

Original Article

Effects of Mothers' Socio-economic Status on Adequate Complementary Feeding during Covid-19 Pandemic in Nigeria

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Abstract

COVID-19 pandemic worsens mothers' socioeconomic status and indirectly affects infant feeding in developing countries. This study aimed to determine the effects of mothers' socioeconomic status on complementary feeding practices during COVID-19 pandemic. Mothers with infants aged 5-11 months (n=423) were interviewed at selected Basic Health Centers (BHCs) in Ondo State. Structured questionnaires were used to collect data on complementary feeding (CF) practices and socioeconomic status during routine immunization visits to the BHCs. The socioeconomic characteristics revealed that only 21.7% of mothers had no formal education. Most (75.2%) lived below ₦100,000 (\$140) monthly income. The feeding indicators showed that 27.1% had timely initiation of CF. Minimum Meal Frequency (MMF) was achieved by 16.8% of the mothers. Only 12.3% could achieve Minimum Dietary Diversity (MDD), and 11.3% were able to achieve Minimum Adequate Diet (MAD). Moreover, the mother's employment status influenced the timely initiation of CF (OR=5.6, P<0.001) and spouse support (OR=5.7, P<0.001). There is a statistical relationship between MMF and mothers' tertiary education status (OR=10.5, P<0.001), mothers' monthly income (OR=7.6, P<0.001), mothers employment status (OR=6.3, P<0.001) and spouse support (OR=7.2, P<0.001). The result showed that MDD was influenced by mothers' level of income (OR=4.1, P<0.05) and spouse support (OR=4.2, P<0.01). The determinants of MAD were the tertiary education status of the mother (OR=9.3, P<0.001), income ₦100 (OR=6.7, P<0.001), self-employment (OR=4.9, P<0.01) and spouse support (OR=8.7, P<0.001). In conclusion, COVID-19 pandemic impacted CF practices primarily due to the influence of maternal socioeconomic status on the achievement of feeding indicators.

Keywords: Maternal, Complementary Feeding, Minimum Meal Frequency, Minimum Dietary Diversity, Minimum Adequate Diet

1. Introduction:

INFANTS AND YOUNG CHILDREN'S FEEDING could receive a critical setback during the COVID-19 pandemic, which could be worse in developing

countries [1]. Before the pandemic, there was a struggle to improve infant feeding practices to achieve a Minimum Adequate Diet (MAD) in developing countries [2]. UNICEF [3] in an analysis of 91 countries, including Nigeria reported that 50% of children between ages 6 to 23 months globally are not being fed the minimum recommended number of meals a day. Two-thirds do not consume the minimum number of food groups they need to thrive, and young children have had no improvement in diet in the last decade, which could worsen during COVID-19. Before COVID-19, the National Demographic and Health Survey [4] reported that in Nigeria, among children aged 6-23 months, only 23 percent had the minimum necessary dietary diversity, and only 42 percent had minimum adequate meal frequency.

Meanwhile, the World Health Organization [5] stated that breast milk alone could not be sufficient for maintaining the growth of infants; at six months, semi-solid and solid foods are required along with breastfeeding to meet the nutritional and growth needs of the infants. In Nigeria, [2] showed that the socioeconomic factors of the caregivers played an important role in the inadequacy of the complementary feeding of infants. This case could have worsened during the COVID-19 pandemic.

Socioeconomic status (SES) is a combined total measure of a person's economic and social position in relation to others based on education, income, and occupation [6]. This socioeconomic factor determines an individual's access to food [7]. However, in the face of the COVID-19 pandemic, complementary feeding should be adequate to achieve normal nutritional status for the children and prevent future health implications.

Malnutrition in children is harmful. The damage to physical and cognitive development during the first two years of a child's life could be irreversible [3].

Coronaviruses have been discovered as the largest group of known positive-sense RNA viruses with an extensive range of natural hosts [8]. This virus has been affecting the socioeconomic status of individuals and thereby affecting vulnerable groups such as children through the parents due to its effects on household food security [9].

Children are not attacked by this pandemic directly, as it is typically attacked by the elderly and individuals with underlying co-morbidities [10]. However, children are victims of this pandemic through its effects on the socioeconomic status of the mothers. A recent United Nations report on women showed that the COVID-19 pandemic has pushed 97 million people to extreme poverty, and 47 million of the people were women [11].

In Nigeria, the impact of the pandemic has caused a drastic drop in crude oil prices to USD29.62/ barrel. This could be translated to a 48% decline in revenue generated from crude oil [12]. Crude oil, being the primary source of the nation's revenue, was destabilized, which led to restructuring in different organizations and forcing both males and females out of jobs since the nation's GDP has dropped by 0.55% points [12].

The negative impact of this pandemic on households affects all children in all countries from the perspective of socioeconomic impacts. The harmful effects of this pandemic will not be distributed equally. They are

expected to be most destructive for children in the poorest countries [13]. The author stated further that there are three main channels through which children are affected by this pandemic: firstly, the infection with the virus itself; secondly, the immediate socioeconomic impacts of measures to stop transmission of the virus; and thirdly, the potential longer-term effects of delayed implementation of the goal number 3 of the Sustainable Development Goals. This study focused on the pandemic's socioeconomic impact on Nigeria's complementary feeding adequacy.

In Vietnam, 31% of households complained of the effects of Covid-19 on their income [14]. Also, in India, COVID-19 has affected the household economy negatively, and the negative impact has increased from 9% to 45.6% [15]. The economic distress associated with the COVID-19 pandemic, its health implications to those affected, especially the most vulnerable group in the community, the strain on service delivery infrastructure, and the societal cost of well-being could be enormous in Nigeria [12].

There is no registered treatment for COVID-19 [16]. However, research has proved that an immune response is essential to control and eliminate COVID-19 infections. The role of adequate nutrition in improving the immune system in response to COVID-19 should be considered. Murdoch and Skaar [17] revealed that iron as a nutrient is essential for both microbial pathogens and their mammalian hosts in the course of infectious disease. The author further stated that alterations in the expression of host molecules that transport iron can directly affect pathogen growth and can also impact the ability to achieve normal immune responses. To further buttress this fact, researches revealed that the key player in the immune system is the white blood cell [18,19].

Nutrients play a crucial role in determining the number of white blood cells. Hariz & Bhattacharya [20] demonstrated that elevated levels of vitamin B12 correlate with an augmentation in the number of white blood cells. This demonstrates that the significance of nutrients in the body's reactions to infectious diseases is of utmost importance. Hence, it is imperative to ensure proper nourishment for infants to enhance the immune systems of these susceptible populations amidst the COVID-19 pandemic. The significance of malnutrition caused by COVID-19 cannot be overstated, affecting both children and adults. Hence, this study specifically examines the impact of mothers' socioeconomic status on infants' complementary feeding practices amidst the COVID-19 pandemic.

Objectives

The objectives of the study are to

- 1- Investigate the complementary feeding practices of infants in Ondo State during the COVID-19 pandemic.
- 2- Assess the socioeconomic condition amidst the COVID-19 pandemic.
- 3- Determine the correlation between the caregiver's financial situation and the practices of providing complementary food during the COVID-19 pandemic.

2. Subjects and Methods

2.1. Subjects:

2.1.1 Sample Size

This study involved male and female infants in Akure South Local Government Area (LGA) of Ondo State. A total number of 10,261 infants were given birth in 2020. The males were 5,023, and the females were 5,238 [21].

2.1.2 Sample size Determination

Sample size determination for larger size is used and calculated thus;

$$\text{Sample Size} = N = \frac{z^2 * p(1-p)}{e^2}$$

N = population size

z = z-score = 95% confidence interval = 1.96

e = margin of error = 5% = 0.05

p = standard of deviation = 50% = 0.5

$$\frac{1.96^2 * 0.5 * (1-0.5)}{0.05^2}$$

N = 384.16

10% for attrition = 38.416

N = 422.6. This was taken to be 423 subjects

2.2 Methods

A questionnaire based on WHO-recommended complementary feeding guidelines [22] was administered to the mothers attending routine infant child immunization at the Basic Health Centers (BHCs) in Akure South LGA, the most populous LGA in the State capital. Also, the recruitment of mothers from different homes was done with the help of the Community Health Extension Workers (CHEWs). Informed consent was given to the mothers for voluntary participation.

An interviewer-administered questionnaire was used, depending on the mother's education level. To ascertain the socio-economic status (SES) of the mothers, the Kuppuswamy SES scale [23] was used. This was also used to validate the socio-economic questionnaire to determine the SES of the caregivers.

Adequate complementary feeding was determined based on the WHO IYCF indicators [22], where continued breastfeeding was determined as the [proportion of infants fed with breast milk on the previous day]. Meal frequency was considered adequate if a frequency of 2 times for ages 6-8 months and three times for 9-11 months (it should be a thick consistency) was determined. Similarly, formula or milk feeding frequency for non-breastfed infants was estimated as the proportion of infants 6-11 months who received at least two milk feedings during the previous day]. For dietary diversity, a daily intake of 4 or more out of 7 food groups was considered adequate [5]. For consumption of iron-rich and iron-fortified foods, the proportion of infants who received iron-rich or iron-fortified food designed for infants or fortified at home was considered adequate.

The relationship between the caregiver's SES and infants' complementary feeding was determined using Statistical Package for Social Sciences (SPSS) version 21. Inferential and descriptive statistics were determined.

Ethical clearance

Ethical clearance NHREC/18/08/2016 with protocol number OSHREC/31/03/22/ 433 was obtained in Ondo State Primary Health Care Board to collect data from the medical facilities. Informed consent was obtained prior to the study's recruitment from the participants, and the participation was voluntary.

Originality was assured by training the research assistant on the research ethics and methods of assessment. Data obtained was coded in the computer, and there was no easy access for confidentiality.

3. Results

The mean age of the infants was 8.7±7.53; age 5 to 8 months was 32.2%, while age nine months to 12 months was 67.8%. Males were 47.5%, and females were 52.5%. The majority was Yoruba (60.5%), Ibos were 18.5%, and the Ebiras were 21.0%. The mothers were married and living with their spouse (94%), 2% were divorced, 0.4% were single mothers, 2.0% were separated, and 1.6% were widows. The most religion practiced among the parents was Christianity (78.0%); Muslims were 19.4%, while 2.6% were traditionalists (Table 1).

Table 1: Socio-demographic status of the Mothers

Socio demographic	Frequency	Percentage
Age(months)		
5-8	136	32.2
9-12	228	67.8
Total	423	100.0
Sex of child		
Male	201	47.5
Female	222	52.5
Total	423	100.0
Mothers' ethnicity		60.5
Yoruba	256	18.5
Ibo	78	21.0
Ebira	89	100.0
Total	423	
Mothers' marital status		
Married	394	94.0
Single	12	2.0
Divorced	5	0.4
Separated	10	2.0
Widowed	2	1.6
Total	423	100.0
Caregiver's religion		
Christianity	330	78.0
Muslim	82	19.4
Traditional	11	2.6
Total	423	100.0

The parental socio-economic characteristics (Table 2) revealed that 6.4% of the mothers possessed primary education, 29.1% held secondary school certificates, 42.8% had attained tertiary education, and 21.7% were engaged in artisanal occupations. The primary forms of employment were characterized by petty trading (36.9%), salaried waged labor (24.3%), agricultural labor (13.2%), and unemployed mothers (13.0%). Meanwhile, 2.2% of mothers were unemployed homemakers, and 2.8% were enrolled in educational institutions. The spouses were also educated, with 39.2% having completed tertiary education and only 3.8% having completed primary education. The primary source of revenue for the household is the business.

Table 2: Socio-economic Characteristics of the Parents

	Frequency	Percentage
Highest education level attained by the Parents		
Primary	27	6.4
Secondary	123	29.1
Artisan	92	21.7
Tertiary	181	42.8
Total	423	100.0
Main employment of the Mothers		
Agricultural labor	56	13.2
Livestock herding	32	7.6
Waged labor (salaried)	103	24.3
Petty trading	156	36.9
unemployed	55	13.0
Student	12	2.8
Housewife	9	2.2
Total	423	100
Highest level of education of the spouse		
No education	16	3.8
Primary	20	4.7
Secondary	115	27.2
Artisan	106	25.1
Tertiary	166	39.2
Total	423	100.0
Main Source of Income for the household		
Parental	7	1.6
Private sector Employment	69	16.3
Government/ Civil servant	64	15.1
Casual work	65	16.4
Farming	39	9.3
Business	113	25.7
Spousal support	66	15.6
Total	423	100.0

The average monthly income (Table 3) ranged from ₦40,000.00 to ₦79,000.00 for 156 (36.9%) family members. The study found that 99 (22.7%) people lived between ₦80,000.00 and ₦99,999.00 per month, while 66 (15.6%) lived on less than ₦40,000.00. Only 105 (24.8%) people lived on or above ₦100,000 per month.

Table 3: Average Monthly Income of the Family

Average monthly income	Frequency	Percentage
≥₦100, 000.00	105	24.8
₦80,000.00-₦99,999.00	96	22.7
₦40,000.00-₦79,999.00	156	36.9
≤₦39,999.00	66	15.6

Complementary feeding introduction (Table 4) was not timely among the infants, 44.9% of the infants received complementary feeding at exactly six months while others received too early or too late. It was recorded that 27.4% of the infants took thick grain-based porridge and 42.3% took food made from roots. Colored foods like yellowish in color were taken by 43.5%. Intake of food made from beans and nuts was 44.2%. Dark green leafy vegetables were taken by 31.7%. Vitamin-A rich foods was taken by 17.0% infants. Organ meat was taken by 20.4% of the infants. Fruits and fresh vegetables were taken only by 11.8%. Intake of milk and milk products was 34.3%. Food made with read palm oil was taken by 68.1%. Sugar intake was 23.9% among the infants. Intake of spiced foods was 46.1% among the infants. Solid foods were taken by 47.8%. Intake of iron fortified foods was 44%.

Table 4: 24 hr. dietary recall and feeding history on complementary feeding practices by Mothers

Food intake	Frequency	Percentage
Introduce complementary feeding at exactly 6 months?	189	44.9
Feed on breast milk yesterday?	403	95.3
Feed on any of the food below yesterday?		
Thick grain-based porridge?	116	27.4
Foods made from roots?	179	42.3
Foods that are yellow or orange inside?	184	43.5
Any foods made from beans, peas, lentils or nuts, including Plumpy ‘nut?	187	44.2
Any dark green leafy vegetables?	134	31.7
Ripe mangoes, ripe papayas or (insert other local vitamin A-rich fruits)?	72	17.0
Any other fruits or vegetables?	52	11.8
Liver, kidney, heart or other organ meats?	87	20.4
Any meat such as beef, pork, lamb, goat, chicken or duck?	196	46.3
Fresh or dried fish, shellfish, or seafood?	167	39.8
Grubs, snails or insects?	122	28.8
Eggs?	86	20.3
Cheese, yogurt, or other milk products?	145	34.3
Any oil, fats or butter, or foods made with any of these?	283	66.8
Foods made with red palm oil, red palm nut and red palm nut pulp sauce?	288	68.1
Any sugary foods such as chocolates, sweets, candies, pastries, cakes or biscuits?	101	23.9
Condiments for flavor such as chilies, spices, herbs or fish powder?	195	46.1
Times eating solid, semi-solid or soft foods other than liquids yesterday during the day or at night?	202	47.8

Food intake	Frequency	Percentage
Consume any [list iron fortified solid, semi-solid or soft foods designed specifically for infants and young children available in the local setting]?	186	44.0
Consume any food to which you added a powder or sprinkles like this? Show common type of sprinkles available in survey area.	21	4.96
Consume any [list lipid based nutrient supplement (LNS) available in the local setting.	12	2.8
Consume any [list iron fortified infant/toddler formulas available in the local setting]?	189	44.7

According to Table 5, the feeding indicators revealed that 72.9% of the infants could not properly initiate complementary feeding amidst the COVID-19 pandemic. 16.8% of the infants achieved exclusive breastfeeding, whereas 83.2% of the mothers could not feed their infants frequently amidst the COVID-19 pandemic. The prevalence of Minimum Dietary Diversity (MDD) was 12.3%, indicating that only a small proportion of mothers could provide their infants with a diverse range of foods. Conversely, most mothers (87.7%) could not meet the recommended daily intake of four food groups for their infants. 88.7% of the mothers did not achieve the Minimum Acceptable Diet (MAD) during the COVID-19 pandemic. Only 11.3% of them could feed their infants frequently and provide them with at least four food groups daily.

Table 5: Achievement of feeding indicators during Covid-19 Pandemic

Feeding indicators	Frequency	Percentage
Timely introduction of complementary feeding		
Achieved	115	27.1
Not Achieved	308	72.9
MMF		
Achieved	71	16.8
Not Achieved	352	83.2
MDD		
Achieved	52	12.3
Not Achieved	371	87.7
MAD		
Achieved	48	11.3
Not Achieved	375	88.7

A regression analysis (Table 6) was conducted to ascertain how much mothers' socioeconomic status influenced the practice of complementary feeding during the COVID-19 pandemic. The findings indicated that the mothers' employment status had a significant impact on the prompt initiation of complementary feeding, with an odds ratio of 5.6 (95% confidence interval: 2.33-25.2; $p < 0.001$). Similarly, spouse support also played a crucial role, with an odds ratio of 5.7 (95% confidence interval: 3.26-24.38; $p < 0.001$). There is a significant statistical correlation between MMF and various socioeconomic factors, including mothers' tertiary education status (OR=10.5 (3.12-29.46; $p < 0.001$)), mothers' monthly income (OR=7.6 (2.29-21.23; $p < 0.001$)), mothers' employment status (OR=6.3

(2.11-20.97; p<0.001)), and spouse support (OR=7.2 (2.18-19.96;p<0.001)). The findings indicated that Major Depressive Disorder (MDD) was significantly impacted by the maternal income level (OR=4.1, 95% CI: 2.45-18.80, p=0.03) and the level of support from the spouse (OR=4.2, 95% CI: 1.88-13.80, p=0.002). The Minimum Adequate Diet (MAD) is positively associated with both the income level of mothers (OR=4.2, 95% CI: 3.88-13.66, p=0.004) and the level of support from spouses (OR=4.9, 95% CI: 2.88-16.42, p=0.002).

Table 6: Relationship of Socioeconomic Status and Complementary Feeding using Selected Socioeconomic Variables of the Parents

Socio-economic parameters	Timely initiation of CF		MMF		MDD		MAD	
	OR	P value	OR	P value	OR	P value	OR	P value
Tertiary education (%)	1.4	0.07	10.5	<0.001	1.2	0.08	0.6	0.072
Yes (42.8)	(0.88-		(3.12-		(1.2.67-		(0.18-	
No (57.2)	2.88),		29.46)		2.23)		1.32)	
Income ≥₦100,000	1.6	0.08	7.6	<0.001	4.1	0.003	4.2	0.004
Yes (24.8)	(0.67-		(2.29-		(2.45-1		(3.88-	
No (75.2)	2.80),		21.23)		8.80)		13.66)	
Employment status	5.6	<0.001	6.3	<0.001	1.3	0.08	1.3	0.064
Employee (24.3)	(2.33-		(2.11-		(0.58-1.		(0.62-	
Self-employment (70.7)	25.24)		20.97)		80)		2.28)	
Unemployed (5.0)								
Spouse support	5.7	<0.001	7.2	<0.001	4.2	0.002	4.9	0.002
Yes (15.6)	(3.26-		(2.18-		(1.88-1		(2.88-	
No (84.4)	24.38)		19.96)		7.80)		16.42)	

*CF= complementary feeding

A multivariate analysis (Table 7) identified the factors that determine the occurrence of MAD during the COVID-19 pandemic. The findings indicated that mothers with tertiary education (OR=9.3(3.12-27.34; P<0.001), mothers earning above ₦100.000 or ₦100,000 (OR=6.7(2.26-29.21; p=0.001), self-employed mothers (OR=4.9 (2.41-19.21; P=0.002), and mothers receiving support from their spouses (OR=8.7;(2.12-26.11;p<0.001) were significant factors in determining the achievement of MAD in complementary feeding during the COVID-19 pandemic. Mothers who were employed (OR=0.3 (0.07-1.79; p=0.329) and unemployed mothers (OR=0.4 (0.03-1.34; p=0.623) did not have a significant impact on the achievement of MAD in complementary feeding during the COVID-19 pandemic.

Table 7: Determinants of Complementary feeding practices during covid-19 pandemic

Socio-economic variables	OR	p-value	95%CI
Mothers with Tertiary education	9.3	0.001	3.12-27.34
Mothers who earned ≥₦100,000	6.7	0.001	2.26-29.21
Mothers who were employee	0.3	0.329	0.07-1.79
Mothers who were Self employed	4.9	0.002	2.41-17.21
Mothers who were unemployed	0.4	0.623	0.03-1.34
Mothers who had spouse support	8.7	0.001	2.12-26.11

4. Discussion

Maternal socioeconomic status during the COVID-19 pandemic and its effects on the complementary feeding of infants were determined in this study. The infants assessed for adequate complementary feeding were between ages 5 and 12 months, as stated in Table 1. The mothers' socioeconomic status reported in Table 2 showed that most mothers earned below \$100 monthly. The complementary feeding practices during the COVID-19 pandemic are related to the socioeconomic status of others in Table 6. This corroborates Nicola et al. [24], who summarized the economic effects of the COVID-19 pandemic on human life. The pandemic has caused much impending recession, which the world is facing to date, like the effects of World War II [24]. The feeding implication during this era could affect the future health status of the children [25]. The complementary feeding practices during this pandemic must be considered for future reference.

The initiation of complementary feeding in this study was not timely and could not follow the UNICEF [9] guidelines for IYCF. This was revealed in Table 5, where the initiation of complementary feeding was either observed too early or too late during the pandemic. Meanwhile, this report has been on the situation in sub-Saharan Africa, which was eventually worsened by the COVID-19 pandemic. Mohammed et al., [26] showed that the timely initiation of complementary feeding was 83% in Ethiopia, later recorded as 52% by Abate et al. [27]. This scenario was also the same in Nigeria. In Ogun State of Nigeria, Ogunlesi et al. [28] reported that 41% of mothers had timely initiation of complementary feeding practices, which was later reported by Anaemene & Sogunle [29] to be 11.8%. In Ondo State, Akinrinmade [2] showed that timely initiation of complementary feeding was 59.3% in 2019 before the pandemic compared to 27.1% in the current study during the COVID-19 pandemic.

This has been the timely initiation of complementary feeding since the insurgence of the COVID-19 pandemic. The relationship between socioeconomic status and complementary feeding practices was stated in Table 6, and it showed that employment status (OR=5.6(2.33-25.24); p=0.001) and spouse support (OR=5.7(3.26-24.28; p<0.001) have a statistical relationship with the timely initiation of the complementary feeding during the covid-19 pandemic. These factors showed that spousal support influenced the timely initiation of complementary feeding as well as the nature of employment of the mother. Initiation of complementary feeding must be timely due to the effects of early initiation of complementary feeding before the infant is developmentally ready. Early initiation of complementary feeding is associated with respiratory illness in childhood [30]. On the other hand, delayed complementary feeding is associated with eating difficulties, such as picky eating and refusal of many foods. This happens whenever infant feeding practices do not follow WHO/UNICEF guidelines.

Minimum Feeding Frequency (MFF) is an indicator that shows the frequency in the daily feeding of infants, and the current study showed that only 16.8% of infants were fed up to three times/per day. The relationship between (MMF) and socioeconomic status was determined, and Table 6

showed that there is a relationship between the levels of education of the mothers; mothers with tertiary education are more likely to achieve MMF; Income as well as nature of occupation of the mothers had a relationship with MMF. Those who received over ₦100,000 achieved MMF more, and the self-employed mothers. In this study, feeding frequency was lower than in the previous report on MMF in Ondo State [2]. This corroborates Janssen et al., [31], who stated that an income loss is one of the factors for change in feeding frequency during the COVID-19 pandemic in Denmark. Widyaningrum et al., [32] also revealed that income reduction affected 35% of the mothers during complementary feeding in Yogyakarta, Indonesia. In Nigeria, 42% of Nigerian households lost their jobs during the covid-19 pandemic [33].

The researchers identified the implication of not feeding the infants frequently as recommended. Poor infant feeding practices were associated with cognitive development at the adolescent stage in China [34] and have adverse effects on the nutritional status and health outcome of the infants as they grow [25, 35] thus affects the future health status of the infants. Headey et al., [36] concluded that inadequate frequency of meals could lead to wasting. If the condition becomes chronic, it could lead to stunting, further degenerating the infants' cognitive development. Similar findings were reported by Cheikh et al., [37].

Achieving Minimum Dietary Diversity (MDD) during complementary feeding allows nutrients to be available for growth during childhood [38]. Poor-quality diets could be the greatest obstacle to children's survival, growth, development, and learning. Dietary diversity is a significant problem in developing countries [39]. This present study showed that MDD was not achieved (87.1%). The statistical analysis showed that mothers' economic status affects achieving MDD during complementary feeding. This result was in line with Nurriszka et al. [40], who showed that maternal education level is associated with dietary diversity during complementary feeding in Indonesia as well as Ahmed et al. [41], who reported that household socioeconomic status affected complementary feeding practices in Ethiopia.

The Minimum Adequate Diet (MAD) results from the MDD and MFF. The MAD would only be achieved when MDD and MFF were met. In this study, most mothers did not achieve MAD summed in Table 5. The inability of the mothers to diversify the meals during complementary feeding and meet up with the daily feeding frequency in the study area during the COVID-19 pandemic affected the achievement of MAD in the study area. Masuke et al., [42] revealed that the inability of the mothers in Northern Tanzania to achieve MAD during complementary feeding increased the prevalence of wasting, undernutrition, and stunting. In addition, Adedeji et al., [43] discovered that 35.4% of children who were malnourished in Jos, Nigeria, had suboptimal intelligence quotient. In this study, the mothers' socioeconomic status determines the achievement of MAD during the covid-19 pandemic. Mothers' income ($p=0.004$) and spouse support during complementary feeding ($p=0.002$) had a relationship with achieving MAD during complementary feeding. Infants from low-income families tend to receive poor complementary feeding [40].

5. Conclusion:

The mother's socio-economic status impacted the complementary feeding practices during the COVID-19 pandemic. The mothers failed to meet the criteria for complementary feeding indicators (MFF, MDD, and MAD). The factors that influenced the complementary feeding indicators were the mothers' income, support from their spouses, the educational attainment of the mothers (specifically tertiary education), and their self-employment status.

Conflict of interest

The author of this article has indicated that they has no conflicts of interest to disclose.

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