UNIVERSITY OF NAIROBI

COLLEGE OF HEALTH SCIENCES

SCHOOL OF MEDICINE

DEPARTMENT OF PEDIATRICS AND CHILD HEALTH

KNOWLEDGE ATTITUDES AND PRACTICES OF BREASTMILK EXPRESSION AND STORAGE AMONG WORKING MOTHERS WITH INFANTS UNDER 6 MONTHS OF AGE IN PUBLIC WELL BABY CLINICS

BY DR PRISCILLAH WANINI EDEMBA

H58/80145/2015

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Medicine in Pediatrics and Child Health, University of Nairobi

2019

Declaration

I declare that this dissertation is my original work and has not been published elsewhere or presented for a degree in any other institution.

_____ _____

Signature Date

Dr. Priscillah Wanini Edemba, MBChB.

H58/80145/2015.

Department of Pediatrics and Child Health,

University of Nairobi.

This dissertation has been submitted to The University of Nairobi with my approval as the university supervisors.

_____ _____

Signature Date

Prof. Grace Irimu, PhD, MMED (Peads & CH), MBChB.

Associate Professor,

Department of Pediatrics and Child Health,

University of Nairobi.

_____ _____

Signature Date

Prof. Rachel Musoke, MBChB, MMED (Peads & CH), FABM.

Associate Professor,

Department of Pediatrics and Child Health,

University of Nairobi.

Acknowledgements

I thank the almighty God for his blessings.

This book is dedicated to my husband Moses Edemba, my children family and friends for cheering me on during my studies in Pediatrics and Child Health.

I would like to thank my supervisors Prof. Rachel Musoke and Prof. Grace Irimu for their mentorship and guidance as I wrote my dissertation.

Operation Definitions

Breast milk Expression: The act of extracting human milk from the breast by hand or by pump into a container (Source: Breastfeeding mothers Act 2017).

Breast milk storage: Packing expressed breast milk in a hygienically safe container at a safe place for purposes of preserving it to give to a child later.

Exclusive breastfeeding: Feeding infants for the first 6 months of life with only breast milk without supplemental liquids or solids except for liquid medicine and vitamin or mineral supplements (Source: World Health Orgamization).

Lactation room: Private, clean, sanitary and well ventilated room or areas in the work place or places where breastfeeding mothers can wash up, breastfeed, or express their milk comfortably, and hygienically preserve it -and not in the toilet. (Source: Health Bill 2016 Kenya Parliament).

Working women: Women who are engaged in gainful activities usually outside the homes in informal or formal employment that have to be away from the child for a while.

Work place: Work premises whether private enterprises or government agencies including their subdivisions (Source: Breastfeeding Mothers Act 2017- Kenya parliament).

List of Abbreviations

BFHI	Baby Friendly Hospital Initiative
BFCI	Baby Friendly Community Initiative
ILO	International Labour Organization.
KDHS	Kenya Demographic Health Survey
KNH	Kenyatta National Hospital
NVIP	National Vaccine Immunization Program
SDG	Sustainable Development Goals
UNICEF	United Nations Children's Fund
USA	United States of America
WABA	World Alliance for Breastfeeding Action
WHO	World Health Organization

Table of Contents

Declaration.....**i**

Acknowledgements.....**ii**

Operation Definitions.....**iii**

List of Abbreviations.....**iv**

Table of Contents.....**v**

List of Figures.....**viii**

List of Tables.....**ix**

List of Appendices.....**x**

Abstract.....**xi**

1. Introduction.....**1**

2. Literature Review.....**2**

2.1 Work and Exclusive Breastfeeding.....2

2.2 Breast Milk Expression.....4

2.3 Equipment for breastmilk expression.....5

2.4 Work place support to breastfeeding women.....6

2.5 Storage of Expressed Milk.....7

2.6 The Situation in Kenya.....8

3. Study Justification and Utility.....**9**

4. Research Question.....**11**

5. Objectives.....**11**

5.1 Primary Objective 11

5.2 Secondary Objective 11

6. Methodology 12

6.1 Study Design 12

6.2 Study Area 12

6.3 Study Population 12

6.3.1 Inclusion criteria 12

6.3.2 Exclusion criteria: 13

6.4 Sample Size 13

6.5 Sampling Procedure 14

6.6 Data Collection 15

6.7 Study Tools 15

6.8 Data Management and Storage 15

6.9 Data Analysis 15

6.9.1 Logistic Regression Model 17

6.10 Data Assurance 17

7. Ethical Consideration 18

7.1 Informed Consent: 18

7.2 Ethical Approval 18

8. Results 19

8.1 Sociodemographic characteristics 19

8.2 Knowledge of breastmilk expression and storage. 20

8.3 Attitude towards breast milk expression. 24

8.4 Attitudes towards breast milk storage. 25

8.5 Practice of breast milk expression and storage 26

8.6 Factors associated with breast milk expression and storage. 27

8.7 Reasons given by working mothers for expressing breastmilk 28

9 Discussion 29

9.1 Strengths of the study 32

9.2 Study Limitations 32

9.3 Conclusions 33

9.4 Recommendations 33

9.5 Conflicts of interest 34

REFERENCES 35

APPENDICES 41

List of Figures

Figure 2: Distribution of knowledge scores on breastmilk expression and storage. 22

Figure 3: Proportions of mothers with satisfactory and poor knowledge of breast milk expression and storage. 23

Figure 4: Reasons why mothers expressed and stored milk. 28

List of Tables

Table 1: Previous studies on exclusive breastfeeding among working mothers. 2

Table 2: Summary of Optimal Storage Conditions.....8

Table 3: Sociodemographic characteristics of the participants.....19

Table 4: Knowledge on breastmilk expression. 20

Table 5: Knowledge on breast milk storage. 21

Table 6: Factors associated with knowledge of breast milk expression and storage. (multivariate analysis).....24

Table 7: Attitudes towards breastmilk expression 24

Table 8: Attitudes towards breast milk storage.....25

Table 9: Practice of breastmilk expression and storage. 26

Table 10: Factors associated with expression and storage of breast milk. 27

List of Appendices

Appendix 1: Consent form.....41

Appendix 2: Study questionnaire.....45

Appendix 3:Timelines.....61

Appendix 4: Budget.....62

Appendix 5: R Codes for Sample Size Calculation.....63

Abstract

Background: A negative relationship has been noted between exclusive breastfeeding and postpartum return to work. Many studies show that working mothers are not able to successfully exclusively breastfeed. Expression and storage of breastmilk has been seen as a strategy to ensure continued breastmilk consumption in the event of temporary separation of an infant from the mother. The 2018 Kenyan guidelines on Securing a Baby Friendly Work Environment outline the roles of the employer in terms of provision of lactation rooms and lactation breaks as per the 2017 Breastfeeding Mothers Act. However, very few studies have been done in Kenya to explore the knowledge, attitude and practice of breastmilk expression and storage among working mothers.

Objective: The main objective of the study was to assess the Knowledge Attitude and Practice of breastmilk expression and storage among working women with infants below six months of age in Public Well Baby Clinics.

Methodology: A hospital based cross sectional study was conducted at the well-baby clinics of Kenyatta National Hospital and Mbagathi District Hospital. A total of 395 working mothers were interviewed using a structured questionnaire. Open and closed ended questions were used to establish the knowledge and practice around breastmilk expression and storage. A scoring system was used to analyze responses to closed ended questions on knowledge. A five point Likert scale was used to explore the attitudes of the mothers towards the expression and storage of breast milk. Inferential statistics calculated using Odds ratios and Adjusted Odds ratios for univariate and multivariable analysis respectively.

Results: The median age of the mothers was 29 years(IQR=25-34), >85% had attained secondary education or higher, 76%(302) were in the private sector, and the median age of infant at resumption of work was 3 months(IQR=2-4)**.**

The prevalence of breastmilk expression was 41% (161 mothers)**.** Poor knowledge of breast milk expression and storage was in 66% of mothers interviewed. Those who had attained tertiary education and those working in the public sector had some significantly higher odds of having satisfactory knowledge OR4.47(95% CI 2.01-11.07) and OR2.26(95%CI 1.33-3.85) respectively. Attaining tertiary education was significantly associated with a higher odds of expressing milk OR3.6(95% CI 1.81-7.95).

The main challenges during breast milk expression were pain and the process of expression being cumbersome. Most mothers used hand expression (50%) followed by manual pumps at 30%.

Conclusion: Knowledge gaps exist in the expression and storage of breastmilk. Generally working mothers were confident that expression of milk could help them achieve six months of exclusive breastfeeding. More effort needs to be made by the health care workers in teaching lactating mothers on how to express and store breast milk which would help them overcome the challenges of pain while expressing milk.

1. Introduction

The 2016 Lancet series on breastfeeding estimate that scaling up breastfeeding to near universal levels would prevent 823,000 deaths in children under five years annually (1).WHO recommends exclusive breastfeeding for the first six months of life. The fifth global target in the comprehensive implementation plan on maternal infant and young child nutrition is to increase the rate of exclusive breastfeeding from 38% in 2012 to >50% by 2025(2)(3).

In Kenya, the exclusive breastfeeding rate rose from 32% in 2008-09 to 61% in 2014 according to the Kenya Demographic Health Survey (KDHS). However, there seems to be a steady decline of exclusive breastfeeding rates from 3-5 months (63% at 3 months and 42% at 5 months)(4). This could be explained by a Kenyan study by Van et al which showed that 52% of women resumed work within 3 months of child birth(5). This means that work might have a negative effect in the overall ability of a woman to maintain lactation. With exerted efforts towards improving the quality of life of the girl child, more and more women are joining the work force. Currently, women make up 50% of the total labor work force globally, and 47% in Kenya(6).

The International Labour Organization(ILO) convention 2000 C183 proposed a period of paid maternity leave of not less than 14 weeks(7). The Kenyan labor laws provide for 12 weeks maternity leave in the Employment Act(8). Only the women working in the formal sector can benefit from such a provision yet three quarters of the Kenyan population work in the informal sector(5).

With time, lactating women who are faced with the prospect of returning to work, have developed strategies to continue breast-feeding while working e.g. expressing breast milk, cease breastfeeding, or negotiate a reduced-hour or flexible schedule with their employer(9)(10). Expression of breast milk is becoming a normalized behavior among breastfeeding women. Regular expression is consistently seen to be associated with employment (11).Refrigeration and freezing of milk has been shown to have no effect on the fat, protein, lactose and zinc content. A significant decline has been seen with vitamin C, A and E(12).

This study aims to examine the knowledge, attitudes and practices around breast milk expression and storage among working women in Kenya.

2. Literature Review

The 1990 Innocenti Declaration proposed the reinforcement of a breastfeeding culture through elimination of obstacles to breastfeeding within the work place and the community(13). In the 2017 World Breastfeeding Week dubbed "Sustaining breastfeeding together", the World Alliance for Breastfeeding Action (WABA) reinforced that women should be able to combine breast feeding and paid work without discrimination or disadvantage(14).

2.1 Work and Exclusive Breastfeeding

Work has always been in competition with exclusive breastfeeding. The Singapore National Breastfeeding Survey showed that work had a profound effect on the duration of breastfeeding. The rate of exclusive breastfeeding was higher among the non-working mothers (31%) compared to the working mothers (20%). The survey however showed that breastfeeding could continue while still working as 40% of the working mothers continued to breastfeed after their maternity leave (2 months) ended, and 20% of them continued to breastfeed up to 6 months (15). Roe et al noted a negative relationship between the probability of breastfeeding and postpartum return to work. They noted that working mothers made decisions about employment first then structured infant feeding decisions around work constraints (16).

Breastfeeding is seen to be an expectation that clashes with reality and inadequate assistance and guidance has created a perception that breastfeeding is not a good decision(17). Working mothers, though enlightened in the advantages of breast milk, have been shown not to be able to exclusively breastfeed their infants especially after return to work both in Africa and in other continents(18).

Despite working mothers having knowledge on the benefits of exclusive breastfeeding most of them are unable to achieve this goal. Working mothers require supportive work policies when they return back to work. A 2016 Lancet series in breastfeeding showed that reduction of breastfeeding barriers by providing lactation rooms and nursing breaks reduced absenteeism and provided better performance, commitment and retention at work (19).Table 1 gives more illustrations on effect of work and exclusive breastfeeding.

Table 1: Previous studies on exclusive breastfeeding among working mothers.

STUDY TITLE	STUDY DESIGN	RESULTS	CONCLUSION
Exclusive breastfeeding among city dwelling professional working mothers in Ghana. Dun-Dery and Laar et al 2015(18)	Descriptive cross-sectional study (n=369)	99% of mothers had knowledge of exclusive breastfeeding. 10.3% of mothers exclusively breastfed till six months. Beyond maternity leave, the mothers had no other support from employers that could enable them achieve exclusive breastfeeding.	Extension of maternity leave. Educational support to translate knowledge into practice. More collaboration between the ministry of health, the labor relations department and all professional bodies. A more baby friendly work environment.
Knowledge attitude and practice of exclusive breastfeeding among working mothers in South Jordan. Etyad et al 2016.(20)	Cross-sectional survey (n=341)	Working mothers had satisfactory knowledge of and positive attitude towards breastfeeding. However, only one fifth of lactating working mothers breastfed exclusively for 6 months. For 30% of respondents, work related factors were the cause of premature cessation.	The study provided direction for health care professionals and policy makers for planning effective breastfeeding promotion programs and promoting breast feeding friendly work environments.
Assessment of knowledge and practices about breastfeeding and weaning among working and non-working mothers. Khaliq et al 2016.(21)	Cross-sectional design.	85.5% of non-working mothers practiced exclusive breastfeeding compared to 48.3% of the working mothers. 20.5% of reasons given for not breastfeeding in working mothers were professional or job related responsibilities.	There is a dire need to promote knowledge on the importance of breastfeeding not only among women but also to their husbands and other members of society such as employers.
Breastfeeding experience among healthcare professionals in Kenyatta national	Crossectional design (n=334)	Despite 85% of female health professionals intending to exclusively breastfeed,	More support is needed for breastfeeding health professionals after returning to work

Hospital. Gituma et al 2016.(22)		only 29.2% were able to do so for six months.	This is in terms of work schedule, nursing rooms and provision of breast milk storage facilities.
Addressing barriers to health: Experiences of breastfeeding mothers after returning to work. Valizadeh et al 2017. (23)	Descriptive qualitative study.	Employed mothers shared negative experiences with non-supportive employers and coworkers in relation to breastfeeding and their need to express milk. Employers showed no sympathy for lactating mothers when preparing for weekly shifts and workloads.	There is a significant need for more family friendly policies in the work place to include: flexible work schedules, part time work options , access to child care and access to suitable facilities to breastfeed or express milk.

2.2 Breast Milk Expression

Breast milk expression has been seen as a strategy to practice exclusive breastfeeding. The 2018 Baby Friendly Hospital Initiative(BFHI) implementation guide recognizes that mothers need to be trained on how to express breast milk as a way of maintaining lactation in the event of being separated from their infant temporarily (24). In the past, expressed breast milk was predominantly for those infants who were immature, small or unwell, but a 2013 systematic review shows that it has become increasingly common in healthy term infants(25). A 2015 study done in Kenya by Van et al showed that 65% of mothers recognized the need to express breast milk in order to feed their baby while at work(5). A 2008 study done in USA by Labiner et al on the prevalence of breast milk expression showed that expressing breast milk was becoming a normalized aspect of breastfeeding behavior. Out of 1564 mothers with infants between 1.5 to 4.5 months, 85% had successfully expressed milk at some point since the infant was born. Working mothers were twice as likely to express milk compared to non-working mothers (11). A 2010 study done in Australia by Sarah Clemons et al showed that 98% of mothers expressed breast milk and 66% of mothers with infants between 3-6 months had expressed milk at some point since the infant was born (10).

Majority of breastfeeding and working mothers working in an environment supportive of breastfeeding spend less than one hour in a day in two sessions expressing breast milk. A period of time that would customarily be allocated for them as break time (26). A study done among formally employed urban and rural Malaysian women showed that breast milk expression took 15% of the total working hours per day. This is much better in comparison to the leave working women would take if their infants fell sick (27).

In Australia mothers who expressed milk prolonged the duration when an infant would be exclusively breastfed. Breast milk expression was associated with any breastfeeding at 6 months and mothers who expressed breast milk were less likely to stop any breastfeeding before six months compared to those who never expressed breast milk. Appropriate use of expressed breast milk was seen as a means to help mothers to achieve six months of 'full' breastfeeding while giving more lifestyle options (28).

2.3 Equipment for breastmilk expression.

Breast milk expression devices have been used for centuries to address immediate challenges to breast feeding such as engorgement and inverted nipples, but recent advances in breast pump technology have made these devices essential in overcoming challenges such as regular extended separation of mother and child because of work(11). Breast pumps have evolved to be aesthetically appealing, sophisticated and adaptable for domestic use (25). Breast pumps are now moving from being a luxury item for lactating mothers to a necessity(29). A report on a study done by Phillips Africa among the middle class women in Kenya and Ghana showed that breast pumps are becoming popular as baby shower gifts(5). In Australia, women concurred that breast pumps enabled them to feed the infants with breast milk as long as they wanted to and without them, they would have stopped breastfeeding sooner (10). Breast milk expression can be done by hand, by a manual breast pump or by an electric breast pump. The 2018 BFHI implementation guide recognizes the importance of coaching the mothers to express breast milk by hand, or by manual or electric pump depending on the mothers context but goes ahead to point out that hand expression has the advantage of being easily available therefore enabling the mother to relieve pressure or express milk when a pump is not available (24).

A 2016 Cochrane review comparing the hand, manual and electric pumping methods found no significant differences in milk volume obtained, the level of nipple pain, energy content in milk, level of prolactin or oxytocin released and in the contamination of the expressed milk. However, hand and large electric pumps were associated with higher protein content than manual pumping method. Hand expression was associated with higher sodium levels and lower potassium levels compared to large electric pumps or manual pumps. Breast massage when pumping was associated with higher fat content(30). A 2002 study done in Australia looking into the efficacy of an electric breast pump concluded that the 24 hour volume of milk removed by the electric pump was not different from the mean volume of milk breastfed by an infant over 24 hours(31). Despite some studies favoring manual expression especially for colostrum (32), electric pumps seem to be more popular and have been associated with a more regular schedule of breast milk expression compared to manual pumps (10)(11)(25).

2.4 Work place support to breastfeeding women.

Despite the advances in breast milk expression, working women are still not able to express milk at work. Lack of facilities such as a lactation rooms at the work place makes some women see breast milk expression as not feasible. Women are reported to express breast milk in the washrooms and prayer rooms(27). Cars, cubicles, toilets and cupboards have been used to express breast milk in the absence of lactation rooms(10). Tight schedules, unavailability of lactation breaks and tiredness after returning from work made breast milk expression challenging (33). Women felt more confident if a refrigerator was available for them to store expressed milk and provision of a flexible time schedule to express breast milk (34).

The 2016 Lancet series on breastfeeding recognized that multifactorial determinants of breastfeeding needed supportive measures from many levels, health care policies, social attitudes and values, legal, women work and employment conditions to enable women to breastfeed. Promotion of breastfeeding should be seen largely as a societal responsibility (19). Mothers have been seen to continue breast milk expression for longer periods if their employer supported them. In 2004, a study done in the United States of America (USA) involving 462 lactating women employed by 5 corporations that had enrolled them in a comprehensive lactation programme showed that the mean number of months the mothers expressed at work was 6.3 and the mean age of infants when the mothers discontinued pumping was 9.1 months (35). Lactation support at the work place or school environment has been seen to increase breastfeeding at six months of age by 25% (36).

Modifications of the work environment by providing encouragement and time for expressing milk, an electric breast pump, a room for expressing milk and breastfeeding consultation services significantly influenced employed mothers' decisions to continue breast-feeding. It made work physically easier by relieving engorged breasts, made return to work less challenging and mothers seemed to work for longer hours (37). This strongly suggests that an employers' support is indeed invaluable in promoting exclusive breast feeding among working women. When relevant measures are delivered adequately, breastfeeding practices are responsive and can improve rapidly(19).

2.5 Storage of Expressed Milk

Safely stored human milk is largely seen as an alternative in case separation of mother and infant is inevitable for example when the mother has to return to work. The 2018 BFHI implementation guide requires lactating mothers to be coached on how to store expressed milk(24). A study done in Turkey among 240 working pregnant women showed that only 27.2% knew about safe storage conditions of breast milk(38). A 2012 study done in Malaysia showed that women discarded expressed breast milk at work because they were not confident that it could be stored to use later. They seemed to have the perception that frozen breast milk was no longer fresh anymore and that it could be harmful to an infant (27).

When it is not possible to breastfeed an infant in the postnatal period, expressed breast milk, frozen or fresh, may provide both immunological and nutritional benefits, if its nutritional value can be conserved(12).Many studies done to test the integrity of stored milk seem to conclude that freezing milk preserves key macronutrients and immunoactive components of human milk. A study done on short term storage of expressed breast milk showed that it can be safely stored at 15^0C for 24 hours and 25^0C for 4 hours. Short term storage was associated with minimal proteolysis and marked lipolysis that was responsible for slow bacterial growth(39).

A study done in Ethiopia in 2004 comparing refrigerated (4-6^0C) milk for 24 hrs and frozen (-4 to -8^0C) milk for one week showed no significant decline in protein, fat, lactose or zinc in both samples. There however seemed to be a significant decline in vitamin A and C with refrigeration and a decline of vitamin E with extended freezer storage(12). A 1978 study on deep freezing milk at -20^0C for 3 months showed no significant effect on lysozyme, lactoferrin, IgA, IgG, and C3. Deep freezing seemed to be satisfactory compared to lyophilisation(40). A 2016 by Ahrabi et al on extended freezer storage at -20^0C of expressed

milk up to 9 months proved no significant change in total protein, fat, lactoferrin, secretory IgA or osmolality. A significant decrease was noted in the total bacterial count, gram positive colony counts and milk pH with freezer storage(41). Recently, a study on previously expressed fresh or frozen left over milk showed stability in their immunological and bacteriological properties when stored for 6 days at 4^0C(42).

The Academy of Breastfeeding Medicine recommends the following storage protocol summarized in Table 2 (43).

Table 2: Summary of Optimal Storage Conditions

	Temperature (^{0} C)	Maximum Recommended Storage Duration
Room Temperature	16-20	4 hours optimal 6-8 hours acceptable
Refrigerator	4	4 days optimal 5-8 days under very clean conditions
Freezer	-4	6 months optimal 12 months acceptable

2.6 The Situation in Kenya

Kenya has made great strides in helping working mothers to exclusively breastfeed. Kenya launched the BFHI in 1991-1992 based on the WHO/UNICEF Ten Steps to Successful Breastfeeding (44). In 2004-2007, the Kenyan Employment Act was enacted which provided for 3 months of paid maternity leave that could be combined with 30 days annual leave and 14 days of paternity leave(8). In 2012, the Breast Milk Substitutes Regulation Control Bill was passed by the Kenyan Parliament(45). Since the launch of the BFHI, the National guidelines on Maternal, Infant and Young Child Nutrition were formulated in 2013 that encouraged every health care facility to train mothers on how to maintain lactation should

they be separated from their infants(46). To address the ten steps of successful breastfeeding of the BFHI, the Baby Friendly Community Initiative (BFCI) was launched in 2016 to promote breastfeeding at the community level through community support groups, mother to mother support groups and community to mother support groups. (47).Finally in 2017, The Breastfeeding Mothers Bill was passed in parliament which stipulates that every employer should provide lactation stations with hand washing equipment, electrical outlets for breast pumps, refrigerators, comfortable seats and a small table. a forty minute break time for breast milk expression or breastfeeding for every four hours worked and flexible work arrangements(48).

Expressing breast milk however, seems to be a relatively new practice. A 2014 study done in Kenya in two urban slums revealed that expressing breast milk to feed the baby was not a common practice and in some instances, it was considered culturally unacceptable(49). A 2018 study done in the rural coastal region in Kenya showed that the community had a negative attitude towards expressed milk. Some people compared expressing milk to milking a cow and did not want to try it. Older women had strong views that a baby should only be fed from the breast. There was reluctance to handle another person's milk as it was considered coming from blood or even as part of the other person. There was no experience of giving expressed milk to infants(50). Most mothers did not have refrigerators to store milk and concerns were raised on how to warm it. There seems to be strong resistance from older women to the concept of storing milk and giving it to the baby. Therefore, the viable option of working women was breast milk substitutes especially cow milk and porridge as formula milk is expensive(49)(50). In the urban setting, more women are receptive to the idea of expressing milk though the use of breast pumps seems to be higher in the middle class group compared to the lower income groups according to a 2015 report by Phillips Africa(5).

3. Study Justification and Utility

Globally women contribute approximately 50% of the total labor force. In Kenya, the percentage of women in the labor work force is 47% (6). Forced by the need to provide income, 52% of Kenyan mothers report resuming work after 3 months(5).

Working women have been found to wean early as they are not able to exclusively breast-feed(18)(51)(34). Factors contributing to breastfeeding discontinuation among working women include working in the private sector, lack of breastfeeding support in the work place,

lack of a separate refrigerator to store expressed breast milk and lack of flexible time schedules among others(18)(27)(34). Studies done in Kenya on expressing milk show that breast milk expression and storage is a relatively new practice and culturally unacceptable(49)(50). The Kenyan Government has shown political goodwill in supporting breast feeding among working mothers. This includes 3 months of maternity leave with full pay as part of the labor laws (8), the Kenya Breast milk Substitutes Regulation and Control Act, BFHI and the BFCI(44). In 2017, the Breastfeeding Mothers Bill was passed that directs the employers to provide lactation stations, breast milk expression breaks and flexible working hours(48). In line with the Breastfeeding Mothers Act, the Ministry of Health launched Guidelines for securing a Baby Friendly Environment at the work place in 2018(52).

Lactation rooms can only be of benefit if the working mother is conversant with how to properly utilize them for the purposes of achieving exclusive breastfeeding. In 2019, Kenya became the few countries in Africa to launch a human donor milk bank making breast milk expression a necessary skill among donor mothers.

This study aims to look into the knowledge, attitudes and practices of breast milk expression and storage among working women to provide information to policy makers that would guide in ensuring optimal utilization of lactation rooms in the plan to scale up exclusive breastfeeding rates among working mothers. This knowledge can help breastfeeding programs to identify knowledge gaps and areas of intervention. Currently, there has been no study done in Kenya that looks into the knowledge of breast milk expression and storage among working women.

4. Research Question

What is the knowledge attitude and practice of breast milk expression and storage among working mothers with infants under 6 months of age in the well-baby clinics of Kenyatta National Hospital (KNH) and Mbagathi District Hospital?

5. Objectives

5.1 Primary Objective

To assess the knowledge, attitude and practices of breast milk expression and storage among working mothers with infants under 6 months in the well-baby clinics of the Kenyatta National Hospital(KNH) and Mbagathi District Hospital.

5.2 Secondary Objective

To determine the factors that affect breast milk expression and storage among lactating working mothers attending the well-baby clinics of Kenyatta National Hospital (KNH) and Mbagathi District Hospital.

6. Methodology

6.1 Study Design

A cross-sectional study involving breast feeding mothers who were working and had infants below 6 months of age.

6.2 Study Area

The study was conducted at the Well Baby Clinics of Kenyatta National Hospital (KNH) and Mbagathi District Hospital. KNH is situated in Nairobi county and is the largest teaching and referral hospital in Kenya. The hospital has 50 wards, 22 outpatient clinics, 24 theaters and a total bed capacity of 1800.

The Well Baby Clinic in KNH is open from Monday to Friday. It serves an average of 75 children per day. Approximately 1350 (90%) of the 1500 children seen per month are 6 months of age and below (Source: KNH Well Baby Clinic records). The services offered in the clinic include vaccination, growth monitoring and nutrition counselling. The children get vaccinated based on the National Vaccine Immunization Program (NVIP) schedule. The schedule involves 4 weekly visits to the well-baby clinic from 6 weeks to 5 years of age.

Mbagathi District hospital is also situated in Nairobi county. It has a bed capacity of 200 patients. The Well Baby Clinic in Mbagathi Hospital is opened from Monday to Thursday and it serves about 30 children per day. Approximately 384(80%) of the 480 children seen per month are 6 months of age and below (Source: Mbagathi District Hospital Well Baby Clinic records). The clinic also follows the NVIP schedule.

6.3 Study Population

Working mothers in formal or informal sector with an infant under 6 months attending well baby clinics at Kenyatta National Hospital and Mbagathi hospital.

6.3.1 Inclusion criteria

1. Working mothers regardless of their breastfeeding practices at the time of the study.
2. The working women were required to have resumed work at the time of the study.
3. Mothers who gave consent for study participation.

Where working mothers referred to: Women engaged in gainful activities outside their homes in informal or formal employment that had to be away from their child for a while.

6.3.2 Exclusion criteria:

1. Mothers with contraindications to breast feeding such as severe sepsis, herpes simplex 1 infection, on sedating psychotherapeutic drugs, anti-epileptic drugs and opioids. Mothers on radioactive iodine 131, on cytotoxic therapy or mothers on excessive topical iodine or iodophores.
2. Mothers with infants with contraindications to breastfeeding. Infants with conditions that hinder breastfeeding such as severe neurological deficits or severe birth defects.
3. Women who were allowed to carry their children to work.
4. Mothers who were below 18 years of age.

6.4 Sample Size

Sample size was calculated using the Fishers Formula shown in the Equation below.

$$N = \frac{Z_{1-\propto/2^2} p(1-P)}{d^2} = \frac{Z_{1-\propto/2^2} pq}{d^2}$$

Where:

$Expected\ value\ (p) = 50\%$

$Precision\ (d) = 5\%$

$Z_{1-\propto/2^2} = 1.96\ to\ give\ a\ 95\%\ confidencce\ interval$

$$Sample\ size = \frac{1.96^2 \times 0.5 \times (1-0.5)}{0.5^2} = \frac{1.96^2 \times 0.5 \times 0.5}{0.25} = 384.16$$

Calculated Sample Size = 384 Subjects.

Sample size calculation was done in R statistical software. Appendix 5 shows the R Studio Codes that were used in sample size calculation

6.5 Sampling Procedure

The Well Baby Clinics in KNH and Mbagathi District Hospital attends to approximately 1350 and 384 children aged below 6 months respectively. In one month, the two clinics attend to an approximate total of 1734 (1350 + 384) patients aged below 6 months.

Stratified sampling procedure was used to reach the total sample size. Out of the calculated total sample size of 384 subjects, 299 KNH patients and 85 Mbagathi District Hospital patients were interviewed. Equations below depict how the two figures were arrived at. The calculations were done using RStudio software as shown in Appendix 5.

Number of Sub jects from KNH

$$n = \left(\frac{1350}{1734}\right) \times 384.16 = 299.09 = 299$$

Number of Sub jects from Mbagathi Hospital

$$n = \left(\frac{384}{1734}\right) \times 384.16 = 85.07 = 85$$

Further, consecutive sampling procedure was used to select the 299 and 85 mothers to be interviewed from the Well Baby Clinics of KNH and Mbagathi District Hospital respectively. Consecutive sampling was chosen because the mothers attend clinic on monthly basis hence extending the data collection period into the second month posed a risk of re-interviewing the same subject.

6.6 Data Collection

Data were collected by the principle investigator together with trained research assistants who were tasked to administer the questionnaire to the participants. There was one research assistant in each station (KNH and Mbagathi District Hospital). The research assistants were Clinical Officers as they were required to have some medical background. The research assistants were taught about breastmilk expression, breast milk storage and the advantages of expressing milk. They were also updated on the Kenyan work place policies regarding employers and working lactating mothers in the Breastfeeding Mothers Act of 2017(48).They were also trained on study terminologies, data collection and storage. A soft copy interface of the questionnaire was developed using Epi Info software. This was then used to collect and store responses from the participants in an excel format for analysis in R Studio Version 3.5.1 Software.

6.7 Study Tools

An electronic questionnaire with 46 questions was used to collect data. Contextualized Yes/ No questions and open ended questions were used to assess Knowledge and Practice. A five point Likert Scale was used to assess Attitude. Face to face interviews were conducted with each mother and a questionnaire filled by the research assistants or the Principle investigator. The questionnaire was pretested in the pediatric wards and pediatrics outpatient clinics prior to ethical approval. Microsoft excel was used to store the collected data and R Studio statistical software was used for data exploration and subsequent analysis.

6.8 Data Management and Storage

The data were then stored in Microsoft Excel format. Data was explored and subsequently analyzed in R Studio statistical software. After analysis the data was stored in form of a soft copy by the research support unit. The Principal Investigator will give a notice of data destruction to the research committee after the expiry of five years. If permission is granted the data will be permanently destroyed.

6.9 Data Analysis

A scoring system was used to analyze responses to closed ended questions on Knowledge:

1= correct response (consistent with Academy of breastfeeding medicine guidelines)(43).

0= Incorrect response (inconsistent with Academy of Breastfeeding Medicine)(43). Any mothers who did not know the answer were considered to have an incorrect response.

During the analysis of factors associated with poor knowledge of expression and storage of breastmilk, a median score was used to distinguish between satisfactory and poor knowledge. The level of knowledge was then cross tabulated against the variable of interest.

The variables were further analyzed using a multivariate analysis test to determine the factors independently associated with satisfactory knowledge. Associations between satisfactory knowledge and each independent variable were examined by Odds ratio (OR) and 95% confidence interval. Responses for open ended questions were summarized and descriptive statistics carried out.

Prior to regression, the collected data were explored through univariate data analysis of the independent variables so as to describe, summarize and find patterns within it. Univariate analysis of the continuous variables was done through calculation of measures of central tendencies such as median and inter quartile range. Univariate analysis of categorical variables was done through the calculation of proportions. The report was presented in Frequency Distribution Tables, Bar Charts and Venn diagrams.

Responses for attitude were based on a five point Likert scale. The responses were later collapsed into 3 cells representing agree, neutral and disagree for ease of interpretation.

Bivariate data analysis was done through regression of the binary outcome (expressing breast milk/ not expressing breast milk) against each independent variable. This yielded the unadjusted odds ratios, standard errors, confidence intervals and p-values. The results of these analyses were presented in form of a table. Lastly all independent variables that showed a statistically significant relation to the response variable in the bivariate regression analysis were used to develop a multiple regression model. The final model was obtained through forward selection of the variables. This yielded the adjusted odds ratios, standard errors, confidence intervals and p-values. All the analyses were done at an alpha value (critical p-value) of 0.05.

6.9.1 Logistic Regression Model

Given a binary outcome variable, success and failure was denoted by 1 and 0 respectively. Repeated trials of this nature followed a Binomial distribution with a median that denoted the probability of success.

In this study breast milk expression was considered a success hence denoted 1. Failure to express breast milk was considered a failure hence denoted 0. The data therefore followed a Binomial distribution with a median that expressed the probability of breast milk expression. The candidate model in this case was the Logistic regression model.

6.10 Data Assurance

The research assistants went through a refresher course of the study every two weeks. The research assistants were also trained on the questionnaire during piloting. A question was framed to be asked in different ways to obtain an unbiased answer. The Principle investigator went through the questionnaires at the end of day to make sure that all questions were answered.

7. Ethical Consideration

7.1 Informed Consent:

The Principle investigator and the research assistants explained the details of the study to the participants including the purpose of the study, the voluntary nature of the study and the assurance of confidentiality after which a written consent was signed between them in duplicate. Each study participant signed their own consent form and no names were required. They were also not victimized for not accepting to participate in the study. The research assistants and the study participants each retained a copy of the duly signed consent forms. A copy of the consent form is available in Appendix 1.

7.2 Ethical Approval

Ethical approval for this study was obtained from Kenyatta National Hospital and University of Nairobi Ethics and Research Committee (Ref. Number p661/09/2018). Ethical approval was also sought from the Research and Ethics Committee of Mbagathi District Hospital (Ref MDH/RS/1/Vol.1). Copies of the research approvals are in the Appendix.

8. Results

A total of 395 working mothers were interviewed as more mothers were willing to participate in this study. This chapter presents the results of the sociodemographic characteristics of participants and the knowledge, attitude and practice of breast milk expression and storage.

8.1 Sociodemographic characteristics

The median age of the mothers was 29 years (IQR) of 25-34 years. The median age of the children when mother resumed work was 3 months (IQR=3-6). More than half of the mothers had received tertiary level of education at 52%(204), 34%(136) had secondary education while 11%(50) had attained primary education. In terms of work place, the majority were in the private sector 76%(302) while 22%(86) were in the public sector. At the time of data collection, only 41%(161) of mothers were expressing breast milk either regularly or irregularly. A table on the sociodemographic characteristics of mothers who expressed milk showed no difference in numbers compared to the combined population in terms of the independent variables.

Table 3: Sociodemographic characteristics of the participants

Indicator	**Levels**	**n(%)**
N	395	100
Age of mother (median years)	29(IQR=25-34)	
Child age (median months)	4(IQR=3-6)	
Age of child when mother resumed work (median months)	3(IQR=2-4)	
Gestational Age Of Child At Birth	<=36 weeks	77(19.49%)
	>36 months	313(79.24%)
	Not documented	5(1.27%)
Highest level of education attained	No formal education	6(1.52%)
	Primary education	44(11.14%)
	Secondary	136(34.43%)
	Tertiary	204(51.65%)
	Not documented	5(1.27%)
Parity	Multiparous	252(63.8%)
	Primiparous	138(34.94%)
	Not documented	5(1.27%)
Place of Work	Private Sector	302(76.46%)
	Public Sector	86(21.77%)

	Not documented	7(1.77%)
Nature of mothers' employment	Salaried	175(44.3%)
	Self Employed	215(54.43%)
	Not documented	5(1.27%)
Expressing Milk	No	234(59.24%)
	Yes	161(40.76%)
	Not documented	0(0%)

8.2 Knowledge of breastmilk expression and storage.

Almost all women 97% had knowledge that expression of milk could be done using hand or breast pump. A majority of them 83% knew that expressed breast milk was still nutritious for the baby to feed on. However, a smaller number (62%) knew that the Kenyan Government had directed employers to set up lactation rooms at their work places. (Table 4).

Table 4: Knowledge on breastmilk expression.

Indicator	Level	Score	Frequency n(%)
What can be used to express breast milk	Not Known	0	8(2.03%)
	Hand or Pump	1	387(97.97%)
Any difference in volume when expressing by hand or by pump	Yes	0	353(89.37%)
	No	1	42(10.63%)
Any difference in contamination of milk when expressing by hand or pump	Yes	0	366(92.66%)
	No	1	29(7.34%)
Is it correct to discard the first few drops of milk before expressing milk	Yes	0	160(40.51%)
	No	1	235(59.49%)
Whether expressed milk is nutritious for baby	No	0	67(16.96%)
	Yes	1	328(83.04%)
Handwashing is important before expressing breastmilk.	No	0	5(1.27%)
	Yes	1	390(98.73%)
Cleaning the breast important before expressing breastmilk.	Yes	0	365(92.41%)
	No	1	30(7.59%)
The government of Kenya has	No	0	149(37.72%)

Indicator	Level	Score	Frequency n(%)
directed employers to have lactation rooms.	Yes	1	246(62.28%)

More than 70% of mothers correctly stated that expressed breast milk can be stored at room temperature or refrigerated. However, there was a huge knowledge gap in terms of the duration of storage in the refrigerator and freezing. Only 39% of mothers knew that breast milk can be stored up to 72hrs in the refrigerator and 22% knew that it could be frozen up to 9 months. (Table 5).

Table 5: Knowledge on breast milk storage.

Indicator	Level	Score	Frequency n(%)
Breast milk can be stored at room temperature	No Yes	0 1	103(26.08%) 292(73.92%)
Breastmilk can be stored in refrigerator	No Yes	0 1	75(18.99%) 320(81.01%)
Breast milk can be stored in a freezer.	No Yes	0 1	162(48.49%)) 228(58.46%)
How long can breast milk be stored in room air.	9-12 hours or >24 hours 8 hours	0 1	123(31.14%) 272(68.86%)
How long Breastmilk can be stored in a refrigerator in hours	8 hours or 9 months Up to 72 hours	0 1	242(61.27%) 153(38.73%)
How long can Breastmilk be frozen	1 month or 24 hours 9 months	0 1	309(78.23%) 86(21.77%)
Expressed breast milk is nutritious if stored at room temperature	No Yes	0 1	84(21.27%) 311(78.73%)
Expressed breast milk is nutritious if stored in a refrigerator.	No Yes	0 1	115(29.12%) 280(70.89%)
Expressed breast milk is nutritious if frozen for 9 months	No Yes	0 1	173(43.8%) 222(56.2%)

Refrigerated milk has a different smell from fresh breast milk	No Yes	0 1	186(47.09%) 209(52.91%)
Can baby refuse to take stored milk because of smell	Yes No	0 1	153(38.47%) 242(61.27%)

A scoring system was used to analyze responses to closed ended questions on Knowledge:

1= correct response (consistent with Academy of breastfeeding medicine guidelines)(43).

0= Incorrect response (inconsistent with Academy of Breastfeeding Medicine)(43). Any mothers who did not know the answer was considered to have an incorrect response. A median score was used to distinguish between satisfactory and poor knowledge. (Figure 3).

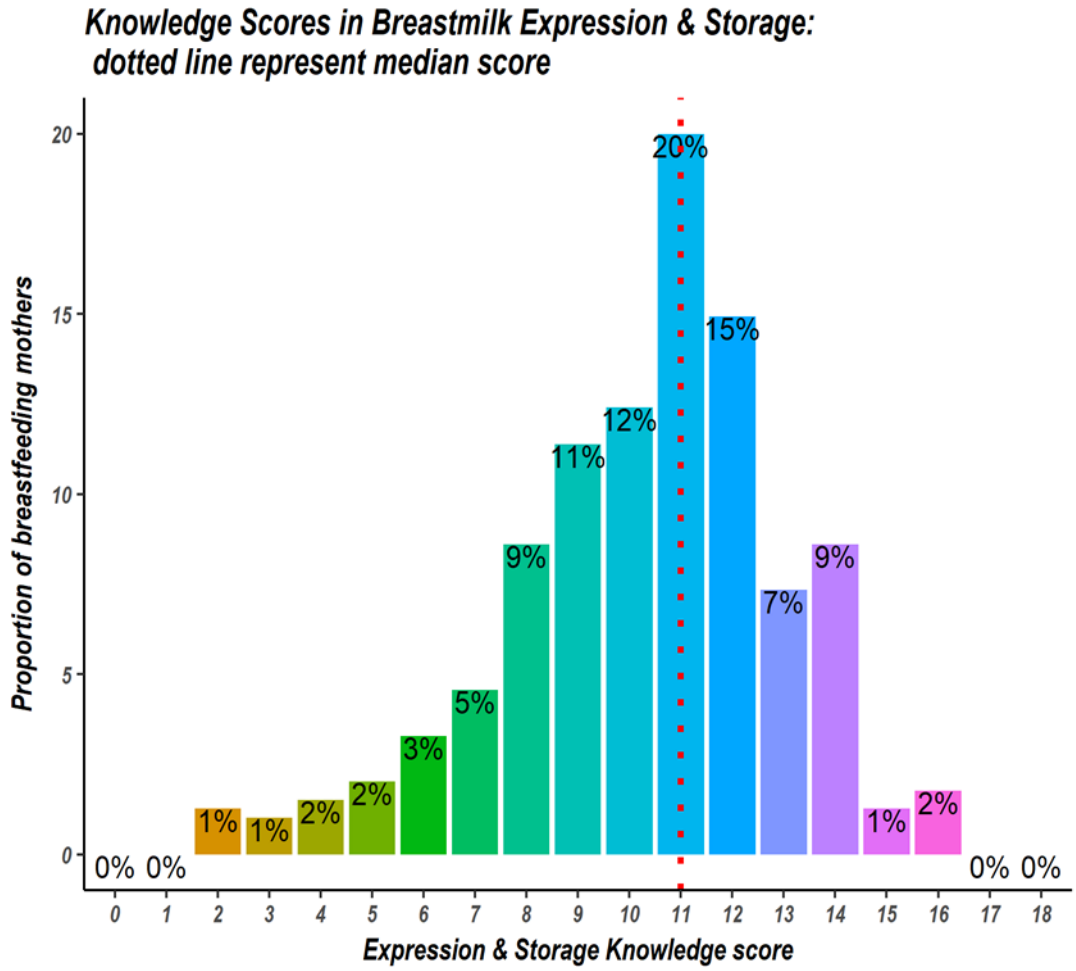


Figure 1: Distribution of knowledge scores on breastmilk expression and storage.

Satisfactory knowledge on breast milk expression was attained by 43%(170) of mothers while 47%(186) of mothers had satisfactory knowledge on storage of breast milk. When combined, 34%(135) of mothers had satisfactory knowledge on breastmilk expression and storage (Figure 3).

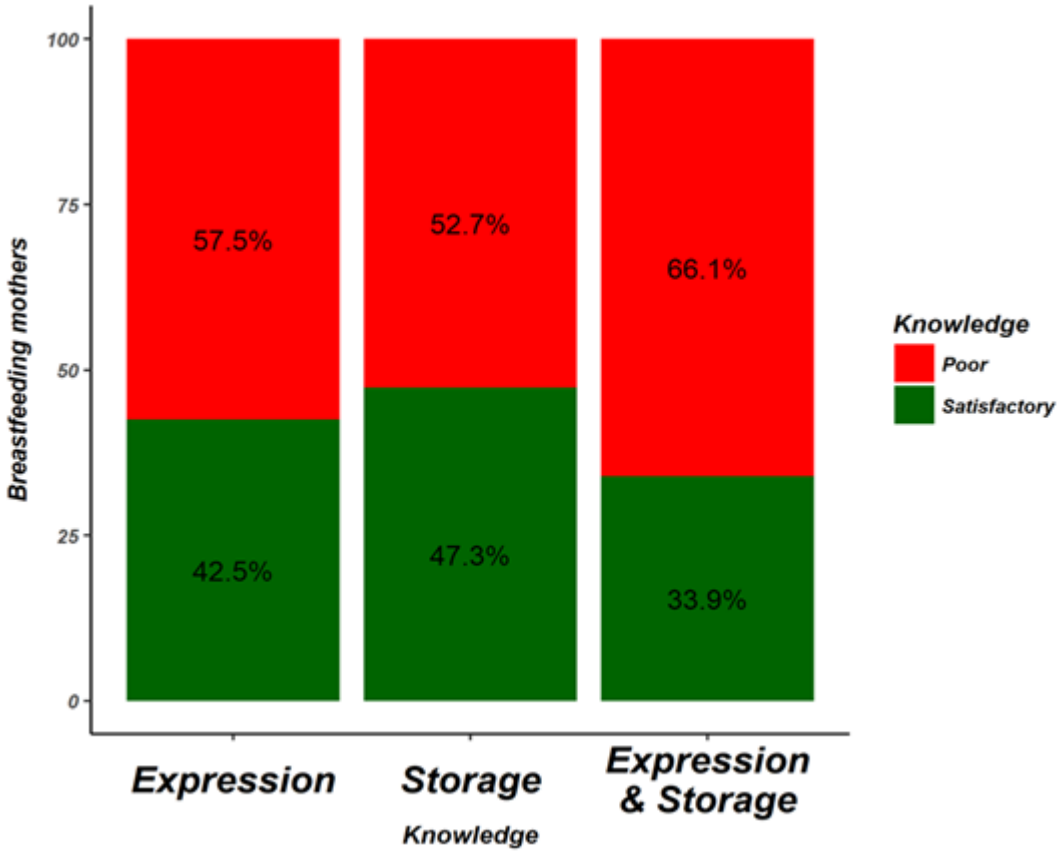


Figure 2: Proportions of mothers with satisfactory and poor knowledge of breast milk expression and storage.

Working in the public sector and having attained tertiary level of education was associated with having satisfactory level of knowledge compared to their counterparts (Table 6).

Table 6: Factors associated with knowledge of breast milk expression and storage. (multivariate analysis).

	Term	AOR	95%CI	p.value
Age	Mother's age	1.09	1.03-1.14	0.001
Gestation Period	<36 weeks	ref		
	>36 weeks	0.89	0.49-1.63	0.701
Level of education	Primary	ref		
	Secondary	1.81	0.78-4.61	0.188
	Tertiary	4.47	2.01-11.07	0.001
Parity	Multiparous	ref		
	Primiparous	1.1	0.63-1.91	0.742
Place of Work	Private sector	ref		
	Public sector	2.26	1.33-3.85	0.003

8.3 Attitude towards breast milk expression.

Most mothers understood the importance of exclusive breastfeeding at 98% and 84% of them were positive that expression of breastmilk would allow them achieve six months of exclusive breast feeding. The majority (94%) also agreed that it could be done using hand technique. However, 50% of mothers felt that expression of breast milk was painful and 66% thought it was cumbersome.

In terms of their work place, 58% of the mothers felt that breast milk expression could be done at the work place but 75% of them felt that they had no facilities at work to facilitate breast milk expression (Table 7).

Table 7: Attitudes towards breastmilk expression

Breast milk expression	Agree	I don`t know	Disagree
Other feeds should be introduced to the baby after 6 months	386(97.72%)	0(0%)	4(1.01%)

Breast milk expression	Agree	I don`t know	Disagree
Breast milk expression can allow mothers to achieve exclusive breastfeeding for 6 months	333(84.3%)	12(3.04%)	44(11.14%)
Breast milk expression is painful	198(50.13%)	33(8.35%)	159(40.25%)
Breast milk expression is cumbersome/ fussy	260(65.82%)	15(3.8%)	115(29.11%)
Breast milk expression can be done at the work place	229(57.97%)	9(2.28%)	152(38.48%)
Your work place has facilities that support breast milk expression	91(23.04%)	3(0.76%)	296(74.94%)
Breast milk expression can be done by hand	373(94.43%)	4(1.01%)	13(3.29%)

8.4 Attitudes towards breast milk storage.

Majority (87%) of the mothers agreed that proper storage of breast milk would help them succeed in exclusive breastfeeding. Those that thought that stored milk is safe for infants to drink and that it was an expensive venture were 76%.

The fact that breastmilk can be stored for 8 hours in room temperature was agreed by 63% of mothers while 52% felt that freezing for 9 months was unacceptable (Table 8).

Table 8: Attitudes towards breast milk storage

Breast milk storage attitude	Agree	I don`t know	Disagree
Proper storage of breast milk can help achieve six months of exclusive breastfeeding	344(87.09%)	13(3.29%)	33(8.35%)
Stored breast milk is safe for infants to drink	301(76.2%)	19(4.81%)	70(17.72%)
Storing breast milk is expensive	301(76.2%)	19(4.81%)	70(17.72%)
Stored breast milk has less nutritional value compared to milk that baby feeds directly from the breast	177(44.81%)	31(7.85%)	182(46.08%)
It is safe to store expressed breast milk for up to 8 hours at room temperature	247(62.53%)	58(14.68%)	85(21.52%)
It is safe to freeze expressed breast milk for up to 9 months	101(25.57%)	86(21.77%)	203(51.39%)
I would like to know how to properly express and store breast milk	367(92.91%)	0(0%)	23(5.82%)

8.5 Practice of breast milk expression and storage

The mothers who expressed breast milk were 40.8% (161) and 63% of mothers learnt how to express and store milk through health care professionals, followed by relatives at 17%. Hand expression was done by 50% of the mothers, while 12% used both hand and pump, 30% used a manual pump and 7% used an electric pump.

Most mothers preferred expressing breast milk at home (77%) compared to expressing at work (3%). Mothers with access to refrigerators at home were 76% while only 35% had refrigerators at work. Despite a higher number of mothers having refrigerators at home, only 16% of them ever froze breast milk and 34% refrigerated expressed milk. Most mothers 78/161 (45%) stored milk at room temperature. The storage of milk was mostly done in conventional baby feeding bottles 88/161 (55%) while 36/161 22% stored in special milk bags (Table 9).

Table 9: Practice of breastmilk expression and storage.

Indicator	Levels	n=161(%)
Learnt how to express breastmilk through	Friend	14(8.7%)
	Healthcare Provider	101(62.73%)
	Mass Media	10(6.21%)
	Others	7(4.35%)
	Relative	28(17.39%)
	Not documented	1(0.62%)
Methods used to express breastmilk	Both Hand & Pump	20(12.42%)
	Electric Pump	12(7.45%)
	Hand	81(50.31%)
	Manual Pump	48(29.81%)
	Not documented	0(0%)
Breastmilk is stored in	Freeze	25(15.53%)
	Refrigerator	55(34.16%)
	Room Temperature	78(48.45%)
	Not documented	3(1.86%)
Where express breast milk	Both	31(19.25%)
	Home	124(77.02%)
	Work	4(2.48%)
	Not documented	2(1.24%)
Has a refrigerator at home	No	39(24.22%)
	Yes	122(75.78%)
	Not documented	0(0%)
Has a refrigerator at work	No	104(64.6%)

Indicator	Levels	n=161(%)
	Yes	57(35.4%)
	Not documented	0(0%)
Container for storing breastmilk	Baby Bottle	88(54.66%)
	Others	23(14.29%)
	Paper Bag	3(1.86%)
	Special Breast milk Bags	36(22.36%)
	Not documented	11(6.83%)

8.6 Factors associated with breast milk expression and storage.

Mothers who had tertiary education and those working in the public sector were more likely to express and store breast milk. When subjected to a multivariate analysis to remove confounders, only mothers with tertiary education (AOR 3.9 CI 1.96-8.41) were significantly associated with expression and storage of breast milk (Table 10).

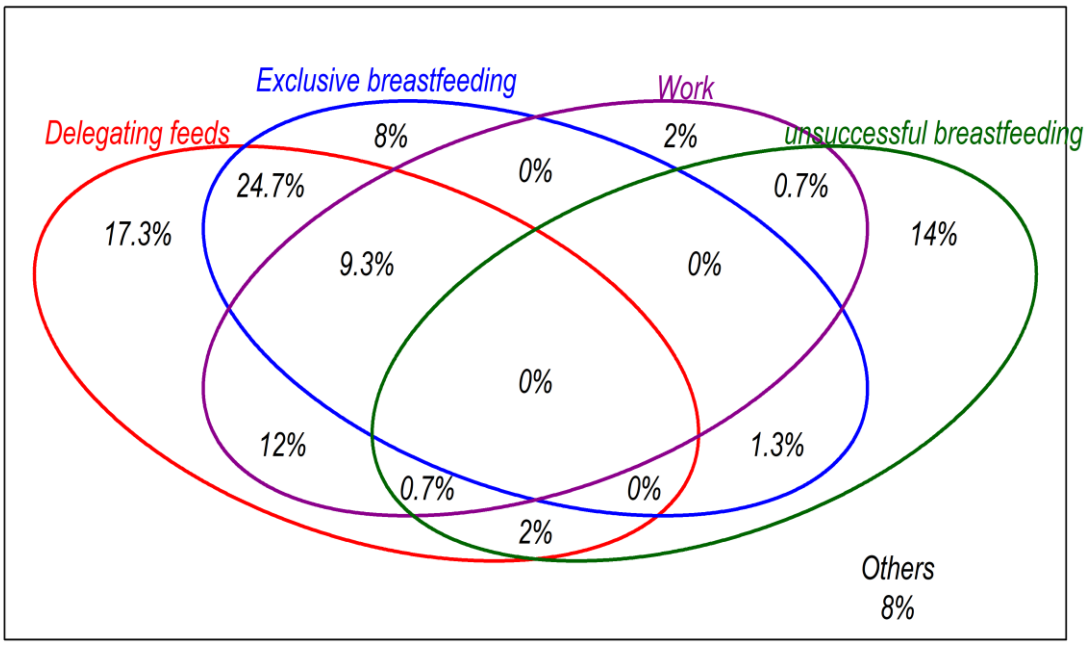
Table 10: Factors associated with expression and storage of breast milk.

Indicator	Term	Univariable model			Multivariable model		
		OR	95%CI	p.value	AOR	95%CI	p.value
Age	Mother's age	1	0.96-1.03	0.905	-	-	-
Level of education	Primary	ref			ref		
	Secondary	1.64	0.79-3.64	0.203	1.6	0.76-3.55	0.229
	Tertiary	3.91	1.96-8.41	0	3.66	1.81-7.95	0.001
Place of Work	Private sector	ref					
	Public sector	1.68	1.04-2.73	0.035	1.32	0.8-2.18	0.283
Gestation period	<36 weeks	ref			ref		
	>36 weeks	0.76	0.46-1.25	0.277	-	-	-
Exclusive breastfeed	No	ref					
	Yes	0.77	0.48-1.22	0.263	-	-	-

When subjected through a chi- square statistical analysis, there was a statistically significant relationship between expression of breast milk and ownership of a fridge : p-value<0.001.

8.7 Reasons given by working mothers for expressing breastmilk

The main reason why mothers chose to express breastmilk was being able to delegate feeding to someone else when they were at work. Others were to help them achieve exclusive breast feeding and lastly to help mothers who had been unsuccessful at breast feeding. A mother could have more than one reason for expressing milk. Mothers who desired to exclusively breast milk and work and had to get someone else to feed the baby when they were not around were 24.7%. A few mothers (14%) expressed milk because they had been unsuccessful at breastfeeding (Figure 4).



*Others implies other reasons not among the four in the venn diagram.

Figure 3: Reasons why mothers expressed and stored milk.

9 Discussion

The 2018 BFHI guidelines state that at least 80% of mothers of preterm and term infants should correctly describe or demonstrate how to express milk(24). In our study, only 161(41%) of mothers expressed and stored breastmilk. The median age of child when mother resumed work was 3 months and it coincides with a 2015 Kenyan study that showed that most working mothers resumed work when their child was 3 months old(5).

Our findings demonstrated that there is poor knowledge of breastmilk expression and storage with only 34% of mothers having satisfactory knowledge. Satisfactory knowledge was more among those who expressed milk 75(47%) compared to those that didn't 59(25%). Poor knowledge on expression and storage of breast milk was predominantly seen in the mothers who were not expressing milk 175(75%).

Satisfactory knowledge was more among mothers who had attained tertiary education 70%, Multiparous women 67%, and those working in the private sector 64%. However, after adjusting for confounding factors, acquiring tertiary education OR4.5(95%CI 2.01-11.07) and working in the public sector OR2.26(95% CI1.33-3.85) was significantly associated with a possibility of having satisfactory knowledge.

In our study, 98% of the 395 participants knew that expression of breast milk could be done by either hand or breast pump however, only 41% expressed and stored milk. This contrasts with a 2008 study in the USA by Labiner *et al* which showed that breast milk expression was becoming a normalized aspect of breastfeeding behavior. Out of 1564 mothers with infants between 1.5- 4.5months 85% had successfully expressed milk(11). A majority of participants (83%) also knew that expressed breast milk still retained its nutritional value. Most of the mothers knew about facilities used for storage of milk as 74% responded correctly that expressed milk could be stored at room temperature and 81% knew that a refrigerator could be used to store milk. This suggests that having the correct knowledge on expressing and storing milk does not necessarily support best practice.

A 2015 Kenyan study by Van *et al* showed that two thirds of the mothers interviewed recognize the need to express milk in order to feed their infant while at work. This shows that more mothers are seeing an opportunity to achieve exclusive breastfeeding through

expression and storage of breast milk and exerted efforts need to be made in empowering lactating working mothers with the correct knowledge and skills in expression of breast milk.

The results on attitudes towards expression and storage were encouraging as most mothers demonstrated positive attitudes towards breast milk expression as seen by majority of mothers (84%) who agreed with the statement "Breast milk expression can allow mothers to achieve exclusive breastfeeding for 6 months". Most (76%) of the mothers also agreed to the statement that "Stored breast milk is safe for infants to drink".

In terms of attitude towards the work place environment, 58%(229) of the women in our study were confident that breastmilk expression could be done at the work place but 296(75%) felt that there were no facilities put in place to support expression of milk. This coincides with a 2016 study among professional working women in Ghana in which 69% of mothers received no additional support from their employers at work to help them exclusively breastfeed beyond maternity leave. A 2010 Australian study by Clemons *et al* also indicated that women used toilets, cars, cubicles and work cupboards to express breast milk while at work(10).

Extended freezer storage of milk has been shown to preserve key macronutrients and immunoactive components of human milk. In 2016, Ahrabi *et al* showed that freezing human milk for 9 months had no effect on total protein, lactoferrin, secretory IgA or osmolality for freshly expressed or previously frozen milk(41). Most mothers in our study disagreed with the statement "It is safe to store expressed milk for up to 9 months", yet from our analysis, 122(75%) of mothers had a refrigerator at home. This could mean that refrigerators are becoming more available and education is vital to all mothers concerning the use of refrigeration or freezing to safely store human milk. Kenya is now the second country in Africa to establish a human milk bank and refrigeration and freezing methods of storage will be used to store donated human milk.

Information on expression of milk was mainly from health care providers (62%) followed by relatives at (17%). This shows that health care providers still hold a major platform in addressing issues to do with Child Health. This is in line with the 2025 WHO Global Nutrition target policy that identifies the need to provide training and capacity building in health facilities to support exclusive breastfeeding(3).

Most (50%) mothers seemed to prefer expressing using hand technique followed by manual pump at 30% and lastly by both hand and pump at 12%. This is an impressive start as the 2018 BFHI recognizes that hand expression is more advantageous in terms of availability and convenience for all mothers(24).In Kenya, women prefer manual pumps compared to electric pumps which are considered dangerous especially among the low income groups(5). However in other studies, most women prefer electric pumps and manual pumps compared to hand expression(11) A 2016 Cochrane review found low cost interventions such as early initiation of expression of milk, hand expression and low cost pumps to be more effective compared to large electric pumps(30).

In our study, working mothers (77%) preferred to express their milk at home compared to expressing at work (3%). This correlated with our findings that 75% of the working women felt they had inadequate facilities in the work place to support expression of milk. The respondents who had access to a fridge at work were 57(36%) but it seems only 4(3%) of them utilized this facility for the purpose of storage of breastmilk. This would seem to indicate that women found the home environment a more comfortable place to express milk compared to the work place. Good effort has been made by the 2017 Kenyan Breastfeeding Mothers Act in defining the lactation rooms in terms of having a comfortable seat, a small table, electrical outlets, refrigeration facilities and that the lactation station should not be located in the rest rooms(48).

Attaining tertiary level of education was independently associated with the probability that a mother would express and store breast milk. This could have been due to their ability to access information on different fronts, may have had better access to health facilities or financial strength to buy breast pumps and storage devices. There was also a statistically significant relationship between ownership of a fridge and expression of breast milk. In Kenya, breast pumps are common among middle class women and are becoming popular baby shower gifts(5). A 2009 study done in USA among lactation consultants that showed purchasing of breast pumps being a norm in middle class mothers despite the huge monetary cost(29).

9.1 Strengths of the study

The study had a large sample size of 395 mothers providing more accurate findings on this topic.

The study was also done in more than one center (Kenyatta National Hospital and Mbagathi Hospital) thus mitigating selection bias.

This being a cross sectional study, it provided a quick way to obtain information on breast milk expression.

9.2 Study Limitations

This study was based on reported rather than observed practice of breastmilk expression and storage. There was therefore the risk that the mothers might have reported what was expected of them but their actual practices may have been different.

Lack of a universal consensus definition on what is poor knowledge and satisfactory knowledge also proved to be a challenge.

The study was carried among working mothers in public hospitals of Kenya: Kenyatta National Hospital and Mbagathi District Hospital. The findings may not be generalized to the whole country.

The study was a hospital based study and the findings may not be generalized to a community population.

The study location was in an urban setting and the results of this study may not be applicable in a rural set up.

9.3 Conclusions

Most working mothers are not knowledgeable on expression and storage of breastmilk. Having tertiary education and working in the public sector was associated with having satisfactory knowledge in breastmilk expression and storage. Those who expressed breastmilk were more knowledgeable compared to those that did not express milk.

Most mothers had a positive attitude towards achieving 6 months of exclusive breastfeeding through breast milk expression and proper storage though majority of them experienced pain during breast milk expression and others felt that it was cumbersome or fussy.

The work places did not seem to provide adequate facilities to enable working mothers express breast milk and safely store it.

Attaining tertiary level of education was associated with a significantly high odds of expressing and storing breastmilk.

The top most reason for expressing milk by working mothers was to have someone else feed the baby as they try to achieve six months of exclusive breast feeding.

9.4 Recommendations

Special emphasis needs to be put in place in all health facilities to educate all mothers on expression and storage of breastmilk. Mothers need to be equipped in relevant knowledge on the techniques of expressing breastmilk to overcome the challenge of pain and cumbersome attitude while expressing breastmilk. This is important in Kenya as the government gears up towards setting up many milk donation banks.

Education of the girl child needs more serious consideration as those who had attained tertiary education had a significantly high odds of expressing and storing breast milk.

The work places need to be compliant with the 2018 Kenyan Policy Guidelines for Securing a Baby Friendly Environment at the Work place. Provision of fully equipped lactation rooms and having expression breaks would help in encouraging more working mothers to express breast milk from their work places.

All these approaches would produce a maximum result if delivered as integrated interventions to all lactating mothers.

9.5 Conflicts of interest

There were no conflicts of interest in this study.

REFERENCES

1. Victora CG, Bahl R, Barros AJD, França GVA, Horton S, Krasevec J, et al. Breastfeeding in the 21st century: Epidemiology, mechanisms, and lifelong effect. Lancet [Internet]. 2016;387(10017):475–90. Available from: http://dx.doi.org/10.1016/S0140-6736(15)01024-7
2. WHO | Global targets indicators. WHO [Internet]. 2018 [cited 2019 Apr 26]; Available from: https://www.who.int/nutrition/globaltargets_indicators/en/
3. WHO/UNICEF. Global Nutrion Target 2025. Breastfeeding policy brief. WHO/MNH/NHD 14.7. WHO Libr Cat Data [Internet]. 2014 [cited 2017 Jan 25];8. Available from: http://www.who.int/nutrition/publications/globaltargets2025_policybrief_breastfeeding/en/#.WIhke6jU6bE.mendeley
4. National Bureau of Statistics Nairobi K, KNBS. Key Indicators 2014 Kenya Demographic and Health Survey. 2015 [cited 2019 Apr 28];42. Available from: www.DHSprogram.com.
5. Van Houten F. Breast feeding in Urban Africa [Internet]. [cited 2019 Apr 28]. Available from: http://origin.www.images.2.forms.healthcare.philips.com/Web/PhilipsHealthcareProd/
6. THE WORLD BANK. Labor force participation rate, female (% of female population ages 15+) (modeled ILO estimate) | Data [Internet]. [cited 2018 Apr 21]. Available from: https://data.worldbank.org/indicator/SL.TLF.CACT.FE.ZS
7. International Labour Organization. Convention C183 - Maternity Protection Convention, 2000 (No. 183) [Internet]. 2000 [cited 2019 Apr 28]. Available from: https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C183
8. LAWS OF KENYA. [cited 2018 Apr 12]; Available from: http://www.kenyalaw.org/kl/fileadmin/pdfdownloads/Acts/EmploymentAct_Cap226-No11of2007_01.pdf
9. Fein SB, Roe B. The effect of work status on initiation and duration of breast-feeding. Am J Public Health [Internet]. 1998 Jul 7 [cited 2018 May 4];88(7):1042–6. Available from: http://www.ncbi.nlm.nih.gov/pubmed/9663151
10. Sarah N. Clemons, RN, and Lisa H. Amir, MBBS, MMed, PhD F.

BREASTFEEDING WOMENS EXPERIENCE OD EXPRESSING: A DESCRIPTIVE STUDY. [cited 2018 May 22]; Available from: http://login.research4life.org/tacsgr0journals_sagepub_com/doi/pdf/10.1177/0890334410371209

11. Labiner-Wolfe J, Fein SB, Shealy KR, Wang C. Prevalence of Breast Milk Expression and Associated Factors. [cited 2018 May 4]; Available from: http://pediatrics.aappublications.org/content/pediatrics/122/Supplement_2/S63.full.pdf
12. Din ZME El, Ghaffar SA El, Gabry EK El, Fahmi WA, Bedair RF. Is stored expressed breast milk an alternative for working Egyptian mothers ? 2004;10(6):815–21.
13. Patricio H, Rojas S, Seth MM, Oliech JS, Nora AH. Innocenti declaration. 1990;
14. world alliance for breastfeeding. sustaining breastfeeding together. 2017.
15. Ong G, Yap M, Li FL, Choo TB. Impact of working status on breastfeeding in Singapore. Eur J Public Health [Internet]. 2005 Aug 1 [cited 2018 May 7];15(4):424–30. Available from: http://academic.oup.com/eurpub/article/15/4/424/469108/Impact-of-working-status-on-breastfeeding-in
16. Roe B, Whittington LA, Fein SB, Teisl MF. Is There Competition between Breast-Feeding and Maternal Employment? Demography [Internet]. 1999;36(2):157. Available from: http://link.springer.com/10.2307/2648105
17. Mozingo JN, Davis MW, Droppleman PG, Merideth A. "It wasn't working". Women's experiences with short-term breastfeeding. MCN Am J Matern Child Nurs [Internet]. [cited 2018 May 14];25(3):120–6. Available from: http://www.ncbi.nlm.nih.gov/pubmed/10810844
18. Dun-Dery EJ, Laar AK. Exclusive breastfeeding among city-dwelling professional working mothers in Ghana. Int Breastfeed J [Internet]. 2016;11(1):23. Available from: http://internationalbreastfeedingjournal.biomedcentral.com/articles/10.1186/s13006-016-0083-8
19. Rollins NC, Bhandari N, Hajeebhoy N, Horton S, Lutter CK, Martines JC, et al. Why invest, and what it will take to improve breastfeeding practices? Lancet [Internet]. 2016;387(10017):491–504. Available from: http://dx.doi.org/10.1016/S0140-6736(15)01044-2
20. Altamimi E, Nsour R Al, Almajali N. Knowledge, Attitude, and Practice of Breastfeeding Among Working Mothers in South Jordan. Workplace Health Saf. 2016;XX(May):1–9.
21. Khaliq A, Qamar M, Hussaini SA, Azam K, Zehra N, Hussain M, et al. Assessment of

knowledge and practices about breastfeeding and weaning among working and non-working mothers. J Pak Med Assoc. 2017;67(3):332–8.

22. Adrian G, Nairobi O. Breastfeeding Experience Among Health Care Professionals At Kenyatta National Hospital. 2016;
23. Valizadeh S, Hosseinzadeh M, Mohammadi E, Hassankhani H, M. Fooladi M, Schmied V. Addressing barriers to health: Experiences of breastfeeding mothers after returning to work. Nurs & Heal Sci [Internet]. 2017;(November 2016):105–11. Available from: http://doi.wiley.com/10.1111/nhs.12324
24. WHO/UNICEF. Implementation Guidance BFHI 2018. 2012. 1–7 p.
25. Johns HM, Forster DA, Amir LH, McLachlan HL. Prevalence and outcomes of breast milk expressing in women with healthy term infants: a systematic review. BMC Pregnancy Childbirth [Internet]. 2013 Dec 19 [cited 2018 May 16];13(1):212. Available from: http://bmcpregnancychildbirth.biomedcentral.com/articles/10.1186/1471-2393-13-212
26. Slusser WM, Lange L, Dickson V, Hawkes C, Cohen R. Breast milk expression in the workplace: A look at frequency and time. J Hum Lact. 2004;20(2):164–9.
27. Ismail TA, Sulaiman Z, Jalil R, Muda WM, Man NN. Breast milk expression among formally employed women in urban and rural Malaysia: A qualitative study. Int Breastfeed J [Internet]. 2012 Aug 29 [cited 2018 May 16];7(1):11. Available from: http://internationalbreastfeedingjournal.biomedcentral.com/articles/10.1186/1746-4358-7-11
28. Win NN, Binns CW, Zhao Y, Scott JA, Oddy WH. Breastfeeding duration in mothers who express breast milk: a cohort study. Int Breastfeed J [Internet]. 2006 Dec 22 [cited 2018 May 10];1(1):28. Available from: http://internationalbreastfeedingjournal.biomedcentral.com/articles/10.1186/1746-4358-1-28
29. Buckley KM. A double-edged sword: lactation consultants' perceptions of the impact of breast pumps on the practice of breastfeeding. J Perinat Educ [Internet]. 2009 [cited 2018 May 16];18(2):13–22. Available from: http://www.ncbi.nlm.nih.gov/pubmed/20190850
30. Becker GE, Smith HA, Cooney F. Methods of milk expression for lactating women. Cochrane Database Syst Rev. 2016;2016(9).
31. Mitoulas LR, Lai CT, Gurrin LC, Larsson M, Hartmann PE. Efficacy of Breast Milk Expression Using an Electric Breast Pump. J Hum Lact [Internet]. 2002 Nov 25 [cited

2018 May 7];18(4):344–52. Available from: http://journals.sagepub.com/doi/10.1177/089033402237907

32. Ohyama M, Watabe H, Hayasaka Y. Manual expression and electric breast pumping in the first 48 h after delivery. Pediatr Int [Internet]. 2010 Feb 1 [cited 2018 May 16];52(1):39–43. Available from: http://doi.wiley.com/10.1111/j.1442-200X.2009.02910.x
33. Sulaiman Z, Liamputtong P, Amir LH. Timing of return to work and women's breastfeeding practices in urban Malaysia: A qualitative study. Heal Soc Care Community. 2017;(May):1–8.
34. Amin RM, Said ZM, Sutan R, Shah SA, Darus A, Shamsuddin K. Work related determinants of breastfeeding discontinuation among employed mothers in Malaysia. Int Breastfeed J [Internet]. 2011 Feb 22 [cited 2018 May 16];6(1):4. Available from: http://www.ncbi.nlm.nih.gov/pubmed/21342506
35. Ortiz J, McGilligan K, Kelly P. Duration of breast milk expression among working mothers enrolled in an employer-sponsored lactation program. Pediatr Nurs [Internet]. 2004;30(2):111–9. Available from: https://www.ncbi.nlm.nih.gov/pubmed/15185732
36. Dabritz HA, Hinton BG, Babb J. Evaluation of lactation support in the Workplace or school environment on 6-month breastfeeding outcomes in Yolo County, California. J Hum Lact [Internet]. 2009 May 16 [cited 2018 Mar 29];25(2):182–93. Available from: http://journals.sagepub.com/doi/10.1177/0890334408328222
37. Katcher AL, Lanese MG. Breast-Feeding by Employed Mothers: A Reasonable Accommodation in the Work Place. Pediatrics [Internet]. 1985 [cited 2018 May 7];75(4). Available from: http://pediatrics.aappublications.org/content/pediatrics/75/4/644.full.pdf
38. Karanci G, Yenal K. Breastfeeding Knowledge Among Working Pregnant Women in Turkey. Workplace Health Saf. 2014;62(4):143–8.
39. Hamosh M, Ellis LA, Pollock DR, Henderson TR, Hamosh P. Breastfeeding and the Working Mother: Effect of Time and Temperature of Short-term Storage on Proteolysis, Lipolysis, and Bacterial Growth in Milk. Pediatrics [Internet]. 1996;97(4):492–8. Available from: http://pediatrics.aappublications.org/content/97/4/492.abstract
40. Evans TJ, Ryley HC, Neale LM, Dodge JA, Lewarne VM. Effect of storage and heat on antimicrobial proteins in human milk. Arch Dis Child [Internet]. 1978 Mar 1 [cited 2018 May 20];53(3):239–41. Available from:

http://www.ncbi.nlm.nih.gov/pubmed/306224

41. Ahrabi AF, Handa D, Codipilly CN, Shah S, Williams JE, McGuire MA, et al. Effects of Extended Freezer Storage on the Integrity of Human Milk. J Pediatr [Internet]. 2016 Oct 1 [cited 2018 May 18];177:140–3. Available from: http://www.ncbi.nlm.nih.gov/pubmed/27423174
42. Fogleman AD, Meng T, Osborne J, Perrin MT, Jones F, Allen JC. Storage of Unfed and Leftover Mothers' Own Milk. Breastfeed Med [Internet]. 2018 Jan [cited 2018 May 7];13(1):42–9. Available from: http://online.liebertpub.com/doi/10.1089/bfm.2016.0168
43. Eglash A, Bunik M, Chantry CJ, Howard CR, Lawrence RA, Marinelli KA, et al. ABM Clinical Protocol #8: Human Milk Storage Information fr Home Use for Full-Term Infants. Breastfeed Med. 2010;5(3):127–30.
44. World Health Organization; Country experiences with the Baby Friendly Hospital Initiative [Internet]. [cited 2019 Apr 29]. Available from: https://www.unicef.org/nutrition/files/BFHI_Case_Studies_FINAL.pdf
45. KENYA BREAST MILK SUBSTITUTES (REGULATION AND CONTROL) ACT. 2012;(34).
46. MINISTRY OF PUBLIC HEALTH AND SANITATION KENYA. NATIONAL POLICY ON MATERNAL , INFANT AND YOUNG CHILD NUTRITION [Internet]. 2013. Available from: https://scalingupnutrition.org/wp-content/uploads/2013/07/MoPHS-MIYCN-Policy-Document-08_2012.pdf
47. Nutrition Matters, Your Right, Your Role, Act Now. 2012 [cited 2018 Apr 11]; Available from: https://scalingupnutrition.org/wp-content/uploads/2013/10/Kenya-National-Nutrition-Action-Plan-2012-2017-final.pdf
48. parliament of kenya. REPUBLIC OF KENYA. BREASTFEEDING MOTHERS ACT 2017. Parliam BILLS. 2017;37(37).
49. Kimani-murage EW, Wekesah F, Wanjohi M, Kyobutungi C, Ezeh AC, Musoke RN, et al. Original Article Factors affecting actualisation of the WHO breastfeeding recommendations in urban poor settings in Kenya. 2014;1–19.
50. Talbert AW, Tsofa B, Mumbo E, Berkley JA, Mwangome M. Knowledge of, and attitudes to giving expressed breastmilk to infants in rural coastal Kenya; focus group discussions of first time mothers and their advisers. Int Breastfeed J [Internet]. 2018;13(1):16. Available from: http://www.ncbi.nlm.nih.gov/pubmed/29719563%0Ahttp://www.pubmedcentral.nih.g

ov/articlerender.fcgi?artid=PMC5928566%0Ahttps://internationalbreastfeedingjournal.biomedcentral.com/articles/10.1186/s13006-018-0158-9

51. Gebriel AW. Determinants of Weaning Practices [Internet]. Ethiopian Journal of Health Development Feb 1, 2000 p. 183–9. Available from: http://www.ajol.info/index.php/ejhd/article/view/9919

52. Ministry of Health KENYA. GUIDELINES FOR SECURING A BREASTFEEDING FRIENDLY ENVIRONMENT AT THE WORK PLACE [Internet]. 2018 [cited 2019 Apr 25]. Available from: http://www.health.go.ke/wp-content/uploads/2018/11/GUIDELINES-FOR-WORKPLACE-SUPPORT-FOR-WOMEN-SOFTY-COPY-SAMPLE-converted.pdf

APPENDICES

Appendix 1: Consent form

Consent Form

Study Title: Knowledge, Attitude and Practice of Breast Milk Expression and Storage Among working Lactating Mothers with Infants Below 6 Months in Public Well Baby Clinics.

Institutions and Investigators:

Dr. Priscillah Wanini Edemba.

(SHO Pediatrics Department, University of Nairobi)

Introduction

You are invited to participate in this study. You have been selected as a possible participant in this study. We ask that we read and explain this form to you as you ask any questions you may have before agreeing to be in this study. This study finding out the knowledge, practice and attitude of breast milk expression and storage among working mothers.

Purpose of the study

To find out if working mothers know how to express and store breast milk.

Risks of Study Participation

This study has no known risks. Although your details will be written on paper, no other person will be allowed to read this information except the ones directly involved in this study. There are almost no chances of you getting an injury in the course of our study. Discomfort is not anticipated either as you will complete the questionnaire in absolute privacy.

Benefits

By participating in this study and answering to our questions, you will help us realize our gaps in terms of educating mothers in management of breastfeeding. Taking part in this study will not involve any payment.

Note: In cases where gaps are seen in the expression and storage of breast milk, proper guidance will be offered by the research assistants.

Study Procedures

If you agree to take part in this study, we shall lead in a question and answer session on knowledge of breast milk expression and storage and what you practice from day to day. The information that you will provide during the study will be kept confidential. Only the interviewer and the researcher will have access to the questionnaires.

Confidentiality

The records of this study will be kept private. The questionnaire will not have your names but codes. The privacy will be enhanced by the use of lockable cabinet. Any publication or presentations arising from this study will not include any information that will make it possible to identify you as a subject. However, this information will only be available to the people who are involved in the study and no one else.

Voluntary Nature of the Study

Participation in this study is voluntary. You have the right to refuse to participate or to answer to any question that you feel uncomfortable with. If you change your mind, you have the right to withdraw at any time. If anything is not clear or if you need further information we shall provide it to you. Your decision whether or not to participate in this study will not affect your current or future relations with this facility or the other institutions involved. If you decide to participate, you are free to withdraw at any time without affecting those relationships.

Contacts and Questions

The Principal Investigator for this study is Dr Priscillah Wanini. You may ask any questions you have now, or if you have questions later, you are encouraged to contact her through:

Telephone No: 0725388416 and E-mail: wanini.edemba@gmail.com

For any questions pertaining to rights as a research participant, the contact person is:

The Chairperson,

Kenyatta National Hospital/ University of Nairobi Research and Ethics Committee,

Tel No. 2726300 Ext. 44355/ 44102.

Consent

Please read the information and have it explained to you carefully before agreeing to be part of this study. We will have a discussion as a group but only the group leader selected by you will sign the consent form on everyone's behalf. If there are any questions you have about the study, please feel free to ask them to the investigator prior to signing of the consent form.

Declaration of the Volunteer

I, ... hereby give consent on behalf to participate in the proposed study. I have read the information sheet concerning this study, I understand the aim of the study and what will be required of me if I take part in the study. The risks and benefits if any have been explained to me. Any questions we have concerning the study have been adequately answered. I understand that at any time that we may wish to withdraw from this study we can do so without giving any reason and without affecting our access to normal health care services. I realize that I will be interviewed once. I consent voluntarily to participate in this study.

Participants' Name .....

.....

(Signature/ Left Thumb Print & Date)

Name of Person Taking Consent .....

.....

(Signature/ Left Thumb Print & Date)

Name of Investigator .....

.....

(Signature/ Left Thumb Print & Date)

Kipengeo 1a: Idhini ya maswali

FOMU YA RIDHAA YA KUULIZA MASWALI YA KINGEREZA

Kichwa cha Utafiti:

NINI UJUZI UCHUKUZI NA MAZOE YA MAZIWA YA KUKAMULIWA YA MATITI NA KUHIFADHIWA MIONGONI MWA WAMAMA WANAONYONYESHA KATI YA WATOTO WA CHINI YA MIEZI SITA KATIKA KLINIKI ZA WATOTO ZA UMMA.

Taasisi na wachunguzi:
Dk. Priscillah Wanini SHO Kituo cha watoto, Chuo kikuu cha Nairobi

Utangulizi

Unaalikwa kushiriki katika utafiti huu. Umechaguliwa kama mshiriki anayetarajiwa katika utafiti huu. Tunaomba tukusomee na kukuelezea fomu hii kwako unapouliza maswali yoyote ambayo unaweza kuwa nayo kabla ya kukubali kuwa katika utafiti huu. Utafiti unataka kujua ujuzi, mazoea na mtazamo wa kukamua na kuhifadhi maziwa kati ya mama anayefanya kazi

Madhumuni ya Utafiti

Kuangalia ili kujua kama wamama wanaofanya kazi wanajua jinsi ya kukamua na kuhifadhi maziwa ya matiti.

Hatari ya kushirika kwa utafiti

Utafiti huu hauna hatari yoyote inayojulikana. Ingawa maelezo yako yataandikwa kwenye fomu ya ridhaa tutatumia numbari kwa fomu ya maswali, hakuna mtu mwingine atakayeruhusiwa kusoma habari hii isipokuwa wale wanaohusishwa moja kwa moja katika

utafiti huu. Hakuna nafasi ya uwezekano wa kupata jeraha wakati wa utafit wetu. Usumbufu hautarajiwa hivyo utamaliza fomu ya maswali kwa mahali pa faragha kabisa.

Faida

Kwa kushiriki katika utafiti huu na kujibu maswali yetu, utatusaidia kutambua pengo kwa njia ya kuelimisha wamama kufuatilia kunyonyesha. Kushiriki katika utafiti huu hautahusisha malipo yoyote.

Kumbuka: Wakati ambapo mapengo yataonekana katika kukamua na uhifadhi wa maziwa, mwongozo sahihi utatolewa na wasaidizi wa utafiti.

Hatua za Utafiti

Ikiwa utakubali kushiriki katika utafiti huu, tutakuuliza maswali ya kina kwa muda wa dakika kumi na tano hadi theladhini kukuhusu wewe, ujuzi juu ya kukamua maziwa na mahifadhi ya maziwa ya matiti na yale unayofanya kila siku. Majibu itaandikwa kwa fomu ya maswali. Maelezo ambayo utakayo toa wakati wa utafiti itawekwa siri. Msaidizi na mtafiti tu wataweza kuangalia fomu za maswali. Taarifa itaharibiwa baada ya utafiti.

Siri

Rekodi za utafiti huu zitahifadhiwa mahali pa faragha. Fomu ya maswali haitakuwa na majina lakini itakuwa na nambari. Faragha itaimarishwa na matumizi ya kabati itakayofungwa. Machapisho yoyote au mawasilisho yanayotokana na utafiti huu haitaweka habari yoyote ambayo itafanya uwezekano wa kukutambua wewe kama mshiriki. Hata hivyo, habari hii itapatikana tu kwa watu ambao wanahusika katika utafiti na hakuna mtu mwingine yeyote.

Hali ya kujitolea kwa hiari ya Utafiti

Kushiriki katika utafiti huu ni kwa hiari. Una haki ya kukataa kushiriki au kujibu swali lolote utakalosikia uko na wasiwasi nalo. Ikiwa unatadilisha mawazo yako, una haki ya kujiondoa wakati wowote. Ikiwa kitu chochote si wazi au unahitaji habari zaidi tutakupa. Uamuzi wako kama utashiriki au la katika utafiti huu hauathiri mahusiano yako ya sasa au ya baadaye na kituo hiki au taasisi nyingine zinazohusika. Ikiwa utaamua kushiriki, uko huru kujiondoa wakati wowote bila kuathiri mahusiano hayo

Habari za mawasiliano

Mtafiti anayefanya utafiti huu ni Dk. Priscillah Wanini. Unaweza kuuliza maswali yoyote unayo sasa, au ikiwa una maswali baadaye, unahimizwa kuwasiliana naye kupitia nambari ya simu 0725388416.

Barua pepe : wanini.edemba@gmail.com

Kwa maswali yoyote yanayohusu haki kama mshiriki wa utafiti mtu unayewezakuwasiliana naye ni: **Mwenyekiti, Hospitali ya Kitaifa ya Kenyatta / Chuo Kikuu cha Nairobi Utafiti na Maadili, Tel 27263000 Ext: 44355/ 44102.**

FOMU YA RIDHAA

Tafadhali soma taarifa na uelezewe kwa makini kabla ya kukamilisha na kusaini fomu hii ya idhini. Ikiwa kuna maswali yoyote unayo kuhusu utafiti, tafadhali kuwa huru kuwauliza wachunguzi kabla ya kusaini fomu yako ya kibali.

Azimio la kujitolea

Mimi, ... Kwa hivyi natoaidhini ya kushiriki katika utafiti uliopendekezwa. Nimesoma karatasi ya habari kuhusu utafiti huu, ninaelewa lengo la utafiti na nini kitahitajika kwangu ikiwa nitashiriki katika utafiti. Hatari na faida kama kunayo yeyote imeelezea kwangu. Maswali yoyote niliyo nayo juu ya utafiti yamejibu kwa kutosha. Ninaelewa kwamba wakati wowote nikitaka kujiondoa kwenye utafiti huu ninaweza kufanya

hivyo bila kutoa sababu yoyote na bila kuathiri kupata kwangu kwa huduma za kawaida za afya. Ninafahamu kuwa nitahojiwa mara moja. Ninakubali kwa hiari kushiriki katika utafiti huu.

Mshiriki

Jina…….....

Sahihi au kidole cha ghumba cha kushoto**.....**.....Tarehe……

Jina la shahidi **.....,**

Sahihi ya shahindi ……. ……Tarehe……

Jina la mtafiti ……...

Sahihi ya mtafiti / tarehe …….

Appendix 2: Study questionnaire

Study Questionnaire

Study of the Knowledge, Attitude and Practice of Breast milk Expression and Storage Among Working Lactating Women with Infants Below 6 Months in Public Well Baby Clinics.

Inclusion Criteria:

- Lactating working mothers with an infant under 6 months old.
- Attending well baby clinics at either KNH or Mbagathi hospital.
- The mothers don't have to be exclusively breastfeeding at the time of the study.
- Mothers must sign the consent form to participate in the study.
- The Working women should have resumed work for more than 2 weeks at the time of the study.

Exclusion criteria:

- Mothers with contraindications to breast feeding such as severe sepsis, herpes simplex 1 infection, on sedating psychotherapeutic drugs, antiepileptic drugs and opiods. Mothers on radioactive iodine 131, on cytotoxic therapy or mothers on excessive topical iodine or iodophores.
- Mothers with infants with contraindications to breastfeeding such as Phenylketonuria, Marple syrup urine disease and Classic Galactocemia.
- Mothers with infants with conditions that hinder breastfeeding such as severe neurological deficits or severe birth defects.
- Women who are allowed to carry their children to work .
- A house wife with other source of income.
- Mothers who do not give consent.
- Mothers who are below 18 years of age.

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Study Location . . . . . KNH /Mbagathi Hospital

Date _____

Participant Code _____

Socio -Demographics

1. Age of mother (years) _____
2. Parity
3. Age of child (months)
4. Gestational age of child at birth (weeks)
5. Age of the child when mother resumed work? (months)
6. Level of education

   ☐ Primary

   ☐ Secondary

   ☐ Tertiary

   ☐ No Formal Education

7. Place of work

   ☐ Public Sector

   ☐ Private Sector

   (Public Sector refers to institutions run by the government; otherwise Private Sector)

8. Nature of mother's employment if she works for the private sector

   ☐ Self Employed

   ☐ Salaried

   (Salaried = Receives salary every month)

KNOWLEDGE ON BREAST MILK EXPRESSION AND STORAGE

Knowledge on Breast Milk Expression

9. What can you use to express milk from the breast?

☐ Hand

☐ Breast pump (Manual/ Electric)

☐ Both hand and pump

10. Is there any difference between expressing breast milk by hand or using a pump in terms of?

a) The volume of milk obtained

☐ Yes

☐ No

☐ I don't know

b) Contamination of the expressed milk

☐ Yes

☐ No

☐ I don't know

11. Is it correct to discard the first few drops of milk when starting breast milk expression?

☐ Yes

☐ No

Why? .....

12. Is expressed breast milk nutritious for the baby?

☐ Yes

☐ No

☐ I don't know

13. Is hand washing important before expressing the breast milk?

☐ Yes

☐ No

Why? .....

14. Is it important to clean the breast before expressing milk?

☐ Yes

☐ No

Why? .....

15. The government of Kenya has directed employers to have lactation rooms.

☐ True

☐ False

☐ I don't know

Knowledge on Breast Milk Storage

16. After expressing milk where can it be stored?

a) Room Temperature

☐ Yes

☐ No

☐ I don't know

b) Refrigerator

☐ Yes

☐ No

☐ I don't know

c) Frozen

☐ Yes

☐ No

☐ I don’t know

17. For how long can breast milk be stored after expression?

a) Room Temperature

☐ <8 hours

☐ 9-12 hours

☐ >24 hours

☐ I don’t know

b) Refrigerator

☐ <8 hours

☐ Upto 72 hours

☐ Upto 9 months

☐ I don’t know

c) Freeze

☐ 1 month

☐ 9 months

☐ 24 hours

☐ I don’t know

18. Do you think expressed breast milk is nutritious if stored in the following conditions?

a) Room temperature

☐ Yes

☐ No

☐ I don’t know

b) Refrigerator

☐ Yes

☐ No

☐ I don’t know

c) Frozen

☐ Yes

☐ No

☐ I don’t know

19. Does refrigerated breast milk have a different smell from the fresh breast milk?

☐ Yes

☐ No

☐ I don’t know

20. Can a baby refuse to take stored breast milk because of the smell.

☐ Yes

☐ No

☐ I don’t know

Attitude towards breast milk expression and storage

Attitude Towards Breast Milk Expression (Likert Scale)

	Attitude Towards Breast Milk Expression (Likert Scale)	Strongly Disagree	Disagree	I don't know	Agree	Strongly Agree
20	Other feeds should be introduced to the baby after 6 months.					
21	Breast milk expression can allow mothers to achieve exclusive breastfeeding for 6 months.					
22	Breast milk expression is painful.					
23	Breast milk expression is cumbersome/ fussy.					
24	Breast milk expression can be done at the work place					
25	Your work place has facilities that support breast milk expression.					
26	Breast milk expression can be done by hand.					

	Attitude Towards Breast Milk Storage (Likert scale)	Strongly Disagree	Disagree	I don't know	Agree	Strongly Agree
27	Proper storage of breast milk can help achieve six months of exclusive breast feeding.					
28	Stored breast milk is safe for infants to drink.					
29	Storing breast milk is expensive.					
30	Stored breast milk has less nutritional value compared to milk that baby feeds directly form the breast.					
31	It is safe to store expressed breast milk for up to 8 hours an room temperature.					
32	It is safe to freeze expressed breast milk for up to 9 months.					

	Attitude Towards Breast Milk Storage (Likert scale)	Strongly Disagree	Disagree	I don't know	Agree	Strongly Agree
33	I would like to know how to properly express and store breast milk.					

PRACTICE OF BREAST MILK EXPRESSION AND STORAGE

Practice of Breast Milk Expression

34. What do you feed your baby on?

☐ Breast milk and other type of food

☐ Breast milk alone

35. Do you express breast milk?

☐ Yes

☐ No

36. If you express milk, why do you express milk? (Can have more than one response)

☐ For someone else to feed the baby.

☐ To have an emergency store.

☐ To give to the baby while I am at work.

☐ To achieve 6 months of exclusive breastfeeding.

☐ I have not been successful at breastfeeding.

☐ To prevent engorgement.

☐ To release pressure of the milk.

☐ To soften the nipples

Others (specify) .....

37. If you express milk, how did you learn how to express milk?

☐ ☐ Healthcare Provider

☐ ☐ Relative

☐ ☐ Friend

☐ ☐ Mass Media

☐ ☐ Others

(Mass media refers to any form of communication that reaches a large audience and includes television, radio, advertising, movies, newspapers, magazines and the Internet.)

38. If you express milk, how do you express breast milk?

☐ ☐ Hand

☐ ☐ Manual Pump

☐ ☐ Electric Pump

☐ ☐ Both Hand and Pump

39. If you express milk, where do you express breast milk from?

☐ ☐ Home

☐ ☐ Work

☐ ☐ Both

40. If you express breast milk, how do you store the expressed milk while at home?

☐ ☐ Room Temperature

☐ ☐ Refrigerator

☐ ☐ Freeze

41. If you express milk while at work, is there a designated location reserved for expressing milk?

☐ Yes

☐ No

42. If there is a designated location reserved for expressing breast milk while at work, please tick the items availed by the employer from the following list? (You can tick more than one item)

☐ Hand washing equipment

☐ Refrigerators/ Cooling facilities

☐ Electrical outlets

☐ A small Table

☐ Comfortable seats

43. If there is no designated location reserved for expressing breast milk while at work, where do you express milk while at work? .....

44. If you express milk while at work, is there specific times allocated for expressing breast milk?

☐ Yes

☐ No

45. If you express milk while at work, how many minutes do you consider adequate for expressing milk in one episode? ..... minutes

46. Which challenges have you experienced while expressing milk while at work or home?

☐ Expressing milk is painful.

☐ Expressing milk is time consuming.

☐ Expressing milk is expensive.

☐ No place at work to express milk.

Others (Specify) .....

Practice of Breast Milk Storage.

47. How long do you store milk at home or work before giving it to the baby?

☐ Less than 8 hours.

☐ 8 hours - 3 days

☐ 3 days - 9 months

48. Do you have a refrigerator at home?

☐ Yes

☐ No

49. Do you have a refrigerator at work?

☐ Yes

☐ No

50. If there is a refrigerator at work, is the refrigerator reserved for lactating mothers to store expressed milk?

☐ Yes

☐ No

51. What container do you use to store breast milk?

☐ ☐ Paper Bag

☐ ☐ Baby Bottles

☐ ☐ Special Breast milk Bags

☐ ☐ Others

52. What challenges do you face when storing expressed breast milk?

.....

.....

.....

53. What other measures would you like your employer to put in place at work to encourage expression of breast milk?

.....

.....

.....

Appendix 3:Timelines

	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19
Proposal Writing									
Ethical Approval									
Data Collection									
Data Analysis									
Thesis Writing									
Manuscript Preparation									

Appendix 4: Budget

Items	Unit Cost (KSh)	Quantity	Total (KSh)
Proposal and Questionnaire Development			
Printing	10	1,000	10,000.00
Photocopying	5	1,000	5,000.00
Binding	100	10	1,000.00
Consent and Ascent Translation	1,500.00	3	4,500.00
UON/ KNH ERC	200	1	200.00
SubTotal			**20,700.00**
Data Collection and Analysis	30,000.00	1	30,000.00
Research Assistant/ Data collection	10,000.00	2	20,000.00
Statistician - Data Analysis	30,000.00	1	30,000.00
Subtotal			**50,000.00**
Report Preparation	3000	1	3,000.00
Printing	10	1,000	10,000.00
Binding	10	1,000	10,000.00
Photocopying	2	2000	4,000.00
Telephone Airtime and internet	500	6	3,000.00
Sub Total			**30,000.00**
Total			**100,700.00**
Contingencies (at 5%)			5,035.00
Grand Total			**105,735.00**

Appendix 5: R Codes for Sample Size Calculation

```
## SAMPLE SIZE CALCULATION
## Calculations done at Alpha = 0.05 and Proportion of 50%
p = 0.5
q = 1-p
z = 1.96
d = 0.05
SampleSize = z^2*p*q/0.05^2
SampleSize
## SampleSize = 384.16
# ..............................................................
## NUMBER OF PATIENTS BELOW 6 MONTHS
## Number of Subjects Below 6 Months from KNH
PatPerMonthKNH = 1500
PercBelow6MonthKNH = 0.9
PatBelow6MonthKNH = PercBelow6Month*PatPerMonthKNH

## Number of Subjects Below 6 Months from Mbagathi Hospital
PatPerMonthMbag = 480
PercBelow6MonthMbag = 0.8
PatBelow6MonthMbag = PercBelow6MonthMbag*PatPerMonthMbag
PatBelow6MonthKNH;PatBelow6MonthMbag
```

```
## b) FROM MBAGATHI HOSPITAL (N_Mbag)
N_Mbag = PatBelow6MonthMbag*SampleSize/TotalPatBelow6
N_KNH;N_Mbag


## N_KNH = 299.0865 ; N_Mbag = 85.0735
#.............................................................
## MAX NUMBER IN THE RANDOM NUMBER TABLE GENERATOR (Stat Trek)
ResponseRate = 0.6
MaxKNH = ResponseRate*PatBelow6MonthKNH
MaxMbag = ResponseRate*PatBelow6MonthMbag
MaxKNH;MaxMbag
## MaxKNH = 810; MaxMbag = 230.4
```