

EXPLORING FACTORS AFFECTING BREASTFEEDING BEHAVIOURS: A
MIXED METHOD APPROACH

by

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DEDICATION PAGE

To every hard-working mother who been raised by a Queen.

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ABSTRACT

Breastfeeding is widely perceived as the best option for healthy mothers and infants due to its benefits. According to WHO, infants should be exclusively breastfed for the first six months after birth and continue until the age of two. However, there are many factors that may influence mothers' decisions to breastfeed and continue breastfeeding. This thesis is part of a project aimed at developing technology-driven interventions to support breastfeeding mothers. The first step in this project was mining social media data and using various Machine Learning approaches and thematic analysis to identify both the negative and positive factors influencing breastfeeding behaviors. This thesis builds on and advances the findings by validating the factors identified and also examining for possible effects of technologies on breastfeeding behaviors with the main aim of informing the design of persuasive technological interventions to support breastfeeding mothers. These factors range from personal, cultural, psychological, environmental, social factors to technological factors.

We employed the mixed-method approach, using a combination of qualitative and quantitative methods. The quantitative study involved a large-scale study of 550 people from a diverse population of breastfeeding mothers, age 18 to 40+. The aim of the study was to investigate whether and how the various factors influence breastfeeding behavior. As a secondary objective, we also investigate possible moderating effects of age and mothers' breastfeeding experience on how these factors influence their breastfeeding behavior. Using the data from the study, we developed five different models using the Partial Least Square Structural Equation Model (SEM) to show the relationship between various factors and the likelihood of breastfeeding and the moderating effect of age and experience.

To uncover more insight regarding the mechanism through which these factors affect breastfeeding behaviors and shed light on the possible impact of technologies, we conduct an in-depth interview on 20 mothers. Based on the findings, we propose some persuasive intervention design guidelines to support breastfeeding mothers such as web-based intervention, Mobile applications, social media support groups, e-training, and awareness programs to exclusive breastfeeding. Public and private sectors must play active roles in developing breastfeeding support programs and systems for mothers.

LIST OF ABBREVIATIONS USED

BF	Breastfeeding
BAR	Barrier
CF	Cultural Support
BFS	Breastfeeding Support
Dal	Dalhousie
EBF	Exclusive breastfeeding
EF	Environment Factor
HBM	Health Belief Model
HIT	Human Intelligence Task
MTurk	Amazon Mechanical Turk
PBN	Perceived Benefit
P1-20	Participant 1-20
SFL	Social Factors
WHO	World Health Organization

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CHAPTER 1 INTRODUCTION

Breastfeeding behavior is influenced by many factors including the attitude of the mother, father, family members and friends. The attitude of the parents and specifically mother determines whether she will breastfeed the child or not. Support from the healthcare staff about breastfeeding might also influence the behavior of the mother towards breastfeeding [1]. There are several research studies discussing the effects of parent health beliefs on the mothers' breastfeeding.

The health belief model (HBM) can be described as a study that addresses health behaviour. indicates that individuals try to have healthy behavior in order to prevent health problems and diseases. This is because the individuals' believe that they are susceptible to the problem, and that the outcome of the action is good and capable of preventing the problem [1]. As per HBM, if a mother believes that there is a perceived benefit in breastfeeding then she is more likely to breastfeed her child. A study mentions that the benefits of breast milk are "perceived by the mothers as protection against diseases, in such a way that it acts as a vaccine for the baby and regulates the bodyweight of the child" [2]. Primo et al. [2] further states that "73.8 per cent of women decided to breastfeed because of the health benefit to the child". Breastfeeding has lasting health benefits for both mothers and infants and breast milk is known as the best nutrition for infants. Along with this nutritional fact, breastfeeding helps in mother-child bonding and relationship building. The children build stronger connections with their mother in their infancy which helps their social and emotional development especially in the regulation of feelings [3].

1.1 BACKGROUND

Technologies play vital roles in many areas. Breastfeeding mothers use several technological platforms such as social media and other mobile applications to not only interact with friends and peers but also to seek breastfeeding-related information and gain necessary support. According to Nielsen [4], it is essential for new mothers to exchange their experiences on social media as this will help them to identify their new role.

Pregnant women and those with young children also regard the help and knowledge received from social media and other mobile applications [5]. Social media and mobile technologies have a more positive outlook for young mothers in terms of providing vital information when needed. Women not only used digital media to obtain information, but they play an active role in the creation of content and participating in other practices such as “tagging, liking, sharing, commenting and recommending”[5]. A survey by Pricewaterhouse Coopers states that 33 per cent of consumers in the United States are using social media platforms such as Facebook, Instagram, and twitter to obtain parental health information [6].

Moreover, the research also indicates that women are dependent on smartphone devices and other interactive channels to obtain and view information. Lupton [7]believes in the value of using digital resources to create and preserve social relationships with other mothers and health providers. The researcher insisted on the value of using internet content to develop positive social connections with other mothers. Young mothers have a responsibility to research using technology on the best parenting practices to be used to improve the quality of motherhood to the coming generation.

However, Nielsen mentioned that excessive participation of mother on social media can cause distraction, decrease parental engagement, and makes the child at a risk to any injuries [4]. According to Nielsen, technology has adverse effects that come with it, which are starting to become a significant problem in society and could also affect mothers breastfeeding behaviors negatively.[4]

On the other hand, breastfeeding is the most effective source of nutrition for a newborn for the first six months. Research states that infants who are breastfed are less likely to experience “ear infections, asthma, respiratory infections, diabetes, and obesity” [6]. Dakkak identified that breastfeeding is influenced by belief of every society. [6]. The benefits of breastfeeding are described as a factor that influences the women in the decision making on breastfeeding [2].The benefit of breastfeeding to maternal health is

also highly recognized as it helps in protecting against breast disease and rapid weight reduction in mothers.

Besides, this documented benefits of breastfeeding, many young mothers experience uncertainty, anxiety, and feelings of loneliness and social isolation in coping with the demands of caring for young children [5] due to many factors. Mother needs support from people around her for a healthy breastfeeding practice. Nielsen [4] argues that “to manage parental stress and defend against negative outcomes, the young mothers need to feel the sense of social support.”. The transition to motherhood and shift in roles and commitments demonstrates that more people use new media to connect with others [8]. Research has shown that support offered by health professionals provides mothers with informed advice about breastfeeding and encourages them to breastfeed [2]. Primo et al. argue that “information given to the mother in the postnatal period increases her self-confidence and security to take care of the baby”. The decision to breastfeed or use formula is ultimately the mother’s, and she will make the decision influenced by their “relations with the family members, partners, friends, healthcare providers, and society” [6]. Hence, family support also play a vital role in mothers’ breastfeeding behaviors[6].

1.2 PROBLEM STATEMENT

Research has discussed several issues regarding breastfeeding over the years, however, there is lack of research on how various factors likeage of the mother ,breastfeeding experience level ,e-communication and social media interaction affect breastfeeding behaviour of mothers. There is huge gap in research studies exploring and analyzing in depth the factors affecting breastfeeding attitude and behaviors of mothers. Most breastfeeding mothers are no longer practicing exclusive breastfeeding for 6 months as approved by World Health Organization (WHO) and switch to bottle-feeding from as early as 16 weeks [9]. Therefore, the purpose of this research is to understand the barriers, social, environmental, cultural and economic factors affecting breastfeeding, how they influence mothers’ decisions against or for breastfeeding, and the reason why mothers may adopt bottle-feeding early. We also investigate for possible moderating effect of age and mothers’ breastfeeding experience level on how these factors influence

their breastfeeding behavior. Social, cultural, economic factors and breastfeeding self-efficacy have been found to be important predictors of breastfeeding related decision Lau, Lok and Tarrant [10]. Kanhadilok and McGrath found in a nutritional study that factors that influenced breastfeeding decisions of mothers include social and cultural norms. However, the effects of these factors positive or negative changes with age and experience [11]. Personal beliefs about being a good mother were identified as an important predictor to intention and initiation of breastfeeding. Experience was found to be essential to breastfeeding initiation and continuation. Support from partners and family also led to positive attitudes toward breastfeeding initiation and continuation. The Breastfeeding Self-Efficacy (BSE) Framework identified direct relationships with mother breastfeeding initiation [10]. These factors may have varying effects depending on the age and experience of mothers.

Research has also shown that mothers use technologies for many purposes including for connection, information and help seeking. It is possible that engagement with various technologies may have adverse effect on mothers breastfeeding behaviors. Therefore, to be able to design technological interventions that will effectively support breastfeeding mothers, there is a need to investigate how mothers use technologies and how technology may affect breastfeeding positively and negatively.

1.3 SCOPE OF THE STUDY

The objective of this research study was to evaluate breastfeeding practices among mothers and associated factors affecting breastfeeding.

Therefore, the scope of the study outlined was to investigate breastfeeding mothers having such experience. Such an investigation will help to identify concerns of breastfeeding mothers in arriving at a decision whether to breastfeed their babies or not.

As a result, we hope that the findings of this research study may produce results based on the breastfeeding experiences of mothers of varying age groups. We hope that the findings of this research study may help in designing a technological intervention to support breastfeeding mothers, such as a mobile app.

1.4 SOLUTION

This thesis is part of a project aimed at developing technology-driven interventions to support breastfeeding mothers. The first step in this project was mining social media data and using Machine Learning approaches and thematic analysis to identify both the negative and positive factors influencing breastfeeding behaviors. This thesis builds on and advances the findings from the social media data mining by validating the factors identified and also examining for possible effects of technologies on breastfeeding behaviors with the main aim of informing the design of persuasive technological intervention to support breastfeeding mothers. These factors range from personal, cultural, psychological, environmental, social factors to technological factors.

Understanding the factors associated with low breastfeeding initiation rates and possible facilitators that can be used to overcome these barriers is very important.

We employed the a mixed-method approach, using a combination of qualitative and quantitative method. The quantitative study involved a large-scale survey of 550 people from a diverse population of breastfeeding mothers, age 18 to 40+. The aim of the study was to investigate whether and how the various factors influence breastfeeding behavior. As a secondary objective, we also investigated for the moderating effect of age and mothers' breastfeeding experience level on how these factors influence their breastfeeding behavior. Using the data from the study, we developed five different models using the Partial Least Square Structural Equation Model (SEM) to show the relationship between various factors and the likelihood of breastfeeding, as well as the moderating effect of age and experience.

To uncover more insight regarding the mechanism through which these factors affect breastfeeding behaviors and shed light on the possible impacts of technologies, we conduct an in-depth interview with 20 mothers. The results reveal that 63% of the mothers admitted that the use of social media affects their breastfeeding activity negatively. Also, 40% of the mothers breastfed their babies for between 1-2 years. In general, the perceived benefit of breastfeeding emerged as the factor that most strongly

affects mothers breastfeeding behaviors positively. This is followed by Breastfeeding Norm, Self-efficacy, Cultural Factors, and Breastfeeding Support, in decreasing order. Perceived Barrier and Social Factors impact breastfeeding behaviors negatively. The impact of these factors varies depending on the mothers age and their breastfeeding experience (experienced vs inexperienced). Based on the findings, we propose persuasive intervention design guidelines to support breastfeeding mothers such as web-based intervention, e-prompts, social media support groups, e-training, and awareness programs. Public and private sectors must play active roles in developing breastfeeding support programs and systems for mothers.

1.5 RESEARCH QUESTIONS

The research question explored in this study are as follow:

RQ1: What are the personal, social, cultural, environmental and other factors influencing women's decisions to whether breastfeed their baby and not (breastfeeding behavior)?

RQ2: How can technology and social media (e. g. Facebook, twitter) and mobile apps be used to support breastfeeding and mother-child relationship?

RQ3: Does social media and communication affect negatively the mother-child relationship?

RQ4: How does age moderate the impact of various factors on mothers' breastfeeding attitude?

RQ5: How does breastfeeding mother's experience level moderate the impact of various factors on mothers' breastfeeding attitude?

1.6 ETHICS APPROVAL

Approval for the study was provided by Dalhousie University, Human Research Ethics Committee. Permission was sought from the admin of every Facebook groups and information about research was posted at the top of the groups informing members of the study.

1.7 ORGANIZATION OF THIS RESEARCH

Chapter 1 – Introduction: The Introduction aims to explain the background information of this research. It also gives insight into the problem statement, solutions, and research questions.

Chapter 2 – Literature Review: This chapter contains a discussion of the related topics, keeping in mind the theoretical background and various factors that are affecting BF are researched and created a conceptional framework out of previous work.

Chapter 3 – Methodology: This chapter contains a discussion on the research methodology. It outlines the taken to recruit the studies participants, recruitment criteria, data collection and data analysis.

Chapter 4 – Findings: This chapter details the results obtained through quantitative and qualitative analysis.

Chapter 5 –Conclusion and Recommendation: This chapter discusses the results and the limitations of the study. It also contains the conclusion and future work.

CHAPTER 2 LITERATURE REVIEW

In this section we present an overview of different factors investigated in this study

As per medical research by WHO , breastfeeding is the ideal feeding method for infants[9]. Exclusive breastfeeding (EBF) is essential as it improves maternal and child health. EBF means giving the infant only breast milk and no other liquids and solids except vitamins, oral rehydration, minerals, or medicines to the infant in the first six months [12]. According to the World Health Organization (WHO), optimal breastfeeding practices include initiation of breastfeeding within 1 hour of birth, EBF for the first six months of infant life, and the incorporation of weaning food after six months as breastfeeding continues up to 2 years [13].

Worldwide, only 36% of infants were exclusively breastfed between 2007 and 2014. In the U.S, the percentage of infants breastfed at birth is 81%, with the rate dropping to 44% after three months mostly because of mothers going back to work [14]. The World Health Organization (WHO) and United Nations Children’s Fund (UNICEF) have a target of having at least 50% of infants exclusively breastfed for the first six months by 2025. The Global Strategy for Infant and Young Child Feeding stresses the need to understand the social, cultural, and environmental factors affecting breastfeeding[15].

2.1 PERCEIVED BENEFITS

In the health belief model, perceived benefits refer to an individual's beliefs concerning the relative effectiveness of an action to reduce threat [16]. Benefits of breastfeeding to a child include increased intelligence, social development, productivity, educational attainment at adulthood, and income [17]. EBF promotes optimal infant growth by contributing to the daily nutritional needs of children: 100% for children of up to 6 months of age, 50% for children 6-12 months, and 35% for

those aged 12-24 months [13]. EBF reduces morbidity and mortality of infants in the first year of life and the risk of childhood obesity [12]. For lactating mothers, it reduces the risk of diabetes and premenopausal breast and ovarian cancer. Optimal breastfeeding reduces infant and child mortality across the globe [17]. Also, EBF reduces total healthcare costs by saving the money that would go into buying formula. The potential saving from breastfeeding was estimated to be around 3.6 billion dollars in 2008 [18]. On the contrary, suboptimal breastfeeding is cause of over 30% of child deaths and is linked to national gross economic losses. Delayed breastfeeding causes adverse effects such as minimized receptivity and suckling ability, which results in insufficient milk supply. Therefore, an understanding of factors that affect breastfeeding behavior is critical. Here, perceived benefits are referred to a mother belief in the perceived usefulness Breastfeeding. Thus, higher perceived benefits are likely to lead to greater attitude towards BF according to the health belief model [1]. Therefore, we hypothesize:

H1: Perceived Benefits are positively related to mother attitude towards breastfeeding

2.2 PERCEIVED BARRIERS

Here, perceived barrier refers to the barriers or difficulties that a mothers face while BF her child in different spaces like the house, educational institute and workplace. Even though studies have demonstrated that breastfeeding is important for the infant's health and help to create a bond between mother and child, mothers have consistently faced cultural and structural barriers to breastfeeding. The stigma and barriers associated to breastfeeding have been identified as the main contributing factor to low breastfeeding rates. Mothers have managed the stigmatization of breastfeeding through secrecy and avoidance of health professionals and family members who might judge them, often leading to social isolation [19].

Many mothers do not feel comfortable to breastfeed in public and that stopping them from initiating nursing [20]. Also some mothers are choosing to breast feed their babies using bottles with formula milk because they cannot find a place to express

their milk [21]. This creates an anxiety among mothers and that reduces the duration of Breast feeding [21]. Lack of social support, embarrassment, insufficient maternity leave, commercial pressures, and concerns about breast milk quality or infant weight gain are some of the reasons that encourage formula feeding [17]. Factors that affect EBF in developed countries include social class, lack of parental support, level of education, , age of the mother, level of education, employment status, workplace issues or lack of private spots to BF in public locations like shopping malls, educational institutes, and workplaces. According to the health belief model [3], perceived barrier affects behaviors negatively. Thus, higher perceived benefits are likely to increase BF attitude. We hypothesize:

H2: Perceived Barrier is negatively associated with mother attitude towards breastfeeding

Maternal factors such as education level, maternal employment, lack of partner support, perceived breast milk insufficiency during breastfeeding, using medications, higher maternal age, pre-existing health problems, and assisted delivery negatively influence the duration, willingness, and successful EBF [22]. Bottle feeding decreases the duration of EBF. A perception of insufficient supply of breast milk is a factor that determines the period of EBF. The mother's employment and period of maternity leave impact EBF. A mother's occupation negatively affects EBF by limiting the number of hours a mother spends at home with an infant. Young mothers, especially teenagers, who deliver through cesarean section and mothers with postpartum depression, report a shorter duration of EBF[23]. Smoking affects early breastfeeding, with about 11% of women in the U.S. smoking when pregnant. 50-80% of women cease smoking when pregnant but relapse in the first six months [14]. Smoking among breastfeeding mothers is linked to reduced milk production and shorter BF duration.

Effective strategies to improve the numbers of mothers carrying out EBF include pumping breast milk, educating mothers and medical staff, such midwives and nurses on breastfeeding, and close mother-baby skin contact [12].

2.3 SELF EFFICACY

Self-efficacy is another prime variable in the health belief model [24] and an important determinant of behavior. Self-efficacy is a person's self-confidence in her ability to perform a target behavior. This concept originates from the social cognitive theory [25] and also part of the health belief model determinants [24]. Mothers self-efficacy can lead to successful breastfeeding and women high in self-efficacy can breastfeed their babies much longer and exclusively than those who score low in self-efficacy [26]. In another study carried out in Japan, role of hospital practices was identified in mediating breastfeeding self-efficacy [27]. It was revealed that in “baby-friendly hospitals”, the self-efficacy intervention of hospitals improved the breastfeeding self-efficacy of mothers as well as exclusive breastfeeding self-efficacy [27]. Sometimes mothers’ personality traits can also affect the breastfeeding self-efficacy and can reduce or increase the breastfeeding status of the infant [28]. Results from a study suggested that maternal factors such as cesarean operation, smoking, education, age and premature birth, negative affectivity (e.g., anxiety or depression) led to an increased chance of mixed feeding that includes Breastfeeding and bottle feeding. Research found that those women who are less optimistic are four to five times more likely to suffer breastfeeding failure [28]. Psychological factors like depression, anxiety, and mental illness also contribute to the breastfeeding self-efficacy [29]. A longitudinal study at a university affiliated hospital in Hong Kong, conducted in 2016 highlighted that educational programs can help in improving breastfeeding self-efficacy [30]. Breastfeeding self-efficacy can predict the breastfeeding initiation and it depends on milk supply [31]. Recently, a cross-sectional descriptive research tried to diagnose the sociodemographic factors that were directly linked with breastfeeding self-efficacy of mothers. Results showed that significant number of participants faced problems with breastfeeding and 82% of them attended classes for breastfeeding but still only 37% opted for exclusive breastfeeding [31]. Consistent breastfeeding patterns for initial six months leads to higher chances of longer breastfeeding [24]. Cato et al. found that women perceived societal pressure to breastfeed, however it was balanced by their own knowledge of breastfeeding, and also their experience of breastfeeding [32]. According to the health belief model [1], self-efficacy influences health behavior positively.

Therefore, we hypothesize that:

H3: Self Efficacy is positively related to mother attitude towards breastfeeding.

2.4 SOCIAL FACTORS

Social Factors (SF) is considered as a broad perspective. Two social variables that are considered essential in social factors are social network and social support [35]. Social network is the actual relation between network members [14]. Furthermore, social support focuses on various types of social assistance received by the social network [35].

Education and income status are considered as two important variables of socio-economic status [49].

Significant socio-demographic variables influencing long-term breast-feeding activity are: age, marital status, training, social ties and economic level [50]. A study in Vancouver found that maternal age, marital status [52], ethnicity, social factors, income and education are directly associated to initiation of Breastfeeding [53].

Taking above studies in consideration, we hypothesize that:

H4: Social Factor is positively related to mother attitude towards breastfeeding

2.5 CULTURAL FACTORS

The cultural factors that are likely to influence a woman's decision to breastfeed are mostly linked to their ethnic background and religion [44]. Cultural beliefs and norms significantly influence personal choices and are a strong determinant of breastfeeding practices. Cultural beliefs and local traditions impact breastfeeding practices in different communities all over the world [45].

Most cultures find female breasts to be solely a private organ, and thus a private part of the body that needs to be concealed in the public domain [21]. It is essential for healthcare professionals to understand local traditions, customs, and beliefs related to breastfeeding to offer better support and interventions to breastfeeding mothers.

Ethnic traditions and religious recommendations may affect the duration of EBF. For example, Islam religion equates breastfeeding with sharing one's wealth with their children and recommends it for a certain number of years [17]. As a result, mothers from the Islamic community tend to breastfeed for a minimum of two years. Although the Quran recommends the practice, it is up to parents to decide, whether they will breastfeed or not and if yes, for how long. However, the Quran seems more lenient on the breastfeeding recommendation, as the decision about breastfeeding and the time of weaning is expected to be a mutual decision by both parents [17].

Also, the mother's emphasis on the privacy of breastfeeding is another aspect of Islam that can affect breastfeeding in the U.S. The requirement for Muslim mothers to cover their body parts in the presence of nonfamily members can encourage the provision of formula to infants especially when in the public [18].

African Americans mothers have the least breastfeeding rates among U.S. ethnic groups. The rate is even lower for inner-city African American women. The absence of role models, family, and friends with similar personal experiences only serve to propagate myths about the physical pain and adverse effects of breastfeeding and encourage formula feeding [18]. Breastfeeding among low-income, inner-city African American women is not popular since they relate it to a child's early dependence on the mother and the development of a "needy" or "spoiled" personality.

Hispanics mothers in the U.S. have higher rates of breastfeeding than their White or African American counterparts. However, the rates are lower than those in Mexico, where most of the U.S. Hispanic population originated [46]. Acculturation contributes to the difference in breastfeeding rates, even among specific groups of people. U.S.-born Mexican women have a higher likelihood of supplementing breastfeeding with formula and discontinuing breastfeeding compared to Mexican-born women who migrated to the U.S.

However, it is essential to note that cultural beliefs and factors that discourage breastfeeding may exist in communities that have high breastfeeding rates. For example, women of Mexican descent believe that negative maternal emotions can taint the

mother's milk [46]. In Brazil, women are not expected to exclusively breastfeed their children for six months [2]. Therefore, it is essential to understand the influence of cultural beliefs and practices breastfeeding behaviors. After going through different BF and cultural studies we hypothesize:

H5: Cultural Factors are positively related to mother attitude towards breastfeeding

2.6 BREASTFEEDING SUPPORT

Breastfeeding Support that influence breastfeeding include partner/husband and family support, friends support, peer support, health professional support, workplace place support [33]. Such mothers are more likely to control their work environment and schedule, which provides the support required for a longer duration of breastfeeding.

Educating mothers on breastfeeding increases the chances of breastfeeding initiation and continuation by about 41% [34]. Health professional support that include prenatal breastfeeding classes equip women with skills to deal with challenges that arise at the beginning of breastfeeding, such as breast engorgement, perception of insufficiency supply of milk cracked nipples and long-term skills in the establishment of breastfeeding and pumping routines. BF mothers have a tendency to rate breastfeeding support as more important than health service support [35].

Companionship and social support include support and information from healthcare professionals, and family support in the hospital setting and at home. Social support empowers women in the process of breastfeeding, especially where there is a separation between the mother and child. Support from family and healthcare professionals is essential to the success of breastfeeding as mothers get information on what to do and how to care for the newborn. The optimal benefits of breastfeeding support occurs when it comes from friends and family [14]. It is important to note that family and healthcare professionals have distinct roles in supporting mothers, and neither can replace the other. Healthcare professionals should consider the doubts, actions, and opinions of the family regarding breastfeeding and advise them accordingly.

Support networks, both formal and informal, have been recognized as influencing maternal decisions and subjective experiences in relation to breastfeeding. For example,

approval of breastfeeding decisions from the father of the child has been found to affect women's breastfeeding practices [36][37][38] as has the social support from family members, such as the woman's mother and friends [39].

Based on above studies, we hypothesize:

H6: Breastfeeding Support is positively related to mother attitude towards breastfeeding

2.7 ENVIRONMENTAL FACTORS

Hector et al discussed environmental factors as conditions that have a significant effect on mothers and children, such as the environment in hospitals and medical services, home and peer setting, especially: Family situations, job setting and the neighbourhood environment, as well as policies in public spaces [38]. The inadequate workplace facilities for breastfeeding mothers have been documented in studies as major factor that affects breastfeeding mothers [47].

Skin-to-skin contact are strongly associated with increased breastfeeding initiation. A mechanism that improves breastfeeding initiation and continuation is for mother and child to stay together at the hospital as it enhances attachment with the dyad [12]. Breastfeeding policies at hospitals on that include staff encouragement of early breastfeeding, training, education, and restrictions of pacifiers are critical in determining the rates of breastfeeding in U.S. hospitals [18]. Breastfeeding is a human activity influenced by maternal, social, cultural, environmental factors. The factors interact in various ways to influence the perception, process, duration, and effectiveness of breastfeeding.

For EBF, we will consider all the positive elements like support systems at home and workplace that would encourage the mother to Breastfeed [47]. In the United States, lack of post-partum leave contributes to early reduction of breastfeeding, particularly women who are non-management staff, are experiencing high occupational distress [48]. Quick access to a private breastfeeding space has been identified to increase the time for breastfeeding as this will aid mothers in returning back to school or employment [12].

Therefore, our hypothesis is that:

H7: Environmental factors are positively related to mother attitude towards

2.8 BREASTFEEDING NORM

Breastfeeding norm derived from subjective norm is the belief that people or group of people who are important to the mother will approve and support their breastfeeding behavior [40]. Breastfeeding norm (BF norm) is the integral part of breastfeeding behavior of all mothers. Here, it is used as the dependent variable and is not considered as a stand alone factor. The World Health Organization (WHO) recommended a least six months of exclusive breastfeeding in 2001 [26] and it was reasserted in 2012. BF norm is based on theory of planned behavior (TPB) which emphasizes on intentional behavior based on one's beliefs and subjective norms [40].BF norm is associated with cultural and behavioral norms[38].

Breastfeeding norm remains constant for almost every mother, however, its duration can vary from mother to mother and some mothers can go for prolonged breastfeeding [41]. Therefore, breastfeeding norm is often known as subjective norm because although it's based on planned control behavior, but the intention, motivation, initiation, prediction and maintenance are varying from one person to another. To validate this point, a study was conducted in 2012 to observe and predict the variation in breastfeeding behavior in White British and South-Asian mothers[42]. On average, at least six months exclusive breastfeeding is set as a norm due to a significant role of psychosocial factors [42].

At times, it can also happen that previous experience of mothers becomes a driving force in setting the breastfeeding norm and eventually determining the breastfeeding behavior [43]. Findings from a qualitative survey concluded that mothers who bottle-feed their babies often feel guilty, depressed and anxious, as bottle-feeding is risky and breastfeeding is a healthy option available [43]. In line with the above discussion, we hypothesize that:

H8: Breastfeeding Norm is positively related to mother attitude towards breastfeeding
breastfeeding

2.9 EXPERIENCE LEVEL OF EXCLUSIVE BREASTFEEDING

Berger highlighted that mothers who have experience related to breastfeeding have a positive attitude towards breastfeeding [54]. As per study of Fisher et al., more experienced mother, meaning mothers who has breastfed more than one babies show positive attitude towards breastfeed [55]. Mohammed and Soliman found that there was a significant relationship between mothers age and previous experience about breastfeeding [56]. There is clear evidence that older generation with more experience, marital status, occupation of parents, household earnings, education level and higher earnings are greatly associated with prolonged Breastfeeding [51].

Other research also found that more experienced mother, meaning mothers who fed more than one baby show positive attitude towards BF [57][58][33]. Therefore, we hypothesize that:

H9: Experience is positively related to mothers' attitude towards breastfeeding.

This hypothesis is further broken down into sub-hypotheses corresponding with the seven distinct factors examined in this research:

H9(a): Experience moderates the impact of perceived benefits on mothers' attitude towards BF.

H9(b): Experience moderates the impact of perceived barriers on mothers' attitude towards BF.

H9(c): Experience moderates the impact of self-efficacy on mothers' attitude towards BF.

H9(d): Experience moderates the impact of social factor on mothers' attitude towards BF.

H9(e): Experience moderates the impact of cultural factor on mothers' attitude towards BF.

H9(f): Experience moderates the impact of breastfeeding support on mothers' attitude towards BF.

H9(g): Experience moderates the impact of environmental factors on mothers' attitude towards BF.

H9(h): Experience moderates the impact of breastfeeding norm on mothers' attitude towards BF.

2.10 YOUNG MOTHERS VS MATURE MOTHERS BREASTFEEDING ATTITUDE

Young mothers that got support from the hospital and at home tend to breastfeed their babies longer [59][58]. Young mothers chose bottle feeding because they felt that breastfeeding would make it challenging to go back to school or work. The information given by the health professional to young mothers encourage the value of breastfeeding among lactating mothers. Moreover, this information also encourage mothers to continue breastfeeding their babies once discharged from the hospital after child-birth [58].

Another important study revealed that smoking, parental education, parental age and maternal employment are associated with short term breast feeding [60]. In a study [57] the researcher explored maintenance of exclusive breastfeeding and associated it with socio-economic styles and different levels of education, depression and anxiety, and intention to breastfeed. The study data revealed that if these factors are controlled that older women tend to maintain BF.

According to a study in Norway, older maternal age group favors EBF [61]. Similarly, Lande et al. [62] found that older maternal age group has an effect on mothers behaviors in regard to breast-feeding decisions. Females in their mid-thirty or older are more likely to quit breastfeeding than females of 30-34 [63].

Keeping above studies in consideration and relate it to the demographics of the current study we hypothesize that:

H10: Age moderates the impact of various factors on mother's attitude towards breastfeeding.

This hypothesis is further broken down into sub-hypotheses corresponding with the seven distinct factors examined in this research:

H10(a): The moderating effect of age increases the positive impact of perceived benefits on mother attitude towards BF

H10(b): The moderating effect of age increases the positive impact of perceived barriers on mother attitude towards BF.

H10(c): The moderating effect of age increases the positive impact of self-efficacy on mother attitude towards BF.

H10(d): Age moderates the impact of Social factor on mothers' attitude towards BF.

H10(e): The moderating effect of age increases the positive impact of cultural factors on mother attitude towards BF.

H10(f): The moderating effect of age increases the positive impact of breastfeeding support on mother attitude towards BF.

H10(g): The moderating effect of age increases the positive impact of environmental factors on mother attitude towards BF.

H10(h): The moderating effect of age increases the positive impact of breastfeeding norm on mother attitude towards BF

2.11 TECHNOLOGY ,SOCIAL MEDIA AND BREASTFEEDING

Social media, mainly Facebook and twitter is an essential tool to disseminate breastfeeding information. However, it has been identified that these platforms are not being utilized to full capabilities. Participants frequently used social media for educational and social support and searched the internet for prenatal and other parenting information. A study mentions that majority of pregnant ladies use social media mobile application during their pregnancies and after giving birth [6]. Same research states that participants acquired substantial information concerning infant development and breastfeeding through Facebook application. The use of internet to gain breastfeeding knowledge is relatively a new approach and aiding breastfeeding mothers[99].Therefore,

increasing popularity in the use of social media offers an opportunity to create more innovations towards mobile applications to promote breastfeeding among young mothers. Over the past years, social media platforms and mobile devices have become part of our daily lifestyle [64]. Lack of social support contributed to low breastfeeding rates in the United States. Social networking sites such as Facebook are online platforms that provide breastfeeding support through female-dominated groups [65]. In such groups, women share their experiences of breastfeeding and provide each other with information and emotional support by offering encouragement, exchanging information, offering empathy, and sharing experiences. Social media groups provide emotional support, exchanging information groups that are providing encouragement, empathy and examples of similar experiences [65].

An example of how mobile apps can support breastfeeding is Mamava. It is an app that helps mothers to locate lactation spaces distributed all over the United States. Communication technology used at Mamava demonstrates the creators' understanding of breastfeeding mother's physical, emotional, and logistical considerations [17]. Mamava has a comprehensive directory of lactation spaces. GPS as a tool guides mothers where they need to go. The "Sounds for Letdown" is a feature in the app that provides a gentle white noise for acoustic privacy to cover the sound of the pump. Van Hatch [66] argues that social media has been compared to "a chat in a restaurant, a culture that is virtually constructed by pervasive, interconnected, and diversified media systems". The young "mother's participation on social media can lead to increased perception of social support" [4]. Nielsen [4] further mentions social media is an important mode of communication for mothers. Nicole reveals that there are many support groups on social network software, which contain supporting messages in reaction to mother's post [65]. Heather et al. suggests that online support networks are very efficient in meeting mothers' needs [67].

However, there is limited research on the impact of social media on breastfeeding. According to recent research studies, social networking sites are excellent platforms to share health information as they enable women to interact as both providers and receivers

of health information and knowledge [68]. Mothers use social media support groups to exchange information for nursing [67]. Breastfeeding mothers have been using social media support groups to seek emotional support on how they handled breastfeeding while sleeping [67]. A research by Patricia [109] identifies that a virtual group of mothers with small children increases social power especially when women are isolated as new mothers. Mobile health (mhealth) interventions can potentially address factors that contribute to breastfeeding disparities, particularly among African-American women [69]. Smartphone apps have the potential to provide an effective and low-cost way to disseminate information about the importance of breastfeeding to nursing mothers [70]. Therefore, it is essential to research on the influence of social media and mobile apps on breastfeeding.

H11: Social media and e-communication negatively affect the mother-child relationship?

2.12 CONCEPTUAL FRAMEWORK

The health belief model (HBM) [24] provides a useful framework for studying health behavior among individuals. The study discussed about different factors that may influence health behavior or attitude of a person to adapt [24][71]. This model has been widely employed to study all types of healthcare behavior. The six factors highlighted by the health belief model as influencing health behaviors include: Perceived benefit, perceived barrier, self-efficacy, cue to action, perceived susceptibility, and perceived severity. We adopt the HBM as the conceptual framework of this study. We removed the cue to action, perceived susceptibility, and perceived severity which we believe do not apply much to the context of our research on breastfeeding behavior. We extend the model by adding five additional factors: the environmental, cultural, social factors, social support, and breastfeeding norm based on the review of the literature that shows these factors impact breastfeeding behaviors as discussed above [72].

Figure 2.1 illustrates the HBM conceptual framework and shows how study variables fit into the model.

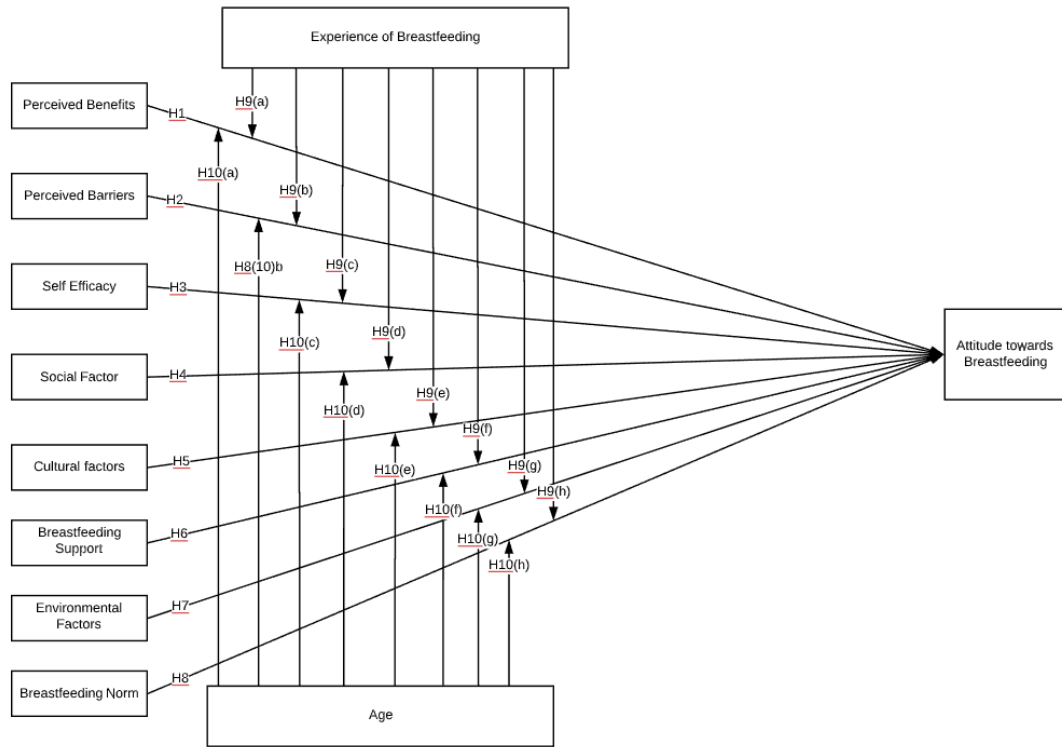


Figure 2.1 The Conceptual Framework Guiding this Study.

CHAPTER 3 RESEARCH METHODOLOGY

3.1 RESEARCH DESIGN

The study was designed using mixed method technique, a questionnaire was filled out followed by an in-depth interview with open-ended questions.

3.2 DATA COLLECTION

Information about the study was distributed through social media sites such as Facebook and Kijiji. In an effort to get a socioeconomically diverse study population, mothers were recruited from community centres, university campus, social networking sites such as Breastfeeding Support Group on Facebook and a crowd-sourcing platform: Amazon Turk. In previous work, Amazon Mechanical Turk (AMT) has been shown to be a valid tool for conducting user studies [73]. Criteria for selection on MTurk was self-identified breastfeeding mothers with HIT approval rate above 95%. Potential participants were asked to fill out the survey hosted in Dal-opinio. Consent was obtained from all study participants prior to the initiation of the survey.

3.3 STUDY PARTICIPANTS

Data was collected through completion of questionnaires and semi structured interviews. The duration of Questionnaire completion was 15-120 minutes.

The questionnaires were administered through dal opinio. Total 552 respondents completed the questionnaire. We eliminated incomplete responses and the participants who did not correctly answer the attention questions on MTurk [74].

Twenty mothers with BF experience were recruited through community centres and community breastfeeding support groups for the indepth interview. In order to get information about breastfeeding experience, mothers with breastfeeding experience were approached for this study. Mothers were recruited with different ethnic backgrounds from different continents and a semi-structured interview guide was used for this purpose. A semi-structured interview based on how breastfeeding mothers associate with technology

and what other factors affect breastfeeding, was used for the interview. Initial interview questions were based on a semi structured interview guide followed by the researcher prompts and questions. Participants were able to develop their own conversation topics as needed. The interview was conducted using a voice recorder and the duration was between 30–45 min.

The decision to breastfeed a baby and how long to do it for is primarily of the mother. Therefore, the appropriate population for the research is mothers with BF experience around the globe. This was irrespective of whether they are breastfeeding currently, or did it in the past.

3.4 INSTRUMENT FOR QUANTITATIVE DATA

A pre-designed questionnaire (Appendix 2A) was used to collect the data. The questionnaire was adapted from a previously published paper [75]. Part one of the questionnaire included 14 questions to collect background information of participating mothers. This included demographic questions and technology usage questions. Part 2 captured responses about various factors influencing breastfeeding behaviours via 5 point Likert scales with responses ranging from Strongly Disagree (1) to Strongly Agree(5). It covered variables mainly Perceived Barrier, Breastfeeding support, Culture factors, Environment factors, Breastfeeding norm, Self-efficacy, Perceived benefit, Social factors. Formal ethical approval was obtained from the ethics committee of the university. All participants gave informed consent prior to participating in the study.

3.5 VARIABLES

The variables that were factored into the research study include barriers, self-efficacy, cultural factors, social support, breastfeeding norm, environmental factors, social factors, barriers and perceived benefit. They all represent factors that the study was evaluated to establish whether they have any significant influence on the attitudes and likelihood of breastfeeding children in mothers.

3.6 SMART PLS AND STRUCTURAL EQUATION MODELLING (SEM) DATA ANALYSIS

We used Smart PLS 3, one of the prominent software applications developed by Ringle, Wende & Will [76] used for Partial Least Squares Structural Equation Modelling (PLS-SEM), to perform path analysis to test our data in each group. Smart PLS has a graphical user interface (GUI) and provide many features that allow end-users to create structural models, importing indicator data and generating outputs of parameter estimates in a comfortable manner. PLS is a soft modeling approach to SEM with no assumptions about the data distribution [76]. PLS-SEM has been deployed in many fields, such as behavioral sciences, marketing [77], organizational health sciences, Management Information System (MIS) and business strategy [78]. It is a comprehensive statistical approach for testing hypotheses about relations among observed and latent variables [79].

3.7 PATH ANALYSIS

Path Analysis is a comprehensive methodology for specifications of relationships between variables, which is a subset of SEM - a multivariate procedure. Path analysis, as defined by Ullman [80] is a technique that allows examination of a set of relationships between one or more independent variables, either continuous or discrete, and one or more dependent variables, either continuous or discrete [80]. Path analysis is considered an appropriate technique for investigating economic trends, health issues, family and peer dynamics, self-concept, exercise, self-efficacy, depression, psychotherapy, and other such related phenomena [81]. Several HCI and health informatic research has successfully employed SEM in their analysis [82]–[87] and we carefully followed their procedure in our analysis.

3.8 DATA ANALYSIS

As noted in Chapter 1, the main objective of this research is to investigate the various factors that influence breastfeeding behavior. The study by Kong and Lee [75] was employed as the base for our research study. Therefore, the questionnaire used in our research study as a data collection instrument were adapted from Kong and Lee [75]. We developed models using the Partial Least Square Structural Equation Model (SEM) to show the relationship between various factors and the likelihood of breastfeeding, and the moderating effects of age and breastfeeding experience of the subjects.

3.9 RELIABILITY AND VALIDITY ANALYSIS:

We report here the indicators for model validity and used various measures to test model reliability and validity using SmartPLS SEM. The reliability is measured through Composite reliability and Cronbach's Alpha, the widely used method for estimating the internal consistency [88]. The values of Cronbach alpha and composite reliability ranges between 0 and 1, where a higher value indicate a higher level of reliability or internal consistency [89]. Accordingly, construct reliability is same for both the measures, i.e. Cronbach alpha value and composite reliability value must be 0.70 or higher [89] [83]. As shown in Table 3.1, the values of Cronbach alpha are all above 0.75 and composite reliability are above 0.80 for all the factors in our research study. This indicates that both the measures of internal consistency demonstrate high values. Consequently, the condition of internal consistency is met, hence the construct used are reliable. Similarly, the values of AVE ranges between 0 and 1 is used to measure the convergent validity, where a higher value indicates a strong convergent validity. The values of both Cronbach alpha and composite reliability must ≥ 0.70 in conjunction with AVE of >0.50 . Furthermore value of ≥ 0.4 is also acceptable if Cronbach alpha is ≥ 0.70 [84]. We have adopted the model reliability and validity used in this research study from Orji et al. [82-86]. The scale validity and reliability are presented in table 3.1.

Table 3.1: Validity and Reliability of the Scales

Variables	AVE	Composite reliability	Cronbach's alpha
	Threshold values		
	≥ 0.5	≥ 0.7	≥ 0.7
PBN	0.49	0.85	0.79
BAR	0.47	0.888	0.862
SEF	0.618	0.958	0.952
BFS	0.59	0.91	0.884
BFN	0.602	0.9	0.867
CLF	1.00	1.00	1.00
ENF	0.603	0.815	0.754

SLF	0.483	0.821	0.763
AVE= Average Variance Extract, PBN = Perceived Benefit, BAR = Perceived Barrier, SEF =Self Efficacy, BFS = Breastfeeding Support, BFN = Breastfeeding Norm, , CLF =Cultural Factor, ENF -Environmental Factor, SLF - Social Factor			

According to Kong and Lee [74], the data collection instrument has a Cronbach alpha value of 0.71 which is very reliable. It shows reliability of the construct used. Therefore, the questionnaire employed in the present study was internally consistent and highly reliable.

3.10 EXCLUSION CRITERIA

We excluded questions in the Variables that loaded <.5. for example, a question from perceived benefit “Breastfeeding helps mothers loss weight” had a low value of 0.43 which was removed from the model. We ran the models multiple times and took out variable one at a time until the loading up ≥ 0.5 were retained.

CHAPTER 4 FINDINGS

4.1 BACKGROUND QUESTIONS ANALYSIS

Total 550 valid responds were included in the analysis. The demographic information is as presented in Table 4.1.

Table 4.1 Participant Characteristics

Characteristics	Responses	N=550
Age	Under 18	0
	18–20	2
	21-25	38
	26–30	109
	31–35	148
	36–40	132
	40+	121
Mothers who own a mobile phone	Yes	544
	No	6
Using social media while BF affect positively	Yes	201
	No	349
Maximum duration breast fed baby	Less than 6 months	132
	6 months - 1 yr	198
	1-2 yrs	220

Out of the total respondents of 550, 206 had Bachelor’s degree, 139 had Master’s degree, 60 with associate degree, 48 went to college, and 36 had Professional degrees such as law ,MBA ,Medicine, MD, as shown in Figure 4.1.

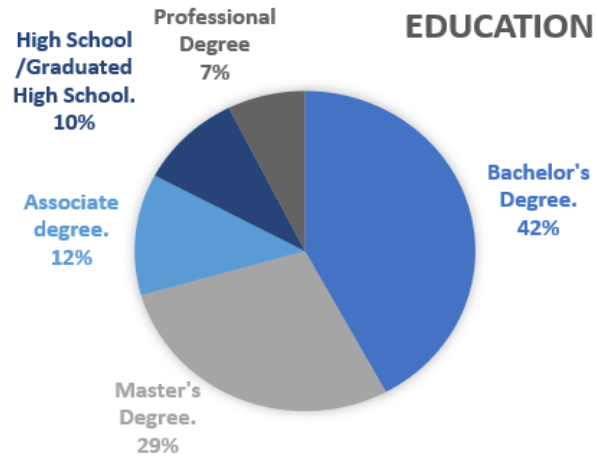


Figure: 4.1 Educational demographics

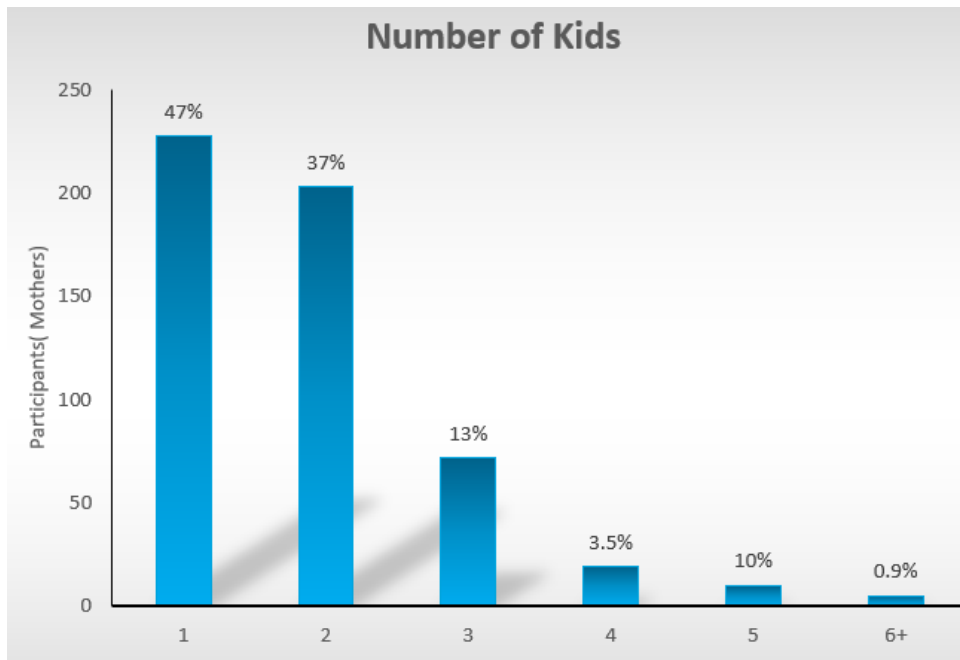


Figure: 4.2 Illustration of Number of children

As shown in Figure 4.2, 47% mothers had one child, 37% had 2 children, 13% mothers had 3 children, 3.5% were mother of 4 children, 10% mothers had 5 children, and only 0.9% mothers with more than 5 children participated.

When asked about usage of Breastfeeding apps, 24% mothers responded with a ‘Yes’ whereas 76% responded to ‘No’ as shown in graphical illustration Figure 4.3.

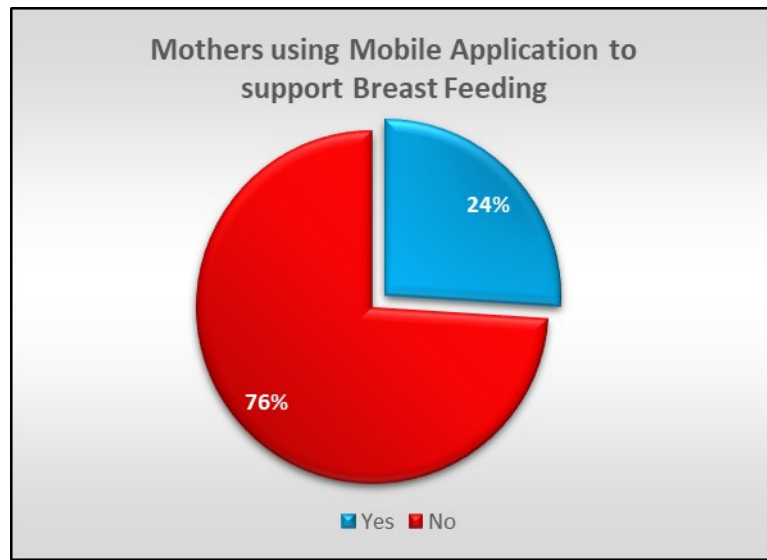


Figure 4.3 Illustration of Mothers using Breastfeeding Application

Social Media can be used for various reasons. As shown in Figure 4.4, 50% mothers said they use social media for connecting with friends, 47% for entertainment purposes, 32% for catching up on work, 32% for connecting with family and 21% to connect with other breastfeeding mothers.

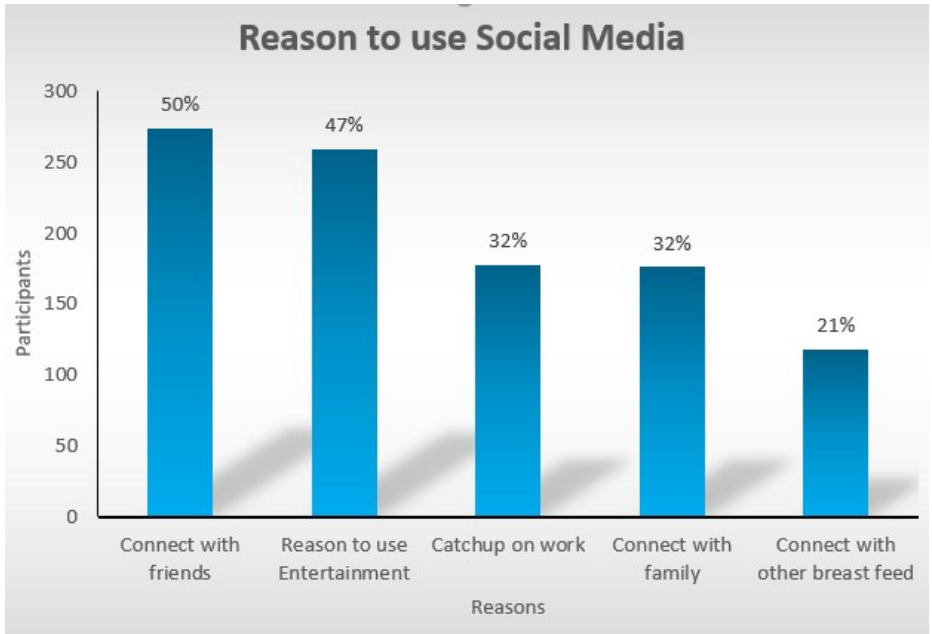


Figure 4.4 Illustration of reasons why mothers are using Social media

Mothers are using different types of social media platforms to stay connected with their work or family/Friends. When asked their preferred social media, Facebook seemed to be the most widely used with a total of 90% of responses. For this specific question mothers had the option to choose more than one option. Figure 4.5 shows which social media they use the most.

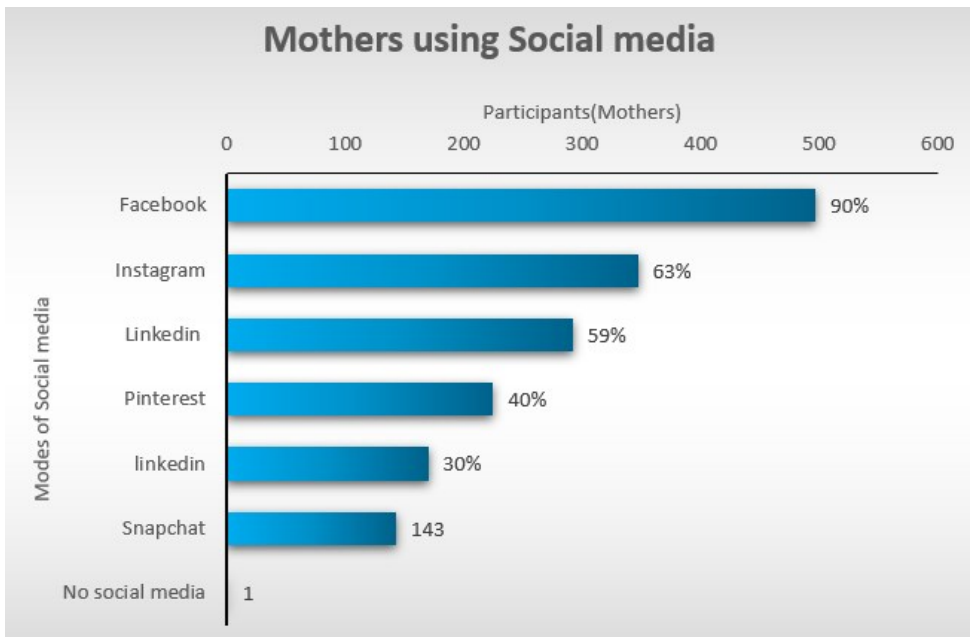


Figure: 4.5 Mothers using different types of Social Media

4.2 QUANTITATIVE DATA ANALYSIS

Kong and Lee [75] found that personal, cultural, social, and environmental factors are common influencing factors in the decision to breastfeed. Mother's age and experience, followed by husband's support, were identified as important in influencing infant feeding choices. Expected local cultural differences were also identified as an influential predictor. A research In Vancouver [90] highlighted that confidence with breastfeeding, the ability to be discreet, the mother's body image, previous experience, age of the mother, the audience, support of the partner, breastfeeding location and perceptions of societal expectations, all impacted upon the decision of breastfeeding.

Table 4.2 Smart PLS analysis for factors influencing mothers' attitude

Factor	PBN	BAR	SEF	SLF	CLF	BFS	ENF	BFN
Path Coefficient	0.43	-0.07	0.13	0.00	0.10	0.10	-0.06	0.21
P- value	0.0001	0.19	0.0001	0.100	0.003	0.034	0.07	0.0001
PBN = Perceived Benefit, BAR = Perceived Barrier, SEF =Self-Efficacy, SLF = Social Factor, CLF =Cultural Factor, BFS = Breastfeeding Support, ENF = Environmental Factor , BFN = Breastfeeding Norm								

Table 4.2 consist of different factors that were expected to have an impact on the attitude of mothers towards breastfeeding. It shows the path coefficients and p-values of factors under study. The path coefficient represents the strengths of the relationship while the p-value shows the significance of the relationship. Moreover, the path coefficients with values around 0.10 indicate a small effect, values above 0.30 indicate a medium effect and values greater than 0.50 indicate a large effect [91]. Whereas, p-values less than 0.05 indicate a statistically significant effect/relationship and p-values above 0.05 level of significance indicate an insignificant effect/relationship [92].

Table 4.2 consist of different factors that were expected to have an impact on the attitude of mothers about breastfeeding. It shows the path coefficients and p-values of factors under study.

4.2.1 Factor-I: Perceived Benefits

As shown in Table 4.2, perceived benefits have a path coefficient of 0.43 with p-value of 0.0001. This specific value of path coefficient indicates a moderate and positive effect of this particular factor on the attitude of mothers towards breast feeding ($\beta > 0.40 < 0.50$, $p < 0.05$) [91]. Moreover, its p-value is less than 0.05 level of significance. It indicates that perceived benefits have statistically significant positive impact on the attitude of mothers related to breast feeding ($p < 0.05$) [91].

To sum up the findings, perceived benefit is representing Health benefit for mother and baby that also include economic affordability. PBN positively influences the attitude of mothers about breastfeeding their baby. It can be summarized that mothers who understand the benefit of breastfeeding are more likely to breastfeed their babies. Based on these findings, H1 is accepted and it is stated that perceived benefit is positively related to attitude towards breastfeeding.

H1: Perceived benefit is positively related to mother attitude towards breastfeeding.

This result is in line with the studies of Wambach and Koehn [93] [94].

4.2.2 Factor-II: Perceived Barriers

As shown in Table 4.2, perceived barrier has a path coefficient of -0.07 with p-value of 0.19. This specific value of path coefficient is very low and negative which indicates a negligible negative effect of perceived barrier on the attitude of mothers towards breastfeeding ($\beta < 0.10$, $p > 0.05$) [91]. Moreover, its p-value is above than 0.05 level of significance. It indicates that perceived barriers have statistically insignificant negative impact on the attitude of mothers towards breastfeeding ($p > 0.05$) [92].

On the basis of these findings, it can be stated that perceived barriers do not influence the attitude of mothers about breastfeeding their child. These barriers are inconvenience to breastfeed in public or difficulty in breastfeeding. Thus, perceived barriers are not one of the factors that hinder mothers to breastfeed their baby ($\beta < 0.10$, $p > 0.05$). Therefore, H2 which stated that perceived barriers affect the attitude of mothers towards breastfeeding their baby is rejected.

H2: Perceived Barriers are negatively related to mother attitude towards breastfeeding. This result is in line with the studies of Tucker [95].

4.2.3 Factor-III: Self-Efficacy

As shown in Table 4.2, self-efficacy has a path coefficient of 0.13 with p-value of 0.0001. This specific value of path coefficient is low and positive which indicates a weak and positive effect of self-efficacy on the attitude of mothers towards breastfeeding ($\beta > 0.10 < 0.30$, $p < 0.05$) [91]. Moreover, its p-value is less than 0.05 level of significance which indicates that self-efficacy has statistically significant positive impact on the attitude of mothers related to breastfeeding despite the low path coefficient ($p < 0.05$) [92]. To sum up the findings, self-efficacy can positively influence the decision of mothers related to breastfeeding their baby. Self efficacy can be determined by indicators like satisfaction to breastfed and managing to carry on with bresatfeeding. It can be summarized that mothers with strong self-efficacy are more likely to breastfeed their baby. Based on these findings, H₃ which stated that self-efficacy is positively related to attitude towards breastfeeding is accepted.

H3: Self-efficacy is positively related to mother attitude towards breastfeeding.

This result is in line with the study of Dennis, [27] .

4.2.4 Factor-IV: Social Factor

As shown in Table 4.2, social factor has a path coefficient of 0.0 with p-value of 0.10. This specific value of path coefficient is zero which indicates no effect of social factor on the attitude of mothers towards breastfeeding ($\beta = 0$, $p > 0.05$) [91]. Moreover, its p-value is higher than 0.05 level of significance which indicates that social factor has statistically insignificant impact on the attitude of mothers towards breastfeeding ($p > 0.05$) [92].

On the basis of these findings, it can be stated that social factor like criticism in public and harrasmnet does not influence the attitude of mothers about breastfeeding their child

($\beta=0$, $p>0.05$). Therefore, H4 which stated that social factor positively affects the attitude of mothers towards breastfeeding is rejected.

H4: Social factor is positively related to mother's attitude towards breastfeeding.

This result is in line with the study of Wambach, Aaronson, Domian, Rojjanasrirat, & Yeh [93].

4.2.5 Factor-V: Cultural Factors

As shown in Table 4.2, cultural factor has a path coefficient of 0.10 with p-value of 0.003. This specific value of path coefficient is low and positive which indicates a weak and positive effect of cultural factor on the attitude of mothers towards breastfeeding ($\beta=0.10<0.30$, $p<0.05$) [91]. Moreover, its p-value is less than 0.05 level of significance which indicates that cultural factor has statistically significant positive impact on the attitude of mothers related to breastfeeding despite the low path coefficient ($p<0.05$)[92].

On the basis of these findings, it can be stated that cultural factor positively influences the attitude of mothers about breastfeeding their child. It can be summarized that mothers with supporting culture including breastfeeding in public are more likely to have a positive attitude towards breastfeeding their baby. Based on these findings, H₅ which stated that cultural factor is positively related to mothers' attitude towards breastfeeding is accepted. This result is in line with the study of Nelson & Sethi [98].

H5 : Cultural factor is positively related to mother attitude towards breastfeeding.

4.2.6 Factor-VI: Breastfeeding Support

As shown in Table 4.2, breastfeeding support has a path coefficient of 0.10 with p-value of 0.034. This specific value of path coefficient is low and positive which indicates a weak and positive effect of breastfeeding support on the attitude of mothers towards breastfeeding ($\beta=0.10<0.30$, $p<0.05$) [91]. Moreover, its p-value is less than 0.05 level of significance which indicates that breastfeeding support has statistically significant positive impact on the attitude of mothers related to breastfeeding despite the low path coefficient ($p<0.05$) [92].

On the basis of these findings, it can be stated that breastfeeding support positively influences the attitude of mothers about breastfeeding their child. It can be summarized that mothers with strong breastfeeding support like spouse support, health care professionals support or friends support are more likely to breastfeed their baby. Based on these findings, H6 which stated that breastfeeding support is positively related to mother's attitude towards breastfeeding is accepted.

H6: Breastfeeding support is positively related to mother's attitude towards breastfeeding. This result is in line with the studies of Alexander, O'Riordan, & Furman [96][94].

4.2.7 Factor-VII: Environmental Factors

As shown in Table 4.2, environmental factor has a path coefficient of -0.06 with p-value of 0.07. This specific value of path coefficient is very low and negative which indicates a negligible negative effect of environmental factor on the attitude of mothers towards breastfeeding ($\beta < 0.10$, $p > 0.05$) [77]. However, its p-value is higher than 0.05 level of significance which indicates that environmental factor has statistically insignificant impact on the attitude of mothers towards breastfeeding ($p > 0.05$) [92].

On the basis of these findings, it can be stated that environmental factors like workplace breastfeeding places or other maternity leave issues do not influence the attitude of mothers about breastfeeding their child ($\beta < 0.10$, $p > 0.05$). Therefore, H7 is rejected and it is stated that environment factors do not affect the attitude of mothers towards breastfeeding their baby.

H7: Environment factors are positively related to mother attitude towards breastfeeding. This result is in line with the study of Dennis, Heaman, & Mossman [27].

4.2.8 Factor-VIII: Breastfeeding Norm

As shown in Table 4.2, breastfeeding norm has a path coefficient of 0.21 with p-value of 0.000. This specific value of path coefficient is low and positive which indicates a weak and positive effect of this particular factor on the attitude of mothers towards breastfeeding ($\beta > 0.20 < 0.30$) [91]. Moreover, its p-value is less than 0.05 level of

significance which indicates that breastfeeding norm has statistically significant positive impact on the attitude of mothers related towards breastfeeding ($p < 0.05$) [92].

On the basis of these findings, it can be stated that breastfeeding norm positively influences the attitude of mothers about breastfeeding their child. However, this particular factor has a low effect on the attitude of mothers towards breastfeeding ($\beta > 0.20 < 0.30$, $p < 0.05$). To sum up the findings, breastfeed norm is one of the factors that can positively influence the decision of mothers related to breastfeeding their baby. It can be summarized that mothers who have positive norms and beliefs like family and friend opinion about breastfeeding will possess a very positive attitude towards breastfeeding their baby. Based on these findings, H8 is accepted and it is stated that breastfeeding norm is positively related to attitude towards breastfeeding.

H8: Breastfeed norm is positively related to mother attitude towards breastfeeding.

This result is in line with the studies of Alexander, O’Riordan, & Furman [96] and Dyson, [97].

4.2.9 Moderating Effect of Experience

Rahman and Akter found that lack of appropriate breastfeeding experience, lack of support from family and society, age group are very influential in mothers attitude towards breastfeed [100]. Mgongo et al. found that experienced mothers have the basic knowledge which encourages them to breastfeed as it prevents child sickness, creates happiness, and is good for family economy [81].

Based on this, we investigated the moderating effect of experience on mothers’ attitude towards breastfeeding. To examine for moderating effect of experience, we conducted a multi-group analysis using SmartPLS 3 to compare the three different age groups as shown in Figure 4.3.

Table 4.3: Total number of experienced and In-experienced mothers.

Groups	No. of Mothers
Inexperienced Mothers (With one kid)	241
Experienced Mothers (With more than one kid)	309

Table 4.3 consist of grouping of the respondents based on number of children they have. They have been divided into two categories i.e. inexperienced mothers and experienced mothers. The respondents who have one kid have been categorized as inexperienced mothers and the respondents who have more than one kid have been categorized as experienced mothers.

As per Table 4.3, 241 (44%) mothers have one kid (Group 1-inexperienced mothers), 309 (66%) mothers have more than one kid (Group 2-experienced mothers). Thus, group 2-experienced mothers constitute the major part of the sample. We hypothesized that:

H₉: Experience moderates the impact of various factors on mother’s attitude towards breastfeeding.

This hypothesis is further broken down into eight sub-hypotheses corresponding with the eight distinct factors examined in this research:

Table 4.4 Smart PLS analysis for mothers with different number of children

Groups	Path/p-value	PBN	BAR	SEF	SLF	CLF	BFS	ENF	BFN
Inexperienced Mothers (Group-I)	Path Coefficient	0.36	-0.03	0.12	0.04	0.12	0.16	-0.11	0.17
	P- value	0.0001	0.70	0.04	0.60	0.02	0.04	0.06	0.01
Experienced Mothers (Group-II)	Path Coefficient	0.46	-0.08	0.14	-0.04	0.09	0.08	-0.03	0.23
	P- value	0.0001	0.16	0.002	0.50	0.02	0.17	0.45	0.0001

PBN = Perceived Benefit, **BAR** = Perceived Barrier, **SEF** =Self Efficacy, **SLF**- Social Factor, **CLF** =Cultural Factor, **BFS** = Breastfeeding Support, **ENF** =Environmental Factor, **BFN** = Breastfeeding Norm, ,

4.2.10 Moderating Effect of Experience on Perceived Benefits

As shown in Table 4.4, for inexperienced and experienced mothers, perceived benefit has path coefficients of 0.36 with p-value of 0.0001 and 0.46 with p-value of 0.0001 respectively. For both groups, path coefficients are moderate and positive ($\beta > 0.30 < 0.50$,

$p < 0.05$) [91]. It indicates statistically significant effect of perceived benefit on the attitude of mothers towards breastfeeding for both groups ($p < 0.05$). The path coefficients moderate values also infer a moderate positive relationship between perceived benefit and attitude towards breastfeeding for both groups ($p < 0.05$) [92].

Since, path coefficients for both groups are still significant ($p < 0.05$), thus, perceived benefit significantly influences mother's attitude regardless of experience. It is also same for the general group where the effect of perceived benefit on mother's attitude towards breastfeeding was also significant (see Table 4.2).

On the basis of these findings, it can be stated that there is no significant difference between the path coefficients for the groups, hence experience does not moderate the impact of perceived benefit on mother's attitudes towards breastfeeding.

Therefore, H10(a) which stated that experience moderate the impact of perceived benefit on mothers' attitude towards breastfeeding is rejected.

H9(a): Experience moderates the impact of perceived benefit on mother's attitude towards breastfeeding

4.2.11 Moderating Effect of Experience on Perceived Barriers

As shown in Table 4.4, for inexperienced and experienced mothers, perceived barriers have path coefficients of -0.03 with p-value of 0.7, and -0.08 with p-value of 0.16 respectively. For both groups, path coefficients are negative but almost negligible which indicates a negligible negative effect of this factor regardless of experience on the attitude of mothers towards breastfeeding ($\beta < 0.10$, $p > 0.05$) [91]. These low values also infer a negligible relationship between perceived barriers and attitude towards breastfeeding regardless of age ($\beta < 0.10$, $p > 0.05$). It indicates that regardless of number of children, perceived barriers have statistically insignificant impact on the attitude of mothers related to breastfeeding ($p > 0.05$) [92].

Since there is no significant difference between the groups, it means that regardless of experience, perceived barrier has statistically insignificant impact on the attitude of

mothers towards breastfeeding ($p > 0.05$). This result is similar to the general group model that showed perceived barrier has no effect on mother's attitude towards breastfeeding (see Table 4.2).

On the basis of these findings, it can be stated that experience do not moderate the impact of perceived barriers on mother's attitude towards breastfeeding because there are no significance differences between the groups.

Therefore, H10(b) which stated that experience moderate the impact of perceived barrier on mother's attitude towards breastfeeding is rejected.

H9(b): Experience moderates the impact of perceived barrier on mother's attitude towards breastfeeding.

This result is similar to the general group model that shows that barrier has no effect on mother's attitude towards breastfeeding.

4.2.12 Moderating Effect of Experience on Self-Efficacy Factor

As per results presented in Table 4.4, for inexperienced and experienced mothers, self-efficacy factor has path coefficients of 0.12 with p-value of 0.004 and 0.14 with p-value of 0.002 respectively. For both groups, path coefficients are positive and low ($\beta < 0.20$, $p < 0.05$). It indicates weak and positive effect of this factor on the attitude of mothers towards breast feeding for both groups ($\beta < 0.20$, $p < 0.05$) [91].

Since, path coefficients for both groups are still significant ($p < 0.05$), thus, self-efficacy significantly influences mother's attitude towards breastfeeding regardless of experience. It is also same for the general group model where the effect of self-efficacy on mother's attitude towards breastfeeding was also significant (see Table 4.2).

On the basis of these findings, it can be stated that there is no significant difference between the path coefficients for the groups, hence experience does not moderate the impact of self-efficacy on mother's attitudes towards breastfeeding.

Therefore, H10(c) which stated that experience moderate the impact of self-efficacy on mother's attitude towards breastfeeding is rejected.

H9(c): Experience moderates the impact of self-efficacy factor on attitude towards breastfeeding.

This result is similar to the general group model that shows that self-efficacy has no effect on mother's attitude towards breastfeeding.

4.2.13 Moderating Effect of Experience on Social factor

As per results presented in Table 4.4, for inexperienced and experienced mothers, social factor has path coefficients of 0.04 with p-value of 0.60 and -0.04 with p-value of 0.50 respectively. For both groups, path coefficients are very low ($\beta < 0.20$, $p > 0.05$) [91]. It indicates weak and insignificant effect of social factor on the attitude of mothers towards breastfeeding for both groups ($\beta < 0.10$, $p > 0.05$) [92].

It means that regardless of experience, social factor has statistically insignificant impact on the mother's attitude towards breastfeeding ($p > 0.05$). This result is similar to the general group model that showed social factor has an insignificant effect on mother's attitude towards breastfeeding (see Table 4.2).

Based on these findings, it can be stated that experience does not moderate the impact of social factor on attitude towards breastfeeding since there is no significance differences between the groups.

Therefore, H10(d) which stated that experience moderate the impact of social factor on mother's attitude towards breastfeeding is rejected.

H9(d): Experience moderates the impact of social factor on mother's attitude towards breastfeeding.

4.2.14 Moderating Effect of Experience on Cultural Factors

As shown in Table 4.4, for inexperienced and experienced mothers, cultural factor has path coefficients of 0.12 with p-value of 0.002 and 0.09 with p-value of 0.02 respectively.

For both groups, path coefficients are positive and low ($\beta < 0.20$, $p < 0.05$) [91]. It indicates statistically significant positive effect of cultural factor on the attitude of mothers towards breastfeeding for both groups ($\beta < 0.20$, $p < 0.05$) [92].

Since, path coefficients for both groups are still significant ($p < 0.05$), thus, cultural factor significantly influences mother's attitude towards breastfeeding regardless of experience. It is also same for the general group where the effect of cultural factor on mother's attitude towards breastfeeding was also significant (see Table 4.2).

On the basis of these findings, it can be stated that there is no significant difference between the path coefficients for the groups, hence experience does not moderate the impact of cultural factor on mother's attitudes towards breastfeeding.

Therefore, H10(e) which stated that experience moderate the impact of cultural factor on mother's attitude towards breastfeeding is rejected.

H9(e): Experience moderates the impact of cultural factor on mother's attitude towards breastfeeding.

4.2.15 Moderating Effect of Experience on Breastfeeding Support

As shown in Table 4.4, for inexperienced and experienced mothers, breastfeeding support has path coefficients of 0.16 with p-value of 0.04 and 0.08 with p-value of 0.17 respectively. For both groups, path coefficients are positive and low ($\beta < 0.20$). However, p-value for inexperienced mothers is under 0.05 level of significance and for experienced, it is higher than 0.05 level. It indicates weak and positive effect of breastfeeding support on the attitude of mothers towards breast feeding for inexperienced mothers ($\beta < 0.20$, $p < 0.05$) [91].

This low value also infers a weak positive relationship between breastfeeding support and attitude towards breastfeeding for inexperienced mothers. The result of inexperienced mothers is more in line with the general group model where the effect of breastfeeding support on mother's attitude towards breastfeeding was also significant (see Table 4.2).

On the basis of these findings, it can be stated that experience moderates the impact of breastfeeding support on mother's attitude towards breastfeeding since there are significant differences between the groups path coefficients. Inexperience mothers are more likely to breastfeed their papers if they receive enough support from people around them.

Therefore, H10(f) is accepted and it is stated that experience moderates the impact of breastfeeding support on mother's attitude towards breastfeeding.

H9(f): Experience moderates the impact of breastfeeding support on attitude towards breastfeeding.

4.2.16 Moderating Effect of Experience on Environmental Factor

As shown in Table 4.4, for inexperienced and experienced mothers, environmental factor has path coefficients of -0.11 with p-value of 0.06 and -0.03 with p-value of 0.45 respectively. For both groups, path coefficients are negative and very low ($\beta < 0.20$, $p > 0.05$) [91]. It indicates weak and insignificant effect of environmental factor on the attitude of mothers towards breastfeeding for both groups ($\beta < 0.20$, $p > 0.05$). These low values also infer a weak and insignificant relationship between environmental factor and attitude towards breastfeeding for both groups ($p > 0.05$) [92].

It means that regardless of experience, environmental factor has statistically insignificant impact on the mother's attitude towards breastfeeding ($p > 0.05$). This result is similar to the general group model that showed environmental factor has an insignificant effect on mother's attitude towards breastfeeding (see Table 4.2).

On the basis of these findings, it can be stated that experience do not moderate the impact of environmental factor on mother's attitude towards breastfeeding because there are no significance differences between the groups.

Therefore, H9 (g) which stated that experience moderate the impact of environment factor on mother's attitude towards breastfeeding is rejected.

H10(g): Experience moderates the impact of environmental factor on mother's attitude

4.2.17 Moderating Effect of Experience on Breastfeeding Norm

As shown in Table 4.4, for inexperienced and experienced mothers, breastfeeding norm has path coefficients of 0.17 with p-value of 0.01 and 0.23 with p-value of 0.0001 respectively. For both groups, path coefficients are positive, low and statistically significant ($\beta < 0.30$, $p < 0.05$) [91]. It indicates weak and positive effect of breastfeeding norm on the attitude of mothers towards breastfeeding for both groups ($\beta < 0.20$, $p < 0.05$). These low values also infer a weak positive relationship between breastfeeding norms factor and attitude towards breastfeeding for both groups [92].

Since, path coefficients for both groups are still significant ($p < 0.05$), thus, breastfeeding norm significantly influences mother's attitude towards breastfeeding regardless of experience. It is also same for the general group model where the effect of breastfeeding norm on mother's attitude towards breastfeeding was also significant (see Table 4.2).

On the basis of these findings, it can be stated that there is no significant difference between the groups, hence experience does not moderate the impact of breastfeeding norm on mother's attitudes towards breastfeeding.

Therefore, H10(h) which stated that experience moderate the impact of breastfeeding norm on mother's attitude towards breastfeeding is rejected.

H9(h): Experience moderates the impact of breastfeeding norm on mother's attitude towards breastfeeding

Based on the analysis, the main difference between inexperienced and experience mother is the impact of breastfeeding support on their attitude. Breastfeeding support does not matter for experienced mothers; however, it has a significant impact on inexperienced mothers. This means, breastfeeding intervention targeted at new mothers should focus on connecting them to various supports networks and making them feel that they are not alone in the journey.

4.2.18 Moderating Effect of Age

Cox, Giglia and Binns found that sociodemographic factors such as social support, cultural support, environment, education, and income influence attitude towards breastfeeding. However, the effect of these factors changes with age and experience [99]. To examine for moderating effect of age, we conducted a multi-group analysis using SmartPLS 3 [76] to compare the three different age groups as shown in Figure 4.5.

Table 4.5 Groups segregation as per age

Age Groups	Group 1	Group 2	Group 3
Age Between (Years)	18-30	31-35	36 +
No. of Respondents	149	148	253

Table 4.5 consist of age groups of the respondents. It has been divided into three categories i.e. Group 1, Group 2 and Group 3. The respondents who are in between 18 years to 30 years of age have been categorized in Group 1, the respondents who are in between 31 years to 35 years of age have been categorized in Group 2, and the respondents who are above than 35 years of age have been categorized in Group 3. As shown in Table 4.5, 149 (27%) mothers were between 18-30 years of age (Group 1), 148 (26.91%) mothers were between 31-35 years of age (Group 2), and 253 (46%) mothers were above than 36 years of age (Group 3). Thus, group 3 constitute the majority of the sample.

H10: Age moderates the impact of various factors on mother attitude towards breastfeeding

This hypothesis is further broken down into eight sub-hypotheses corresponding with the eight distinct factors examined in this research: Table 4.6 shows the SmartPLS results for Analysis of the moderating effect of Age.

Table 4.6 P-value for Three age groups

Age Groups	Path/p-value	PBN	BAR	SEF	SLF	CLF	BFS	EN F	BFN
Age Group 1	Path Coefficient	0.56	0.05	0.16	-0.10	0.03	0.01	-0.03	0.18
	P- value	0.0001	0.60	0.01	0.20	0.60	0.90	0.50	0.03

Age Group 2	Path Coefficient	0.39	-0.04	0.03	-0.28	0.18	0.07	-0.13	0.26
	P- value	0.001	0.70	0.74	0.16	0.01	0.40	0.35	0.006
Age Group 3	Path Coefficient	0.40	0.04	0.17	-0.01	0.10	0.14	-0.04	0.21
	P- value	0.0001	0.55	0.002	0.53	0.04	0.03	0.33	0.0001
PBN = Perceived Benefit, BAR = Perceived Barrier, SEF =Self-Efficacy, SLF = Social Factor, CLF =Cultural Factor, BFS = Breastfeeding Support, ENF = Environmental Factor , BFN = Breastfeeding Norm									

4.2.19 Moderating Effect of Age on Perceived Benefit

As shown in Table 4.6, for age group 1, age group 2, and age group 3, perceived benefits factor has path coefficients of 0.56 with p-value of 0.0001, 0.39 with p-value of 0.001, and 0.41 with p-value of 0.0001 respectively. For all the age groups, path coefficients are positive and moderate ($\beta > 0.30 < 0.60$, $p < 0.05$) [91]. Moreover, for all groups, p-value is less than 0.05 level of significance, it indicates statistically significant effect of perceived benefit on the attitude of mothers towards breastfeeding for all age groups ($\beta > 0.30$, $p < 0.05$) [92].

Since, all path coefficient for the three age groups are still significant ($p < 0.05$) after introducing age as a moderating factor, we conclude that age does not moderate the impact of perceived benefit on mother's attitude towards breastfeeding. Moreover, it is also same for the general group where perceived benefit has a significant effect on mothers' attitude towards breastfeeding (Table 4.2).

On the basis of these findings, it can be stated that there is no significant difference between the path coefficients for the groups, hence age does not moderate the impact of perceived benefit on mother's attitudes towards breastfeeding. Therefore, H9(a) is rejected.

H10(a): Age moderates the impact of perceived benefit on mother's attitude towards breastfeeding.

4.2.20 Moderating Effect of Age on Perceived Barrier

As shown in Table 4.6, for age group 1, age group 2 and age group 3, perceived barrier has path coefficients of 0.05 with p-value of 0.6, -0.04 with p-value of 0.7, and 0.04 with p-value of 0.55 respectively. For all age groups, path coefficients are low which indicates

a negligible effect of perceived barrier on the attitude of mothers towards breastfeeding regardless of their age ($\beta < 0.10$, $p > 0.05$) [91].

Although, for age group 1 and age group 3, the path coefficient is positive and for age group 2, it is negative, but the p-values for all age groups are above than 0.05 level of significance. It means that regardless of age, perceived barrier has statistically insignificant impact on the attitude of mothers related to breastfeeding ($p > 0.05$) [92].

A multigroup comparison shows that there are no significance differences between the groups. This result is similar to the general group model that showed perceived barrier has no effect on mother's attitude towards breastfeeding (see Table 4.2).

Therefore, H9(b) which stated that age moderate the effect of perceived barrier on mother's attitude towards breastfeeding is rejected.

H10(b): Age moderates the impact of perceived barrier on mother attitude towards breastfeeding.

4.2.21 Moderating Effect of Age on Self-Efficacy

As per results presented in Table 4.6, for age group 1, age group 2 and age group 3, self-efficacy has path coefficients of 0.16 with p-value of 0.01, 0.03 with p-value of 0.74, and 0.17 with p-value of 0.002 respectively. For age group 1 and age group 3, path coefficients are positive but low and for age group 2, it is also positive but almost negligible [91]. It indicates a weak positive effect of this particular factor on the attitude of mothers towards breastfeeding for age group 1 and 3 ($\beta < 0.20$, $p < 0.05$), whereas for age group 2, its effect is negligible and insignificant ($\beta = 0.03$, $p > 0.05$).

The findings above reveal that age moderates the impact of self-efficacy on attitude towards breastfeeding since there is a significant difference between the groups. Group 1 and Group 3 mothers (age 18 – 30 and above 35) are more likely to breastfeed their children if they believe that they have the ability to do this effectively. The group 1 and 3 result is more in line with the general results that show that self-efficacy impact mother's breastfeeding behavior (see Table 4.2).

Therefore, H9(c) which stated that age moderates the impact of self-efficacy on mothers' attitude towards breastfeeding is accepted.

H10(c): Age moderates the impact of self-efficacy on mother's attitude towards breastfeeding

4.2.22 Moderating Effect of Age on Social Factor

As shown in Table 4.6, for age group 1, age group 2 and age group 3, social factor has path coefficients of -0.10 with p-value of 0.20, -0.28 with p-value of 0.16, and -0.01 with p-value of 0.53 respectively. For all age groups, path coefficients are negative but insignificant ($\beta < 0.30$, $p > 0.05$) [91]. It indicates an insignificant effect of social factor on the attitude of mother's towards breastfeeding regardless of age ($p > 0.05$).

Since, all path coefficients are low and insignificant, therefore, there is no significant difference between the path coefficients for the groups, hence age does not moderate the impact of social factor on mother's attitudes towards breastfeeding. This result is similar to the general group model that showed social factor has no effect on mother's attitude towards breastfeeding (see Table 4.2).

Therefore, H9(d) which stated that age moderate the impact of social factor on mother's attitude towards breastfeeding is rejected.

H9(d): Age moderates the impact of social factor on mother's attitude towards breastfeeding.

4.2.23 Moderating Effect of Age on Cultural Factors

As shown in Table 4.6, for age group 1, age group 2, and age group 3, cultural factor has path coefficients of 0.03 with p-value of 0.6, 0.18 with p-value of 0.01 and 0.10 with p-value of 0.04 respectively. For age group 2 and age group 3, path coefficients are positive but low and for age group 1, it is also positive but almost negligible [91]. It indicates a significant positive effect of cultural factor on the attitude of mothers towards breastfeeding for age group 2 and 3 ($\beta < 0.20$, $p < 0.05$), whereas for age group 1, its effect is negligible and insignificant ($\beta = 0.03$, $p > 0.05$) [92].

Based on these findings, it can be stated that age moderate the impact of cultural factor on attitude towards breastfeeding since there is a significant difference between the groups. The group 2 and 3 result is more in line with the general model results which showed that cultural factor impact mother's breastfeeding behaviors (see Table 4.2).

Therefore, H9(e) is accepted and it is stated that age moderate the impact of cultural factor on mother's attitude towards breastfeeding.

H10(e): Age moderates the impact of cultural factor on mother attitude towards breastfeeding

4.2.24 Moderating Effect of Age on Breastfeeding Support

As shown in Table 4.6, for age group 1, age group 2 and age group 3, breastfeeding support has path coefficients of 0.01 with p-value of 0.9, 0.07 with p-value of 0.40 and 0.14 with p-value of 0.03 respectively. For all age groups, path coefficients are positive but low ($\beta < 0.30$) [91]. However, p-values are insignificant for group 1 and group 2 ($p > 0.05$) and for group 3, p-value is significant ($p < 0.05$) [92]. It indicates a weak positive effect of breastfeeding support on the attitude of mothers towards breastfeeding for age group 3 ($\beta < 0.20$, $p < 0.05$), whereas for age group 1 and age group 2, its effect is negligible and insignificant ($\beta < 0.10$, $p > 0.05$). For age group 3, results infer a positive and significant relationship between breastfeeding support and attitude towards breastfeeding ($\beta < 0.20$, $p < 0.05$).

On the basis of these findings, it can be stated that age moderate the impact of breastfeeding support on mothers' attitude towards breastfeeding since there is a significant difference between the groups. The group 3 result is more in line with the general model results which showed that breastfeeding support has a significant effect on mother's breastfeeding behavior (see Table 4.2).

Therefore, H9(f) which stated that age moderate the impact of breastfeeding support on mothers' attitude towards breastfeeding is accepted.

H10(f): Age moderates the impact of breastfeeding support on mother's attitude towards breastfeeding.

4.2.25 Moderating Effect of Age on Environmental Factor

As shown in Table 4.6, for age group 1, age group 2 and age group 3, environmental factor has path coefficients of -0.03 with p-value of 0.50, -0.13 with p-value of 0.35 and -0.04 with p-value of 0.33 respectively. For all age groups, path coefficients are low and insignificant ($p > 0.05$) [91]. It indicates an insignificant negative effect of environmental factor on the attitude of mothers towards breastfeeding for all age groups ($p > 0.05$).

Therefore, on the basis of these findings, it can be stated that age do not moderate the impact of environmental factor on mothers' attitude towards breastfeeding since there is no significant difference between the groups. This result is similar to the general group model that showed environmental factor has no effect on mother's attitude towards breastfeeding (see Table 4.2).

Therefore, H9(g) which stated that age moderate the impact of environmental factor on mothers' attitude towards breastfeeding is rejected.

H10(g): Age moderates the impact of environmental factor on mother attitude towards breastfeeding.

4.2.26 Moderating Effect of Age on Breastfeeding Norm

As per results presented in Table 4.6, for age group 1, age group 2 and age group 3, breastfeeding norm factor has path coefficients of 0.18 with p-value of 0.03, 0.26 with p-value of 0.006 and 0.21 with p-value of 0.001 respectively. For all age groups, path coefficients are positive but low ($p < 0.30$)[91]. It indicates a weak positive effect of this particular factor on the attitude of mothers towards breastfeeding for age group 1 and group 3 (path > 0.10 , $p < 0.05$), whereas for age group 2, its effect is negligible and insignificant ($\beta < 0.10$, $p > 0.05$). These low values also infer a weak positive relationship between breastfeed norm and attitude towards breastfeeding for age group 1 and group 3 ($\beta < 0.30$, $p < 0.05$)[92].

Based on these findings, it can be stated that age does not moderate the impact of breastfeed norm factor on attitude towards breastfeeding. Therefore, H9(h) is rejected and it is stated that age does not moderate the impact of breastfeeding norm on attitude towards breastfeeding.

H10(h): Age moderates the impact of breastfeeding norm on mother's attitude towards breastfeeding.

4.2 QUALITATIVE ANALYSIS

4.2.1 Interview Recruitment

Purposeful sampling is a extensively used approach in qualitative studies [101]. All mothers approached for participation were over the age of 18 coming from different cultural and ethnic backgrounds. Twenty participants were interviewed using a semi structure interview guide (Appendice 2-B) for the purpose of this study. Out of 20, 2 women contacted via video call and agreed to participate in the study whereas rest were interviewed face to face. All the participants had one or more than one small children, it was more appropriate to conduct the interviews at the participant's home or a library in order to keep the mothers at their comfort zone. The interview began with an explanation about the research followed by a consent. Five of them were on maternity leave and planned to go back to work. 12 out of them were full time mothers who decided to stay home and take care of their kids. Three of them were university students.. With face to face interview, we again clarified the purpose of this research and signed a consent form. The interview question can be found in Appendix 2-B

The researcher conducted in-depth, open ended interviews in person and over the skype with mothers having BF experience whether they were new mothers or mothers who fed their babies couple of years back. Open-ended questions assessed mothers' intention towards breast feeding. The duration of all the interviews on average was 15-45 minutes. Mothers chose the time and location of interview as some of them were having little babies, so their comfort was taken in notice on priority.

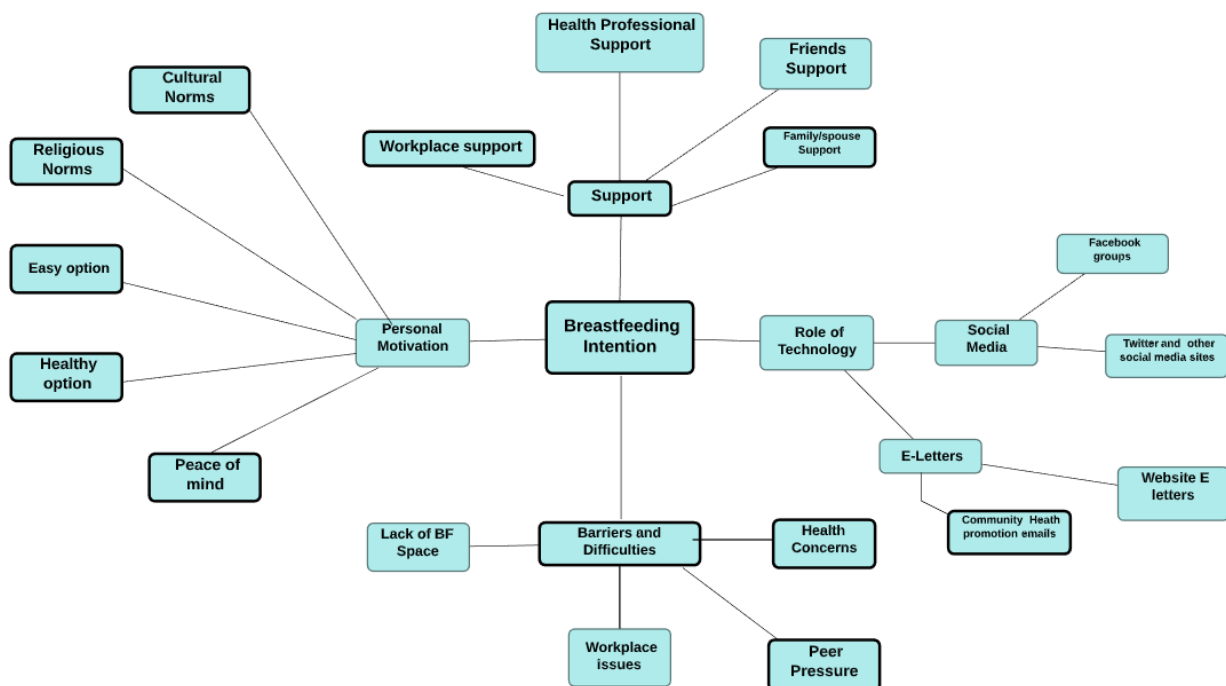
4.2.2 Interview Analysis

The Interviews were audio recorded and then fully transcribed by the researcher. To analyze the qualitative data, thematic analysis was conducted to identify key themes in the data with the help of a fellow researcher in the university to avoid biasness [102]. We also used Nvivo to get better visuals for interpretation.

All interviews were documented with the consent of the respondents and then anonymized and transcribed. Anonymized interviews were stored on a password-protected device for future studies. The interview analysis begins with a thematic analysis of the responses administered by the participants. For this purpose, substantial reading and re-reading of the interview transcripts were undertaken. Then analysis was conducted by performing manual coding. The coding performance was conducted in collaboration with another researcher from the lab which guided towards the key factors for our conceptual model, The researcher was aware of the halo-effects and unconscious bias in conducting the interview, therefore, caution was exercised to avoid bias and possible misinterpretations of any sort. Underlying themes and subthemes were identified and reviewed. Talking to many participants about breastfeeding, it was obvious that all of them had gone through the process of breastfeeding at least once in their lives. Some mothers have grownups children now, age ranging from 3 to 14 years old while other mothers were still breastfeeding their infant babies of few months. On average, all the mothers have breastfed their children for one year.

The thematic analysis identified four core themes, i.e Barriers and difficulties, Role of technology, Personal motivation and family support. Figure 4.6 illustrates conceptual framework for qualitative analysis. The concept of deriving themes and subthemes codes was derived from a similar qualitative study [103] representing various factors identified during the thematic analysis of current study(Figure 4.6).

Figure 4.6 Conceptual framework for qualitative analysis



4.2.3 Barriers and Difficulties

According to a research by Brown, mothers had to stop breastfeeding after a month due to barriers like pain and other barriers that hinder mothers from breastfeeding are social, cultural and political. Whereas, age and experience mediate the effect of these factors [10]. The majority (92%) of breastfeeding queries about barriers were coded as negative experience and barriers. Figure 4.7, shows the factors that contributed in the negative experience from breastfeeding mothers by using thematic and Nvivo analysis for the data. Based on the diagram, there are six major negative experiences that stopped mothers from breastfeeding (barriers). These include unavailability of space, tiredness, friends/colleagues critics, workplace issues, attitude of people in public, and after effects of postnatal medication. Unavailability of space was one of the major issues to feeding babies especially when outside the home whether in the public or at work.

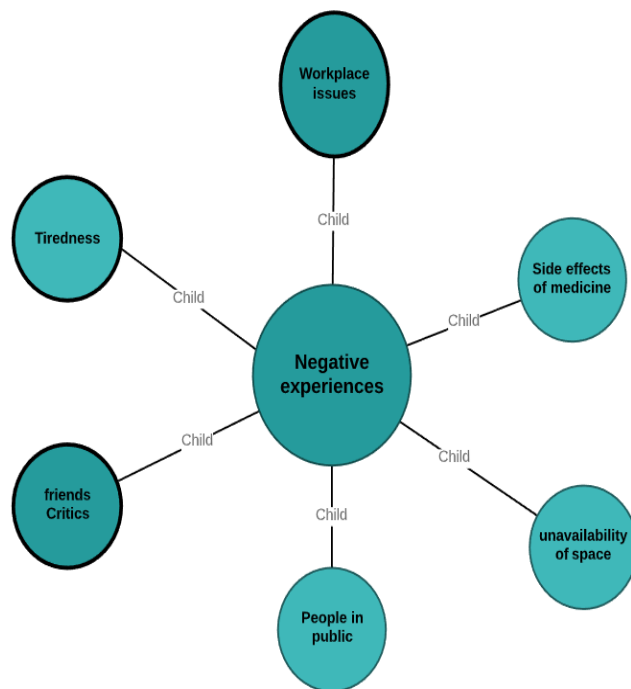


Figure :4.7 Illustration of Negative factors affecting Breastfeeding

A participant, [P7] who is also a teacher by profession criticized public places for not being adequately equipped as she shared her restaurant experience. She said that she had to go to bathroom to breastfeed the baby.

“I’ve nursed the baby in the booth of the restaurant, but there’s not enough room for the baby and you to do that” [P7].

When asked “Does your workplace support breastfeeding space?” ,The mother living and working in Canada shared her experience about how she faced problems while breastfeeding outside home [P10]. She said she had cubicle or isolated place where she could express milk for her baby at the office but when she went out with family friends to a restaurant, she could not find a proper place to feed her baby. She also mentioned that she had to go to bathrooms to feed the baby. Even in bathrooms of public places like restaurants, they do not have a chair which means the mother has to leave eventually. At the restaurant the participant was once told not to breastfeed so in her view the unavailability of facilities at public places also put burden on mothers. [P10]

Another barrier was negative perception from people when breastfeeding in the public. A mother who was a frequent traveler and been to different countries explained as “The only issue in public would be in airports, grocery stores in the car, people keep staring as if it was something not natural. I think people should be more educated on this matter, as they consider natural action as not, and assume babies should be feed by a bottle.” [P17]

Upon asking for any difficulties being faced with regards to breastfeeding, it was revealed that the experience of breastfeeding was not the same for every mother as it was smooth for one while challenging for others. Findings to which revealed that some faced medical issues and some did not face any problem. Majority of the mothers admitted that their bodies were producing enough milk for the baby [P4], however, some mothers had to restrict breastfeeding due to medical conditions of either the baby or the mother herself. P[8], who was a university student as well said that part from her medical issue, nothing else intervened in her breastfeeding as people were quite supportive. She had to stop breastfeeding because she had some reactions to medicine. She also mentioned about unavailability of space at the university campus. So, opting for formula was the best solution for her problem. A mother of four [P15] was lucky enough to not face any major problem in breastfeeding; she was personally motivated and faced the obstacles of feeding in public places. However, all the mothers felt insecure in one way or another in public places with respect to breastfeeding their babies as they often receive negative comments.

Another participant [P5] said that the society is getting more open to breastfeeding mothers than it was fifteen years ago. She said that fifteen years ago when she had to breastfeed her daughter, it was extremely difficult to do that in any public place; she had to spend time in bathroom stalls and backseat of a car to feed her daughter. Now there are nursing stations provided in malls to facilitate the mothers but there’s still a long way to go. The mother said that women can make it happen as society is ready to accept breastfeeding openly because it’s such a natural process.

One of the mothers who is a university student as well highlighted:

“I had to go to university after I had my baby. So yeah, it was very difficult experience because I was not constantly available for my kid. So, I had to pump milk for my kid and it was kind of tough for me at that time” [P6].

Another mother stated:

“Majority of the universities got mature students and got the facility of childcare but when it comes to take care of infant then unfortunately there is not much options available” [P5].

One of the biggest obstacles in the way of breastfeeding for a mother was the tiredness and restlessness [P8]. When the mother is tired or sleep deprived then it becomes difficult to breastfeed even if she wanted to.

Mothers also emphasize that public places should be more equipped with facilities for breastfeeding mothers and their babies so that they don't have to leave the place for the sake of breastfeeding. Lack of facilities at public places and workplace is still the biggest challenge for majority of the mothers and they expect positive change in future.

4.2.4 Role of technology

Another popular topic was 'Role of the technology' (82% of breastfeeding favoured responses). Role of the technology and its relationship with breastfeeding was also explored in the interviews by asking questions like “ Do you use mobile phone applications to track breastfeeding?”, “Do you use facebook support groups for breastfeeding and are they beneficial?”. Four basic codes were identified that includes Use of social media, Mobile apps , Community health centres sending e-support letters and Health e-letters offered by the health centres. Participant [P10] stated that she used breastfeeding app for both her children She considered a website by Johnson and Johnson newsletters to be helpful. She didn't completely rely on them but attended breastfeeding groups and never engaged in any online support groups. Asking about technology a Chinese mum [P18] replied that she did not use any app whether its related to health or breastfeeding. When asked about the situation in China, she quoted, *“I had Newborn baby in China, I didn't use any breastfeeding app”*.

A mother [P5] compared the present time with the time seven years ago, said that she often referred to google and search for different websites to subscribe for breastfeeding e-letters for guidance regarding breastfeeding. She used to search online the benefits of breastfeeding, body changes, milk supply or the baby behaviors. She admitted that it would had been very useful if there were such groups or communities on social media like Facebook back then, but she never bothered to explore them as she was not an active user. At present, she is more active on Facebook and would surely join such group if she needs one. The following are some of the comments that mothers highlighted when asked about the role of technology while breastfeeding.

“I saw Instagram photos of mothers breastfeeding and it made me feel empowered, it made me want to continue to breastfeed. It’s an amazing experience” [P13].

“I used social media to keep up with family and to help relax myself when I was breastfeeding” [P6].

Figure 4.8 The figure shows technologies that were used by mother in the process of breastfeeding

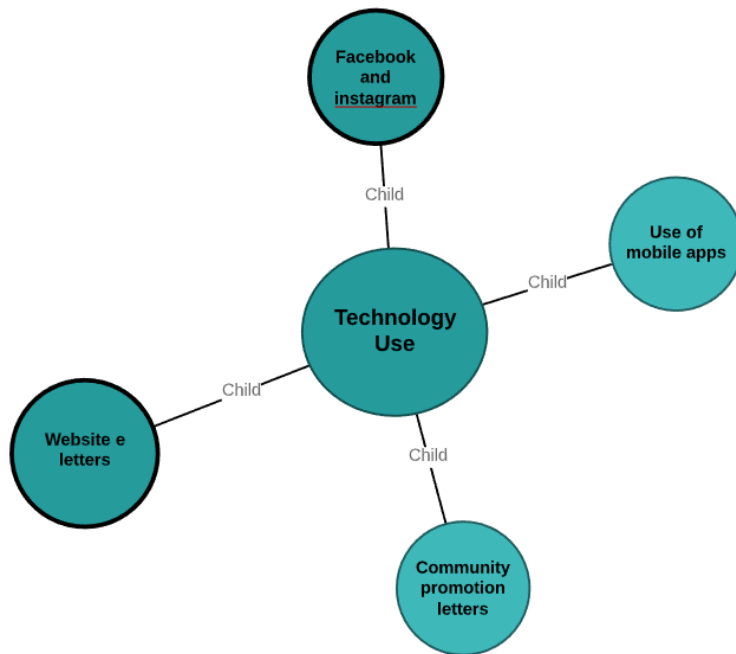


Figure 4.8 Illustration of technology Usage while Breastfeeding

To many mothers, nowadays the Internet and social media apps are not only a mode of relaxation but also a motivation especially when they see celebrities encouraging breastfeeding. Similar response is quoted as below:

“There are celebrities and people in the medical community who are very open about their breastfeeding experiences and its benefits on Instagram and seeing and reading their experiences made me feel more empowered to not give up even though my son had trouble latching initially” [P13].

Few respondents also revealed that social media turned out to be a savior for them especially in the early weeks of having a baby when they felt stuck and detached from the rest of the world. In those early weeks of breastfeeding, many of them were stuck and failed to do something for themselves. So, through social media they were able to control their anxiety by contacting their friends and family and which made them feel much better.

While answering questions about the support groups, a mother replied:

“I joined a Facebook group to get involved in local breastfeeding support group suggested by her community health centre.” [P17].

The Facebook support group helped her a lot in resolving her queries about breastfeeding and also provided a support from all other mothers.

Another mother said that she in fact searched many effective pages on Facebook related to breastfeeding that lessened her frustration during breastfeeding. She said:

“It is important to reach out to those who are going through similar experience as me. It helps to choose the right food to choose that can make more milk for my body” [P2].

Breastfeeding was not the case twenty years ago and back then when mothers were left on their own but at present information is more accessible.. Following is a comment by an experienced professional.

“I breastfed before the era of social media. As certified La Leche League Leader, I currently use social media (Facebook) to support mothers who are currently breastfeeding. Social media makes it possible to reach mothers who do not have local support.” [P11].

Some other participants also highlighted some downsides of technologies. For example, many participants claimed that although technology have made them aware more about the breastfeeding tips and tactics, but it has also put a lot of pressure on mothers. Because of social media, mothers feel more cautious about their physical fitness and com[parison with other breastfeeding mothers Mother[P19], complained that social media should understand that not all mothers are the same as some might produce enough milk while others struggle with that. Similarly, their lifestyles are also different, and their stress also varies. According to interviewed mothers, social media can spread negativity for mothers as the internet can be judgmental as well. Besides lifestyle, some mothers were also concerned about how mothers cannot create a lovely bonding with their babies.

According to a mother of 3 children:

“Spending too much time on social media can lead to poor sleep. Numerous studies have shown that increased use of social media has a negative effect on your sleep quality” [P17].

When asked about use of technology for BF support a mother stated:

“Yeah, I use Instagram a lot. I never really used Instagram before I got pregnant, but ever since I did, I have. There’re quite a few people I follow on Instagram that offer support with breastfeeding and other child tips and advice. I’m very kind of selective though. I only pick a few that I feel are very positive and are very educational.” [P13].

The fact that life changes fundamentally in the early days of motherhood and with the passage of time it becomes busier and busier. Technology plays a vital role in understanding pregnancy and motherhood. There are valid researches in the field of Human Computer Interaction where researchers are discussing about designing different tools to help new mothers understand motherhood[104]. There are different prototypes designed for parents to understand their child development which is very helpful for new parents [68][105]. Digital Interactions help mothers to exchange information so they can give their child the best. Mothers are using technology more nowadays to enhance the experience of motherhood.

4.2.5 Breastfeeding support

Radzynski and Callister found that education, age, culture, social support, experience, and confidence have all been identified as variables affecting breastfeeding decision [69].

To breastfeed exclusively it is very important for a mother to have a support system that can encourage her to breastfeed. When asked “ Does you family support breastfeeding ?”, a mother with her second baby mentioned *“My mother and my mother in law, my husband, they all support breastfeeding. I mean, yeah, I was, I had a lot of family support at that time”* [P5].

Another mother also commented “I would say my mother, obviously, you know, moms always, have the right things to say” [P16].

Another mother stated “my greatest motivation would definitely be my mother and also my husband” [P13].

Another mother of two daughters and 3rd baby [P7] stated “I do not find any issues at home with breastfeeding my small family is happy about it” She also added “I know our religion, Islam, we should breastfeed our kids for two years. And for me he's my first son I wanted to feed him the way my family did” [P6].

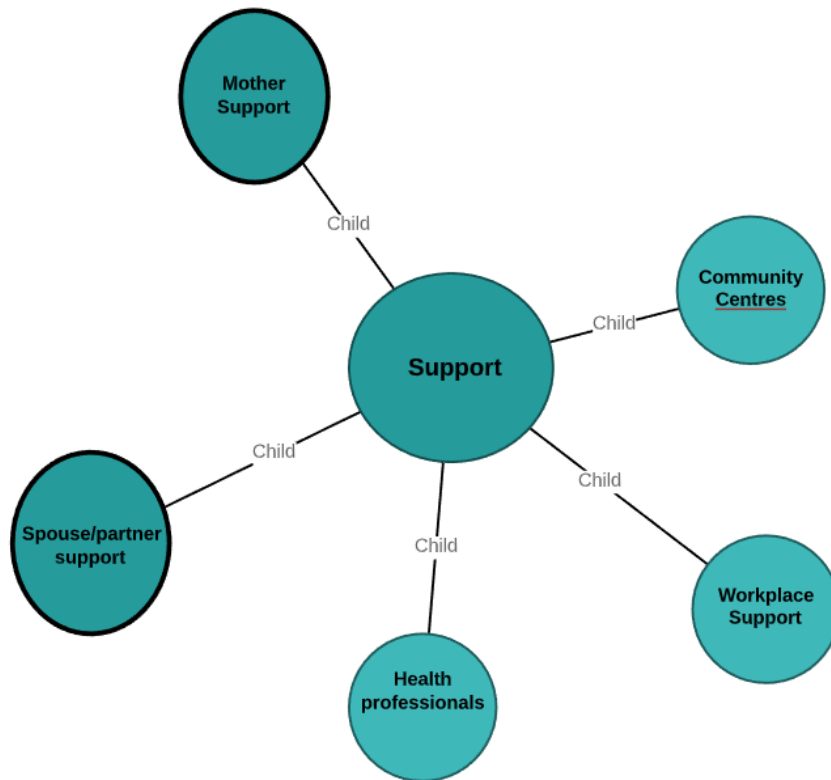


Figure 4.9: Illustration of Breastfeeding support

Professional support from Health workers, midwives, and doctors play a significant role in educating the mothers to breastfeed. A new mother stated:

“We had a lovely visit from the public health nurse just a few weeks after he was born, and she was telling me a lot of interesting information about breastfeeding and kind of was there to help support us as well and that was really, really wonderful. I really appreciated that, the public health nurse” [P13].

Mother [P20] is a young mother and when asked about family / friend support she mentioned that her mother is the biggest support for her. She also mentioned

“I have a few friends also, two of my best friends also had babies around the same time. So, we're all in the same boat. So, it's convenient cause I do have supports from my best friends” [P20].

Health professional support can lead to a change as well in favour of breastfeeding. When asked “ Did you receive any professional support to breastfeed at the hospital ?”, a mother mentioned as follows:

“When I was in the hospital with my daughter, a nurse really helped me and she made me feel very comfortable with the idea of doing so. Um, I don't come from a family that did, they were all formula fed, so I was the first one at decided to go this route” [P2].

It is evident that these themes derived by thematic analysis are common in breastfeeding mothers and mothers need support to achieve their breastfeeding goals.

4.2.6 Personal motivation

The overarching theme identified was personal motivation.(95% positive responses).When mothers were interviewed and asked questions like “ why did u choose to breastfeed?” ,they identified six major sub-themes as shown in Figure 4.10 .The figure shows that there are many reasons why mothers breastfed. These reasons became a source motivation for breastfeeding mothers, dominant among them is the family support, personal motivation, nurses’ cooperation, peace of mind, cultured home, religious, and societal factors etc.

A mother responded that she breastfed both her babies till their second birthdays saying that the motivation came from her mother as she always breastfed her kids. The respondent also said that during pregnancy, she read many studies where the mother and child is strengthened due to breastfeeding. She added, *“I didn't want my kids to get bottles or nipples or anything, so all these included, I decided to breastfeed my kids [P2]”*.

As for all of them, breastfeeding is easy, cheap, accessible and available anytime for both baby and the mother [P20]. “I don't really allow the community to influence me too much”. The decision was mine [P7]. The decision to breastfeed their babies was personal as they wanted to give their babies the best treatment possible to protect their welfare and development. Participants’ families were supportive enough to go with their decisions of feeding the baby either their milk or the formula milk.

Another new mother added:

“I like to continue as long as I can and as long as I can produce the milk I guess, and it's just all the health benefits and my religious norm to feed for two years, that motivated me”[P13].

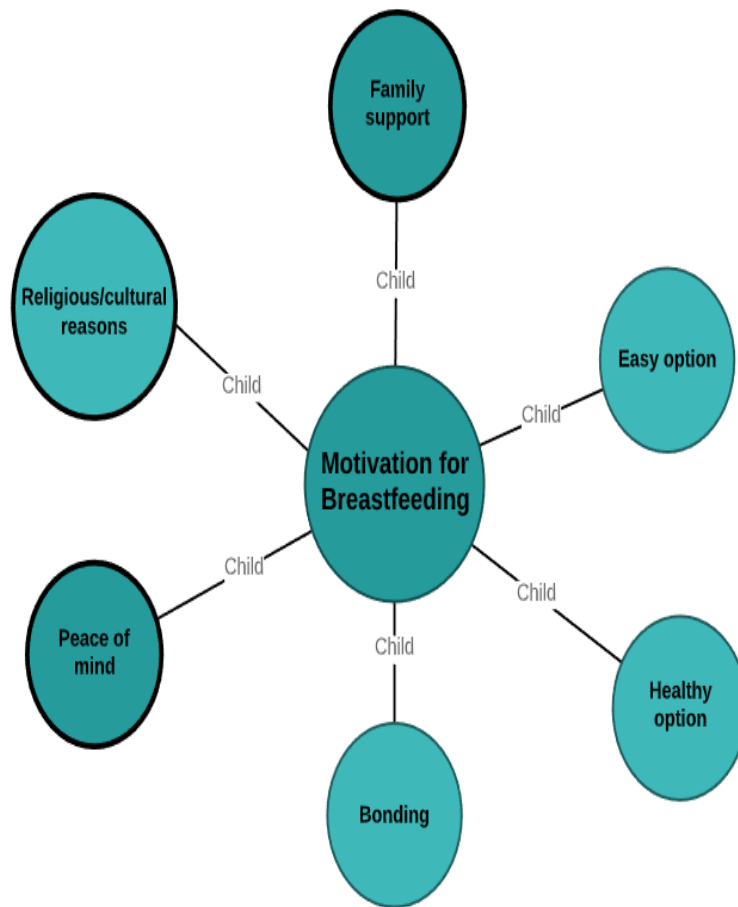


Figure 4.10 Illustration of Motivation for Breastfeeding

Figure 4.10: Illustration of motivational factors for breastfeeding by incorporating different factors One of the mothers who didn't get enough support from her family breastfed the baby because of her personal interest and motivation. She mentioned "I wanted to give my baby the best. The experience was quite, quite rewarding because I get some me time with the baby, I can bond with the baby." [P7]

An experienced mother of 4 kids mentioned

"I actually enjoy breastfeeding, so I liked it, but I have lots of friends that struggled and had a really hard time. So, I could see the positives and the negatives on the mom. And I don't think there should always be a push for breastfeeding if it's a struggle for the mom, because you want a healthy, happy mom. But I was lucky and fortunate, and I enjoyed it." [P19]

A young mother of two mentioned "You connect with your kids more in that way and because it's one of the healthiest nutrition that they have in the first early years of their childhood." [P4]

All those mothers were more relaxed while breastfeeding at home due to the sound environment, safety, convenience, and comfort zone.

4.2.7 Impact of Technology of Mother's Breastfeeding Behavior

Electronic media and technology bring progressive development in different aspects of our lives. It is very important to develop programs that can support breastfeeding mothers [106]. Ninety percent of our participants in the interview highlighted that various technologies support their breastfeeding behaviors. Many young mothers shared their positive experience with social media, saying that social media helped them better understand, practice, and also gave them tips on how to be on safe side. Through many social media platforms, some mothers managed to have direct contact with other more experienced mothers. Due to this, they felt more secure even if they were mothers for the first time. Only 10 percent of the mothers stated that although social media helped in many ways to support the breastfeeding mothers but it was getting in their way for healthy sleep and bonding with babies {P14}. Due to social media, many young mothers adopted an unhealthy sleep pattern. This is why few of the mothers denied any use of social media

and technology to support their breastfeeding because for them, it is a distraction that will divert their focus from the baby.

As 90 percent of mothers stated that social media and technology is providing support to breastfeeding which leads to the rejection of H10.

H10 Social media and e-communication negatively affect the mother-child relationship is rejected.

CHAPTER 5 CONCLUSION

5.1 SUMMARY OF FINDINGS

Based on the results and analysis, the findings of present study are summarized below:

Factor	Path Coefficient	P Value	Effect	Significant/Insignificant (At 5% level of significance)	Hypothesis
PBN	0.43	0.0001	Medium/Moderate	Significant	H1 Accepted
BAR	-0.07	0.19	Small/Weak	Insignificant	H2 Rejected
SEF	0.13	0.0001	Small/Weak	Significant	H3 Accepted
SLF	0.00	0.10	No effect	Insignificant	H4 Rejected
BFS	0.10	0.034	Small/Weak	Significant	H5 Accepted
CLF	0.10	0.003	Small/Weak	Significant	H6 Accepted
ENF	-0.06	0.07	Small/Weak	Insignificant	H7 Rejected

Table 5.1 Summary Table: Factor Wise Smart PLS Analysis

BFN	0.21	0.0001	Small/Weak	Significant	H8 Accepted
PBN = Perceived Benefit, BAR = Perceived Barrier, SEF =Self-Efficacy, SLF = Social Factor, CLF =Cultural Factor, BFS = Breastfeeding Support, ENF = Environmental Factor , BFN = Breastfeeding Norm					

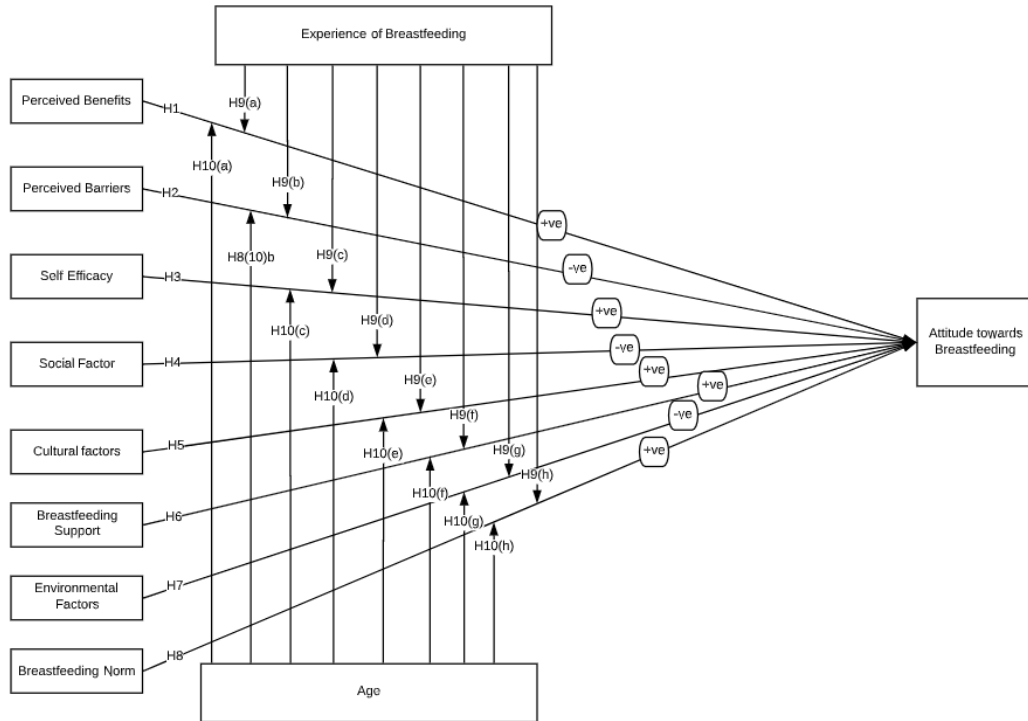


Figure 5.2 Graphical results of Hypothesis results

- Perceived benefits are one of the factors that can positively influence the decision of mothers related to breastfeed their baby. Therefore, the mothers who understand the positive effects of breastfeeding on health will possess a very positive attitude towards breastfeeding their child.
- Perceived barriers do not influence the attitude of mothers about breastfeeding their child. Thus, perceived barriers are not one of the factors that hinder mothers to breastfeed their kids.
- Self-efficacy positively influences the attitude of mothers about breastfeeding their child. Therefore, the mothers with strong self-efficacy will have a very positive attitude towards breastfeeding their child.

- Social factors do not influence the attitude of mothers about breastfeeding their child. Thus, support factor is not one of the factors that hinder mothers from breastfeeding their child.
- Cultural factors positively influence the attitude of mothers about breastfeeding their child. Therefore, mothers with supporting culture will have a very positive attitude towards breastfeeding their child.
- Breastfeeding support positively influences the attitude of mothers about breastfeeding their child. Therefore, mothers with strong social support will have a very positive attitude towards breastfeeding their kids.
- Environmental factors do not influence the attitude of mothers about breastfeeding their child. Thus, environmental factors are not one of the factors that hinder mothers to breastfeed their kid.
- Breastfeed norm positively influences the attitude of mothers about breastfeeding their child. Therefore, mothers who have positive norms and beliefs about breastfeeding will possess a very positive attitude towards breastfeeding their baby.

5.2 MODERATING EFFECT OF AGE

Based on the results and analysis, the findings of present study are summarized below:

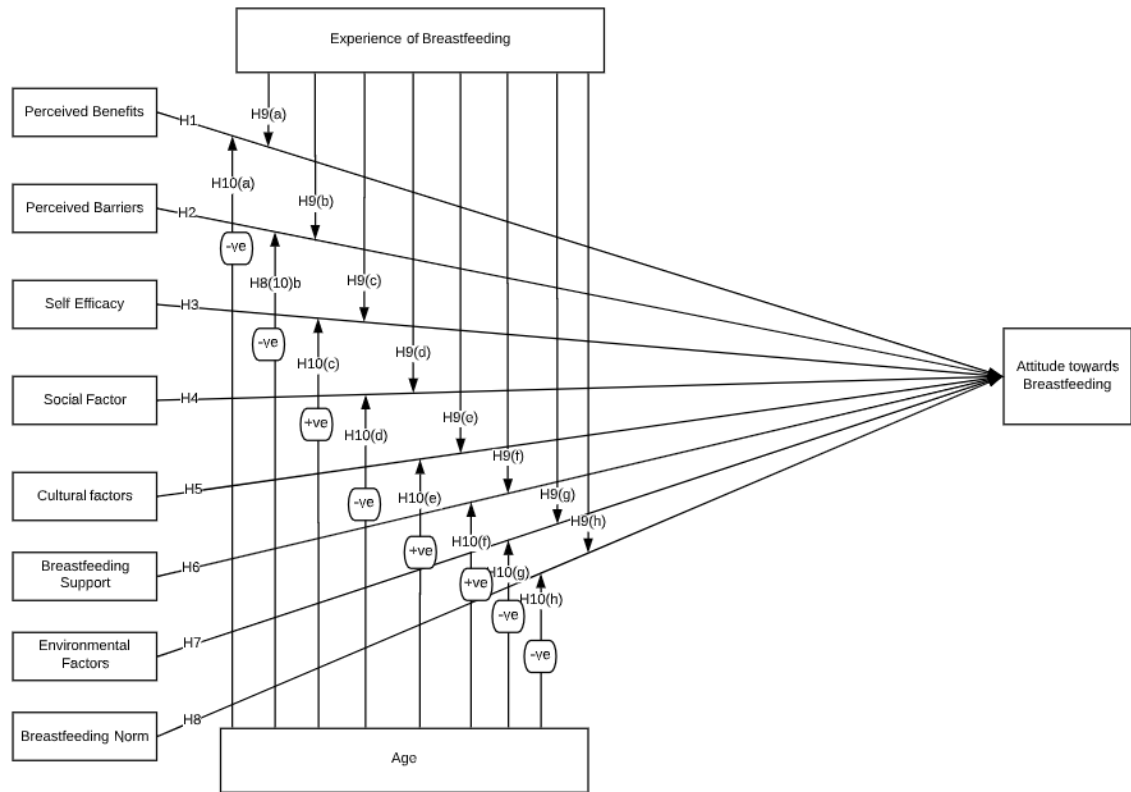


Figure 5.2 Graphical results of Hypothesis results for Moderating Effect of Age on breastfeeding

- Age does not moderate the impact of perceived benefit on mothers' attitude towards breastfeeding.
- Age does not moderate the impact of perceived barrier on mother's attitude towards breastfeeding.
- Age moderates the impact of self-efficacy on mother's attitude towards breastfeeding.
- Age does not moderate the impact of social factor on mother's attitude towards breastfeeding.
- Age moderates the impact of cultural factor on mother's attitude towards breastfeeding.
- Age moderates the impact of breastfeeding support on mother's attitude towards breastfeeding.
- Age does not moderate the impact of environmental factor on mothers' attitude towards breastfeeding.

- Age does not moderate the impact of breastfeed norm on mother’s attitude towards breastfeeding.

5.3 MODERATING EFFECT OF EXPERIENCE

Based on the results and analysis, the findings of present study are summarized below:

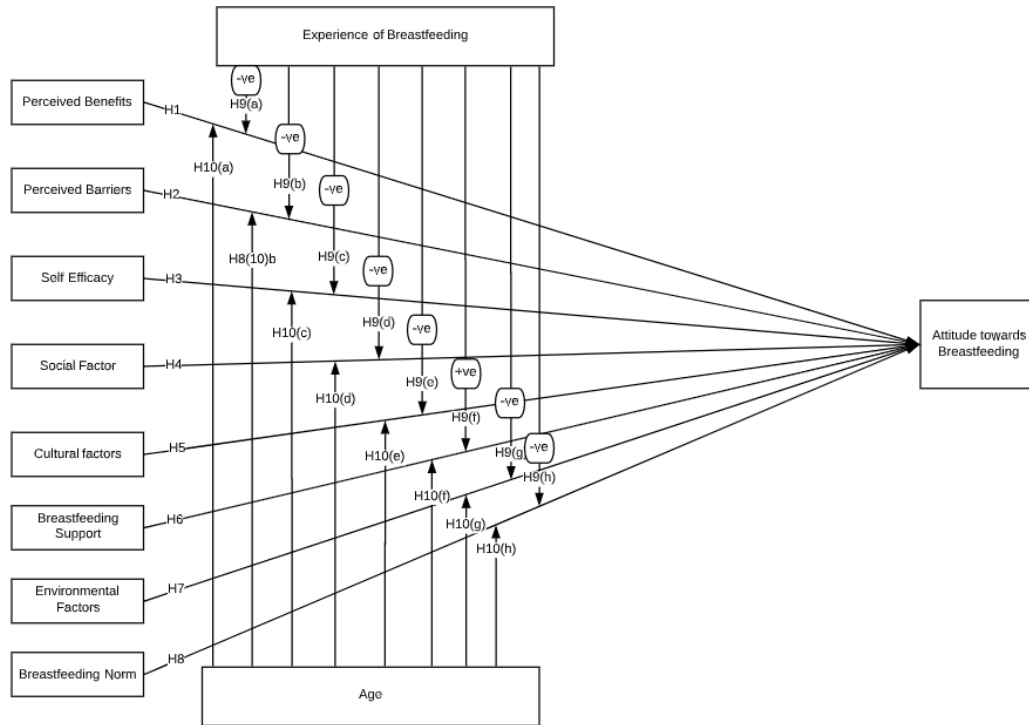


Figure 5.3 Graphical results of Hypothesis results for Moderating Effect of Experience on breastfeeding

- Experience does not moderate the impact of perceived benefit on mother’s attitude towards breastfeeding.
- Experience does not moderate the impact of perceived barrier on mothers’ attitude towards breastfeeding.
- Experience does not moderate the impact of self-efficacy on mother’s attitude towards breastfeeding.

- Experience does not moderate the impact of social factor on mother's attitude towards breastfeeding.
- Experience does not moderate the impact of cultural factor on mothers' attitude towards breastfeeding.
- Experience moderates the impact of breastfeeding support on mother's attitude towards breastfeeding.
- Experience does not moderate the impact of environmental factor on mother's attitude towards breastfeeding.
- Experience does not moderate the impact of breastfeeding norm on mother's attitude towards breastfeeding.

5.4 CONCLUSION

As shown in table 4.6 , the calculated value of Perceived benefits is 0.36 and 0.46 for both age group 1 and 2 respectively. Therefore, it can be concluded that since the value of Perceived benefits is high, barriers to breastfeed really is insignificant. Similarly, breast feeding support have the values of 0.16 and 0.08 for Age Group 1 and 2 are significant therefore, can be incorporated into the design of an App or website for breastfeeding.

The research study findings suggest that the mothers' perceptions of the health benefits, both for the child and herself, helps to increase the initiation and duration of breastfeeding. The benefit for the mother to continue to breastfeed was her belief that it made her a better mother by providing healthy option, which will eventually lead to increased self-esteem. The second benefit was related to bonding. Most mothers reported that because they felt closer (more attached) to their babies, they made the decision to continue breastfeeding for a longer duration.

The study also found that the perceived benefits of breastmilk for the baby's health motivate the mothers to plan feeding choices for the baby and also provide motivation to continue feeding for a longer duration because of the value to the baby health. If women are aware of the benefits of adequate breastfeeding practices for them and their infants, they are more likely to practice it. Adequate enlightenment, especially, during antenatal care is vital for promoting breastfeeding.

The study found that mothers are very convinced to breastfeed their baby hence overcoming all the barriers. It identified that mothers do not feel comfortable to breast feed in public and it hinders them from initiating nursing. Mothers are choosing to feed their babies by pumping so they can breast feed easily where they can not find a safe place to breastfeed in the public. Inexperienced mothers are personally motivated but unaware of the support to keep breastfeeding process convenient.

An adequate breastfeeding education and support will enable women to understand and appreciate the seriousness of health challenges associated with suboptimal breastfeeding. Hence, helping mothers to find strategies to breastfeed in public without gathering attention or risking exposure would be important to facilitating their breastfeeding success. Moreover, mothers also stated that they can breastfeed as recommended if given the support they need to overcome barriers associated with breastfeeding.

The three major factors, i.e. Self-efficacy, Cultural factors, and BF support, across any age group are important while designing a BF support app.

The study found that self-efficacy is influenced by different issues like personal experience, , verbal persuasion from health care professionals, peer counsellors, family members or personal friends. These positively influences the attitude of mothers related to breastfeed. Whereas, pain, fatigue, anxiety or stress reduces one's sense of self efficacy [25].

Furthermore, mothers with high breastfeeding experience are expected to breastfeed more as compared with mothers with low breastfeeding experience.

The study also found that mothers felt pressure about their choice of feeding methods due to cultural norms. The mothers highlighted the fact that their partners and families sometimes told them that breastfeeding was the best feeding method and other methods were not acceptable choices.

The study reveals that that receiving support of husband and other family members could encourage breastfeeding. It significantly influences the attitude of mothers related to breastfeeding. The mothers require breastfeeding support that includes sharing information, facilitating proper breastfeeding techniques, and providing emotional

support related to breastfeeding from their families, friends and peers. The mothers who have received support from their partner, friends, mothers, other family members, and people in their communities have a more positive attitude towards breastfeeding. Moreover, support from health professionals like doctors and nurses and parenting programs, were also found to be important elements.

Breastfeeding norm is often dealt as subjective norm because although it is based on planned behavior control, but the intention, motivation, initiation, prediction and maintenance are different. However, most mothers reported that at least six months exclusive breastfeeding is set as a norm due to significant role of psychosocial factors and physical factors.

The study highlighted that previous experience of mothers becomes a driving force in setting the breastfeeding norm and eventually determining the breastfeeding behavior. It suggests that with experience, mother tend to understand the significance of breastfeeding and choose the best feeding option for their child which is breastfeeding.

The study found that breastfeeding experience is an influential factor that affects mothers' attitude to breastfeed. Breastfeeding experience helps in building confidence and self-efficacy is a determinant of breastfeeding. Women with little or no previous breastfeeding experience require additional support to be able to breastfeed adequately. Women with breastfeeding experience are more likely to intend to breastfeed than those who never had any experience.

The study found that age is a moderator of many factors influencing breastfeeding practices. With increasing age, the attitude towards breastfeeding becomes positive and also duration of breastfeeding increases.

The study found that some mothers highlighted the fact that use of social media contributed to a loss of their bonding with the child and were sleep deprived which created an anxiety and postnatal depression. These negative perceptions related to breastfeeding included that it was a barrier to continuing social activities on social media. Therefore, mothers need design intervention other than facebook support groups where they can directly engage with experienced mothers and other nursing professional. Thus,

helping mothers to find strategies to effectively breastfeed would be important to facilitating their breastfeeding success.

5.6 DISCUSSION AND RECOMMENDATIONS

The findings suggest that age moderates the effect of self-efficacy, cultural factor and breastfeeding support on the mother's attitude towards breastfeeding, therefore, health workers should understand this fact and increase their support for the young mothers. When mothers got that support from the hospital and at home, they tend to breastfeed their babies more. The study also revealed that breastfeeding support was valuable to new mothers, and mothers can be supported with a platform where they might communicate directly with experienced mothers for purpose of knowledge sharing.

The 'technology-based interventions' is considered as a contemporary approach to support several initiatives, including minimizing barriers for the breastfeeding mothers. One notable aspect of the 'technology-based interventions' is digitization.

Based on the findings of this research study, we propose the digitization of implicit knowledge which could be designed as generic learning modules. In addition, other interventions may include web and mobile/desktop applications, electronic medical record (EMR) system, social media, and offline media applications to educate, support, and encourage breastfeeding mothers. These technological based interventions could be consciously designed to not only facilitate communication but also encourage sustainable breastfeeding practices among breastfeeding mothers. We hope that the use of such technological interventions will help mothers to enhance their knowledge; improve self-efficacy; positively counter social, environmental, and cultural barriers which in turn also have the potential to positively influence mothers' intentions and attitude towards breastfeeding.

As breastfeeding support is important for the breastfeeding mothers, and therefore, the following elements must be taken into consideration while designing an app.

- Intervention / Training – e.g how to pump breast milk
- Simulation effect to be included for the breast-fed baby Vs. non-breast-fed baby

- Notification features for different alerts
- Add Encouragement in the form of Virtual Rewards
- Step-by-Step guide towards BF
- Facility to chat with the experts
- Community group chat feature
- Information exchange will be monitored and moderated by an expert
- To propagate for the Legal rights/legislation

Based on the findings discussed above, a guideline Table has been prepared and presented below:

Table 5.4 Guidelines Summary Table

Problem(s)	Technological Solution/Guideline(s)	Brief Description/ Procedure	Examples	proposed intervention
<ul style="list-style-type: none"> • Lack of knowledge related to breastfeeding, Lack of support, Breastfeeding Norms 	A Web-based forum/platform can be established	<ul style="list-style-type: none"> • Doctors, nurses and paramedical staff can provide online training and guidance to mothers about breastfeeding related issues. • Experienced mothers can share their positive experiences, and challenges they faced, how they countered those challenges 	<ul style="list-style-type: none"> • Kellymom • Breastfeeding basics • The mamanurse • La Leche breastfeedingcop 	<ul style="list-style-type: none"> • An online platform where mothers can communicate directly with health professionals and other experienced mothers. • Provide a channel of offline breastfeeding tutorials
Social, cultural and environmental barriers Encouraging breastfeeding support and self	Mobile/desktop applications-based awareness and training programs	<ul style="list-style-type: none"> • Mobile applications can provide a platform to track feeding and educate for breastfeeding 	<ul style="list-style-type: none"> • LatchME Ap MilkTrack Ap • Feed Finder Ap 	<ul style="list-style-type: none"> • Current mobile applications features are breastfeeding tracking • A new mobile app can be designed having chat facility for mothers with experts.Step

efficacy				by step guide for breastfeeding or pumping milk.
Remote lactation consultation services	Telemedicine	<ul style="list-style-type: none"> • Mothers can get remote lactation consultation services and guidance through audio or video calls or through email communication. 	<ul style="list-style-type: none"> • Audio/video calls or email communication 	<ul style="list-style-type: none"> • A platform that removes geographical barriers
Online health record/Database	Electronic Medical Record System	<ul style="list-style-type: none"> • A database that can contain record of all matters related to maternal health issues and breastfeeding practices. • It can be used by health care professionals and experts to personalize their breastfeeding support tactics. 	<ul style="list-style-type: none"> • Electronic health records clinic. 	<ul style="list-style-type: none"> • Web-based virtual maternity clinic. • Online availability of personalized record. • Better health care support services.
Psychological barrier	Games based intervention	<ul style="list-style-type: none"> • A quest-based interactive game for mothers can be designed to build up their breastfeeding knowledge by completing playful quests. 	<ul style="list-style-type: none"> • Online/offline educational games related to breastfeeding 	<ul style="list-style-type: none"> • Adding virtual reward features in game applications where mothers feel encouragement to feed their babies. • A game-based training session to support and teach breastfeeding

The technological solutions and guidelines discussed in the above table can play a significant role in minimizing barriers to breastfeeding and have the potential to positively influence attitude of mothers as it relates to breastfeeding. These technological based systems facilitate communication and encourage breastfeeding practices mainly due to perceived support from the experts in specific and from the society in general. The use of these e-tools will help mothers to enhance their knowledge, improve their self-efficacy, positively counter social, environmental, and cultural barriers which in return will positively influence mothers' intentions and attitude towards breastfeeding.

Impact of Environmental factors on mothers' attitude towards BF got rejected in my research because mothers are determined to BF in any age and hence environment does not matter.

5.8 LIMITATIONS

The limitations of this research are as follows:

- Women who do not have internet access may not have participated in this research especially the quantitative study.
- Women with negative experience from social media may have not participated because of no access or they have blocked social media and did not want to take part.
- However, to get access, researcher made sure to access mothers face to face to get possible data and did not only use online adverts but also visit to local breastfeeding support group. For interview sessions mothers were very busy looking after their babies.
- Women with no breastfeeding experience could have provided insights of why they did not choose to breastfeed.
- Women using different mobile applications were not investigated to check the design features of those breastfeeding apps.
- Women recruited for qualitative analysis were accompanied by their babies which created time limitation for the mothers and researcher.
- Mothers recruited through Mturk cannot be categorized for ethnic and cultural backgrounds which creates a biasness for breastfeeding norm.

5.8 FUTURE WORK

Overall, the participants were positive towards breastfeeding their babies.

- This research sheds light on various factors that impact mother breastfeeding behavior both positively and negatively. It identified various moderating factors that influence mother's breastfeeding behavior.
- It informs about specific factors to design intervention keeping in mind moderating factors like age and experience
- Applying the results from this research this thesis proposes design recommendations that can assist breastfeeding and promote positive breastfeeding behavior among mothers. Moreover this further recommends to study different designs and methods that can be a guidance in breastfeeding by healthcare professionals, Experienced mothers and other breastfeeding counsellors.

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APPENDIX A Ethics Approval

Reply all | Delete | Junk | Block | ...

REB # 2019-4808 Amendment Approval

 **ethics@dal.ca**
Mon 9/30/2019 10:47 AM
Nazia Asad: Rita Orji: Research Ethics

****This was sent from a no-reply address. To respond to this message, please reply directly to Research Ethics at ethics@dal.ca.*

**DALHOUSIE UNIVERSITY**
Research Services

**Social Sciences & Humanities Research Ethics Board
Amendment Approval**

September 30, 2019

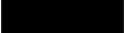
Nazia Asad
Computer Science\Computer Science

Dear Nazia,

REB #: 2019-4808
Project Title: The impact of Social Factors and Technology in Women with Breastfeeding Experience

The Social Sciences & Humanities Research Ethics Board has reviewed your amendment request and has approved this amendment request effective today, September 30, 2019.

Sincerely,


Dr. Karen Beazley, Chair

APPENDIX B Questionnaire

Questionnaire for Breastfeeding Mothers (Online Survey)

Question 1: Are you currently breastfeeding, or have you in the past 5 years, breastfed an [infant](#) or child?

Yes.

No.

Question 2: How old are you?

Under 18.

18–20.

21–25.

26–30.

31–35.

36–40.

40+

Question 3: What is your country of residence?

United States.

Canada.

Other (specify)

Question 4: What is the highest level of education that you have obtained?

Some High School Graduated High School.

Some College

Associate degree.

Bachelor's Degree.

Master's Degree.

Professional Degree (eg. PhD, MD, JD)

Question 5: What is your household income?

Under 25,000, Under 25,000.

25,000 to 34,999.

35,000 to 49,999.

50,000 to 74,999.

75,000 to 99,999.

100,000 to 149,999.

150,000 to 199,999.

200,000+

Question 6: How many children do you have?

1.

2.

3.

4.

5.

6+

How old is your youngest child? -----

Do own a mobile phone? Y/N

Have you ever used any mobile application? Y/N

Have you ever used a mobile application to support your maternal and infant healthcare? Y/N

If yes, what is the name of mobile application(s) you used?-----

Question 7: Do you use any forms of social media (eg. [Facebook](#), [Twitter](#), [LinkedIn](#), [Pinterest](#), Instagram)? If yes,

Please check all that apply Facebook

Instagram

LinkedIn

Pinterest

Snap Chat

Other: _____

No.

Question 8: Do you use email services?

Yes.

No.

Who is your email provider (e.g., gmail, Hotmail, yahoo etc.) _____

Question 9: While breastfeeding did you utilize a [mobile phone](#), tablet, or lap top computer to use social media or check and send emails at the same time?

Yes.

No.

Question 10: How often during breastfeeding did you utilize a phone, tablet, or laptop computer to use social media or check and send emails

- A. 100% (All the time)
- B. 75% (Often)
- C. 50% (Sometimes)
- D. 0-25% (Rarely)

Question 11: What are the top two social media apps or technology that you used while breastfeeding? Please check all that apply.

- Facebook.
- Pinterest.
- Twitter.
- [Instagram](#).
- LinkedIn.
- Email.
- Other: _____

Question 12: What were the reasons you utilized social media and technology while breastfeeding? Please check all that apply.

- Entertainment.
- Catch up on work.
- Connect with other [family members](#).
- Connect with friends.
- Connect with other breastfeeding mothers.
- Other. (Specify)-----

Question 13: Does using social media while breastfeeding impact the duration of breastfeeding negatively (i.e. reduce the time spent breastfeeding)?

Yes.

No.

Please, explain -----

Question 13: Does using social media while breastfeeding impact the duration of breastfeeding positively (i.e. increase the time spent breastfeeding)?

Yes.

No.

Please, explain -----

Question 14: Please rate your level of agreement with the following statements using check mark where applicable :

BARRIER	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
1. I would feel embarrassed if someone saw me breastfeeding					
2. Breastfeeding is inconvenient					
3. Breastfeeding makes me feel run down					
4. Breastfeeding causes excessive craving					
5. I am not producing good quality milk					
6. Insufficient breast milk is a barrier to breastfeeding					
7. I do not think I know enough about breastfeeding to be successful					
8. Breastfeeding is difficult					
9. Breastfeeding makes my breasts sag					
10. The physical pain and discomfort associated with breastfeeding discourages me from breastfeeding					

Social Factors	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
1. Breastfeeding ties women down socially					
2. Lack of support from social support network undermines my ability to breastfeed					

I am afraid of facing some public harassment when I breastfeed in the public					
3. Women should not be tied to the baby/family					
4. Criticism over public breastfeeding is a barrier to breastfeeding					
Sexualization of breastfeeding scares me from breastfeeding					

Cultural Factors	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
1. It is unacceptable to breastfeed in public					
2. Breastfeeding is a natural human activity					
3. It is unacceptable to breastfeed in front of others (except husband/health care workers)					
4. The breast is a sex symbol in this community					

Environmental Factors	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
1. Overcrowded living environment is a barrier to breastfeeding					
2. No privacy for breastfeeding at my home is a barrier to breastfeeding					
3. The short maternity leave is a barrier to breastfeeding					
4. No privacy for breastfeeding at public places is a barrier to breastfeeding					
5. The facilities at work do not support breastfeeding practice					
6. The public facilities do not support breastfeeding practice					
7. The facilities in my work place do not support breastfeeding practice					

BREASTFEEDING INTENTION	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
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1. I usually breastfeed or I intend to feed my baby only breast milk for the 6 months (exclusive breastfeeding)					
2. I like to breastfeed my infant for one year or longer					
3. I really like to breastfeed for as long as I can					

BREASTFEEDING NORM	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
1. My family believes that breastfeeding is a good thing					
2. My friends believe that breastfeeding is a good thing					
3. My colleagues believe that breastfeeding is a good thing					
4. People who are important to me believe that breastfeeding is a good thing					
5. Most people whose opinions are important to me think that I should feed my infant only breast milk, and no other food or water, for the first 6 months					
6. Most people who are important to me (e.g. family members, friends) think I should breastfeed my infant for one year or longer'					

SELF-EFFICACY	Not at all confident	Slightly Confident	Moderately Confident	Confident	Very Confident
How confident are you about your ability to do the following:					
1. Determine that my baby is getting enough milk					
2. Successfully cope with breastfeeding like I have with other challenging tasks					
3. Breastfeed my baby without using formula as a supplement					
1. Ensure that my baby is properly latched on for the whole feeding					

2. Manage the breastfeeding situation to my satisfaction					
3. Manage to breastfeed even if my baby is crying					
4. Keep wanting to breastfeed					
5. Comfortably breastfeed with my family members present					
6. Be satisfied with my breastfeeding experience					
7. Deal with the fact that breastfeeding can be time-consuming					
8. Finish feeding my baby on one breast before switching to the other breast					
9. Continue to breastfeed my baby for every feeding					
10. Manage to keep up with my baby's breastfeeding demands					
11. Tell when my baby is finished breastfeeding					

PERCIEVED BENEFIT	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
1. Breastfeeding is economical					
2. Breastfeeding is enjoyable					
3. Breastfeeding makes the baby closer to me					
4. Breastfeeding makes me feel important					
5. Breastfeeding helps mothers loss weight					
6. Breastfeeding is good for both the baby and mother's health					
7. Breastfeeding is a rewarding experience					

ATTITUDE	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
1. Formula-feeding is more expensive than breast-feeding					
2. Breast milk is the ideal food for babies					
3. Formula-feeding is more convenient than breast-feeding					
4. Breast-feeding interferes with a couple's sexual relationship					
5. Breastfeeding increases mother-infant bonding					
6. Breastfeeding is good for both the baby and mother's health					

SUPPORT	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
7. My spouse was supportive my decision to breastfeed in the face of breastfeeding problems					
8. My spouse provided me with enough emotional support during breastfeeding					
9. My family was supportive my decision to breastfeed in the face of breastfeeding problems					
10. My family provided me with enough emotional support during breastfeeding					
11. My health providers were supportive my decision to breastfeed in the face of breastfeeding problems					
12. My health providers provided me with enough emotional support during breastfeeding					
13. My friends/peer was supportive my decision to breastfeed in the face of breastfeeding problems					
14. My friends/peer provided me with enough emotional support during breastfeeding					
15. My workplace was supportive my decision to breastfeed in the face of breastfeeding problems					

16. My workplace provided me with enough emotional support during breastfeeding					
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5 Factor Personality Questions

On a scale of 1 to 5, to what extent do you agree with the following statements.

1 – Strongly Disagree, 5- Strongly Agree

I see myself as someone who:

1. **is reserved.**
2. **is generally trusting.**
3. **tends to be lazy.**
4. **is relaxed, handles stress well.**
5. **has few artistic interests.**
6. **is outgoing, sociable.**
7. **tends to find fault with others.**
8. **does a thorough job.**
9. **gets nervous easily.**

APPENDIX C Interview

Theme A: Personal breastfeeding experience

1- Tell me about your breastfeeding experience.

- P* - Difficulties encountered
- Breastfeeding duration

2- What motivated you to continue breastfeeding for X weeks?

3- Tell me about how satisfied you feel with your breastfeeding experience. 4- Are you still breastfeeding now? If not, what led you to stop?

- P - Reasons related to the mother
- Reasons related to the child

Theme B: Factors facilitating breastfeeding

5- What helped you continue breastfeeding?

- P - Breastfeeding support service
- Society in general
- Policies
- Personal motivation

6- Are there other things that might have helped you breastfeed longer? If yes, what?

Theme C: Obstacles and barriers to breastfeeding

7- Did you encounter any obstacles to breastfeeding? Would you like to tell me about them?

- P - Obstacles/barriers
- Something that interfered

Theme D: Social influence on breastfeeding

8- Which persons had the most influence on how long you breastfed? How did they influence you?

- P - Those who had a positive influence (family, friends, health professionals)
- Those who had a negative influence (family, friends, health professionals)

Theme e: social media and technology

17- Have you ever used social media and technology to support you breastfeed? How did social media and technology influence you?

P means probe.

Question 6: Why did you decide to stop breastfeeding after the period of time mentioned in 5 above

Question 7: Do you think you are adequately supported at home to achieve the desired breastfeeding behaviour? Y/N

Question 8: How does being at home facilitate adequate breastfeeding practice?

Question 9: How does being at home hinder adequate breastfeeding practice?

Question 10: Do you think that workplaces are adequately equipped to support your breastfeeding behavior?

Y/N

Question 10: How do workplaces facilitate adequate breastfeeding practice?

Question 11: How do workplaces hinder adequate breastfeeding practice?

Question 12: Do you think the public places are adequately equipped to support your breastfeeding behaviour?

Y/N

Question 13: How do public places facilitate adequate breastfeeding practice?

Question 14: How do public places hinder adequate breastfeeding practice?

Question 15: What is your perception of breastfeeding?

Question 16: Do you believe in exclusive breastfeeding?

Question 17: Do you believe in breastfeeding for a long time?

Question 18: What is your friends' perception of breastfeeding?

Question 19: Do your friends believe in exclusive breastfeeding?

Question 20: Do your friends believe in breastfeeding for a long time?

Question 21: What is your family's perception of breastfeeding?

Question 22: Does your family believe in exclusive breastfeeding?

Question 23: Does your family believe in breastfeeding for a long time?

APPENDIX D Screenshot - SmartPLS

