

Factors Affecting Mothers' Choice of Artificial Feeding Postpartum and during the first Six Months of Infant Life

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Abstract

Background: Breast milk has nutritional, anti-allergic, anti-infective, defensive, developmental, psychological and socio-economic proprieties for both mother and infant. So, exclusive breast-feeding (EBF) is a unique source of feeding during the first six months of an infant's life. Though the numerous proprieties of breast milk, the median duration of EBF in Egypt is 1.8 months making the identification of risk factors a high priority. The aim was to assess factors affecting mothers' choice of artificial feeding postpartum and during the first six months of infant life. Design; A descriptive cross –sectional exploratory was used. **Sample:** A purposive sample of 365 mothers were chosen. Tools: I- Socio demographic questionnaire. II- Anthropometric measurements. III- Factors of artificial feeding questionnaire. **Results;** the rate of EBF is very low as 80% of mothers gave artificial feeding, while only 20% gave mixed feeding. Artificial feeding was associated significantly with socio demographic characteristics as 44.7 % are in age group 20 - < 30 years and 30.1% are read and write. Regarding maternal factors, 60 % of the mothers have insufficient time. Likewise, 85.2 % of the mothers have feeling of need to teach infant to eat and 74.8 % of them had previous experience of artificial feeding. Regarding feeding practices, 70 % gave babies pre-lacteal fluids. **Conclusion;** Timely initiation and pattern of breastfeeding at Minia is unsatisfactory as 80 % of the participant mothers did not apply WHO recommendations attributed significantly to specific socio-demographic characteristics of infant/ mother, maternal, environmental, infant and health care services factors. **Recommendations;** Pre natal and post natal education of mothers to achieve longer duration of breast feeding and overcoming maternal, infant and environmental barriers. Provide continuous training of health care providers on EBF importance at all levels.

Key words: Exclusive breast feeding, Mothers' Choice, Artificial Feeding, Infant

Introduction:

Exclusive breastfeeding (EBF) is defined by WHO as a state in which an infant receives only breast milk from the mother for the first 6 months with no other solids or liquids with the exception of drops or syrups consisting of vitamins, minerals, supplements, or medicines (Elyas et al. 2017). WHO, 2011, recommends initiating feeding during the first hour after delivery and exclusively continuing till six months. This is for enhancing optimal growth and development. So, infants should receive nutritious complementary feeding and continue breastfeeding (BF) till two years age. Breastfeeding is recommended by WHO and UNICEF as the ideal feeding method for infants due to supplying all the essential nutrients and antibodies (UNICEF, 2011). Exclusive breastfeeding is the most effective method for enhancing child health. Breast milk benefits both infants and mothers. Though BF advantages, the rates of initiation and continuation are still less than ideal in numerous countries (Nuzrina et al. 2016).

In comparison with artificial-fed infants, breastfed infants have less death, contagious, morbidity, obesity, diabetes, and better mental development later in life. Also, both breastfed mothers and community benefit from it (Eidelman, et al. 2012). Despite the benefits of breast milk, worldwide, solely 38% of infants in age between 0–6 months are exclusively breastfed, making the

determination of actual factors a crucial domain (WHO,2018). If BF rates were reached to a global level, 823,000 died child and 20,000 breast cancer deaths can be prohibited annually (Eidelman, et al. 2016). Formula feeding is prevalent leading serious problems during the first few months of infants' life (Duan, et al. 2018).

The probable effect of optimal BF practices is specifically crucial in developing countries with higher disease burden and more risks to unclean water and sanitation. Breastfeeding (BF) also immediately improves mother health after birth due to reducing the risk of post-partum bleeding. Likewise, BF postpones the return to fertility and reduces type 2 diabetes and breast, uterine and ovarian cancer (WHO, 2011 and UNICEF, 2015). Artificial feeding increases the mortality due to diarrhea and the incidence of acute respiratory tract infections in infants. Artificial or mixed feeding of infants less than 6 months is prevalent at numerous countries. It poses risks to health of infant due to increasing the risk of diarrhea and other contagious diseases (Al-Sharbatti and AlJumma, 2012).

In mixed feeding, giving water or other liquids can decrease breast milk supply as the newborn sucks less. Newborn do not need liquids except breast milk, not even water, in the first 6 months as breast milk pertains all the needed water, even in

elevated heat climates. Formula is unacceptable option for BF as formula, solely replaces some of the nutritional elements of breast milk: it is only a meal, but breast milk is a complex living nutritional fluid pertaining anti-bodies, enzymes, long chain fatty acids and hormones, many of which is not included in artificial feeding. Also, in the early life of the newborn, it is hard for to absorb anything except breast milk. Even one feeding of formula can induce injuries to the gut spending weeks to recover (UNICEF, 2015).

As artificial or mixed feeding during the first six months of infant life poses health risks to the mother and the newborn, it is crucial to determine the associated factors (Dharmika and Gunawardena, 2012). The drop of EBF prevalence in numerous developing countries is associated with various socio-demographic factors such as residence place, race, age of the child, number of births and space between children, mother age and educational state, income, work load, maternal healthcare access (Reddy and Abuka, 2016, Elyas et al. 2017).

Maternal reasons of stopping BF may be related to unplanned pregnancy, difficult work and lacked psychological support, specifically from the partner (Hamade et al. 2013, Mueffelmann et al.2015). Some of the reported factors included lack of BF knowledge, social support and lack of self confidence in BF and delayed BF initiation (Lee et al. 2015, Fujita et al. 2017). Perceived insufficient milk supply is a prevalent cause for BF discontinuation or for supplying complementary feeding (Liu et al.2013).

Ineffective BF skills of mothers include problems regarding BF technique, uncomfortable BF act, or inadequate BF skills (Kilic et al.2016). Mother's health status which is not related to BF is considered (Fujita et al. 2017). Inconvenience due to tiring BF as mothers perceive and insufficient time to breastfeed especially caring for numerous children; or occupational demands (Mgongo et al. 2013). Specific environmental attributes can be correlated with BF is the perceived level of acceptance of BF at workplaces (Chen et al. 2011).

Infant factors include problems with suckling, fatigue, spending long time for each feeding, the infant refusing BF, improper or difficult feeding. Also, newborn or mother medical condition not related to BF (Queluz et al.2012, Chiou et al. 2014 , Chang et al. 2019). Also, domains about infant weight state and necessity to take drugs, and problems with milk production are considered (Odom et al. 2013).

Significance:

Instead of the advantages of EBF and the WHO recommendations, globally, solely 39% of newborns received BF within 1 hour of delivery. Also, solely 37% of infants were exclusively breastfed. In Sub-Saharan Africa, 20% of mothers reported EBF of the last infant. The prevalence of EBF is 41 %, 44% and 30 % in North Africa, Asia, and Latin America respectively (Reddy and Abuka, 2016, Hazir et al. 2013). Exclusive breastfeeding is targeted to rise to 50% by 2025 for the first 6 months (WHO, 2016). Despite the raising rates of EBF in the last 2 decades, a broad gap to achieve the 100% global target coverage recommended by UNICEF is still present. This is confirmed through the present low prevalence of EBF in the developing countries of West and Central Africa as having one of the highest rates of infant malnutrition globally (Mensah et al. 2017, Cai et al. 2012).

In Egypt, infants are exclusively breastfed or predominantly breastfed for less than the first six months. The median duration of EBF is 1.8 months and the median duration of predominant BF (receiving only non-milk liquids plus breast milk) is 4.1 months. Also, some studies have found that as the child gets older, BF times diminish. As formula feeding makes many health risks to both the mother and the infant, it is crucial to determine the risk attributes correlated with artificial feeding during the period of EBF. Further advances in improving BF rates can result from a better understanding of the factors surrounding BF and early weaning. The results of the present paper may be helpful to take necessary measures to the reported factors that are associated with EBF appropriately (Dharmika and Gunawardena, 2012).

Aim of the study:

It was to determine factors affecting mothers' choice of artificial feeding postpartum and during the first six months of infant life through the following objectives:

- To assess demographic and behavioral characteristics associated with the decision to artificial feeding during period of EBF.
- To assess the factors govern decision of artificial feeding.

Research question:

What are the factors affecting mothers' choice of artificial feeding postpartum and during the first six months of infant life?

Subjects and Methods

Design: A descriptive cross –sectional exploratory design was utilized. Qualitative and quantitative data collection methods were

utilized. Quantitative data collection was the most used type in the tool, to illicit the needed characteristics of participants and questions related risk factors. Qualitative data collection method was the least used type in the tool; it was coded and interpreted.

Settings: The research was performed at two Family Health Centers including the Western Medical Center lied in the west direction of Minia city and the East Medical Center lied in the East direction of it. The two maternal and child health(MCH) centers serve Minia city of Minia Governorate of north Upper Egypt, its population size equal 679821 (CAPMAS, 2017). Also, the percent of married women aged 15-49 years old at Lower Egypt equal 49 % (10.7 % and 38.3 % of urban and rural sectors respectively) and of Upper Egypt = 37.4 % (11.1 % and 26.2 % of urban and rural sectors respectively), the percent at Minia governorate is 5 % at reproductive age(El-Zanaty, 2016).

Sample Calculation

Using Epi-info software program, for population size equal 6088(Health Affairs Province, 2018), expected frequency equal 50 % and design effect equal 1, the total sample size will be equal 365 at 95 % confidence level.

Sample: a purposive sample was used as a total of 400 married mother were interviewed obtaining the required 365 participant women who agreed to participate and fulfilled the following criteria

- Biological mothers with an infant during first six months of age.
- Biological mothers dependent on artificial feeding.
- Biological mothers dependent on mixed feeding

Exclusion criteria:

- Biological mothers exclusively breast fed
- Biological mothers with twins.

Data Collection tools:

1. An interviewing questionnaire to determine personal data, included questions such as maternal age, level of education and marital status etc.
2. Anthropometric measurements tool was used to assess body mass index (BMI) it was utilized to determine weight and height which were transformed into BMI. It is an important predictor for state of nutrition among

participant mothers and generally, reflects the degree of fatness and slimness (Mehri et al,2016). The BMI was calculated using the standard formula (weight in kg divided by the square of the height in meter (kg/m²). BMI was categorized into six groups according to the National Institute of Health and WHO (Weir and Jan,2019).

The State of nutrition

BMI	The State of nutrition
Below 18.5	Underweight
18.5–24.9	Normal weight
25.0–29.9	Pre-obesity
30.0–34.9	Obesity class I
35.0–39.9	Obesity class II
Above 40	Obesity class III

A- Method of weighing women using standing weight scale of the MCH after calibration was adopted from (National Nurses Nutrition Group, 2017).

- Removing the shoes, mothers were informed to stand on the platform with back of head touching the upright.
- Set weighing equipment at zero and reset before weighing to ensure an accurate reading.

B- Method of measuring height using stadiometer was adopted from (National Institute for Health Research,2016) as stadiometer is a long ruler attached to the wall. It has a sliding horizontal headpiece that's adjusted to rest on top of your head. It's a quick way of accurately measuring height as following:

- Removed shoes and the heavy outer clothes for checking the position of the heels.
- Remove any head accessories interfering with measurement.
- Adjust the mother position to stand on the stadiometer to be straight as possible then recording.

3. **Factors of artificial feeding questionnaire : it was designed by the researcher after broad revision of literature (Etowa et al.2018, Swarts et al.2010, Nshimura et al.2018, Pierro et al.2016) consisting of four parts as following:**

- A- **Maternal factors.** It included 9 items such as insufficient time (yes or no responses), length of maternity leave (< 3 months, 3 months or not applicable) and insufficient breast milk to infant demand (yes or no).
- B- **Environment related factor.** It included 4 items such as the main places of BF information and the person who made the feeding choice decision.

- C- Maternal physical factors.** It included 4 items such as whether experiencing any BF problems or not and presence of current diseases of mother.
- D- Health care services related factors.** It included 7 items such as attending antenatal care services or not and having maternal child health center personnel introduced printed material including booklets, magazines or pamphlets about BF.
- E- Infant related factors.** It included 7 items such as children number, birth order of the last baby and age (months) of the last baby.
- F- Feeding practices factors:** it included 10 items as giving the baby pre-lacteal fluids before initiation breastfeeding, time of BF Initiation and knowledge on method and technique of feeding

Scoring system:

Each question of each questionnaire had directive responses which were coded according to the meaning of each question and originally represented without changes.

Validity: The questionnaire was revised for content validity by a five professors in the specialties of Community Health Nursing and Maternity and Obstetric Health Nursing.

Reliability: The researchers tested the internal consistency of the tools. It is the administration of the same tools to the same participants under similar conditions on one or more occasions. The Cronbach' alpha for factors of artificial feeding questionnaire was 0.8 indicating a suitable reliability.

Pilot Study:

A pilot study was performed on 10 % of the study participants (30) and was excluded. It was conducted to test the applicability of the tools. It also aided in estimating the necessary time to complete the questionnaires (20: 25 minutes).

Procedures for Data Collection:-

The sample was selected through the following process:

- The researchers selected the participant biological mothers who attended MCH for different purposes as vaccination (having a child aged from birth to 6 months), family planning services, diagnostic or therapeutic purposes due to infant health problems, routine medical checkup for the mothers of infants or for receiving subsidized artificial formula.

- The researchers interviewed the agreed women after receiving medical and nursing services for the previous purposes in the same MCH.
- Each woman was interviewed individually.
- Researchers collected data through face to face interview with participant mothers.

Study period: data collection started from beginning of June 2019 to end of December 2020

Approval: formal authorization was obtained from the concerned authority to perform the research; a formal letter was directed by the Dean of the Faculty of Nursing to the Directory of MCH and the allocated Health Administration Facility.

Ethical Consideration

After notifying the nature and the aim of the study to obtain mothers approval, each one was informed to sign the consent form in advance. The name of the respondents was omitted; confidentiality of the collected data was assured. Each mother was informed about the right of refusing to participate or withdraw at any time.

Statistical Analysis:

The content of the instrument was analyzed, classified and then coded by the researchers. Using SPSS software version 21, the data was tabulated and analyzed. Excel used for figures. Descriptive statistics were utilized for presenting information in the form of frequencies, percentages for categorical data of demography or factors. Quantitative variables were described utilizing Stepwise Regression for relative effect of characteristics and factors of artificial feeding and to control for confounding factors. At P. value <0.05, statistical significance was considered.

Limitations of the study:

It was only including lack of interest or boredom of some mothers during data collection

Operational definitions (WHO, 2020):

Types of infant feeding

- 1- Breast feeding including biological mothers or caregiver breast fed of another child.
- 2- Exclusive breastfeeding is meaning that the infant only receives breast milk. No other liquids or solids are received – not even water – except oral rehydration therapy, or syrups of vitamins, minerals or medicines.

- 3- Artificial feeding (formula feeding) including fresh animal milks, evaporated and condensed sweetened milks or dried animal milks.
- 4- Mixed feeding: means to combine formula feeding with breast milk

Results

Table 1 explains the personal characteristics of the studied mothers as 44.7 % are in age group between 20 - < 30 years. Pertaining to the educational status, 30.1% are read and write, while 20% have high education. 74.8% and 40 % of mothers are married and housewives respectively. 89.9 % of mothers live in housing with all electricity and water facilities and those of normal BMI representing 44.9%.

Table 2 illustrates maternal factors as 60 % of the studied mothers have insufficient time and 55.6 % have no time for maternity leave. Infant feeding method choice was mostly made after pregnancy by 60.3 % of them. 74.8 % of mothers had previous experience of artificial feeding continued for 5 - 8months among 53.5 % of them. 89.9 % of mothers reported insufficient breast milk to infant demand and 55.1 % of them returned to work.

Table 3 explains environment related factors as 64.9 % of the mothers consider the available media TV/radio as a main place of BF information. 50.4 % of mothers consider health care workers as a main source of BF information .Also, 44.7 % and 25.1% of the mothers made the feeding choice decision by the mother and the husband respectively.

Table 4 explains the maternal physical factors as 65.2 % of the studied mothers experienced BF problems. 38.2%, 30.7 % and 15.5 % of them attributed the factors to painful breast due to cracked nipples, engorgement or mastitis respectively.

Table 5 illustrates health care services related factors as 54.2 % and 59.5 % of the mothers received antenatal care and BF information during ante/post natal care. 64.7 % of them delivered at a hospital and 79.7 % normally delivered.

Table 6 explains infant factors as 69.9 % of mothers had 1-3 living infants, half of them (50.1%) was in first - second birth order, half of babies were in 0-3 months age group(54.8%),male (54.5%),and healthy infants(74.8%). Also, 85.2 % of the mothers have feeling of need to teach infant to eat.

Table 7 illustrates feeding practice as 70.1 % of the studied mothers are giving pre-lacteal fluids

before initiating BF.56.6 % of the studied mothers attributed it to misconception of low birth weight. Only 20 % of them initiated BF within first hour after delivery and 80 % put newborn to breast after the first hour of birth (late BF initiation). Regarding pattern of BF, the majority (80%) practiced artificial feeding, while only 20% practiced mixed feeding. The age of infants when mothers discontinued BF was 4-6 months (80.3 %). 80 % of the studied mothers who used bottle feeding gave > 2 bottles / day for babies. Unfortunately, majority of mothers were weaning infants at age of 2 -4 months (79.7%).

N.B. Timely initiated BF = put babies to breast within first hour after delivery, Late initiated BF = put newborn to breast after the first hour of birth (UNICEF and WHO 2018).

Table 8 explains that 59.2 % variance in type of infant feeding ($R^2= 0.0592$, $F = 64.5$, $p < .0001$). The significant statistically variables in our model were maternal age with mothers less than 20 years old were more probable to utilize bottle feeding to their infants approximately four times more than mothers aged 20 years or older (OR: 3.9; 95%CI: 3.7,4.31); employed mothers were more likely than housewives to utilize bottle feeding three times more than housewives (OR: 3.3; 95%CI: 3.1,3.9); mother education, with secondary educated and above, mothers were more likely than lower educated to use bottle feeding (the odds ratio of secondary educated mothers and above was about four times the odds of < secondary educated mothers (OR:3.5; 95%CI: 3.2,3.8). Other significant statistically risk factors include: mothers have no enough time were more likely to use bottle feeding approximately four times more than mothers have enough times (OR: 3.7; 95%CI: 3.1, 4.9), Insufficient breast milk misconception for infant was more likely to use bottle feeding approximately ten times more than mothers than mothers have not. Infant gender as expected mothers had female infant were approximately four times more than mothers had male infant (OR: 3.9; 95%CI: 2.9, 5.2).The stepwise regression model correctly predicted 83.2% of mothers used artificial feeding for their infants. On the other hand, method of delivery predictor was not significantly predictive of artificial feeding in Minia Governorate.

Constant = 2.750; $F=64.5$; $P =0.000$, $R^2 = 0.592$; $R= 0.77$, a = Reference group. Method of delivery predictor was not significantly predictive of bottle feeding and was excluded from the model. OR= Odds Ratio; CI = Confidence Interval. % correctly predicted = 83.2 %.

Table 1: Socio-economic data and BMI of studied mothers with artificial feeding(N=365)

Maternal Socio-economic data		N0.	%
Maternal Age (years)	Less than 20 yr.	127	34.8
	20 to less than 30	163	44.7
	30 to less than 40	55	15.1
	40&more	20	5.5
Education:	Read and write	110	30.1
	Primary	109	29.9
	Secondary	73	20.0
	High education	73	20.0
Marital status	Married	273	74.8
	Divorced	74	20.3
	Widowed	18	4.9
Employment	Employed	37	10.1
	Worker	108	29.6
	house wife(no work	146	40
	have manual craft	56	15.4
	Trader	18	4.9
Type of housing	All elec.&water facilities	328	89.9
	Non elec.&water facilities	37	10.1
BMI	Underweight	73	20.0
	Normal	164	44.9
	Overweight	56	15.3
	Obese	72	19.7

Table 2: Distribution of maternal related factors for artificial feeding (N=365)

Maternal factors		N0.	%
Insufficient time	No	146	40
	Yes	219	60
Length of maternity leave	< 3 months	90	24.7
	3 months	72	19.7
	Not applicable	203	55.6
Infant feeding method choice was mostly made:	Before pregnancy	145	39.7
	After pregnancy	220	60.3
Previous experience of artificial feeding	Yes	273	74.8
	No	92	25.2
If yes, duration of bottle feeding:	2 - 4 months	73	26.7
	5 - 8months	146	53.5
	>=12 months	54	19.8
Insufficient breast milk to infant demand (reported):	Yes	328	89.9
	No	37	10.1
Pain after delivery (CS or vaginal)	Yes	166	45.5
	No	199	54.5
Return to work	Yes	164	44.9
	No	201	55.1

Table 3: Distribution of environment related factors for artificial feeding (N=365)

Environment related factors		N0.	%
The main places of BF information of available media	Internet	18	4.9
	Home	37	10.2
	TV/radio	237	64.9
	MCH/Hospital	73	20.0
The main source of BF information of related Personnel	Health care worker	184	50.4
	Friends & sisters	19	5.2
	Mother	54	14.8
	Family	108	29.6
The person who made the feeding choice decision	Mother	163	44.7
	Husband	92	25.1
	Both	55	15.1
	Mothers in low	36	9.9
	Health care worker	19	5.2
The main source of bottle feeding information	Friends& relatives	126	34.5
	Doctor/nurse	166	45.5
	Hospitalization of baby	73	20

Table 4: Distribution of Maternal Physical factors for artificial feeding (N=365)

Maternal physical factors		N0.	%
Experiencing any breastfeeding problems during postpartum period?	No	127	34.8
	Yes	238	65.2
If yes, what BF problems have been experienced(N=238)	Engorgement	73	30.7
	Painful breast due to blocked duct	19	8
	Painful breast due to cracked nipples	91	38.2
	Painful breast and fever due to mastitis	37	15.5
	Abscess(swollen, warm and painful lump in the breast)	18	7.6
If yes: method of management (N=238)	Express breast milk	92	38.7
	Expose breast to sun and air	18	7.6
	Rub vaslin	126	52.9
	Others(correct attachment, and frequent BF)	2	0.8
Current diseases of mother(N=238)	No disease	166	69.7
	Breast abscess	36	15.1
	BP	18	7.6
	Diabetes	18	7.6

Table 5: Distribution of health care services related factors for artificial feeding (N=365)

Health care services related factors		N0.	%
Attending antenatal care services:	Yes	198	54.2
	No	167	45.8
Received BF information during ante/post natal care:	Yes	217	59.5
	No	148	40.5
Had MCH personnel introduced printed material, including booklets, magazines or pamphlets about BF:	Yes	163	44.7
	No	202	55.3
Place of delivery:	Home	129	35.3
	Hospital	236	64.7
Methods of delivery:	CS	56	15.3
	Normal	291	79.7
	Assisted	18	4.9

Table 6: Distribution of infant factors for artificial feeding (N=365)

Infant factors		N0.	%
Number of children in the family	1 - 3 children	255	69.9
	4 - 6 children	110	30.1
Birth order of the last baby	First - Second child	183	50.1
	Third - Fourth child	163	44.7
	> forth child	19	5.2
Age (months) of last baby	0 - 3 months	200	54.8
	4 - 6 months	165	45.2
Gender of last baby	Male	199	54.5
	Female	166	45.5
Diseased baby	No	273	74.8
	Yes	92	25.2
Baby refuse BF	No	74	20.3
	Yes	291	79.7
Maternal feeling of need to teach infant to eat	No	54	14.8
	Yes	311	85.2

Table 7: Distribution of feeding practice for artificial feeding (N=365)

Feeding practice:		N0.	%
Giving the baby pre-lacteal fluids before initiation breastfeeding?	No	109	29.9
	Yes	256	70.1
If yes, reasons for giving pre-lacteal fluids(N=256)	Milk did not come in yet	56	21.9
	low birth weight	145	56.6
	Mother was ill	55	21.5
Initiation of breast feeding	Timely initiated BF	73	20.0
	Late initiated BF	292	80.0
Knowledge how to feed the newborn	No	72	19.7
	Yes	293	80.3
Knowledge the technique of BF	No	72	19.7
	Yes	293	80.3
Maternal self-confidence that BF is important for herself and her infant	No	90	24.7
	Yes	275	75.3
Pattern of BF	Mixed feeding	73	20
	Artificial feeding	292	80.0
Age of infant at BF discontinuation:	2 - < 4 months	72	19.7
	4 to 6 months	293	80.3
How many bottles per day?	One to two / day	73	20
	> Two /day	292	80
Age of weaning	2 - 4 months	291	79.7
	5 - 6 months	74	20.3
Why specific at this age?	Returning to work	91	24.9
	Insufficient milk	56	15.3
	to supplement breast milk	146	40
	to teach the child to eat	72	19.7

Table 8: Coefficients of Stepwise Regression for Relative Effect of maternal age, education, occupation, place of last delivery and infant gender variables in Predicting bottle feeding(N=365)

Predictors	B	SE	t	Sig.	Adjusted OR	95% CI for OR		
						Lower	Upper	
Age	<20 years	1.38	0.03	10.8	0.000 HS	3.9	3.7	4.3
	≥ 20 years (ref.)	-----	-----			1 ^a	-----	-----
Education:	≥ 2ry education	1.250	0.04	5.61	0.000 HS	3.5	3.2	3.8
	< 2ry education (ref)	-----	-----			1 ^a	-----	-----
Employment	Employed	1.20	0.14	4.9	0.004 HS	3.3	3.1	3.9
	Housewife(ref.)	-----	-----			1 ^a	-----	-----
Mothers have no enough time	Yes	1.327	0.04	8.7	0.000 HS	3.7	3.1	4.9
	No(ref.)	-----	-----			1 ^a	-----	-----
Insufficient breast milk for infant	Yes	2.340	0.17	5.22	0.000 HS	10.3	8.3	12.2
	No(ref.)	-----	-----			1 ^a	-----	-----
Attending antenatal care	Yes	1.18	0.04	2.24	0.02 Sig.	3.2	3.1	3.7
	No(ref)	-----	-----			1 ^a	-----	-----
Place of delivery	Hospital	1.518	0.03	15.9	0.000 HS	4.6	4.1	6.4
	Home (ref)	-----	-----			1 ^a	-----	-----
Infant gender	Female	1.37	0.04	8.6	0.000 HS	3.9	2.9	5.2
	Male (ref.)	-----	-----			1 ^a	-----	-----

Discussion:

WHO and UNICEF recommend BF as the ideal feeding choice for infants (UNICEF,2011). EBF for the first six months is evidenced as most appropriate method to lessen morbidity and mortality of infant (Berhanu et al.2014). WHO recommends EBF till six months of infant's age persisting until 2 years. Exploring the attributors aligned to EBF may improve the infant's nutritional state.

The current study results revealed the socio-demographic characteristics of the studied mothers as more than two fifths of mothers are 20 - < 30 years old. Pertaining to the educational status of mothers, one third is read and writes; while one fifth have high education. About three quarters and two fifths of mothers are married and housewives respectively. Fast majority of mothers live in housing with all electricity has water facilities and less than half has normal BMI.

The current study results are similar to Ayisi et al.2014 who showed that more than half of participants

were aged 25 years less and nearly a half over 25 years old. Less than half of the subjects had primary level education while two fifths attained secondary education. More than two-thirds of participants were housewives, little percent had occupation or were informally employed and less than fifth is self-occupied.

This is contradictory with **Pathirathna, 2014** who showed that about two thirds of mothers exclusively breastfed babies for 6 months in comparison with about two fifths of the employed mothers. The researchers attributed that the difference may be due to knowledge deficit among participant mothers of current study leading to not making use of the house spare time of being not employed.

The present study illustrated maternal factors as two thirds of the studied mothers have insufficient time and more than half have no time for maternity leave. Infant feeding method choice was mostly made after pregnancy by two thirds of mothers. Three quarters of the mothers had previous experience of artificial feeding that continued for 5 - 8months among more than half of them. Majority of participants reported insufficient breast milk to infant demand. More than half of mothers returned to work.

This is in the same line with **Nafee Elsayed and Al-Dossary, 2016** findings as a prevalent cause for stopping BF early. More than quarter and less than fifth from Saudi and Egyptian mothers' respectively were dissatisfied with EBF. The participant mothers attributed the dissatisfaction to insufficient breast milk. Also, the Saudi mothers' domains were considering BF another load for employed mothers by minority, change breasts shape and necessitate extra effort and time and embarrassed from lactation in public place represented by the fact minority.

The current study results are similar to **Garbarino et al.2013** who found some misconceptions held by participants who fed formula during the period of EBF as almost a half of the participants believed that the breast milk is less sufficient or nutritious. The participants reported the insufficiency occurrence when not taken nutritious foods during the period of EBF.

The present study results explained the environment related factors, as regarding the main places of BF information of available media, about two third of the studied women consider TV/radio and half of them consider health care workers as a main source of personnel .Also, less than half and quarter of the mothers made the feeding choice decision by the mother and the husband respectively.

This is similar to **Nuzrina et al.2016** who reported inadequate knowledge exposure plays a crucial role in BF decision. Male partners support BF, determine needs, encourage and share the experiences that proven to aid mothers continue BF.

Also, Ayisi et al.2014 revealed that women supported and advised on BF from various groups. As Health personnel were reported by majority of respondents to promote EBF through health education classes and counseling sessions. Others were advised for EBF by husbands, friends, mother's in-law and neighbors. Mothers' in-law were found to significantly influence the practice of EBF.

The current study findings revealed the maternal physical factors as about two thirds of the studied mothers experienced BF problems allocated as less than two fifths, one third and less than one fifth attributed the factors to painful breast due to cracked nipples, engorgement or mastitis respectively.

This is similar to **Chang et al.2019**who reported that abscess, engorgement of the breast, infant's restlessness, perceived insufficient milk amount and early discontinuation of BF may be the associated factors. Also, **Leung, 2016** reported that breast pain among lactating mothers was reported to less than three days in half of women but longer in the remaining percent. Pain duration exists for more than seven days in one third: one fifth of mothers with infrequent pain for 14 to 30 days and may attribute to breast feeding cessation till management.

The current study findings illustrated the health care services related factors as more than half of the studied mothers received antenatal care services and BF information during ante/post natal care. About two thirds of the mothers delivered at a hospital and the majority normally delivered.

This finding is in agreement with **Shumey et al.2013** who showed that more than half of mothers who educated about EBF to six months were less likely to early introduce artificial feeding in comparison with those who had not. Also, **Wu et al.2019** suggested that cesarean section, multiparous, and delayed BF initiation are significant risk factors for BF practices in the first six months of age in China.

The current study results explained the infant factors as two thirds of mothers had 1-3 living infants, half of them were in first - second birth order, more than half of babies were in 0-3 months and were male Also, and about three quarters are healthy infants. Likewise, majority of the mothers have feeling of need to teach infant to eat.

Some researchers reported that multiparous mothers had longer BF durations (**Holowko et al.2016, Hackman et al.2015**).On other hand a negative association between multi-parity and breastfeeding was reported (**Tarrant et al.2010**). Other researchers attributed this is to the previous BF experience influencing present BF practices among multiparous women (**Colombo et al.2018, Bai et al.2015**). Previous

unsuccessful experience can decrease the next BF duration (Colombo et al.2018).

The current study results illustrated the feeding practice as less than three quarters of the studied mothers are giving pre-lacteal fluids before initiating BF. More than half of mothers attributed it to misconception of low birth weight. Only one fifth initiated BF within first hour after birth and the majority put newborn to breast after the first hour of birth (late BF initiation). Regarding pattern of BF, the majority practiced artificial feeding, while only one fifth practiced mixed feeding. The age of infants when mothers discontinue BF was 4-6 months by the majority. Majority of the mothers who used bottle feeding gave > 2 bottles / day for babies. Unfortunately, majority of mothers were weaning infants at age of 2 -4 months.

N.B. Timely initiated BF = put babies to breast within first hour after delivery, Late initiated BF = put newborn to breast after the first hour of birth (UNICEF and WHO, 2018).

The previous result reveals the crucial role of prenatal and postnatal BF support to both multi and nulliparous women especially with weak BF experience. The current study results are in agreement with **NEOVITA Study Group,2016** and **Tang et al.2013** who reported delayed BF initiation anticipate an elevated risk of stopping EBF. Also, early BF initiation attributes to the probability of EBF by decreasing the utilization of pre-lacteal feeds and enhancing the BF skills of the mothers (**Paramashanti, 2016**).

Timely initiation of breastfeeding at Minia City is considered unsatisfactory as majority of the participant mothers did not follow WHO's recommendation to timely start BF within the first hour after delivery. Therefore, health education regarding benefits of timely initiation of BF is of a special importance. Seventy percent of mothers gave their babies pre-lacteal fluids. The main reason for this behavior was the misperception of the mother that her baby is of LBW (as reported by more than the half).

The Coefficients of Stepwise Regression model of the current study results revealed 59.2 % variance in type of infant feeding ($R^2= 0.0.592$, $F = 64.5$, $p < .0001$). The significant statistically variables were **maternal age** with mothers less than 20 years old were more probably to utilize bottle feeding to their infants approximately four times more than mothers aged 20 years or older (OR: 3.9; 95%CI: 3.7,4.31); employed mothers were more probably than housewives to use bottle feeding three times more than housewives (OR: 3.3; 95%CI: 3.1,3.9); **mother education**, with secondary educated and above mothers were more probably than lower educated mothers to use bottle feeding (the odds ratio of secondary educated mothers and above was about four times the odds of <

secondary educated mothers (OR:3.5; 95%CI: 3.2,3.8). Other significant statistically risk factors include: **mothers have no enough time** were more likely to use bottle feeding approximately four times more than mothers have enough times (OR: 3.7; 95%CI: 3.1, 4.9). Insufficient breast milk misconception for infant was more likely to use bottle feeding approximately ten times more than mothers than mothers have not related misconception.

The current study results are similar to **Berhanu et al.2014** results who used the bivariate analysis showing a statistically significantly associations between non-EBF and educational state of mothers, occupational status, antenatal care, place of delivery, follow-up, child's sex, number of under five children, husband's educational status, occupational status, and residence.

Infant gender as expected mothers had female infant were approximately four times more than mothers had male infant (OR: 3.9; 95%CI: 2.9, 5.2).The stepwise regression model correctly predicted majority of mothers used artificial feeding for their infants. On the other hand, method of delivery predictor was not significantly predictive of artificial feeding in Minia city.

The current study results are convenient with **Chang et al.2019** who used Multivariate logistic regression analysis revealing the predictors associated with EBF discontinuation at one month pertained having no higher education, primiparity, believed insufficient milk amount, newborn separation, mother's health problems, inconvenience due to BF and newborn-centered predictors.

The current study results are convenient with **Nafee Elsayed and Al-Dossary, 2016** who found that the personal characteristics are indicators of EBF among Egyptian mothers and had a significant and vital effect on the continuation of EBF. It included the educational level and work in comparison with the Saudi mothers. While disagree with **Ghwass and Ahme,2011** who reported that personal characteristics of the Saudi and Egyptian mothers was not factors of BF patterns and EBF prevalence. The infants' socio-demographic data in both samples were not indicators on the continuation of EBF and consequently have not a significant impact on the EBF continuation (**Nafee Elsayed and Al-Dossary,2016**). The researchers attributed the different results to different sample characteristics and circumstances.

Conclusion

Among socioeconomic factors, bottle feeding showed highly significant associations with maternal age. All young mothers who get married before they reach 20 years old choose bottle feeding rather than mixed feeding for their infants. The same pattern was

observed among middle aged mothers (30 - < 40 years old). Also, bottle feeding showed highly significant associations with education as well as occupation of mothers ($p < 0.0001$ for each). The EBF patterns are dropped among the studied mothers in Minia City, Egypt as majority of the participant mothers (80%) are giving artificial feeding, while only 20% are giving mixed feeding.

Regarding feeding practices, majority of mothers were weaning their infants at age of 2 -4 months (79.7%). The age of infants when mothers discontinue BF was 4-6 months (80.3 %). Regarding maternal factors, 60 % of the studied mothers have insufficient time and 55.6 % have no time for maternity leave. Likewise, 85.2 % of them have feeling of need to teach infant to eat. 74.8 % of mothers had previous experience of artificial feeding. Seventy percent of mothers gave infants pre-lactate fluids. The main reason was misperception of the mother that her newborn is of LBW (low birth weight=56.6%). In addition, among maternal factors, bottle feeding showed highly significant associations, with mothers who had insufficient time, considered breast milk is insufficient to infants' demand. Among health care services related factors, mothers neglected attending antenatal visits, delivered at hospital, and delivered through CS ($p < 0.0001$ for each). Regarding infant factors, infant gender (girls) had a high significant association with bottle feeding ($p < 0.0001$).

Timely initiation of breastfeeding at Minia is unsatisfactory as 80 % of the participant mothers did not implement the recommendation of WHO to timely start BF within the first hour after delivery. So, health education regarding benefits of timely initiation of BF must be confirmed.

Recommendations:

- Health care providers should provide appropriate support to initiate BF immediately after delivery and ban any supplementations.
- Pre natal and post natal education of mothers to achieve longer duration of BF, overcoming maternal, infant and environmental barriers and confirming its benefits for both mothers and infants health.
- Preparing prenatal awareness programs addressing BF issues as perceived low milk supply for improving women's self-efficacy and the attitudes to continue BF.
- Preparing workplace and hospital BF rooms and supporting policies to BF.
- Make use of mass media education (radio/ TV) for EBF continuation.
- Educating the mothers on self-management of temporary breast health and feeding problems.
- Continuous training of health care providers on EBF importance at individual, family and community level.

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