kobia

RESEARCH PROPOSAL: EFFECTIVENESS OF MOTHER-TO –MOTHER SUPPORT GROUPS IN PROMOTING EXCLUSIVE BREASTFEEDING IN MERU COUNTY, KENYA: A RANDOMIZED CONTROLLED TRIAL (P292/05/2012)

This is to inform you that the KNH/UoN-Ethics & Research Committee (KNH/UoN-ERC) has reviewed and approved your above revised proposal. The approval periods are 13th December 2012 to 12th December 2013.

This approval is subject to compliance with the following requirements:

a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation.
c) Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification.
d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
e) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*)
f) Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
g) Submission of an *executive summary* report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

For more details consult the KNH/UoN ERC website **www.uonbi.ac.ke/activities/KNHUoN**

Appendix AA: Ethical clearance from KNH/UoN continued.

Yours sincerely

PROF. A.N. GUANTAI
SECRETARY, KNH/UON-ERC

c.c. The Deputy Director CS, KNH
The Principal, College of Health Sciences, UoN
The HOD, Records, KNH
Supervisors: Judith Kimiywe, Sophie Ochola

Appendix AC: Letter of introduction from MOH Igembe South Sub-County

MINISTRY OF MEDICAL SERVICES

Telephone: 064-21255
Fax: 064- 21355
Telegrams:MOH, MAUA

OFFICER OF MEDICAL OFFICER
IGEMBE DISTRICT
P.O. BOX 482
MAUA

Ref: NYB/MOH/D17 VOL II/21

Date: 23RD JULY 2012

TO WHOM IT MAY CONCERN

RE: INTRODUCTION LETTER
MR. JOSEPH KOBIA M'LIRIA
REG. NO. H87/13609/09

The above underlined officer who is a student in Kenyatta University pursuing post graduate PHD degree in Foods, Nutrition and Dietitic has been authorized by the MOH's office to carry out the exercise freely without any obstruction.

You have been requested to cooperate with him and his group to achieve the set targets.

I hope you will acknowledge the request positively.

Yours,

Medical Officer of Health
Igembe District
P. O. Box 482
MAUA

Andrew Achoki
HAO
FOR: Medical Officer in Charge
NYAMBENE DISTRICT HOSPITAL