

## Knowledge Attitude and Practices of Mothers and Medical Staff towards Breastfeeding during the COVID-19 Crisis

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### Abstract

**Background:** The COVID-19 crises caused increased stress, staff deployment and conflicting policies with regards breastfeeding. The extent to which such factors influenced early feeding practices is poorly understood. Objective: To investigate the knowledge, attitudes, and practices (KAP) of women and health providers towards continuation of exclusive breastfeeding (EBF) during the COVID crisis. Subjects and Methods: A community-based cross-sectional study was conducted among 400 breastfeeding mothers and 300 health providers in Benha City as an after-effect to this crisis. Data were collected through interviewer-administered structured questionnaires covering demographics, knowledge, attitudes, and practices, and statistically analysed. Results: The mean age of mothers was 28±5 years. Most mothers resided in rural areas (60%) and had high education levels (75.5%). About 62.5% were familiar with EBF, and 68.3% identified six months as the recommended EBF duration. Opinions on breastfeeding during COVID-19 varied: 34% knew breast-milk protected against COVID infection, while 56.5% disagreed with stopping breastfeeding due to infection with COVID. Urban residents had KAP about vaccination against COVID-19 and better hygiene practices. Health providers were less likely to encourage continuation of breastfeeding especially for admissions to neonatal units. Logistic regression revealed that each additional year of mother's age reduced the risk of not EBF by 10% (OR = 0.897, 95% CI = 0.843 – 0.954, P = 0.001), and being a working mother reduced this risk by 43% (OR = 0.575, 95% CI = 0.349 – 0.946, P = 0.029). Conclusion: COVID-19 crises affected early feeding practices to some extent. The gap between knowledge and practice of EBF is probably attributed to inconsistency, poor communication and dissociation of infection control and preventive care sector policies with primary health care servicing mothers with breastfeeding babies.

**Keywords:** Knowledge; Attitude; Practices; Exclusive Breast Feeding; COVID-19.

### 1.Introduction

Covid crisis had significant impact on mother and child health and feeding progress. Exclusive breastfeeding (EBF) reduces infant mortality from common illnesses such as diarrhea and pneumonia, and aids quicker recovery during illness. Non-breastfed children face higher risks of elevated blood pressure, type 2 diabetes, obesity, lower intelligence scores, asthma, and childhood leukemia [1]. Sub-optimal breastfeeding, particularly non-exclusive breastfeeding in the first six months, results in 1.4 million deaths and 10% of diseases in children under five [2].

The World Health Organization and the American Academy of Pediatrics recommend EBF for six months, followed by continued breastfeeding with complementary foods until two years of age or beyond [3]. Breast milk is enriched with anti-infective and anti-inflammatory factors, making it crucial in mitigating infectious conditions [4]. COVID-19, declared a pandemic by the World Health Organization, is a highly contagious disease spread from person to person. WHO has issued guidelines to protect infants from COVID-19 infection from their mothers [5, 6].

There is no evidence of vertical transmission of COVID-19 from infected mothers to fetuses. However, infected mothers can transmit the virus to their infants through respiratory droplets during breastfeeding or close contact [7]. Pregnant and lactating mothers need scientific advice to protect their health and that of their babies. Health care professionals can play a crucial role in dispelling doubts and misconceptions about breastfeeding during the pandemic [8]. Infected mothers are advised to take precautions to avoid spreading the infection to their infants. Breast milk from infected mothers contains anti-SARS-CoV-2 IgA and IgG, neutralizing the virus and supporting continued breastfeeding during mild-to-moderate maternal COVID-19 illness [9].

The Centers for Disease Control and Prevention recommends vaccinating breastfeeding women who are in target groups [10]. Breastfeeding offers numerous health benefits to both mother and child. The COVID-19 vaccine poses minimal risk to the newborn through breast milk and may provide direct neonatal benefits if vaccine-stimulated immunoglobulin-A passes through breast milk.

Therefore, the COVID-19 vaccine is recommended for breastfeeding women who meet the prioritization criteria, such as healthcare providers or other high-risk groups [11]. Uncertainties during the COVID-19 crises increased the stress and anxiety levels of women about transmission [12].

Health professionals impacted breastfeeding plans by the strict infection control policies to mitigate the virus transmission between the mother and the child by mother-infant separation, pre-lacteal supplementation, non-initiation of breastfeeding or discontinuation. Similarly, community containment measures compromised health care visits and postnatal care follow-ups and limited social contacts and familial support, further reducing breastfeeding support to new mothers. Globally, the COVID-19 pandemic had a negative toll on economies, increasing unemployment rates (mostly for women), and leading to financial insecurity. In addition, exposure to the disease, mortality, grief, and the perception of threats to life, along with over-exposure to social media information associated with SARS-CoV-2 transmission contributed to increased uncertainty and insecurity among mothers [13]. The World Health Organization (WHO) acknowledged breastfeeding as the preferred feeding method for all neonates and infants, particularly during the first six months of life [14-16].

In Egypt, a conflict existed between breastfeeding support policies, COVID-19 infection control policies and preventive sectors responsible for vaccination. The government had prohibited vaccination for pregnant and breastfeeding women, leading many women to discontinue breastfeeding prematurely, depriving their babies of its benefits. Therefore, this study aims to investigate the knowledge, attitudes, and practices (KAP) of women and health providers towards breastfeeding and how to manage breastfeeding during the COVID crisis.

## **2. Subjects and Methods**

### **Study Design and Participants:**

This was a community based cross-sectional study conducted among breastfeeding mothers in Benha City. The study aimed to investigate KAP of women towards breastfeeding and how to manage breastfeeding during the COVID crisis. The study period spanned from January 2022 to June 2022. Inclusion criteria were healthy breastfeeding mothers with healthy babies. The exclusion criteria were sick or infected mothers or women with problems that prevent them from breastfeeding (e.g. cancer patients or severe debilitating

disease). The development of the questionnaire was conducted by a comprehensive review of the existing literature. This process allowed for the inclusion of well-established constructs and measures, ensuring that the instrument is theoretically grounded. Data was collected through an interviewer administered structured questionnaire for 400 breastfeeding mothers with healthy infants between zero- and 24-month-old attending child welfare clinics for immunization or health care monitoring (not sick): The questionnaire for mothers included four domains: Demographics, Knowledge, Attitude, and Practice. The first domain (Demographics): This domain included questions about name, age, residence, education, and employment status. The second domain (Mothers' Knowledge): This included 14 questions to assess mothers' understanding of EBF, its duration, benefits for the child and mother, and its protective effects against future diseases. Additionally, it explored their knowledge of COVID-19 symptoms, transmission modes, protective methods, and the role of breast milk in protecting against the virus. The third domain (Mothers' Attitudes): This section included 8 questions and delved into mothers' perceptions of EBF sufficiency, the best feeding method for their child, and their views on breastfeeding during illness and vaccination. It also investigated their intention to get vaccinated against COVID-19. The fourth domain (Mothers' Breastfeeding Practices): This included 24 questions covering various aspects of breastfeeding practices, including attendance at pre-birth classes, initiation of breastfeeding after birth, feeding practices at any time, milk expression methods, EBF and weaning practices, dealing with breastfeeding problems, practices during COVID-19 symptoms, and vaccination-related practices. The questionnaire for medical staff consisted of four domains: Demographics, Knowledge, Attitude, and Practice. Demographics: Questions covered name, age, gender, years of experience, and workplace. Medical Staff's Knowledge: Assessed through 9 questions, focusing on exclusive breastfeeding, WHO recommendations, the impact of breastfeeding on immunity, COVID-19-related practices, and sources of knowledge during the pandemic. Medical Staff's Attitudes: Comprised 8 questions exploring attitudes toward exclusive breastfeeding, pacifier use, feeding practices during COVID-19, and vaccination-related perspectives. Medical Staff's Practices: Consisted of 15 questions examining practices like recommending exclusive breastfeeding, educating mothers on its benefits, advising on solid food

introduction, and offering guidance on COVID-19 vaccination and postnatal care. It also evaluated recommendations for formula feeding in specific situations. To examine the content validity of every sentence and phrasing of the questionnaires, the draft was given to supervisors to assess whether it represented the principles intended to test and to decide its readability and consistency. After modifications and adjustments based on the professors' comments, a pilot study was performed. It aimed at determining the tool usability and clarity. It also helped to predict the time required for each questionnaire. The sample size was calculated with expected frequency of satisfactory KAP score 50% [17]. This yielded a sample size of 384 people. Allowing for drop out or missed data, the sample size was adjusted and increased to 400 subjects. The researchers conducted regular visits to 4 places including Benha University Hospitals, Benha Children Hospital, Masjed El-khadr PHC and Istanha PHC from 9 am to 3pm, three days weekly, until the predetermined sample size was reached. The researcher conducted live interviews with mothers. At each interview, the researcher introduced himself to each mother and told them the purpose of the study in order to obtain their approval and cooperation. Data confidentiality was ensured to gain the trust and confidence of the participating mothers.

#### **Ethical considerations:**

The study was done after being accepted by the Research Ethics Committee, Benha University. All participants provided written informed consents prior to their enrolment. The consent form explicitly outlined their agreement to participate in the study and for the publication of data, ensuring protection of their confidentiality and privacy.

#### **Statistics:**

Data management and statistical analysis were done using SPSS version 28 (IBM, Armonk, New York, United States). Quantitative data were assessed for normality using the Kolmogorov–Smirnov test and direct data visualization methods. According to normality, quantitative data were summarized as means and standard deviations or medians and ranges. Categorical data were summarized as numbers and percentages. Mothers' practice was compared according to residence and medical staff practice was compared according to hospital type and work experience using the Chi-square or Fisher's exact test. Multivariate logistic regression analysis was done to predict not performing EBF by mothers. The odds ratios with 95% confidence intervals were calculated. All statistical tests were two-sided.

P values less than 0.05 were considered significant.

### **3.Results**

The mean age of participating mothers was  $28 \pm 5$  years, ranging from 17 to 47 years. Most mothers resided in rural areas (60%) compared to urban areas (40%). In terms of education, a significant proportion had attained high education levels (75.5%), while a smaller percentage held master's or PhD degrees (21.5%), and only 3% had completed primary education. Additionally, a substantial portion of the participants were employed mothers (64.5%). About two-thirds (62.5%) of participants were familiar with the concept of EBF. Among these, 47.5% correctly defined EBF as providing only breast milk, with 29% also excluding pacifiers. Most (68.3%) identified six months as the recommended EBF duration, and 86% viewed introducing milk or food before six months negatively. Additionally, 81% believed introducing bottles or pacifiers could lead to breastfeeding refusal. Urban residents are more likely to believe in the protective benefits of breastfeeding (BF) against intestinal infections and bronchial diseases, with 81.3% holding this belief compared to 59.6% of rural residents ( $P < 0.001$ ). Urban respondents also more frequently recognize that BF strengthens the bond between mother and child (81.3% vs. 65%,  $P < 0.001$ ). Belief in BF's ability to reduce the risk of obesity and chronic diseases like bronchitis and diabetes is significantly higher in urban areas. Specifically, 60% of urban residents believe BF reduces obesity risk, compared to 22.5% of rural residents ( $P < 0.001$ ). Similarly, 70% of urban respondents believe BF reduces chronic disease risk, versus 19.2% of rural respondents ( $P < 0.001$ ). Urban residents are also more aware of the benefits of extending exclusive breastfeeding (EBF), with 96.3% believing it strengthens child immunity (compared to 53.3% of rural respondents,  $P < 0.001$ ) and 55% believing it increases IQ (compared to 19.6%,  $P < 0.001$ ). In terms of coronavirus knowledge, urban respondents show greater awareness of symptoms and transmission modes. For example, 93.8% recognize fever as a symptom, compared to 80.8% of rural residents ( $P < 0.001$ ), and 82.5% identify sore throat and dry cough as symptoms, compared to 53.3% of rural respondents ( $P < 0.001$ ). Urban residents also more frequently recognize the importance of preventive measures like cleaning surfaces and social distancing ( $P < 0.001$  for both). Lastly, 58.8% of urban respondents believe breast milk contains antibodies that protect against

coronavirus, compared to 17.5% of rural respondents ( $P < 0.001$ ). These findings reveal a significant gap in health knowledge between

rural and urban populations, highlighting the need for targeted educational efforts in rural areas. Table 1

**Table (1) Mothers' knowledge about breastfeeding during COVID according to residence.**

	Residence		P-value
	Rural	Urban	
BF protects from intestinal infections and bronchial diseases	143 (59.6)	130 (81.3)	<0.001*
BF strengthens immunity against diseases	199 (82.9)	142 (88.8)	0.107
BF strengthens the bond between mother and child	156 (65)	130 (81.3)	<0.001*
BF reduces risk of obesity	54 (22.5)	96 (60)	<0.001*
BF reduces risk of chronic dis. As bronchitis and DM	46 (19.2)	112 (70)	<0.001*
extending EBF duration strengthen child immunity	128 (53.3)	154 (96.3)	<0.001*
extending EBF duration Increase IQ level	47 (19.6)	88 (55)	<0.001*
BF helps mothers return to normal weight rapidly	200 (83.3)	130 (81.3)	0.591
BF protects mothers against breast & ovarian cancer	64 (26.7)	140 (87.5)	<0.001*
Fever is a symptom of coronavirus	194 (80.8)	150 (93.8)	<0.001*
Sore throat & dry cough are symptoms of coronavirus	128 (53.3)	132 (82.5)	<0.001*
Running nose is a symptom of coronavirus	84 (35)	94 (58.8)	<0.001*
Difficulty breathing is a symptom of coronavirus	234 (97.5)	156 (97.5)	1
Droplet is a mode of transmission of coronavirus	238 (99.2)	156 (97.5)	0.223
Touching contaminated surfaces is a mode of transmission of coronavirus	136 (56.7)	136 (85)	<0.001*
Washing hands regularly is a mode of transmission of coronavirus	232 (96.7)	158 (98.8)	0.191
Cleaning and sterilizing surfaces protects against coronavirus	87 (36.3)	124 (77.5)	<0.001*
Masks and social distancing protect against coronavirus	184 (76.7)	150 (93.8)	<0.001*
Proper ventilation and avoiding crowded places protect against coronavirus	120 (50)	152 (95)	<0.001*
Breast milk contains antibodies that protect your child from coronavirus	42 (17.5)	94 (58.8)	<0.001*
Friends are the main knowledge source about breastfeeding	147 (61.3)	94 (58.8)	0.617
Medical staff are main knowledge source about breastfeeding	106 (44.2)	82 (51.2)	0.164
Internet & TV are main knowledge source about breastfeeding	73 (30.4)	88 (55)	<0.001*

**Data were presented as number and percentage (%); \*Significant P-value, BF: Breastfeeding, EBF: Exclusive Breastfeeding**

Urban residents are significantly more likely to believe that exclusive breastfeeding (EBF) is sufficient for a child's development during the first six months of life, with 88.8% holding this view compared to 70% of rural residents ( $P < 0.001$ ). Additionally, urban respondents overwhelmingly prefer breast milk only for their child (88.8%) over a combination of breast milk and artificial milk (11.3%), whereas a majority of rural respondents (55.4%) favor the combination ( $P < 0.001$ ). There is a notable difference in opinions on breastfeeding in specific circumstances. Fewer urban respondents (20%) believe that a mother should stop breastfeeding if infected with coronavirus compared to 31.3% of rural respondents ( $P = 0.044$ ), indicating a greater acceptance of continued breastfeeding among urban residents. Similarly, urban respondents are less likely to believe that breastfeeding

should stop if the mother has received the coronavirus vaccine (7.5% vs. 11.7% in rural areas,  $P = 0.005$ ). When it comes to breastfeeding during illness, urban residents are significantly less likely to believe it should be avoided during the child's illness (2.5% vs. 10.8% in rural areas,  $P < 0.001$ ) or the mother's illness alone (70% vs. 43.8% in rural areas,  $P < 0.001$ ). Urban respondents also show greater confidence in the benefits of vaccination during breastfeeding, with 66.3% viewing it as beneficial compared to 43.3% of rural residents ( $P < 0.001$ ). Moreover, a higher percentage of urban residents (41.3%) express a willingness to get vaccinated against coronavirus, compared to only 15.4% of rural respondents ( $P < 0.001$ ). These findings highlight significant differences in attitudes and beliefs about breastfeeding and vaccination between urban and rural

populations, underscoring the need for targeted education and outreach in rural areas to

improve health practices. Table 2

**Table (2) Mothers' attitudes about breastfeeding during COVID according to residence.**

	Residence		P-value
	Rural	Urban	
EBF is sufficient for the child development during the first six months of life	168 (70)	142 (88.8)	<0.001*
The best for child is			
Breast milk + artificial milk	133 (55.4)	18 (11.3)	<0.001*
Breast milk only	107 (44.6)	142 (88.8)	
Mother should stop breastfeeding while taking medication	126 (52.5)	76 (47.5)	0.152
Mother should stop breastfeeding if she is infected with the coronavirus?	75 (31.3)	32 (20)	0.044*
Mother should stop breastfeeding if she has received the vaccination?	28 (11.7)	12 (7.5)	0.005*
Breastfeeding should be avoided during			
Child illness	26 (10.8)	4 (2.5)	<0.001*
Mother and child illness	14 (5.8)	16 (10)	
Mother illness	105 (43.8)	112 (70)	
None of the above	95 (39.6)	28 (17.5)	
Vaccination during breastfeeding is			
Beneficial	104 (43.3)	106 (66.3)	<0.001*
Harmful to you only	8 (3.3)	2 (1.3)	
Harmful to you & your child	92 (38.3)	30 (18.8)	
Harmful to your child only	36 (15)	22 (13.8)	
I will get vaccinated against coronavirus?	37 (15.4)	66 (41.3)	<0.001*

**Data were presented as number and percentage (%); \*Significant P-value**

Urban residents attended pre-birth breastfeeding classes more than rural residents (28.7% vs. 19.2%,  $P = 0.026$ ). Urban residents also received more information on coronavirus (34.8% vs. 13%,  $P = 0.015$ ), were encouraged to breastfeed during the pandemic (39.1% vs. 13%,  $P = 0.004$ ), and were more likely to get vaccinated (56.5% vs. 13%,  $P < 0.001$ ). Compared to rural residents, urban residents practiced skin-to-skin contact more frequently (51.2% vs. 16.7%,  $P < 0.001$ ), initiated breastfeeding within the first hour after delivery (51.2% vs. 16.7%,  $P < 0.001$ ), and were less likely to use baby drinks, herbs, or sugar water after birth (38.8% vs. 82.5%,  $P < 0.001$ ). Rural residents had higher NICU admissions (62.9% vs. 45%,  $P < 0.001$ ) and were less likely to express breast milk for their NICU-admitted child (31.8% vs. 50%,  $P = 0.009$ ). Urban residents gave commercial milk feed more often (37.5% vs. 30%,  $P = 0.003$ ) and breastfed on a schedule more frequently (28.7% vs. 12.5%,  $P < 0.001$ ). Rural residents used formula in the first few days more (45.4% vs. 28.7%,  $P < 0.001$ ) and introduced pacifiers

more frequently (66.7% vs. 41.3%,  $P < 0.001$ ). Urban residents were more likely to use milk-producing medications (63.7% vs. 39.6%,  $P < 0.001$ ), herbal drinks (57.5% vs. 29.6%,  $P < 0.001$ ), and specific foods for milk production (77.5% vs. 61.3%,  $P < 0.001$ ). Urban residents practiced exclusive breastfeeding (EBF) for six months more often (70% vs. 58.8%,  $P < 0.001$ ), while rural residents began weaning earlier (23.3% vs. 3.8%,  $P < 0.001$ ) and stopped breastfeeding at 18 months more often (54.6% vs. 47.5%,  $P = 0.013$ ). Urban residents cited more unspecified reasons for stopping breastfeeding (25% vs. 15%,  $P = 0.013$ ) and sought doctors for breastfeeding problems more frequently (90.9% vs. 76.3%,  $P = 0.002$ ). They also practiced better hygiene, such as using tissues for coughing (95.6% vs. 71.3%,  $P < 0.001$ ) and washing hands before touching the child (94.4% vs. 72.1%,  $P < 0.001$ ). Urban residents received coronavirus vaccinations more frequently than rural residents (47.5% vs. 32.9%,  $P = 0.003$ ). Other variables showed no significant differences by residence. Table 3

**Table (3) Mothers' breastfeeding practices according to residence.**

	Residence		P-value
	Rural	Urban	
I attended pre-birth classes about breastfeeding?	46 (19.2)	46 (28.7)	0.026*
I received information about coronavirus?	6 (13)	16 (34.8)	0.015*
I was encouraged to breastfeed with coronavirus?	6 (13)	18 (39.1)	0.004*
I was encouraged to get vaccinated against coronavirus?	6 (13)	26 (56.5)	<0.001*
I practiced skin-to-skin contact with your child?	40 (16.7)	82 (51.2)	<0.001*
I started breastfeeding at			
After 24 hours	30 (12.5)	16 (10)	<0.001*
First hour after delivery	40 (16.7)	82 (51.2)	
Within 24 hours	170 (70.8)	62 (38.8)	
My child received any baby drink, herbs, or sugar water after birth	198 (82.5)	62 (38.8)	<0.001*
I breastfed my son the colostrum after birth	214 (89.2)	152 (95)	0.122
My child was NICU admitted in the first hours or days after birth	151 (62.9)	72 (45)	<0.001*
I expressed breast milk for my NICU admitted child	48 (31.8)	36 (50)	0.009*
My child received formula at			
First 6 months	72 (30)	60 (37.5)	0.003*
First few days only	109 (45.4)	46 (28.7)	
Not at all	59 (24.6)	54 (33.8)	
I gave my child a pacifier	160 (66.7)	66 (41.3)	<0.001*
When I am at work, I express breast milk for my child?	68 (28.3)	58 (36.3)	0.095
I breastfeed my child at			
According to predetermined schedule	30 (12.5)	46 (28.7)	<0.001*
When showing signs of hunger	210 (87.5)	114 (71.3)	
Practices to increase milk expression			
Receiving milk-producing medications	95 (39.6)	102 (63.7)	<0.001*
Receiving herbs	71 (29.6)	92 (57.5)	<0.001*
Receiving some foods	186 (77.5)	98 (61.3)	<0.001*
Increase baby's breastfeeding, especially in the evening	91 (37.9)	76 (47.5)	0.057
None of the above	0 (0)	0 (0)	-
Exclusive breastfeeding & weaning			
I practiced exclusive breastfeeding for 6 months	141 (58.8)	112 (70)	<0.001*
I began weaning my child (introducing food) at			
4 – 6 months	105 (43.8)	76 (47.5)	<0.001*
After 6 months	79 (32.9)	78 (48.8)	
Less than 4 months	56 (23.3)	6 (3.8)	
I will completely stop breastfeeding at			
At 1 year	30 (12.5)	38 (23.8)	0.013*
At 18 months	131 (54.6)	76 (47.5)	
At 2 years	79 (32.9)	46 (28.7)	
Discontinuing breastfeeding causes			
Getting sick	16 (6.7)	18 (11.3)	0.107
Fatigue	154 (64.2)	88 (55)	0.066
Back to work	79 (32.9)	56 (35)	0.666
Pregnancy	42 (17.5)	30 (18.8)	0.75
Other	36 (15)	40 (25)	0.013*
Occurrence of breast-feeding problems			
I have encountered any problems related to breastfeeding	160 (66.7)	110 (68.8)	0.663
Practices to deal with breast feeding problems			
Doctor visit	122 (76.3)	100 (90.9)	0.002*
Asking family member or friend	58 (36.3)	36 (32.7)	0.55
Other	0 (0)	0 (0)	-
Practices when experiencing symptoms of corona virus			
Wearing mask	240 (100)	160 (100)	-
Cough & sneeze in tissue and dispose them immediately	171 (71.3)	153 (95.6)	<0.001*
Disinfecting surfaces I am touching	227 (94.6)	157 (98.1)	0.077
Hand wash before touching the child	173 (72.1)	151 (94.4)	<0.001*
None of the above	2 (0.8)	0 (0)	0.519
Practices related to coronavirus vaccine			

Did you get a coronavirus vaccination?	79 (32.9)	76 (47.5)	0.003*
If you took the vaccine, what did you do during taking it?			
Continued breast feeding	73 (92.4)	72 (94.7)	0.555
Discontinued breast feeding	6 (7.6)	4 (5.3)	

Data were presented as number and percentage (%); \*Significant P-value

Almost all staff in both settings recommend exclusive breastfeeding during the first six months, with 98.8% at the main hospital and 100% at PHC ( $P = 0.505$ ). However, a significantly higher percentage of main hospital staff (98.8%) inform mothers about the benefits of breastfeeding compared to 96.2% at PHC ( $P = 0.008$ ). Additionally, 86.8% of main hospital staff inform mothers about the disadvantages of formula feeding, compared to 65.4% at PHC ( $P < 0.001$ ). Regarding the introduction of solid foods, 72.5% of main hospital staff recommend waiting until after six months, whereas only 46.6% of PHC staff do ( $P < 0.001$ ), with a significant portion of PHC staff (44.4%) recommending introducing solids before four months. When advising on breastfeeding duration, 76.6% of main hospital staff recommend continuing until 24 months,

compared to 94.7% at PHC ( $P < 0.001$ ). Main hospital staff are also less likely to recommend formula milk regularly, with only 8.4% doing so compared to 33.8% at PHC ( $P < 0.001$ ). In terms of COVID-19-related guidance, a higher percentage of main hospital staff recommend pregnant and breastfeeding mothers receive the COVID vaccine ( $P < 0.001$ ) and educate mothers on expressing milk (58.7% vs. 40.2%,  $P = 0.001$ ). However, PHC staff are more likely to recommend formula feeding when the mother has a nipple infection (45.1% vs. 32.3%,  $P = 0.024$ ) or when the baby is in NICU (44.4% vs. 62.9%,  $P = 0.001$ ). These findings suggest that while both groups support breastfeeding, main hospital staff tend to adhere more closely to recommended breastfeeding practices and provide more comprehensive education on breastfeeding and related health issues. Table 4

**Table (4) Medical staff practices during COVID-19 pandemic by type of health facility (hospital versus primary health care)**

		Main hospital (n = 167)	PHC (n = 133)	P-value
I recommend exclusive breastfeeding during the first six months of a child's life?	n (%)	165 (98.8)	133 (100)	0.505
I inform the mother about the benefits of breastfeeding for her and the child?	n (%)	165 (98.8)	128 (96.2)	0.008*
I inform mothers about the short and long-term disadvantages of formula feeding?	n (%)	145 (86.8)	87 (65.4)	<0.001*
I recommend breastfeeding:				
According to schedule	n (%)	56 (33.5)	59 (44.4)	0.055
On-demand (cue feeding)	n (%)	111 (66.5)	74 (55.6)	
I recommend introducing solid foods to a breastfed child at				
4 - 6 months	n (%)	46 (27.5)	12 (9)	<0.001*
After 6 months	n (%)	121 (72.5)	62 (46.6)	
Less than 4 months	n (%)	0 (0)	59 (44.4)	
I recommend a mother to stop breastfeeding at				
12 months	n (%)	1 (0.6)	0 (0)	<0.001*
18 months	n (%)	38 (22.8)	7 (5.3)	
24 months	n (%)	128 (76.6)	126 (94.7)	
I recommend using formula milk				
Rarely	n (%)	32 (19.2)	15 (11.3)	<0.001*
Selected cases only	n (%)	121 (72.5)	73 (54.9)	
Usually	n (%)	14 (8.4)	45 (33.8)	
I recommend using a pacifier	n (%)	9 (5.4)	3 (2.3)	0.073
After birth, I advise to place the baby on mother's breast within				

Half an hour to one hour	n (%)	133 (79.6)	104 (78.2)	0.055
First 12 hours	n (%)	28 (16.8)	29 (21.8)	
First 24 hours	n (%)	6 (3.6)	0 (0)	
I recommend pregnant and breastfeeding mothers to receive COVID vaccine	n (%)	28 (16.8)	3 (2.3)	<0.001*
I educate mother about the correct way to breastfeed	n (%)	153 (91.6)	124 (93.9)	0.445
I educate mother about the importance of colostrum	n (%)	123 (73.7)	91 (68.9)	0.37
I educate mother about how to express milk	n (%)	98 (58.7)	53 (40.2)	0.001*
I recommend formula feeding in:				
Scanty breast milk rather than to relactate	n (%)	103 (61.7)	72 (54.1)	0.188
Sore nipple or breast infection rather than support continuation	n (%)	54 (32.3)	60 (45.1)	0.024*
Slow weight gain rather than increase milk supply	n (%)	93 (55.7)	86 (64.7)	0.116
Baby's admission to NICU rather than rooming-in	n (%)	105 (62.9)	59 (44.4)	0.001*
I advise after the birth of the child to give:				
Baby drinks, sugar water, or herbal drinks rather than EBF	n (%)	61 (36.5)	52 (39.1)	0.648
Formula milk until the mother recovers rather than Expressed breast milk	n (%)	62 (37.1)	74 (55.6)	0.001*
Breastfeeding rather than skin to skin	n (%)	100 (59.9)	52 (39.1)	<0.001*
I advise after the birth of a child to a COVID-infected mother:				
Giving the child formula milk until the mother recovers	n (%)	98 (58.7)	92 (69.2)	0.061
Expressing breast milk and giving it to the child	n (%)	25 (15)	4 (3)	<0.001*
Wearing a mask & continue breastfeeding	n (%)	85 (50.9)	47 (35.3)	0.007*

#### \*Significant P-value

Multivariate logistic regression analysis was done to predict not performing EBF. The model revealed that one year increase in age was associated with about 10% reduced risk of not performing EBF (OR = 0.897, 95% CI = 0.843 – 0.954, P = 0.001). Additionally, being a working mother was associated with associated with about 43% reduced risk of not performing EBF (OR = 0.575, 95% CI = 0.349 – 0.946, P = 0.029). Table 5

**Table (5) Multivariate logistic regression analysis to predict not performing exclusive breastfeeding.**

	OR (95% CI)	P-value
Age (years)	0.897 (0.843 - 0.954)	0.001*
Urban residence	0.869 (0.545 - 1.386)	0.556
Education		
High education	0.572 (0.156 - 2.093)	0.399
Master or PhD	1.066 (0.239 - 4.755)	0.933
Working mother	0.575 (0.349 - 0.946)	0.029*

\*Significant P-value; OR: Odds ratio; 95% CI: 95% Confidence interval.

#### 4. Discussion

It is evident that there are conflicting practices and policies regarding the up-to-date breastfeeding recommendations about COVID-19 in Egypt. Overall, although breastfeeding as a concept in child nutrition is encouraged, the skills and practices are poorly understood by health staff and reflect on mother practices who were mostly young mothers with less years of education. Other local studies show that only one third of breastfeeding mothers have high education levels, and two thirds are housewives [18].

This problem is even more in Upper Egypt (UE) studies in Giza, where mean age is even lower and less have higher levels of education [19]. Illiteracy and unemployment is high among mothers in Menia in UE (44.3% and 93.2% respectively) [20]. Although Lower Egypt women have higher mean age and more years of education, the trends of illiteracy and younger age persist in rural LE as UE governorates [21]. Level of education and age have been shown to influence breastfeeding practices as more women who are educated



tend to be more adamant about breastfeeding, but their higher education conflicts with their being in employment positions that does not allow them to continue breastfeeding especially in situations where there are restrictions on maternity leave and workplaces that are not fully breastfeeding friendly [22].

Our study revealed that a majority of respondents were familiar with EBF, with most correctly identifying it as providing only breast milk and excluding pacifiers. Many participants knew the recommended duration of EBF as six months and viewed early introduction of other foods negatively. Concerns about bottles or pacifiers leading to breastfeeding refusal were high. The protective effects of breastfeeding against infections and diseases were widely recognized, as was its role in strengthening the mother-child bond and the child's immunity. However, fewer participants were aware of breastfeeding's potential to reduce obesity, lower chronic disease risk, or increase IQ levels.

Most of the mothers recognized breastfeeding's role in returning to normal weight postpartum, but fewer were aware of its protective effects against certain cancers. Knowledge about COVID-19 symptoms and transmission was high, though fewer mothers were aware of breast milk's protective effects against COVID-19. The primary sources of breastfeeding knowledge were family, medical staff, and media. Local studies support our findings. In Egypt KAP about benefits of breastfeeding differed in different cultures and social classes. Mohammed et al. found that 98.5% of mothers attended antenatal care services, with a significant majority (94.0%) receiving breastfeeding education. Primary information sources included health workers (39.5%), family members (30.5%), friends or relatives (20.0%), and mass media (4.0%). Nearly all mothers (98.5%) recognized the first food for infants should be breast milk but had good knowledge about its benefits to the child but not the mother in preventing postpartum hemorrhage (6.5%) and protecting mothers against cancer (4.6%) [23]. While Khairy et al. showed lower knowledge and awareness about EBF practices and preventive measures against COVID-19. They found that 84.2% of mothers had previously breastfed, but less than half initiated breastfeeding within the first hour of delivery. About half provided correct answers regarding the avoidance of COVID-19 transmission to infants and the benefits of breastfeeding for both mother and child. However, a significant portion had incorrect information about the nature of the coronavirus and its complications [18]. Contrariwise, El-

Gamel and El-Nemer study revealed lower awareness and knowledge about EBF practices and COVID-19-related information. They found that 75.8% of women could not define EBF correctly, and 53.4% did not know the best time to initiate breastfeeding. Additionally, 61.2% had incorrect ideas about coronavirus transmission through breast milk, and 53.9% had incorrect information about recommending the COVID-19 vaccination for breastfeeding women [21]. A meta-analysis of 24 local studies in Egypt by Abul-Fadl and Al-Jawaldeh (2022) revealed in its trend analysis that in 12 studies from 2008 to 2018 versus the 12 studies from 2018 to 2022 (from the pooled data for 9685 mothers) knowledge and practice towards EBF, importance of colostrum and hazards of supplementation, increased, but early initiation of breastfeeding (EIBF) decreased. Donated supplies of milk formula to hospitals increased. Trend in practices for offering supplements, and feeding bottles with breastfeeding decreased with increase in EBF at birth but with increase in pacifier use. EIBF through skin-to-skin (STS) remains abstinent. Illiteracy, incomplete education and lack of support of working breastfeeding mothers remain the main impediments to continuation of breastfeeding [25]. These trends substantiate our findings that COVID-19 crises may have played a significant role in this decline in support of breastfeeding continuation [22].

A study in Ethiopia found that the majority of mothers (97.5%) had heard about EBF from one or more sources, primarily from health extension workers. Additionally, 83% of mothers correctly identified the ideal duration of EBF as six months. This supports the effectiveness of community health worker programs in disseminating breastfeeding knowledge, contrasting with our findings where knowledge levels were lower [24]. Wolde et al. revealed that all lactating mothers recognized the importance of breastfeeding, with 91.8% believing breast milk alone is best for newborns. Most mothers (90.9%) knew EBF should last for 6 months, and all agreed breastfeeding does not harm the child [25].

Our findings reveal significant gaps in knowledge about the broader health benefits of EBF and its implications during the COVID-19 pandemic, despite awareness of EBF's disease-protective benefits. These discrepancies highlight the need for improved education and consistent messaging from healthcare providers to enhance breastfeeding practices and address misconceptions, especially during public health emergencies.

In our study, 77.5% of mothers considered EBF sufficient for the first six months, while

12% disagreed and 10.5% were unsure. Most participants preferred breast milk only for their child (62.3%), with 37.8% opting for a combination with artificial milk. Regarding medication and coronavirus infection, opinions were divided, with significant portions believing breastfeeding should either stop or continue. Concerning vaccination, 61.5% disagreed with stopping breastfeeding, while others were either unsure or agreed. Generally, mothers disagreed with avoiding breastfeeding during the child's or mother's illness, except for the mother's illness (54.3%). Opinions on COVID-19 vaccination during breastfeeding varied, with a majority finding it beneficial and others viewing it as harmful to varying extents. About 25.8% were willing to receive the vaccine, while others declined or were unsure. In close alignment with our study, Gebretsadik et al. found similar results, with 78.4% of mothers feeling positive about EBF for six months during the pandemic, and 63.6% comfortable with COVID-19 precautions while breastfeeding [26]. Mohammed et al. partially supported our findings, showing a high agreement on the health benefits of breastfeeding but a contrasting view on breastfeeding during maternal illness (83.4%) [20]. In contrast to our results, Khairy et al. reported lower knowledge and awareness about EBF and COVID-19 preventive measures, with significant differences in breastfeeding initiation and understanding of coronavirus transmission [18]. In addition, El-Gamel and El-Nemer found lower awareness of EBF and COVID-19, with 75.8% unable to define EBF, 53.4% unaware of the best time to start breastfeeding, and 61.2% and 53.9% holding incorrect beliefs about coronavirus transmission through breast milk and vaccination recommendations, respectively. These differences likely reflect variations in educational outreach and healthcare infrastructure between study locations [21].

Our study reveals diverse perceptions and practices regarding EBF for the first six months. While most mothers favored EBF, some preferred combining it with artificial milk. Opinions varied on continuing breastfeeding during medication use, maternal illness, and COVID-19 infection. Mixed views on COVID-19 vaccination and breastfeeding highlight the need for clearer guidelines and education. Few mothers attended breastfeeding classes or received COVID-19 information during these sessions. Encouragement for breastfeeding and vaccination during the pandemic was low. Post-birth practices included skin-to-skin contact and early breastfeeding initiation, though supplements

were common. Many children entered incubators, with few receiving expressed breast milk. Formula use, pacifier use, and on-demand breastfeeding were widespread, with various methods employed to increase milk expression. Although many reported that EBF is for six months yet many introduced other foods or discontinued breastfeeding earlier.

Our results agreed with a study by Gebretsadik et al., who found that 85.5% of mothers fed colostrum but about half discontinuing breastfeeding when their babies were sick [26]. Similarly, Kamal et al. reported that 90.5% of mothers ensured their babies received colostrum and 82.6% initiated breastfeeding on the first day after delivery, with varying EBF durations [19]. Also, Mohammed et al. found 83.7% initiated breastfeeding immediately, and 74.2% fed colostrum with high intensity [20] but discontinuation rates were variable.

Our study revealed a gap between breastfeeding knowledge and practice during COVID-19 crises. While early initiation and on-demand breastfeeding are positive trends, but their knowledge about COVID-19 was limited. The offering of milk formula, pacifiers, and supplements undermine EBF, and inconsistencies in weaning and cessation plans indicate varied guideline adherence. Frequent incubator admissions and less use of expressed breast milk reflect neonatal care restrictions in promoting EBF. Significant differences were noted between rural and urban residents: urban mothers were more likely to attend pre-birth classes, receive COVID-19 information, initiate breastfeeding sooner, and practice skin-to-skin contact, whereas rural mothers more often introduced supplements and used incubators after birth.

Urban residents were more likely to discontinue EBF. They frequently used milk formula but less often used pacifiers. They practiced more scheduled breastfeeding rather than on-demand or to the feeding to the infant cues. They tended to take medications and herbs to increase their milk production rather than use clinical modalities for increasing milk supply as night feeding and milk expression. Urban mothers breastfed exclusively for longer periods but weaned earlier. They also sought medical help more for breastfeeding issues, practiced better COVID-19 hygiene, and had higher vaccination rates. In concordance with our study, Balogun et al. found that urban mothers had higher attendance rates for pre-birth classes compared to rural residents (28.7% vs. 19.2%,  $p=0.026$ ). Work resumption was a significant reason for discontinuing EBF among urban mothers (44.3% vs. 16%,  $p=0.010$ ). However, they found rural mothers

more likely to initiate breastfeeding immediately after birth (75.8% vs. 43.5%,  $p < 0.001$ ) and practice EBF (79.8% vs. 29%,  $p < 0.001$ ) [27]. Ghwass and Ahmed, reported that higher maternal education showed a non-significant trend towards increased EBF (13.8%), OR 1.4 (95% CI: 0.7, 2.7),  $p = 0.231$ . No significant difference was found between working mothers (10.4%) and housewives (10.0%),  $p = 0.062$ . Also they reported that higher paternal education was associated with a higher rates of EBF (14.7%), OR 1.7 (95% CI: 0.8, 3.8),  $p = 0.188$  [28]. This is consistent with the findings of other local studies [22].

On the other hand, despite the poor practices of urban mothers in breastfeeding continuation, they had better access to pre-birth breastfeeding classes, healthcare, coronavirus information, and vaccination. They were more likely to express breast milk for incubated children. They also tended to practice EBF for six months more frequently if not working. On the other hand, rural residents were influenced by traditional practices and limited guidance, used pacifiers, offered baby drinks, herbs, or sugar water post-birth, but breastfed on-demand (crying). They introduced complementary foods earlier. They were more likely to be admitted to the neonatal intensive care unit (NICU) due to birth complications or limited postnatal care, began weaning earlier, and stopped breastfeeding by 18 months due to socio-economic factors. Urban residents sought medical help for breastfeeding issues, had higher vaccination rates, and followed better hygiene practices. The gap in practices between urban and rural mothers could be due to the educational level and age differences. This has also been shown in other local studies [22].

Health providers, on the other hand, had good knowledge about breastfeeding benefits, its protective effects for baby and mother and importance of EBF and continuation for two years as per WHO recommendations. However they had poor education in management skills for supporting mothers facing difficulties in breastfeeding. There was little consensus about the transmission of the virus through breast-milk. Hence, despite expressing their attitude towards continuing breastfeeding, their practices did not go hand in hand with their knowledge and attitude. Many of them introduced milk formula to babies admitted to NICU and applied strict isolation between mother and baby during the COVID crises. Views on COVID-19 vaccination varied, with a substantial number opposing vaccination for pregnant or nursing mothers and disagreeing

with halting breastfeeding to receive the vaccine. This was similar to findings reported by another local research. Abdelglil et al., reported lower levels of confidence and certainty among medical staff regarding breastfeeding during the COVID-19 pandemic [29].

Finally, the study had some limitations, the study's cross-sectional design restricts the ability to establish causality, and reliance on self-reported data may introduce recall and social desirability biases. Additionally, conducting the study in Benha City limits the generalizability of the findings to other regions with different cultural, socio-economic, and healthcare contexts. Future research should include longitudinal designs and diverse populations to enhance the validity and applicability of the results.

**Conclusions and recommendations:** Although many mothers showed a high positive inclination to continue breastfeeding yet, the study highlights disrupted knowledge and attitudes towards EBF among breastfeeding mothers in Benha City during the COVID-19 pandemic attributed to the conflicting messages and practices received from medical staff and fears associated with expressed breast-milk and mother infant contact inside NICUs during the COVID-19 crises. There were significant gaps in awareness about the protective benefits of breast-milk against COVID-19 and transmission of virus through breast-milk. Urban mothers displayed better breastfeeding practices and hygiene measures compared to rural mothers. The gaps in the knowledge of medical staff affected their practice. The split opinions on viral transmission through breast milk and the safety of COVID-19 vaccination for pregnant or nursing mothers suggest areas where further clarification and education are needed. Moreover, the discordance in policies between departments of infection control in the curative sector and maternal and child health in the primary care sector and the preventive sector responsible for vaccination in the Ministry of Health maybe underlying causes. Strengthening coordination and communication between departments for unifying policies is needed across the health care sectors at central and subnational ministerial administrative levels that will track down to district and facility level. Targeted educational interventions are essential to address these critical management and clinical practice gaps that can lead to proper support of breastfeeding during public health crises [30]. Financial support and sponsorship: Nil.

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