

# Bottle feeding practices among nursing mothers of infants in selected rural communities of Egbeda local government area of Ibadan, Oyo state

## Abstract

The WHO recommends that infants have to be exclusively breastfed for the first six months. Sometimes breastfeeding is not achievable, and then alternative methods recommended by WHO/UNICEF as cup feeding must be used. The use of bottle with a nipple started initially in the west and soon became a widespread phenomenon globally. As a result, bottle-feeding is now a socially and culturally accepted norm in developing countries. This study has made a contribution to understand the prevalence of bottle feeding which was higher in proportion than the national average value. Also this study shows the foods mothers bottle feed and highlighted the factors that contributed to the bottle feeding practice of rural mothers.

Four hundred and thirty-six nursing mothers were recruited, four hundred answered to the interviewer administered questionnaire and thirty-six mothers for the focus group discussions in groups of four. The data collected were coded and analyzed with descriptive analysis and the entire interview was done using thematic analysis.

The triangulation of the findings of both the qualitative and quantitative research, the age, occupation, total time spent at work, income, place of delivery, type of delivery and those that gave advice on feeding bottle used were significant ( $P < 0.005$ ) with bottle feeding practice while mothers education was not statistically significant with bottle feeding practice ( $P > 0.005$ ). Furthermore, mother's bottle feed different kinds of foods based on their culture. Although, there is a shift based on urbanization as mothers also want to practice what is being practiced in urban communities.

Based on the findings, there is need for active postnatal campaign directed towards dangers of bottle feeding could increase the prevalence of exclusive breastfeeding. Also nutrition education should be extended to the Nation at large so as to be more aware of side effects of bottle feeding.

**Keywords:** bottle feeding, rural mothers, foods bottle-fed

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**Abbreviations:** WHO, World Health Organization; UNICEF, United Nations International Children's Emergency Fund; IFPRI, International Food Policy Research Institute; UC Davis, University of California Davis; USAID, United States Agency for International Development; NDHS, Nigeria Demographic and Health Survey.

## Introduction

Malnutrition is one of the biggest health problems that the world currently faces and is associated with more than 41% of the deaths that occur annually in children from 6 to 24 months of age in developing countries which total approximately 2.3 million.<sup>1</sup> WHO<sup>2</sup> reported that 54% of all childhood mortality was attributable, directly or indirectly, to malnutrition. Sub-Saharan Africa has a high prevalence of stunting, low weight-for-age and acute malnutrition.<sup>3</sup>

According to World Health Organization,<sup>4</sup> an infant is a child younger than one year of age and thus needs appropriate feeding and care during this period both to improve the child's chances of survival and lay the foundations for a healthy life. Growth during the first year of life is greater than at any other time after birth. Breast milk provides immunologic protection against death from infectious diseases, such as diarrhoea, respiratory infections, otitis media, pneumonia and meningitis. Good nutrition during this period of rapid growth is vital to ensure that the infant develops both physically and mentally to the fullest potential.<sup>5</sup>

Although the formula contain protein, fats, carbohydrates, vitamins, and minerals in amounts similar to those in breast milk but not exactly like breast milk. It may provide most of the nutrients a baby needs to grow and thrive; there are advantages and disadvantages to choosing to feed a baby with formula. These considerations extend not only to the baby but to the mother as well. The disadvantages of using artificial nutrition like formula and bottle-feeding on the economy of families especially in developing countries are remarkable.<sup>6</sup> Formula-fed children are more likely to be exposed to pathogens, which may contaminate bottles, formula and the food given to the child.<sup>7</sup>

However, the World Health Organisation regards bottle feeding practices as an optional indicator that is used for assessing infant and young child feeding practices to ensure continuity in monitoring of previously used indicators and recognizing that some programme may wish to measure additional indicators.<sup>8</sup> Feeding an infant from a bottle with an artificial teat may also make it more difficult for the baby to learn to attach well at the breast and has been associated with earlier cessation of breastfeeding.<sup>9</sup> If an infant cannot feed directly from the breast, then the safest alternative is to feed expressed breast milk from a cup<sup>10</sup> which should have been the best for the infant.

In Nigeria, suboptimal breastfeeding practices are contributing to the burden of childhood diseases and mortality. Malnutrition has been shown to be higher in rural than urban households in Nigeria and other nations.<sup>11</sup> Poor feeding practices are a major threat to social and economic development.<sup>5</sup>

Recent scientific evidence reveals that malnutrition has been responsible, directly or indirectly, for 60% of all deaths among children under-five years annually. Over 2/3 of these deaths are often associated with inappropriate feeding practices and occur during the first year of life with bottle-feeding practices taken 1/3 of them. Poor feeding practices in infancy and early childhood resulting in malnutrition contribute to impaired cognitive and social development, poor school performance and reduced productivity in later life. Poor feeding practices are, therefore, a major threat to social and economic development as they are among the most serious obstacles to attaining and maintaining health of this important age group.<sup>12</sup>

Despite the global strategy and action plan on infant and young child feeding practices, the prevalence of malnutrition among under five children in Nigeria is still high with stunting at 37%, wasting at 18% and underweight at 29%. According to NDHS,<sup>11</sup> the prevalence of bottle feeding in Nigeria is 13% among 0-23months and 16% among 0-6months children. A study conducted in the North western part of Nigeria stated the prevalence of bottle feeding to be 15.3% while another study in Osun state shows the prevalence of bottle feeding to be 89.2% among 384mother-child pair.<sup>13</sup>

This study aims to assess the bottle feeding practices among nursing mothers of infants in selected rural communities of Egbeda local government area of Ibadan, Oyo State. Hence, the study will determine the socio-economic and socio-demographic characteristics of mothers of infants, identify the factors that informed the choice of bottle feeding as well as assess the mother's knowledge in preparation of feeding bottles and its hygiene practice.

## Material and methods

This was a mixed method descriptive, cross-sectional study. This study employed both quantitative and qualitative approach. According to Creswell<sup>14</sup> a mixed methods research design is a procedure for collecting, analyzing, and "mixing" both quantitative and qualitative methods in a single study or a series of studies to understand a research problem. The main assumption behind the use of mixed method is that a combination of both quantitative and qualitative approaches provides a deeper understanding of the study problem and question than one method alone. It comprises of integrating, linking, merging, or embedding two approaches.

A multi-stage sampling technique was adapted; these involved: Selection of Egbeda local government using purposive sampling technique, selection of 4 wards from 11 wards in the local government using random sampling and selection of participants from the wards were done using convenient sampling technique. To further enhance the reliability and validity of this study 400 sample size was used.

The data collection were done in two phases. As this study employed mixed approach, based on the quantitative approach, a pre-tested semi-structured interviewer administered questionnaire was used to obtain information from the participants. The questionnaire consists of the following sections:

- a) Socio- economic and socio-demographic characteristics of the participants
- b) Breast feeding performance index of mothers was used to identify prevalence of bottle feeding using the World Health Organization criteria.
- c) Factors that informed the choice of bottle feeding practices of mothers

d) Adapted food frequency questionnaire for children was used to assess the varieties of food that mothers bottle feed.

e) Mothers knowledge preparation of feeding bottles and it's hygiene

Furthermore, based on the qualitative approach employed in this study, focus group discussions was conducted among nursing mothers of infants to assess the bottle feeding practices of mothers with a group from each ward that was chosen. Questions such as, "What do you understand by exclusive breastfeeding? What is your view about the use of feeding bottle? What are those factors that influence mothers to use feeding bottle? What are those foods that you put in the feeding bottle?" the focus group discussions lasted for about 45minutes were conducted in Yoruba. All were recorded with audio recorders, transcribed verbatim and back-translated. The groups were four and in each group are 9 participants.

For data analysis, statistical interpretation on data collected was performed using the IBM Statistical Package for Social Sciences (SPSS version 20). Descriptive statistics such as frequencies were calculated and presented in tables and charts. Inferential statistics such chi-square was used. Level of significance was placed at  $p=0.05$ . As there is sequence of  $X^2$ . Hence the final error will be  $>5\%$ . Analysis of interview was guided Braun and Clarke's<sup>15</sup> six phases of thematic analysis. Chi-square was used to find the level of association between socio-demographic characteristics like Mothers education, age (both mother and child), occupation, estimated monthly income, marital status, ethnicity, religion, place of work, total hours spent at work per day and bottle feeding practices. While Comparative analysis technique were employed for focus group discussion data.

## Results and discussion

### Age and bottle feeding practices

This study revealed non-significance of the mother's age and bottle feeding practice as chi- square analysis showed the  $p=0.057$ . Though certain literature revealed tendency for high bottle feeding practice elderly mothers; that is mothers who are 40 years and above. The non- significance of mother's age in relationship to bottle feeding practice in this study might be as a result of high number of participant within the age range of 26-35 years that can be referred to be young adult which constituted 23% out of 47.5% of those that bottle feed. Furthermore, this study revealed that as child increase in age, such child tends to be more predisposed to bottle feeding practice. This study confirmed high prevalence of bottle feeding practice among infant of age 10-12 was 12.5%, while 7-9 months was 11% and 4-6 months was 10.5%; revealing an increase as the child get older. This finding relates to, Kebebe and Assaye<sup>16</sup> findings that indicated the prevalence of bottle feeding practice to be was 8.1% among age 0-5 months, 22.1% among age 6-11 months and 24.6% among age 12-23 months children. However, triangulation of findings between quantitative and qualitative analysis was achieved, this is as the qualitative analysis done showed that the age of the child and the age of the mother influence the bottle feeding practice. The focus group discussion showed that mothers above 35 practice more of bottle feeding compared to mothers of low age. For instance, number 13 mother that was interviewed is 44 years stated that she has started feeding her child immediately after the child is four months. Also mother number 25 that was interviewed who is 37 years of age stated that she started giving bottle feeding immediately after the child was born, even though she is currently not using it again.

## Education and bottle feeding practices

This study found significance of mother's education in relations to bottle feeding practice. Past literature showed the tendency for bottle feeding practice to reduce based on mothers high level of education. This is as mothers with higher education level are more conscious of health implication of bottle feeding practice. Most participants of this study are fall within secondary school education (48.5) which education can be considered low compared to those at the tertiary level (38.5%). Further indicated that out of 47.5% of mother that bottle fed 24% of these mothers have secondary school education while those with tertiary education is 16%, those with no formal education are 4.5% and those with primary education are 2.5. While in developing countries where education among women is significantly low few mothers are conscious of the risks associated with formula and bottle-feeding on children.<sup>6</sup> Thus, the importance of providing appropriate health education to the infant mothers as well as utilizing every opportunities of contact with the mother to counsel them regarding the appropriate feeding practices.<sup>5</sup> This study revealed a link with study done by Akinyinka et al.,<sup>17</sup> in southwest of Nigeria, revealed high prevalence of bottle feeding practice which was 30.9% with 58.2% of mother having at least a secondary school education, this was also in tandem with a study in Delta State Nigeria by Oyibo et al.,<sup>18</sup> with the prevalence of bottle feeding of 37.3% and 41.8% of the mothers having at least a secondary school education. Another study in southwest Nigeria by Olatona et al.,<sup>19</sup> showed the prevalence of bottle feeding to be 18.6% with most mothers having at least a tertiary education. Furthermore, in a related study by Kebebe and Assaye,<sup>16</sup> in Ethiopia, 46.4% of the mothers had at least a primary education but their bottle feeding practice tend to increase with increase in the age of the child. However, triangulation of findings was reported between the quantitative analysis and the qualitative analysis, this is the as qualitative analysis also showed the influence of mother's education in bottle feeding practice. In the focus group discussion 24 of mother interviewed have only primary and secondary school education; likewise 12 interviewed mothers have tertiary education. Out of 36 mothers interviewed 26 mothers are reported to use bottle feeding either currently or in the past, and out of this 26 mothers that are using bottle feeding either in the past or presently 13 of the interviewed mother have secondary school education and 2 have primary school education and 11 have tertiary education. Thus, it indicates that prevalence of bottle feeding practice was reported more among women with secondary school education and below.<sup>18</sup>

## Occupation and bottle feeding practices

This study revealed significance of mothers occupation and bottle feeding practice, this is as chi-square analysis revealed  $p=0.003$ . Showing that as mothers are preoccupied with jobs they tend to engage in bottle feeding practice. Scholars posited that maternal employment tend to be in a continuous competition with breastfeeding<sup>20,21</sup> and may also be a barrier to breast feeding. This implies that women that work many hours are likely to mix feeding with the use of feeding bottle as a convenient choice to suit the working mothers. Grzywacz et al.,<sup>22</sup> indicated that in UK working mothers were less likely to initiate and continue breastfeeding as they would prefer infant formula. Furthermore, Motee et al.,<sup>23</sup> reported that mothers are prompted to resort to the supplementation of infant formula before 3 months so that their infants familiarize to bottle feeding during their absence. In this study 37.95% started the use of infant formula within one month after delivery, out of which 32.5% highlighted that they had to resume work as being the major reason to bottle feed. However, triangulation of findings was achieved in this study between the quantitative analysis

and qualitative analysis; this is as the qualitative analysis done further showed that the mothers occupation influence bottle feeding practice. The second mother interviewed indicated that she is a trader who is most time busy, thus prefer to keep the child with the mother in-law also helped her to bottle feed. Also the seventh mother interviewed stated that she is a fashion designer and work 12 hours on daily basis, thus her busy schedule makes her to prefer giving bottle feeding for her 6 months old child immediately after birth. Further, number eight mother that was interviewed stated that she is also a trader and prefer to leave his child with mother in-law, friends and other sibling who help to bottle feed the child.

## Income and bottle feeding practices

This study reported significant of income on bottle feeding practice among mothers of infant as the chi-square analysis done showed the value  $p=0.000$ . Furthermore, studies have shown that the employment status of women is connected with their economic status which is likely to have an impact on bottle feeding practices of mothers. Lukman et al.,<sup>24</sup> in his research found out that the higher the income of the family, the more they tend to give bottle feeding. Bottle feeding was higher among mothers of wealthier household compared with mothers of poorer household.<sup>21</sup>

## Exact foods that mothers bottle feed

Study showed that there are different foods that mothers bottle feed their children which ranges from one culture to the other. Marques et al.,<sup>25</sup> indicated that bottle is used not only to give milk but all other types of fluids e.g. water, tea, juice etc. Also Shamim et al.,<sup>26</sup> stated that the semisolid cereals are also diluted as a drink to be given through the bottle. In Ghana, a study shows that 55.8% of 355 mothers fed other foods with feeding bottles to their child with regards to the foods mothers had given to their babies in the past 24hours which were breast milk, cereals, porridge, milk, rice and stew, banku and stew, SMA, Tom brown, yam, lactogen, tea (milo) and biscuit. Another hospital based study in Nigeria shows that out of 330 mother-child pair, the percentage of bottle feeding practice was 35.1% and starch based foods commonly consumed by children with guinea corn pap taking (37.3%) and formulas alone as first complementary foods is said to be 20%.<sup>27</sup> Ogunba et al.,<sup>28</sup> in southwest Nigeria revealed that out of 340 mother-child pairs, 55.9% of the mothers bottle feed expressed breast milk, 88.6% of the mothers used infant formula This study found mothers bottle fed their infants with water and local herbs are 66%, differenttypes of food like: milk and dairy product accounting for 34.5%; 34% of mothers bottle feed commercial complementary foods; 33% bottle feed maize/millet/sorghum (pap); 30% bottle feed grains/roots/ tubers; 14.5% bottle feed beverages; 9% bottle feed homemade complementary foods; also 9% bottle feed vitamin A rich fruits and vegetables while just few (6%) of the mothers bottle feed pulses/legumes/nuts. In the subcategories, 6.5% bottle feed custard, 5% bottle feed rice, 1.5% bottle feed wheat, sorghum 4%, milk 31%, yoghurt/ice- cream 7.5%, bobo/viju 6.5%,soymilk 7%, Few (4%) mothers used groundnuts to mix their infants food inside feeding bottles, 8% used soybean, 7% bottle feed orange, 2.5% bottle feed banana, 6% bottle feed water melon and 4% uses pineapple in the foods they bottle feed.

## Factors that informed the choice of bottle feeding

Studies have revealed different factors that informed mother's decision to bottle feed. These factors includes: hours spent with the child, alternative care given to the child, child feeding during alternative care, antenatal care attendance during pregnancy;<sup>27</sup> frequency of antenatal attendance;<sup>29</sup> age of pregnancy at delivery,



place of delivery;<sup>30</sup> type of delivery; advice given on infant and young child feeding practices, not sucking well on breast, baby not gaining weight, breast abscess sore nipples, mother became sick, mothers work, the way mother's was fed, friend introduced, and environment.<sup>27</sup> In this study, majority (64%) of the mothers spent about 16-24 hours with their baby, they received different alternative care from people around them with over one-third (41%) receiving care from older children, neighbours, friends and in-laws and more than half (52%) of the mothers fed the child using other methods (force feeding, use of plate and spoon) when the infants were left with an alternative caregiver. A larger proportion (98.5%) attended antenatal care with more than half (52.5%) attended antenatal every week. Over one-third (39.5%) gave birth at exactly 9 months, more than half (60.5%) delivered in the hospital with most (91%) of the babies given birth to through normal delivery. Majority (88.5%) received advice on infant and young child feeding practices, a little below half (42.4%) were given advice by doctor and nurses on infant and young child feeding and more than half (37%) of those that bottle feed chose themselves as for author of the decision to adopt for the use of feeding bottle while the most (15%) common reason given by mothers for bottle feeding was because the child cries too much. Furthermore, the qualitative analysis also revealed different factors that informed the choice of bottle feeding practice; this is as group discussion participants revealed that feed bottle was employed because of convenience, culture, gender, baby cry too much, not sucking well on breast, ways mothers was fed, or work.

### Mother's knowledge in preparation of feeding bottles and its hygiene practice

Based on UK recommendations for bottle-feeding and hygiene practice, indicated that: 1) feeds should be made up with boiled water that has not been allowed to cool to less than 70°C (within 30 minutes of boiling); 2) the water should be added to the bottle before the milk powder to avoid overconcentration; and 3) Properly sterilization of equipment. Ideally there is need for one feed to be prepared at a time. However, also recommended that it is acceptable to cool the bottle and store it in a refrigerator for up to 24 hours.<sup>31</sup> The hygienic practice is considered based on health implication associated with bottle feeding practices. This findings showed that to certain extent mothers who participated does not meet up to standard, as this study found that some (29.5%) of the mothers prepares about 1-3 feeding bottles of foods, a little bit above half (38.5%) of those that bottle fed prepared the infant formula for the child using the instructions given by the manufacturer and well above half (44%) of the mothers used the measuring scoop provided with the infant formula. More than one-third (27%) of the mothers used tap water to prepare the formula, more than half (41.5%) of the mothers used boiled water and some (29.5%) boiled the water for lesser than 10 minutes.<sup>32-39</sup> Out of majority (46%) that sterilized their feeding bottle, more than one-third (25.5%) used boiled water, soap and sponge for sterilizing and some 30% sterilized every morning. A little below half (31.5%) fed the prepared foods immediately after making it and some (8%) kept the prepared formula in cold water as method of storage and more than half, while (35%) of the mothers that prepared infant formula using feeding bottles handle their left over's by throwing it away. Also some (8%) that kept the formulas till the next feeding episode kept them in cold water. Furthermore, the qualitative analysis further revealed that most mothers sterilized with water, soap and sponge as well as salt. Like the case of one of the women interviewed who indicated that she only sterilized with Omo detergent and hot water (mother 26) and the case of a woman who only sterilized with cold water and salt (mother 29).<sup>40-49</sup>

### Conclusion

This study investigates bottle feeding practices among nursing mothers of infant in selected rural community of Egbeda local government Ibadan, Oyo State. As this study employed mixed approach, that is both quantitative and qualitative analysis. This study revealed findings to its objectives; which are to know: exact food that infant mothers bottle feed, association between social demographic factors and bottle feeding practice, mother's knowledge in preparation of feeding bottles and its hygiene practice, factors that informed the choice of bottle feeding, as well as health care related characteristics and bottle feeding. This study don't revealed a clear significance of the mother's age and bottle feeding practice as chi-square analysis showed the  $p=0.057$ . The non-significance of mother's age in relationship to bottle feeding practice in this study might be as a result of high number of participant within the age range of 26-35 years that can be referred to be young adult who constituted 23% out of 47.5% of those that bottle feed. Furthermore, this study revealed that as child increase in age, such child tends to be more predisposing to bottle feeding practice. However, triangulation of findings between quantitative and qualitative analysis was achieved, this is as the qualitative analysis done showed that the age of the child and the age of the mother influence the bottle feeding practice.<sup>50-57</sup> The focus group discussion showed that mothers above 35 practice more of bottle feeding compared to mothers of low age. Furthermore, this study found significance of mother's education in relations to bottle feeding practice. This is as mothers with higher education level are more conscious of health implication of bottle feeding practice. Also, triangulation of findings was reported between the quantitative analysis and the qualitative analysis, this is as qualitative analysis also showed the influence of mother's education in bottle feeding practice. In addition, this study revealed significance of mothers occupation and bottle feeding practice, this is as chi-square analysis revealed  $p=0.003$ . Showing that as mothers are preoccupied with jobs they tend to engage in bottle feeding practice. The qualitative analysis done further showed that the mothers occupation influence bottle feeding practice.<sup>58-61</sup> By examining income and bottle feeding practice; this study reported significant of income on bottle feeding practice among mothers of infant as the chi-square analysis done showed the value  $p=0.000$ . This study further highlight three health characteristics which are very common to the use of feeding bottle with a nipple among mothers, which are place of delivery, antenatal attendance by the mothers and mode of delivery. this research showed that 32%, 5.5%, 1% delivered in the hospital, primary health care and home respectively and a statistical significant association was revealed between bottle feeding practice and place of delivery with  $p=0.005$ . This study found non-significance between antenatal attendant and bottle feeding practice. This might be out of nonchalant attitude of towards infants and young child feeding practice of the mothers.<sup>62-73</sup> This is as the significant of the use of feeding bottle out of self-motivation was found. In addition, this study found significance of mode of delivery and bottle feeding practices as  $p=0.000$ . In addition, this study found mothers bottle fed their infants with water and local herbs are 66%, different types of food like: milk and dairy product accounting for 34.5%; 34% of mothers bottle feed commercial complementary foods; 33% bottle feed maize/millet/sorghum (pap); 30% bottle feed grains/roots/ tubers; 14.5% bottle feed beverages; 9% bottle feed homemade complementary foods; also 9% bottle feed vitamin A rich fruits and vegetables while just few (6%) of the mothers bottle feed pulses/legumes/nuts. This study further revealed different factors that informed mother's decision to bottle feed. These factors includes: hours spent with the child, alternative care given to the child, child feeding during alternative care, antenatal care

attendance during pregnancy; frequency of antenatal attendance; age of pregnancy at delivery, place of delivery; type of delivery; advice given on infant and young child feeding practices, not sucking well on breast, baby not gaining weight, breast abscess sore nipples, mother became sick, mothers work, the way mother's was fed, friend introduced, environment, convenience, culture, baby crying too much, baby not suckling on breast as well as mothers work. Lastly, based on UK recommendations for bottle-feeding and hygiene practice, this is as the findings showed that to some extent mother does not meet up to standard. For instance, only 29.5% of mothers who use feeding bottle boiled the water for lesser than 10 minutes compared to recommended 30 minutes or more.<sup>74-79</sup>

Based on the findings there is need for active postnatal campaign directed towards dangers of bottle feeding could increase the prevalence of exclusive breastfeeding. Nutritional education is needed in the selected rural communities of Egbeda and the whole Oyo State at large so as to be more aware about the present and the future effects of bottle feeding practice and how it affects the income of the household involved and the whole economy at large.<sup>80,81</sup> This nutrition education should be extended to the Nation at large so as to be more aware of side effects of bottle feeding.

Additionally, further researchers should involve more in findings on bottle feeding practice among other ethnic groups within the context of Nigeria and show foods that mothers bottle feed. This will all to know the appropriate intervention to apply across the nation.

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## Conflicts of interest

The authors declare that there are no conflicts of interest.

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