Postpartum Depression In Lactating Mothers, Diet Quality And Weight-For-Length of Infants 6–11 Months: A Community-Based Cross-Sectional Survey In Rural Umuahia, Nigeria

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ABSTRACT

Background: *Maternal depression can lead to negative health outcomes for both mother and child, as well as disruption of appropriate infant and young child feeding practices. The study determined the prevalence of postpartum depression in lactating mothers, diet quality and weight-for-length of infants 6–11 months. in rural Umuahia, Nigeria.*

Methodology: *A community-based cross-sectional survey purposively recruited consenting 150 lactating mothers (LM) with infants 6-11months of age living in the rural communities in Umuahia. The study was conducted in six (6) rural communities in Umuahia. In each of the community, 25 households with lactating mothers with infants 6-11months of age were purposefully selected. Edinburgh postpartum depression scale was used to assess postpartum depressive symptoms in lactating mothers, the minimum dietary diversity indicator was used to assess the diet quality of the infants, while WHO Anthro software for child growth standard was used to categorise weight-for-length. Descriptive statistics was used to analyse the data, while Pearson correlation was performed to determine the extent to which postpartum depression associated with weight-for-length at 5% level of significance.*

Result: *Majority (88.0%) of the LM were between 25–34years old. About 6.7% of the lactating mothers have had abortion. Some (9.3%) felt miserable often, 8.0% of were unhappy to the point of crying, and 9.3% thought of harming themselves. Some (28.7%) of them had high level of depressive symptoms. About 45.3% of the infants achieved minimum dietary diversity. Some of the infants were wasted (36%), and severely wasted (16%), while 48.0% had normal weight. There was a significant relationship ($p < 0.05$) between postpartum depressive symptoms and weight-for-length.*

Conclusion: *Postpartum depression in lactating mothers was found to have a significant relationship on the weight-for-length.*

Keywords: Postpartum depression, Lactating mothers, Infant, Diet quality, Weight-for-length

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INTRODUCTION

The postpartum period is the time that begins immediately after childbirth to six weeks, during which the mother's body returns to its pre-pregnant state. It lasts from the expulsion of the placenta until the mother's various organ systems have fully recovered. The postpartum period is divided into three phases: the acute phase (which is the first 24 hours after the delivery of the placenta), the early phase (which is from first 24 hours up to 7 days after delivery of the placenta), and the late phase (a week to 6 weeks, and to 6 months). Each phase has its own set of clinical considerations and challenges (1,2). Postpartum depression is a depression that occurs after child delivery, and can lead to negative health outcomes for both the mother and child, such as low birth weight, developmental delay,

diarrhoea, incomplete immunisation, disrupted sleep patterns, somatic symptoms, child abuse, and psychiatric and neurobehavioral disorders. Postpartum depression can also disrupt feeding and care protocols for infants and young children, increasing the risk of malnutrition. Mothers with postpartum depression are more likely to stop exclusive breastfeeding and use inappropriate feeding practices, which can harm the child (3). Postpartum blues, also known as 4th blues and maternity blues, is a highly common but temporary condition that typically emerges shortly after giving birth. It can manifest through a range of symptoms, including mood swings, irritability, and tearfulness. Postpartum depression is a prevalent public health issue that has significant effects on the health and well-being of many new mothers, their infants, and their families (4). Common symptoms of depression may include persistent sadness, exhaustion, anxiety, frequent crying, irritability, and alterations in daily habits.

The importance of optimal nutrition for a child's growth and development cannot be overstated. The feeding practices during the first 2 years of life play a crucial role in determining their health status later in life. As the child grows from 6 to 24 months, their diet should evolve from exclusive breastfeeding (breast milk) to semisolid infant foods and eventually, to a variety of family foods (5). The definition of diet quality encompasses a dietary pattern or a measure of diversity within important food groups relative to recommended guidelines (6). A high diet quality during infancy indicates improved nutrient intake profiles and a decreased likelihood of developing diet-related non-communicable diseases (NCDs) in adulthood (7). However, diet quality is subject to various factors, such as food environments, culture, socio-economic status, child and family food preferences, and age-specific nutrition recommendations. The diet quality may be a factor that can be modified to reduce the risk of depression, as certain nutritional elements can influence the biological pathways related to mental health, such as inflammation, oxidative stress, the gut microbiome, epigenetic modifications, and neuroplasticity, which in turn will improve micronutrient intake of infants (8). Following a diet that includes fruits, vegetables, whole grains, and fish may help decrease the likelihood of developing depression after delivery (9,10). Furthermore, poor households living in resource-poor areas are at high risk of inadequate micronutrient intake when their diet lacks diversity, and, study on postpartum depression, diet quality, and infants' anthropometric status is lacking in the study area. The study aims to examine the postpartum depression rate among lactating mothers and the access to food and adequacy of micronutrient intakes of 6-11 months old infants using infant and young child feeding modules with specific attention in diet quality and/or dietary diversity questions.

Methodology

Study design: The study was a community-based cross sectional survey conducted to assess postpartum depression in lactating mothers, diet quality and weight-for-length of infants 6–11 months in rural Umuahia in Abia State, Nigeria.

Study population: The study population was lactating mothers with infants 6-11months of age living in the rural communities in Umuahia.

Sample size determination: The sample size for the study was estimated using Cochran's formula elucidated by Araoye (11).

$$n = \frac{Z2\ P\ (1-P)}{e^2}$$

The margin of tolerable sampling error applied is 5% and 95% confidence level of the standard normal distribution curve which is Z = 1.96, will be used.

P = Prevalence of postpartum depression among women in Enugu State which is 10.7% according to Abasiubong, Bassey & Ekott (12).

$$n = \frac{1.96^2 \times 0.107\ (1-0.107)}{0.052}$$

$$= \frac{.8416 \times 0.107\ (0.893)}{0.0025} = \frac{3.8416 \times 0.095551}{0.0025}$$

$$= \frac{0.3671}{0.0025} = 146.84 = 147$$

To make up for dropout during data collection, 10% of the sample size was computed and added to the sample size = 0.1 x 147 = 14.7 + 147 = 161.7 = 162. Therefore, the sample size was one hundred and sixty-two lactating mothers with infants 6-11months of age.

Sampling procedure: The study was conducted in six rural communities in Umuahia. The author selected 25 compounds (houses) in each of the 6 communities purposively and sampled a total of 150 households overall. However, in a compound (house) where there were more than one lactating mothers with infants 6-11 months, a simple random

sampling by balloting without replacement was used to recruit the index lactating mother for the study. The ballot paper contained one "Yes" and five "No", and the individual that picked "Yes", participated in the study. This was conveyed to potential participants to give them an equal opportunity to participate in the study. For the duration of the study, this approach of recruitment was employed.

Inclusion criteria

Lactating mothers who did not have any recent and/or current history of any psychiatric treatment and lactating mothers who are in postpartum period of 6 months to 11 months of delivery were included in the study.

Exclusion Criteria

Lactating mothers who were sick or have any recent and/or current history of undergoing any psychiatric treatment, lactating mothers who are in the postpartum period of more than 11 months of delivery, and preterm infant were excluded in the study.

Ethics approval: The study was obtained in accordance with the Helsinki ethical criteria for human studies. Furthermore, the data collecting procedure throughout the human subjects study was non-invasive, and the study received ethical permission from the Health and Research Ethics Committee (HREC), Federal Medical Centre (FMC), Umuahia, Abia State, Nigeria, with reference number (FMC/QEH/G.596/Vol.10/716).

Informed consent to participate in the study: The lactating mothers were informed about the study before it started, their oral consent was obtained and approval from their traditional rulers was obtained. There were no biochemical, clinical or biometric data collected, while confidentiality was maintained.

Data collection

Lactating mothers were evaluated for postpartum depression and the diet diversity status of their infants (6-11months) in their homes across the communities, using minimum dietary diversity for infant and young child feeding (MDD-IYCF) for children 6 to 23 months. The questions on dietary diversity (diet quality) were based on consumption of varied foods from breast milk, grains, roots and tubers, legumes and nuts, dairy products, meats/fish, poultry, eggs, vitamin A-rich fruits and vegetables, other fruit and vegetables. The data collection took place over the course of eight weeks (two months) in six communities.

A validated and pretested semi-structured questionnaire was used to collect information on background (age, abortion history and number of abortion) and socioeconomic characteristics. Infant diet quality was assessed using WHO/UNICEF (13) infant and young child feeding module focusing on the dietary diversity questions (MDD-IYCF), while Edinburgh postpartum depression questions Cox et al. (14) were used to assess the postpartum depression status of the lactating mothers. Data collection on dietary diversity was not carried out at occasions such as religious festivals, festivities and/or celebrations to avoid collecting exceptionally diversified or limited diets that are not typical of an infant's diet. Data on weight and length of the infants were collected using infant weighing scale and infant length board, respectively. Measurement for weight was taken to the nearest 0.01kg, while length reading was taken to the nearest 0.1cm.

Data analysis

The minimum dietary diversity indicator was used to assess the proportion of children 6-11months of age who have consumed at least five out of eight pre-defined food groups the previous day or night. The eight predefined food groups are breastmilk, grain/roots/tuber, legume/nuts, dairy product, flesh foods, eggs, vitamin A-rich fruits and vegetables, other fruits and vegetables. An infant can score a maximum of 8 points and minimum of zero (0) point, in which, 'Yes' to questions asked, is coded as '1' and 'No' to questions asked, is coded as '0', and thus, a score of 4 or more indicates achieve minimal adherence to dietary guidelines, and a score of less than 4 means not achieve minimal adherence to dietary guidelines. While, for postpartum depression status, the Edinburgh postpartum depression scale (EPPDS) of 10 questions on mental health was used with a maximum score of 30 points and a minimum score of zero (0) points. Questions 1, 2, and 4, were scored 0, 1, 2, or 3 with the top box scored as 0 and the bottom box scored as 3, while questions 3, 5 – 10, were reverse scored, with the top box scored as a 3 and the bottom box scored as 0. Therefore, a score of 0 to 9.99 points means low depressive symptoms, while a score of 10 points or greater means high depressive symptoms. Data on weight and length was computed using WHO Anthro software for child growth standard.

Statistical analysis

The International Business Machine statistical package for the social sciences (IBM-SPSS) version 26 statistical software was used for the statistical analysis. Descriptive statistics of mean and standard deviation, frequency and percentage were used to analyze the data, while Pearson correlation was used to determine the relationship between postpartum depression in the lactating mothers and infant with weight-for-length-for-age, and $p<0.05$ indicated significance.

RESULTS

The study recorded about 92.6% response rate (that is, 150/162 x 100). The number of lactating mothers was one hundred and fifty.

Table 1 shows the age, abortion history and socioeconomic characteristics of the lactating mothers with infants 6-11 months of age. The majority (88.0%) of the lactating mothers were between 25years to 34years old, while 12.0% of them were between 15 to 24years old, and their mean ± SD age was 29.40 ± 4.26. Few (6.7%) of the lactating mothers reported to have had abortion, during which, 90.0% of them have had abortion once, while 10% have had abortion twice. A little above half (51.3%) of the lactating mothers had tertiary education, 42.0% of them had secondary education. Some of the lactating mothers were traders (42.0%), skilled workers (24.7%), farmers (5.3%) and housewives (4.0%). The monthly income showed that some earned < N30,000 (24.7%), N30,000 to N50,000 (25.3%), and N71,000 to N90,000 (22.7%).

Table 2 shows the mental health state of the mothers. The majority (76.7%) of the mothers reported having always been able to laugh and see the funny side of things, while 14.7% of them reported not quite so

Table 1: Background information and socioeconomic characteristics of the lactating mothers

Variables	Frequency (n = 150)	Percentage
15–24 years (young people)	18	12.0
25–34 years (adult mothers)	132	88.0
Mean age (29.40 40 ± 4.26)		
Abortion history		
Yes	10	6.7
No	140	93.3
Number of abortion		
One	9	90.0
Two	1	10.0
Educational level		
No formal education	4	2.7
Primary education	6	4.0
Secondary education	63	42.0
Tertiary education	77	51.3
Occupation		
Unemployed	8	5.3
Business/trader	63	42.0
Civil/public servant	28	18.7
Artisan/skill worker	37	24.7
Farmer	8	5.3
Housewife	6	4.0
Income		
< ₦30,000	37	24.7
₦30,000 –₦50,000	38	25.3
₦51,000 –₦70,000	26	17.3
₦71,000 – ₦90,000	34	22.7
₦91,000 and above	15	10.0

Table 2: Mental health state of the lactating mothers

Variables	Frequency (n = 150)	Percentage
Able to laugh and see the funny side of things		
As much as you always could	115	76.7
Not quite so much now	22	14.7
Definitely not so much	8	5.3
Not at all	5	3.3
Looked forward to enjoying things		
As much as you used to	89	59.3
Rather less than you used to	41	27.3
Definitely less than you used to	16	10.7
Hardly at all	4	2.7
Blamed oneself when things went wrong		
No, never	53	35.3
Not very often	42	28.0
Yes, some of the time	46	30.7
Yes, most of the time	9	6.0
Anxious or worried for no reason		
No, not at all	65	43.3
Hardly ever	32	21.3
Yes, sometimes	41	27.3
Yes, very often	12	8.0
Felt scared or panicked for no very good reason		
No, not at all	85	56.7
No, not much	24	16.0
Sometimes	29	19.3
Yes, quite a lot	12	8.0
Things getting on top of you		
No, I have been coping as well as ever	58	38.7
No, most of the time I have coped as well as ever	27	18.0
Yes, sometimes I haven't been coping as well as usual	56	37.3
Yes, most of the time I haven't been able to cope at all	9	6.0
So unhappy and having difficulty sleeping		
No not at all	76	50.7
Not very often	39	26.0
Yes, some of the time	24	16.0
Yes, most of the time	11	7.3
Felt sad or miserable		
No, not at all	62	41.3
Not very often	63	42.0
Yes, quite often	14	9.3
Yes, most of the time	11	7.3
So unhappy, have been crying		
No, never	75	50.0
Only occasionally	54	36.0
Yes, quite often	9	6.0
Yes, most of the time	12	8.0
Thought of harming self		
Never	129	86.0
Hardly ever	6	4.0
Sometimes	14	9.3
Yes, quite often	1	0.7

much seeing the funny side of things, and 3.3% of them have not at all been able to laugh and see the funny side of things. More than half (59.3%) of the mothers have looked forward to enjoyment of things, 27.3% of them have rather less enjoyment than they are used to look forward to enjoying things, while 2.7% of the lactating mothers hardly looked forward to enjoyment. Some (30.7%) of the mothers had some of the time blamed themselves when things went wrong, while 35% of them had never blamed themselves when things went wrong, while 6.0% of the mothers most of the time blamed themselves when things went wrong. Few (8.0%) of the lactating mothers had very often been anxious or worried for no reason, while 27.3% of them sometimes were anxious or worried for no reason. More so, 8.0% of the lactating mothers had quite a lot felt scared or panicked for no very good reason, while 19.3% of them sometimes felt scared or panicked for no very good reason.

Few (6.0%) of the lactating mothers most of the time had not been able to cope at all when things get on top of them, while 37.3% of them sometimes had not been coping as well as usual. Some (7.3%) of the lactating mothers had most of the time been so unhappy that they had difficulty sleeping, while 16.0% of them had some of the time been so unhappy that they had difficulty sleeping. Also, 7.3% of the lactating mothers had most of the time felt sad or miserable, while 9.3% of them quite often felt sad or miserable. About 8.0% of the lactating mothers most of the time had been so unhappy that they had to cry, while 6.0% of them had quite often been so unhappy that they had to cry. Only 0.7% of the lactating mothers quite often had thoughts of harming themselves, while 9.3% sometimes have had thought of harming themselves.

Table 3 shows the postpartum depression status of the mothers. The result showed that 28.7% of the lactating women had high levels of depressive symptoms, while 71.3% of them had low levels of depressive symptoms. The mean ± SD score of the postpartum depressive symptoms was 7.48 ± 6.23.

Table 4 shows the dietary diversity of the infants 6-11 months of age as reported by their mothers. A majority (81.3%) of the lactating mothers breastfed their child the previous day (the day preceding the survey), 29.3% of the mothers fed their child food made from grain, root and tubers, 23.3% of them fed their child flesh foods (meats/fish/poultry), 23.3% fed their child vitamin A-rich fruits and vegetables, and 7.3% of the lactating mothers fed their child any other fruits and vegetables the previous day before the survey. It was also reported that 30.7% of the lactating mothers fed their child eggs, 13.3% of them fed their child food made from

Table 3: Postpartum depression status of the lactating mothers

Variables	Frequency (n = 150)	Percentage
High level of depressive symptoms	43	28.7
Low level of depressive symptoms	107	71.3
mean ± SD = 7.48 ± 6.23		

A score of 0 – 9.99 points means low depressive symptoms, while a score of 10 points or greater means high depressive symptoms

Table 4: Minimum dietary diversity of the infants 6 – 11 months

Variables (n = 150)	Yes F(%)	No F(%)
Breastfeeding	122(81.3)	28(18.7)
Grains, roots and tubers	44(29.3)	106(70.7)
Legumes & nuts	20(13.3)	130(86.7)
Dairy product	44(29.3)	106(70.7)
Flesh foods (meats/fish, poultry)	35(23.3)	115(76.7)
Eggs	46(30.7)	104(69.3%)
Vitamin A-rich fruits and vegetables	35(23.3)	115(76.7)
Other fruit & vegetables	11 (7.3)	139(92.7%)

Figure 1 shows the minimum dietary diversity status of the infants aged 6-11 months. About 45.3% of the infants achieved minimum dietary diversity adherence, while 54.7% of their counterparts did not achieve minimum dietary diversity adherence. The mean ± SD minimum dietary diversity score was 2.98 ± 2.16.

pulses (beans/peas/lentils) and nuts, and 29.3% of the lactating mothers fed their child dairy products.
Figure 1 shows the minimum dietary diversity status of the infants aged 6-11 months. About 45.3% of the infants achieved minimum dietary diversity adherence, while 54.7% of their counterparts did not achieve minimum dietary diversity adherence. The mean ± SD minimum dietary diversity score was 2.98 ± 2.16.
Figure 2 shows the weight-for-length of the infants

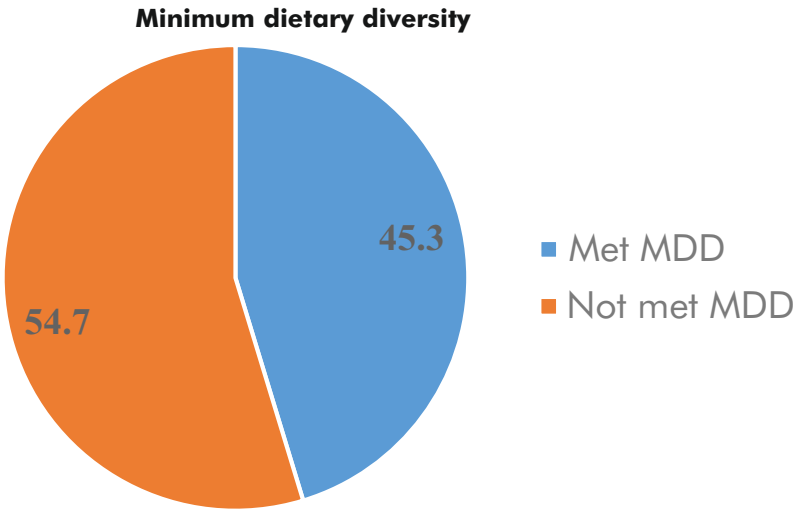

Fig. 1: Minimum dietary diversity (MDD) status of the infants (6–11 months)

Figure 2 shows the weight-for-length of the infants 6–11 months. Some of the infants were wasted (36.0%), severely wasted (16.0%) and (48.0%) of the infants had normal weight-for-length.

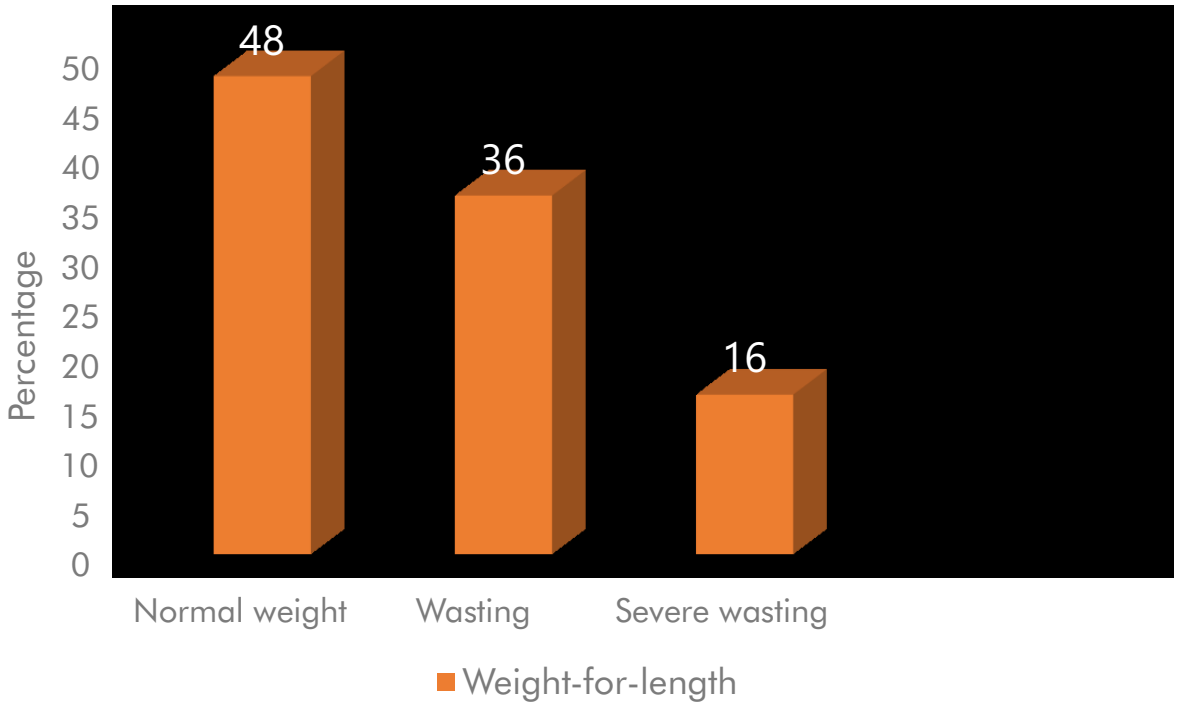

Fig. 2: The weight-for-length status of the infants aged 6–11 months

6–11 months. Some of the infants were wasted (36.0%), severely wasted (16.0%) and (48.0%) of the infants had normal weight-for-length.

Table 5 shows the association between depressive symptom and weight-for-length of the infants. There was a statistically significant difference ($P < 0.05$) between postpartum depressive symptoms and weight-for-length of the infant. The correlation between postpartum depressive symptom and weight-for-age was 0.196.

DISCUSSION

The study examined the postpartum depressive symptoms among lactating mothers, diet quality and weight-for-length-for-age of infants 6–11months. The study showed that majority of the mothers were between 25–34years, had one or two abortions, low income, and held a low paying job/unemployed. These are perceived factors among others that could lead to postpartum depression, although the study did not show any relationship as against postpartum depression. The study however, used the Edinburgh PPD scale to evaluate the PPD status of the lactating mothers, which was a measure to determining their mental health status. The study further revealed a varying levels of postpartum depression (PPD). The current study reported a much higher prevalence of PDD, which is not in line with the studies by Amipara et al. (3) and Dhande et al. (15) who reported 6.8% and 6.0%, respectively, of lactating mothers with high postpartum depressive symptoms attending postnatal clinic. However, the varying rates of postpartum depressive symptoms may be attributed to the study's location, emphasizing the significance of postnatal clinics. In the course of the study, the lactating mothers in the communities reported lack of access to health facilities where they can be evaluated and cared for during their postpartum period. The attendance at postnatal clinics among lactating mothers in rural areas was relatively low at 35.1% (16). The inability to access healthcare facilities for postnatal visits can lead to complications associated with childbirth. To prevent psychiatric disorders, it is essential for rural residents, particularly pregnant, lactating, and reproductive-age women, to have full access to healthcare facilities for adequate screening for PPD/depression.

The study analysed the diet quality of infants aged 6-11 months, as reported by their mothers and/or legal guardians. Less than half of the infants achieved the minimum dietary diversity requirements, which was higher than the 17.7% reported by Ariyo et al. (17) in their study on minimum dietary diversity among 6 – 23 months of age in Iseyin Nigeria. This may have contributed to the weight of the infants as observed in the study in terms of normal weight-for-length. This highlights the importance of appropriate infant and young child feeding practices for good health and nutritional status, which can have long-term benefits into adolescence and adulthood. Therefore, it is recommended that infants (from 6 months old) should consume breastmilk, and varying foods from grains/root/tubers, meat/poultry/fish, eggs, and vitamin A-rich fruits/vegetables on a daily basis, as these can contribute to a healthy diet, good health, and a strong immune system.

The study found a correlation between postpartum depressive symptoms and weight-for-length, which highlights the connection between a mother's mental health and the anthropometric status of her infant. This suggests that stable mental health is crucial for ensuring proper infant and young child feeding practices, which in turn supports the growth and development of infants. Furthermore, other factors such as low income and inadequate dietary diversity could also contribute to wasting and severe wasting in infants. The study collaborated with the study by Amipara et al. (3) who opined a significant correlation between postpartum depression and infant anthropometric status. In addition, Molyneaux et al. (18) also reported a strong link between anthropometric status and postpartum depression.

CONCLUSION

The study found that postpartum depression poses a significant mental health challenge for the lactating mothers, which subsequently affected the diet quality and weight-for-length of their infants.

(n = 150)	PPD	Weight-for-length	MDD
PPD			
r	1	-0.196*	0.111
p-value		0.016	0.178

BMI = body mass index: MDD = minimum dietary diversity: r = correlation: PPD = postpartum depression.

Therefore, there is need to formulate a social behavioural change framework that would ensure adequate care for lactating mothers within the postpartum period and beyond, as well as the practice of appropriate infant and young child feeding.

Limitation of the study: The study did not look at the relationship between abortion, low income and low paying job/employment and postpartum depression.

Declarations

Ethics considerations and approval

The study was carried according the declaration of Helsinki – ethical principles involving human subjects. More so, the process of data collection during the study involving human subjects was non-invasive, and the ethical approval to conduct the study was obtained from the Health and Research Ethics Committee (HREC), Federal Medical Centre (FMC) Umuahia, Abia State, Nigeria, with reference number (FMC/QEH/G.596/Vol.10/635).

Consent to participate: Informed oral consent to participate was obtained from the lactating mothers before the commencement of the study, and no biomedical, clinical and biometric data were collected.

Consent for publication: Not Applicable.

Availability of data and materials: Data that support the findings of this study are not openly available due to some sensitivity and are available from the corresponding author upon reason request.

Competing interest: The authors declare that they have no competing interests in the study

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