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# Exclusive breast feeding practice and its determinants among mothers of children aged 6–12 months living in slum areas of Bhubaneswar, eastern India

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ABSTRACT

*Background:* Exclusive breastfeeding (EBF) is a simple and cost-effective intervention for the promotion of child health and survival. The purpose of the study was to assess the prevalence of exclusive breast feeding (EBF) practices and its determinants among slum women.

*Methods:* A cross sectional study was carried out in the year 2015–16 among 160 mothers having infants aged 6–12 months residing in slum areas of Bhubaneswar, India. Multi-stage, cluster sampling technique was used to select the study population. Exclusive breastfeeding practice was the dependent variable and all relevant information was collected using a semi-structured schedule. Logistic regression analysis was used to determine the factors significantly associated ($p < 0.05$) with EBF practice.

*Results:* Only 21.2% women were exclusively breast feeding their children for six months. After adjustment for confounders, multivariable analysis revealed that being housewife (adjusted OR [aOR]: 2.69, 95% CI: 1.39–5.19); smaller family size (aOR: 2.69, 95% CI: 1.42–5.08); ≥3 antenatal visits (aOR: 2.38, 95% CI: 1.19–4.76); and ≥3 postnatal visits (aOR: 3.12, 95% CI: 1.41–6.67) were the independent predictors of EBF practice among study participants.

*Conclusions:* Prevalence of EBF practice is very low in slums of Bhubaneswar. Creating breastfeeding enabling working environment for working women, placing more emphasis on smaller family size, and regular antenatal and postnatal visits could be helpful for promotion of EBF practice among slum women.

## 1. Introduction

Breastfeeding is considered as the most ideal food for healthy growth and development of infants and Exclusive Breast Feeding (EBF) for first 6 months of life ensures optimal growth, development and health of an infant.[1] It is estimated that every year more than 800,000 child deaths and 20,000 breast cancer deaths can be prevented by scaling up of breastfeeding.[2] Despite demonstrated benefits of EBF, its prevalence in many countries including India are lower than the international recommendation of EBF for first 6 months which is 90%.[3] Furthermore, the prevalence of EBF practice among people living in slum areas is very low.[4,5] Several studies have reported about increased risk of improper child feeding practices in urban slums.[5–8] The rapid growth of urban population with disproportionate development of social facilities has resulted in creation of slums.[9] Almost one third of the world's population is estimated to be living in either slum or squatter settlements and largest proportion of slum population is in the Asian region.[10,11] In India, about 17.4% of urban households live in slum areas.[9] Slum dwellers are deprived of basic amenities such as safe drinking water, sanitation, and proper housing which make them vulnerable to infections further compromising their nutritional status.[8]

Breast feeding practices are influenced by a wide range of socio-economic, cultural and individual factors.[12–14] With this background, this study was conducted to assess the prevalence of exclusive breast feeding practices and its determinants among women having children aged 6–12 months living in slum areas of Bhubaneswar city.

## 2. Methods

### 2.1. Design and site

This community based cross sectional study was conducted during the period between September 2015 and April 2016 in Bhubaneswar, the capital city of Odisha located on the eastern coastal region of India.

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Bhubaneswar city is governed by Bhubaneswar Municipal Corporation and consists of 67 wards comprising of 436 slums with a population of about 3 lakhs. Bhubaneswar City is divided into 5 geographical zones – North, South, Central, East and West.

### 2.2. Sample size and sampling

Assuming the prevalence of exclusive breastfeeding practice as 27.6%[4] and precision as 10%, level of confidence as 95% and design effect 2, sample size was determined as 154 (Using the formula $n = z^2_{1-\alpha/2} \times p\ (100 - p) \times deff/d^2$, where n = sample size, z = 1.96 at 95% level of confidence, p = assumed prevalence of EBF, d = absolute precision, deff = design effect). Multi-stage cluster random sampling technique was adopted to select the study sample. A list of wards having slum areas in each zone was prepared. From each of the 5 zones, 50% of wards having slum areas were randomly chosen and in each ward, one slum was randomly selected. Overall, 24 slums in 24 wards were selected as study clusters. The sample size was equally distributed among the selected slums and thus 7 eligible women were randomly selected from each slum area.

### 2.3. Study population and procedure

All the mothers with their infants of 6–12 months old residing in the selected slums for at least 1 year were considered for the study purpose. A list of all the mothers who had an infant aged 6–12 months in the selected slums was obtained from the registers maintained by the health workers posted in their respective areas. Age of the child was established based on the information from health card/any written document or information given by the mother. Mothers or children suffering from any acute or chronic illness or having any mental disorder were excluded from the study. Also, children having any congenital anomaly such as cleft lip or cleft palate were excluded as presence of such anomaly might affect their breastfeeding. In total, 166 eligible mothers were approached for the study of which 160 agreed to participate. A semi structured schedule was designed to elicit relevant information which consists of four parts: (a) Socio-demographic information including age of parents, age of mother at the time marriage, mother's addiction for tobacco consumption, education and occupation of parents, caste, marital status, family size, per capita monthly income etc. (b) Obstetric history including parity, abortion, place of delivery, type of delivery; health care service related factors like antenatal care attendance, post natal visits; gender, birth weight and birth order of child; health problems of mother such as fever, vaginal discharge/bleeding, pelvic pain, frequent urination, fatigue/sadness etc. and health problems of child such as fever, jaundice, irritation/lethargy, respiratory difficulty etc. during the first week after delivery etc. (c) Child feeding practices of mothers such as whether child was exclusively breastfed for 6 months, duration of breastfeeding, time of initiation of food or fluid other than breastfeeding, bottle/utensil feeding, maintenance of hygiene while feeding etc. (d) Knowledge of the mothers regarding various aspects of breast feeding. The following case definition for EBF was applied in our study: A mother who feeds only breast milk, and no other liquids or solids with the exception of oral rehydration solution, medicines or supplements to the infant since birth till 6 months of age. Breast feeding practice was assessed by asking a variety of questions such as (a) When did you start breastfeeding? (b) For how many months did you give only breast milk? (c) When did you start food/fluid other than breast milk? (d) What other food/fluid was given with breastfeeding? (e) When did you completely stop breastfeeding?

The schedule was first prepared in English language, translated into local language (Odia) and then retranslated into English language by language experts to check the correctness of the schedule. Initially it was pretested in ten mothers of infants aged 6–12 months living in a slum, one of the field practice areas under Urban Health and Training Center of authors' institution. Based on the experience gained in pretesting, suitable modifications were done in the schedule and final schedule was prepared for data collection in the main study. At the end of interview, mothers were informed about the advantages and disadvantages of breastfeeding for infants as well as for themselves.

### 2.4. Ethical considerations

All the participants were told about the aim of the study and confidentiality of information they would provide. They were also informed that they had the right to withdraw from the study at any time. Eligible mothers willing to participate & giving their informed consent were included in the study. Ethical approval was obtained from the Institutional Ethics Committee of the authors' institution (IEC Ref. no: KIMS/KIIT/IEC/107/2015 dated 08.09.2015) and all the procedures followed were in accordance with the national requirements and the principles embodied in the Declaration of Helsinki.

### 2.5. Data analysis

Data were checked for completeness and entered into MS Excel sheet. Then the data were transferred to SPSS software version 21.0 for analysis. Complex sample analysis procedure was followed for analysis of data due to complex nature of sampling design. Sampling weight was calculated by taking the inverse of the inclusion probability (the proportion of units drawn at a given stage) and used within complex samples option. First, univariable logistic regression analyses were performed for each socio-demographic factor; all those with $p \leq 0.1$ were included in the first multivariable model. Similarly, the factors in the other domain (maternal and child health, child feeding and related characteristics) with $p \leq 0.1$ in univariable analyses were entered in the second multivariable model. Then those variables in the two multivariable models for which p was $\leq 0.1$, formed the final multivariable model. Statistical significance was considered if p value was $< 0.05$. In the final model, independent variables found to have significant associations with the dependent variable (EBF practice) were examined for presence of any effect modifications by including appropriate interaction terms in the model. Strength of association was measured using odds ratio and 95% confidence interval.

## 3. Results

Of the 166 eligible mothers approached for the study, 160 consented to participate in the study giving a response rate of 96.4%. The mean age of the respondents was 28 ± 4.87 years (range: 22–43 years), that of the infants was 8.6 ± 1.7 months and 83 (51.9%) infants were males. Participants' partners age ranged from 23 to 49 years with mean of 30.1 ± 5.1. Majority of the respondents belonged to Hindu religion (152, 95%) and rest were Muslim/Christian. Mean age of the respondents at the time marriage was 21 ± 1.87 years. Seventy three (45.6%) women respondents had higher education (> 10th standard) as compared to 55.6% of their partners. Almost two thirds (105, 65.6%) of participants were multiparous and delivered in the health facilities.

The study shows that the prevalence of EBF practice was 21.2% (Table 1). As revealed in the first multivariable model, the socio-demographic factors which remained significantly associated with EBF practice after adjustment of the confounders: education of mother (adjusted OR [aOR]: 0.36, 95% CI: 0.15–0.91 for mothers with education of 6th to 10th standard compared with education above 10th standard); occupation of mother (aOR: 2.39, 95% CI: 1.14–4.99 for being housewife compared with mothers doing outside job); and family size (aOR: 2.73, 95% CI: 1.08–6.88 for families with ≤4 members compared with smaller family size) (Table 2). Table 3 presents that in the second multivariable model, variables like frequency of antenatal visits (aOR: 3.03, 95% CI: 1.47–6.25 for ≥ 3 antenatal visits compared with < 3 visits) and frequency of post natal visits (aOR: 3.12, 95% CI:

**Table 1**
Breastfeeding practice and knowledge of study participants (n = 160) residing in slum areas of Bhubaneswar, India.

| Variable | Number | Percent |
|---|---|---|
| **Breastfeeding practice** | | |
| Exclusive breastfeeding | | |
| No | 126 | 78.8 |
| Yes | 34 | 21.2 |
| Using bottle/utensil for feeding the child | | |
| No | 8 | 5.0 |
| Yes | 152 | 95.0 |
| Washing bottle/utensil before feeding | | |
| No | 63 | 39.4 |
| Yes | 89 | 55.6 |
| Washing hands before feeding | | |
| No | 65 | 40.6 |
| Yes | 95 | 59.4 |
| **Breastfeeding Knowledge** | | |
| Has breastfeeding any advantage for mother/child health | | |
| Do not know/Do not agree | 41 | 25.6 |
| Agree | 119 | 74.4 |
| Should an infant be breastfed immediately after birth | | |
| Do not know/Do not agree | 76 | 47.5 |
| Agree | 84 | 52.5 |
| Should an infant start complementary feeding after 6 months | | |
| Do not know/Do not agree | 55 | 34.4 |
| Agree | 105 | 65.6 |
| Should an infant continue breastfeeding upto 2 years and beyond | | |
| Do not know/Do not agree | 76 | 47.5 |
| Agree | 84 | 52.5 |
| Source of any information regarding breastfeeding | | |
| Health worker | 26 | 16.3 |
| Dai | 29 | 18.1 |
| Doctor | 105 | 65.6 |

1.39–7.14 for ≥ 3 postnatal visits compared with < 3 visits) retained their significance.

In the final multi variable model, variables such as being housewife (aOR: 2.69, 95% CI: 1.39–5.19), smaller family size (aOR: 2.69, 95% CI: 1.42–5.08), increased frequency of antenatal visits (aOR: 2.38, 95% CI: 1.19–4.76), and increased frequency of post natal visits (aOR: 3.12, 95% CI: 1.41–6.67) were found to be significant determinants of EBF practice. The variable "education of mother" was not significantly associated with EBF practice (Table 4).

## 4. Discussion

Research shows that EBF is the safest and healthiest option for every infant for first 6 months of life.[1,15,16] In our study the prevalence of EBF practice among women residing in slums of Bhubaneswar was found to be very low (21.2%) compared to WHO recommended EBF coverage of 90% and current national average of 71.6%.[3,17] The prevalence of EBF practice is lower compared to studies conducted at different corners of the country and worldwide such as Durgapur (27.6%),[4] Gujarat (46.7%),[18] Nagpur (36.8%),[19] Amhara (49.1%),[14] and Kigoma (58%).[20] The EBF prevalence of this study is comparable to the study done in Kilimanjaro (20.7%).[21] These results show wide variation of EBF practice within and between countries. The difference might be due to difference in methodology, study setting, time, and socio-cultural factors.

In the final model although maternal education was not found to be significantly associated with EBF practice, women with higher level of education were more likely to exclusively breastfeed their babies. This finding is in consistency with the study results from Western India,[7] Debre Markos.[22] With higher level education, mothers are more likely to be well informed about the benefits of EBF and thus will be more motivated to practice it.[23,24] Our study showed four variables such as being housewife, smaller family size, and increased frequency of antenatal and post natal visits were found to be significant determinants

**Table 2**
Association of socio-demographic characteristics of study population (n = 160) with exclusive breast feeding (EBF) practice.

| Variable | Exclusive Breastfeeding N (%) | Unadjusted OR (95% CI) | 'p' | Adjusted OR (95% CI) | 'p' |
|---|---|---|---|---|---|
| Age of mother (Years)* | | | | | |
| ≤25 | 17 (27.4) | 2.14 | 0.043 | | |
| 26–30 | 11 (19.0) | 1.33 | 0.474 | | |
| > 30 | 6 (15.0) | 1 | – | | |
| Age of husband (Years)* | | | | | |
| ≤25 | 10 (29.4) | 2.17 | 0.034 | | |
| 26–30 | 14 (21.9) | 1.46 | 0.250 | | |
| > 30 | 10 (16.1) | 1 | – | | |
| Age of mother at marriage* | | | | | |
| ≤20 | 9 (15.3) | 0.55 | 0.049 | | |
| > 20 | 25 (24.8) | 1 | – | | |
| Education of mother | | | | | |
| ≤5 | 2 (4.8) | 0.09 | 0.000 | 0.22 (0.03–1.39) | 0.117 |
| 6–10 | 7 (15.6) | 0.35 | 0.003 | 0.36 (0.15–0.91) | 0.031 |
| > 10 | 25 (34.2) | 1 | – | 1 | – |
| Education of husband* | | | | | |
| ≤5 | 2 (5.3) | 0.13 | 0.000 | | |
| 6–10 | 6 (18.2) | 0.54 | 0.088 | | |
| > 10 | 26 (29.2) | 1 | – | | |
| Occupation of mother | | | | | |
| Housewife | 27 (27.3) | 2.89 | 0.001 | 2.39 (1.14–4.99) | 0.021 |
| Outside Job | 7 (11.5) | 1 | – | 1 | – |
| Addiction of mother | | | | | |
| No | 28 (21.9) | 1.21 | 0.587 | | |
| Yes | 6 (18.8) | 1 | – | | |
| Per capita monthly income* (INR[a]) | | | | | |
| ≤1000 | 6 (12.8) | 0.26 | 0.001 | | |
| 1000 - 2000 | 12 (17.6) | 0.39 | 0.003 | | |
| > 2000 | 16 (35.6) | 1 | – | | |
| Family size | | | | | |
| ≤4 | 24 (34.8) | 4.32 | 0.000 | 2.73 (1.08–6.88) | 0.033 |
| > 4 | 10 (11.0) | 1 | – | | |
| Caste* | | | | | |
| General | 19 (26.8) | 3.29 | 0.005 | | |
| OBC[b] | 11 (22.4) | 2.61 | 0.033 | | |
| SC/ST[c] | 4 (10.0) | 1 | – | | |

OR: Odds ratio; CI: Confidence Interval.
*Variables such as age of mother, age of husband, age of mother at marriage, education of husband, per capita monthly income, and caste were statistically not significant ($p < 0.05$) in the multivariable analysis.
[a] One US dollar is equivalent to INR (Indian Rupee) 66 (approximately) for the year 2015–16.
[b] OBC: Other backward class (Socially and educationally disadvantaged group).
[c] SC/ST: Scheduled Caste/Scheduled Tribe (Most disadvantaged socio-economic groups in India).

of EBF practice. The odds of practicing EBF increases 2.7 times in mothers who were housewives compared to women who were engaged in outside jobs. This finding is in agreement with the results of earlier studies.[22,24–27] Perhaps this is because employed mothers have not adequate time to feed their babies during working hours or they have short maternity leave to stay with their newborn babies and establish breastfeeding or they do not find suitable locations at their working places to breastfeed their babies. On the contrary, Akter et al. in their study showed that mothers working outside their houses were more likely to practice EBF and this might be explained by the fact that most working mothers took their babies with them to the workplaces.[28] It was observed in the present study that mothers with smaller family size (≤4 members in a family) were more likely to exclusively breastfeed their babies than mothers with larger family size. This is similar to the finding of study conducted in Dilla Zuria which revealed that mothers

**Table 3**
Association of maternal and child health, child feeding and related characteristics of study population (n = 160) with exclusive breast feeding practice.

| Variable | Exclusive Breastfeeding N (%) | Unadjusted OR (95% CI) | 'p' | Adjusted OR (95% CI) | 'p' |
|---|---|---|---|---|---|
| Parity | | | | | |
| Primipara | 14 (25.5) | 1.45 | 0.188 | | |
| Multipara | 20 (19.0) | 1 | – | | |
| History of abortion | | | | | |
| No | 28 (20.9) | 0.88 | 0.726 | | |
| Yes | 6 (23.1) | 1 | – | | |
| Sex of child | | | | | |
| Female | 14 (18.2) | 0.70 | 0.201 | | |
| Male | 20 (24.1) | 1 | – | | |
| Birth order of child | | | | | |
| First | 14 (25.5) | 1.45 | 0.188 | | |
| Second and above | 20 (19.0) | 1 | – | | |
| ANC[a] visits | | | | | |
| ≥3 | 25 (37.9) | 5.88 | 0.000 | 3.03 (1.47–6.25) | 0.003 |
| < 3 | 9 (9.6) | 1 | – | | |
| Place of delivery | | | | | |
| Home | 6 (10.9) | 0.34 | 0.002 | | |
| Health institution | 28 (26.7) | 1 | – | | |
| Birth weight of child | | | | | |
| < 2.5 kg | 13 (25.0) | 1.38 | 0.259 | | |
| ≥2.5 kg | 21 (19.4) | 1 | – | | |
| PNC[b] visits | | | | | |
| ≥3 | 12 (52.2) | 5.88 | 0.000 | 3.12 (1.39–7.14) | 0.006 |
| < 3 | 22 (16.1) | 1 | – | | |
| Health problem of mother* | | | | | |
| No | 23 (29.9) | 2.79 | 0.001 | | |
| Yes | 11 (13.3) | 1 | | | |
| Health problem of child* | | | | | |
| No | 19 (32.8) | 2.83 | 0.000 | | |
| Yes | 14 (13.9) | 1 | | | |

OR: Odds ratio; CI: Confidence Interval.
*Variables such as place of delivery, health problem of mother, and health problem of child were statistically not significant ($p < 0.05$) in the multivariable analysis.
[a] ANC: Antenatal care.
[b] PNC: Postnatal care.

with family size of < 4 members were 2.2 times higher odds of practicing EBF than those with higher family size.[29] Another study explored that mothers with family size 3 were 2 times more likely to exclusively breastfeed their babies compared to mothers with family size of six.[30] This could be due to the reason that it is difficult to maintain privacy in larger families in slums due to overcrowding and this may interfere breastfeeding. Also in larger families, uneducated senior members might negatively influence the EBF practice of the mothers. In the present study, frequent antenatal and post natal visits (≥3 visits) increased the odds of EBF practice among mothers as compared to those with less number of visits. This finding is in line with those of studies done in Addis Ababa,[13] Debre Markos,[22] Dilla Zuria,[29] and Chencha.[30] The possible explanation might be that increased counseling efforts, health checkups during these visits could be the deciding factors in promotion of EBF practice.

### 4.1. Limitation of the study

The study could have the following limitations. Firstly, it is difficult to establish the cause-effect relationship due to cross sectional nature of the study. Secondly, the information obtained from the study participants might be subject to recall bias as some women might not remember when they exactly introduced other liquids or solids. However, bias may be minimized by including women having children aged 6–12 months as recall period becomes shorter compared to women with older children. Thirdly, prevalence of EBF practice may be overestimated as women may over report the EBF practice due to social desirability bias. Furthermore, psychological factors like family or peer support, and cultural/traditional practices, were not included in the analysis. In spite of these limitations, the study has various important implications.

There should be sincere effort for promotion of EBF practice in the slum areas. Slum women must be educated regarding appropriate infant and child feeding practices and maintenance of hygiene during child feeding. Creating breastfeeding enabling working environment at workplaces could be helpful in improving EBF practice. To ensure optimal infant feeding, regular antenatal and postnatal visits should be given priority in the existing schemes for the promotion of EBF practice.

**Table 4**
Final multivariable model of association of various factors with exclusive breast feeding practice among study population (n = 160).

| Variable | Adjusted Odds ratio (95% CI) | 'p' value |
|---|---|---|
| Education of mother | | |
| ≤5 | 0.53 (0.17–1.70) | 0.285 |
| 6–10 | 0.89 (0.42–1.89) | 0.771 |
| > 10[R] | 1 | – |
| Occupation of mother | | |
| Housewife | 2.69 (1.39–5.19) | 0.003* |
| Outside Job[R] | 1 | – |
| Family size | | |
| ≤ 4 | 2.69 (1.42–5.08) | 0.003* |
| > 4[R] | 1 | – |
| ANC visits | | |
| ≥3[R] | 2.38 (1.19–4.76) | 0.014* |
| < 3 | 1 | – |
| PNC visits | | |
| ≥3[R] | 3.12 (1.41–6.67) | 0.005* |
| < 3 | 1 | – |

**Note.** Model Wald F statistic = 6.754, $p < 0.001$ shows that the model fits and supports the existence of the relationship between the independent variables and dependent variable. Nagelkerke's pseudo R squares = 0.291, Classification table reports that the overall expected model performance is 78.1%; that is, 79.4% of the cases can be expected to be classified correctly by the model. **R** = Reference category; **CI** = Confidence Interval.*$p < 0.05$

## 5. Conclusion

It is revealed in our study that the prevalence of EBF practice in the urban slums of Bhubaneswar is 21.2%, much lower than the national average and the global target. The present study shows that variables such as being housewife, smaller family size, and increased frequency of antenatal and post natal visits were found to be significantly associated with EBF practice of slum women.

## Declarations of interest

None.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.cegh.2018.11.004.

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