

Socioeconomic inequalities in exclusive breastfeeding, early initiation of breastfeeding, and skin-to-skin contact between mother and newborn in Nigeria: evidence from Demographic and Health Survey

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Research

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Abstract

Background

The effects of breastfeeding practices on children's health are undoubtedly of great interest worldwide. Exclusive breastfeeding (EBF), early initiation of breastfeeding (EIBF) and skin-to-skin contact (SSC) between mother and the newborn have many short-term and long-term benefits. The aim of this study was to explore state-level prevalence and examine the socioeconomic inequalities between EBF, EIBF and SSC in Nigeria.

Methods

Data on 2,936 children aged less than 6 months were extracted from the 2018 Nigeria Demographic and Health Survey (NDHS) to determine EBF. In addition, data from 21,569 women were used for EIBF and SSC estimations. Lorenz curve and concentration index were used to examine socioeconomic inequalities in EBF, EIBF and SSC.

Results

The prevalence of EBF, EIBF, and SSC were 31.8%, 44.2%, and 12.1% respectively. Furthermore, Ogun State had the highest prevalence of EBF (71.4%); while Bayelsa State had the highest prevalence of SSC (67.8%) and EIBF (96.2%) respectively. Urban dwellers had higher prevalence of EBF, SSC and EIBF across household wealth quintile and levels of mother's education, in contrast to their rural counterparts. We quantified the degree of wealth-related and mother's education inequalities in EBF, SSC and EIBF. Overall, EBF, SSC and EIBF had pro-rich coverage; EBF (Conc. Index = 0.118; $p < 0.001$), SSC (Conc. Index = 0.152; $p < 0.001$) and EIBF (Conc. Index = 0.103; $p = 0.002$) respectively. Also, EBF was significantly more concentrated among mothers with higher educational attainment (Conc. Index = 0.157; $p < 0.001$), SSC (Conc. Index = 0.156; $p < 0.001$) and EIBF (Conc. Index = 0.091; $p < 0.001$). The test for differences between urban vs. rural was significant in EBF, SSC and EIBF for mother's educational attainment. But this was only significant in EIBF for household wealth quintile.

Conclusion

Socioeconomic status determined breastfeeding practices and SSC in Nigeria. Breastfeeding practices interventions should target all mothers, especially low socioeconomic status mothers to ensure improvements in baby friendly initiatives.

Background

Approximately 37% of children under 6 months of age are exclusively breastfed in resource-constrained settings; while an estimated 823 000 annual deaths in under 5 children exists (1). Sub-optimal breastfeeding has been reported to be responsible for 1.4 million childhood deaths and 44 million total disease burden (10% of total disease burden in under 5 children) (2). Optimal breastfeeding practices is crucial in improving the health of children, and associated with reduction in the risk of childhood morbidity and mortality (3, 4). EIBF can reduce neonatal mortality. Albeit, the prevalence of EIBF is only about 50% in many resource-constrained settings (5). The guideline for breastfeeding practices include the initiation of breastfeeding for all newborns within the first hour of life, otherwise known as EIBF and EBF which is practiced for infants less than 6 months (6, 7). Interestingly, SSC between mother and newborn plays a mediating role in EIBF (8).

The World Health Organization (WHO) defined SSC as; “when the newborn is placed prone on the mother’s abdomen or chest in direct ventral-to-ventral skin-to-skin contact. Immediate skin-to-skin contact is done immediately after delivery, less than 10 minutes after birth. Early skin-to-skin contact was defined as beginning any time from delivery to 23 hours after birth and should be uninterrupted for at least 60 minutes (9). SSC improves the newborn maintenance of blood glucose levels, temperature regulation and metabolic adaptation. At birth, the newborn has a reduced capacity to generate heat, resulting from a decline in temperature. It is against this backdrop that maintenance of temperature is required for newborn at delivery. During SSC, there is a transfer of heat from the mother to her child, wherewith the mother’s body temperature activates the child’s sensory nerves, which in turn results in the child’s relaxation, reduces the tone of the sympathetic nerves, dilation of skin vessels and increase in its temperature (10).

High prevalence of hypothermia was recorded in settings with large number of newborn death, where hypothermia has become an issue of major concern to improve newborn survival (11). In addition, thermal care is crucial as newborns are commonly susceptible to hypothermia without prejudice to tropical climates. Newborns have thin skin, a large body surface area, little insulating fat, and easily overwhelmed thermoregulatory mechanisms (12). In the absence of thermal protection, newborns are unable to maintain body temperature, while preterm babies become most-at-risk of the adverse effects (13). Several estimates of hypothermia in African settings are limited to hospital studies and ranged between 44% through 85% (14). Besides the provision of several benefits to the newborn, SSC has been linked with many benefits for mothers. For instance, secretion of oxytocin in mothers who receive SSC strengthens uterine contractions, which in turn aids the placenta to separate and the duration of the third stage of labour is shortened (15). As a simple and cost-effective mechanism, mother and newborn SSC is recommended to improve post-delivery care and potentially save the lives of mothers and newborns in alike (16). Though the WHO has recommended mother and newborn SSC, separation of mothers and newborns exists in many health facilities where newborns are often placed under warmers or in cots (17).

Nearly a decade ago, the World Health Assembly Resolution 65.6 endorsed a comprehensive implementation plan on maternal, infant and young child nutrition, which specified six global nutrition targets for 2025; including to increase the rate of EBF in the first 6 months up to at least 50% (18). An

improvement in EBF, EIBF, and SSC between mother and newborn is required to achieve the Sustainable Development Goals (SDGs); especially those targeted to ensure healthy lives and promote wellbeing for all at all ages (SDG 3), and ending preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to a minimum of 12 per 1,000 live births and under 5 mortality to a minimum of 25 per 1,000 live births by 2030 (19, 20). The promotion of optimal breastfeeding practices is a major component of child growth mechanisms. Efforts have been made to improve infant and child feeding practices, including International Code of Marketing of Breast milk Substitutes (21), Global Strategy for Infant and Young Child Feeding (IYCF) (22) and The Code, baby friendly hospital initiative (BFHI) (23). In recent years, WHO provided a set of indicators to evaluate child feeding and determine the progress of breastfeeding advancement efforts. Since then, there has been major attention in infant and child feeding structure and in the knowledge about what comprises ideal breastfeeding practices (6).

Evidence-based studies have reported that EBF and EIBF are associated with large gains and improve childhood survival, as well as support the recommendations to start breastfeeding immediately after childbirth (24, 25). In spite of the numerous advantages that have been identified regarding the benefits of appropriate breastfeeding practices during early childhood (26), the rates of EBF and EIBF in several resource-constrained settings still need to be improved. Understanding the patterns of breastfeeding is essential to prioritize filling the knowledge gaps in childhood survival (27). In addition, SSC and breastfeeding benefit newborns in many ways, by providing warmth and nutrients for facilitating growth and boosting the immunity of babies (8, 28). Childhood survival can be improved through adequate breastfeeding of infants, vaccination of the deadliest childhood diseases such as pneumonia, polio, and measles (29–31). Most importantly, improvement in socioeconomic status can aid in childhood survival through high educational attainment and improving living standard (32, 33). Interestingly, the findings from a previous educational intervention study, led to the development of a guideline that allowed SSC and EIBF be included in newborn care national policy (34). In this paper, we examine socioeconomic inequalities in breastfeeding practices and SSC in Nigeria.

Methods

Data source

We analyzed a cross-sectional secondary data extracted from NDHS 2018. MEASURE DHS provided technical input in the process of data collection in DHS and supported by the National Population Commission (NPC) (35). Data on 2,936 children below the age of 6 months was extracted for analysis. In addition, data on 21,569 women interviewed for EIBF and SSC were analyzed. NDHS is a vital source of data on EBF, EIBF and SSC especially as it consists of a nationally representative sample of households. DHS data was collected through a stratified multistage cluster sampling technique. The procedure for stratification approach divides the population into groups by geographical region and commonly crossed by place of residence - urban-rural. A multi-level stratification approach is used to divide the population into first-level strata and to subdivide the first-level strata into second-level strata, and so on. A two-level

stratification in DHS is region and urban/rural stratification. DHS data is available in the public domain and accessed at; <http://dhsprogram.com/data/available-datasets.cfm>.

Since 1984, Demographic and Health Surveys have been conducted in over 85 countries and repeated every five years. A major advantage is that the sampling design and data collection approach are similar across countries which making the results of different settings comparable. Though from onset, DHS was designed to expand on fertility, demographic and family planning data collected in the World Fertility Surveys and Contraceptive Prevalence Surveys, nonetheless, it has become the prominent source of population surveillance for the monitoring of population health indices particularly in resource-constrained settings. DHS elicits information from respondents in a wide range of health related areas including vaccination, child and maternal mortality, fertility, intimate partner violence, female genital mutilation, nutrition, lifestyle, infectious and non-infectious diseases, family planning, water and sanitation amongst others. DHS has great merits in collecting high quality data through proper interviewer training, national coverage, standardized data collection instrument and proper operational definition of concepts to enhance understanding among policy and decision makers. DHS data is useful in formulating epidemiological research to estimate prevalence, trends and inequalities. The details of DHS has been reported previously (36).

Selection and measurement of variables

Outcome

1. Early initiation of breastfeeding: This is a measure of children who were put to breast within 1 hour of delivery.
2. Exclusive breastfeeding: This is a measure of infants less than 6 months of age who were fed exclusively with breastmilk. This indicator was based on the diets of infants younger than 6 months during the 24 hour before the survey.
3. Skin-to-skin contact was measured dichotomously; *“Was child put on mother's chest and bare skin after birth”* yes vs. no

Explanatory factors

Socioeconomic characteristics was measured by women's educational attainment, thus: no education, primary, secondary and higher. In addition, household wealth quintile was computed by DHS using principal components analysis (PCA) to assign the wealth indicator weights. In their computation, they assigned scores and standardized the wealth indicator variable using household assets including; wall, floor, roof and wall type; whether a household had improved vs. unimproved sanitation amenities and water source; whether a household had essential assets such as electricity, radio, television, cooking fuel,

refrigerator, furniture amongst others. Further, the factor loadings and z-scores were calculated. For each household, they multiplied the indicator values by the factor loadings and summed to produce the household's wealth index value. The standardized z-score was disentangled to classify the overall scores to wealth quintiles; poorest, poorer, middle, richer and richest (37). Household wealth quintiles and mothers' educational attainment were used as measures of socioeconomic status similar to previous studies (38–40).

Residential status was classified as urban vs. rural;

Geographical region and States: **North Central:** Benue, Federal Capital Territory, Kogi, Kwara, Nasarawa, Niger, Plateau; **North East:** Adamawa, Bauchi, Borno, Gombe, Taraba, Yobe; **North West:** Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto, Zamfara; **South East:** Abia, Anambra, Ebonyi, Enugu, Imo **South South:** Akwa-Ibom, Bayelsa, Cross River, Edo, Delta, Rivers; **South West:** Ekiti, Lagos, Ogun, Ondo, Osun, Oyo.

Ethical consideration

This study was based on an analysis of population-based datasets that exist in public domain and available online with all identifier information removed. The authors were granted access to use the data by MEASURE DHS/ICF International. DHS Program is consistent with the standards for ensuring the protection of respondents' privacy. ICF International ensures that the survey complies with the U.S. Department of Health and Human Services regulations for the respect of human subjects. The DHS project sought and obtained the required ethical approval from the National Health Research Ethics Committee (NHREC) in Nigeria before the surveys were conducted. No further approval was required for this study. More details about data and ethical standards are available at <http://goo.gl/ny8T6X>.

Statistical analysis

Stata survey ('svy') module was used to adjust for sampling weights, stratification and clustering in data analysis. Percentage and Chi-square test were used for summary statistics and bivariate analysis respectively. To determine socioeconomic inequalities in EBF, EIBF and SSC, we used concentration index and Lorenz curve. When the concentration index value is positive or Lorenz curve lies below the diagonal line (line of equality), it indicates that EBF, EIBF and SSC coverage is greater among high socioeconomic groups. Conversely, when concentration index value is negative or Lorenz curve is above the line of equality, it indicates that EBF, EIBF and SSC coverage is higher among low socioeconomic groups. Lorenz curves and concentration index were used to decipher socioeconomic inequalities in line with previous studies (41,42). Statistical significance was determined at $p < 0.05$. Stata Version 14 (StataCorp., College Station, TX, USA) was used for data analysis.

Results

In fig.1 we presented the prevalence of EBF (31.8%), EIBF (44.2%) and SSC (12.1%) respectively. This showed that EIBF was mostly practiced in Nigeria over others.

The results from Table 1 showed that Benue (65.3%), Ondo and Osun (66.7%), Ekiti (69.6%), and Ogun (71.4%) had the leading prevalence of EBF respectively. Furthermore, Oyo (45.4%) and Bayelsa (67.8%) reported the highest prevalence of SSC in Nigeria. In addition, Niger (74.9%), Kogi (78.4%), Ogun (78.6%) and Bayelsa (96.2%) reported the highest prevalence of EIBF respectively. Similar differences were obtained across geographical zones.

Table 1. Summary statistics from 36 States + Federal Capital Territory on exclusive breastfeeding, early initiation of breastfeeding and skin-to-skin contact between mother and newborn; NDHS, 2018

| State | Exclusive breastfeeding | | Skin-to-skin contact | | Early initiation of breastfeeding | |
|---------------------------|-------------------------|---------|----------------------|---------|-----------------------------------|---------|
| | n | % | n | % | n | % |
| North Central | | | | | | |
| Benue | 72 | 65.3 | 599 | 20.2 | 591 | 64.3 |
| Federal Capital Territory | 71 | 46.5 | 519 | 6.7 | 529 | 64.7 |
| Kogi | 53 | 18.9 | 411 | 8.0 | 402 | 78.4 |
| Kwara | 54 | 51.9 | 466 | 5.2 | 456 | 61.6 |
| Nasarawa | 72 | 48.6 | 537 | 13.0 | 527 | 23.5 |
| Niger | 120 | 12.5 | 786 | 3.7 | 754 | 74.9 |
| Plateau | 63 | 46.0 | 521 | 1.7 | 515 | 52.4 |
| Total estimate | 505 | 39.0 | 3839 | 8.4 | 3774 | 60.3 |
| <i>P</i> | | <0.001* | | <0.001* | | <0.001* |
| North East | | | | | | |
| Adamawa | 86 | 16.3 | 620 | 32.7 | 606 | 20.3 |
| Bauchi | 129 | 24.8 | 893 | 15.1 | 882 | 14.0 |
| Borno | 67 | 7.5 | 670 | 6.4 | 663 | 51.3 |
| Gombe | 124 | 30.7 | 816 | 22.9 | 798 | 20.7 |
| Taraba | 104 | 30.8 | 709 | 2.5 | 698 | 11.6 |
| Yobe | 101 | 40.6 | 766 | 9.1 | 734 | 51.8 |
| Total estimate | 611 | 26.5 | 4474 | 14.7 | 4381 | 27.7 |
| <i>P</i> | | <0.001* | | <0.001* | | <0.001* |
| North West | | | | | | |
| Jigawa | 118 | 9.3 | 901 | 37.6 | 879 | 11.3 |
| Kaduna | 147 | 19.7 | 895 | 6.4 | 866 | 34.5 |
| Kano | 168 | 12.5 | 1247 | 8.2 | 1210 | 40.4 |
| Katsina | 146 | 25.3 | 929 | 17.1 | 914 | 39.9 |
| Kebbi | 96 | 14.6 | 824 | 5.5 | 794 | 28.2 |
| Sokoto | 104 | 20.2 | 703 | 0.4 | 672 | 14.3 |
| Zamfara | 128 | 39.8 | 804 | 2.5 | 790 | 52.9 |
| Total estimate | 907 | 20.3 | 6303 | 11.5 | 6125 | 32.5 |
| <i>P</i> | | <0.001* | | <0.001* | | <0.001* |
| South East | | | | | | |
| Abia | 55 | 21.8 | 386 | 6.5 | 387 | 47.8 |
| Anambra | 93 | 34.4 | 536 | 9.0 | 537 | 39.3 |
| Ebonyi | 93 | 47.3 | 609 | 7.6 | 603 | |
| Enugu | 49 | 24.5 | 360 | 2.2 | 349 | 47.0 |
| Imo | 52 | 15.4 | 438 | 2.7 | 422 | 47.4 |
| Total estimate | 342 | 31.6 | 2329 | 6.0 | 2298 | 43.4 |
| <i>P</i> | | <0.001* | | <0.001* | | <0.001* |
| South South | | | | | | |
| Akwa-Ibom | 49 | 30.6 | 377 | 13.8 | 365 | 57.3 |
| Bayelsa | 45 | 35.6 | 373 | 67.8 | 366 | 96.2 |
| Cross River | 36 | 41.7 | 307 | 11.7 | 301 | 65.1 |
| Edo | 45 | 37.8 | 306 | 7.5 | 297 | 63.0 |
| Delta | 40 | 25.0 | 328 | 8.5 | 335 | 44.8 |
| Rivers | 48 | 33.3 | 423 | 9.5 | 435 | 52.6 |
| Total estimate | 263 | 33.8 | 2114 | 20.4 | 2099 | 63.0 |
| <i>P</i> | | <0.001* | | <0.001* | | <0.001* |
| South West | | | | | | |
| Ekiti | 46 | 69.6 | 353 | 8.8 | 345 | 52.2 |

| | | | | | | |
|----------------|-----|---------|------|---------|------|---------|
| Lagos | 59 | 59.3 | 555 | 8.7 | 577 | 57.7 |
| Ogun | 42 | 71.4 | 364 | 0.8 | 359 | 78.6 |
| Ondo | 54 | 66.7 | 400 | 7.3 | 391 | 48.1 |
| Osun | 39 | 66.7 | 371 | 5.7 | 366 | 64.5 |
| Oyo | 68 | 51.5 | 467 | 45.4 | 453 | 73.3 |
| Total estimate | 308 | 63.0 | 2510 | 13.7 | 2491 | 62.3 |
| <i>P</i> | | <0.001* | | <0.001* | | <0.001* |

*Significant at $P < 0.05$; P value was obtained using Chi-square test

In Table 2, we presented the percentages of EBF, SSC and EIBF across household wealth quintile and mother's education. Based on the results, urban dwellers had higher EBF, SSC and EIBF across household wealth quintile and levels of mother's education, in contrast to their rural counterparts. Furthermore, the concentration index, quantified the degree of wealth-related and mother's education inequalities in EBF, SSC and EIBF. Overall, the study outcomes were significantly more in higher household wealth, in contrast to the lower household wealth groups; EBF (Conc. Index= 0.118; $p < 0.001$), SSC (Conc. Index= 0.152; $p < 0.001$) and EIBF (Conc. Index= 0.103; $p = 0.002$) respectively. Furthermore, EBF was significantly more from mothers with higher educational attainment, compared with children from mothers with lower educational attainment (Conc. Index= 0.157; $p < 0.001$), SSC (Conc. Index= 0.156; $p < 0.001$) and EIBF (Conc. Index= 0.091; $p < 0.001$). The test for differences between children from urban vs. rural was significant in EBF, SSC and EIBF for maternal educational attainment. But this was only significant for EIBF for household wealth quintile.

Table 2. Prevalence and concentration index of exclusive breastfeeding, early initiation of breastfeeding and skin-to-skin contact between mother and newborn in Nigeria

| | Exclusive breastfeeding | | | Skin-to-skin contact | | | Early initiation of breastfeeding | | |
|--|-------------------------|---------|---------|----------------------|---------|---------|-----------------------------------|---------|---------|
| | Urban | Rural | Total | Urban | Rural | Total | Urban | Rural | Total |
| Household wealth quintile | | | | | | | | | |
| Poorest (%) | 51.1 | 24.8 | 26.6 | 5.2 | 8.1 | 7.9 | 46.7 | 31.5 | 32.8 |
| Poorer (%) | 28.0 | 23.7 | 24.3 | 9.4 | 10.7 | 10.5 | 45.0 | 38.2 | 39.2 |
| Middle (%) | 37.4 | 26.8 | 30.7 | 12.5 | 12.5 | 12.5 | 46.5 | 48.8 | 47.9 |
| Richer (%) | 37.6 | 41.7 | 39.3 | 15.4 | 13.4 | 14.6 | 49.7 | 53.5 | 51.2 |
| Richest (%) | 47.9 | 34.8 | 45.0 | 18.0 | 17.4 | 17.9 | 55.5 | 55.0 | 55.4 |
| Overall (%) | 40.4 | 27.4 | 31.8 | 14.5 | 10.8 | 12.1 | 50.3 | 40.8 | 44.2 |
| Concentration index | 0.061 | 0.083 | 0.118 | 0.125 | 0.121 | 0.152 | 0.042 | 0.114 | 0.103 |
| Standard error | 0.021 | 0.021 | 0.015 | 0.015 | 0.013 | 0.010 | 0.006 | 0.006 | 0.004 |
| <i>P</i> -value ^α | 0.004* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* |
| Rural-urban comparison | | | | | | | | | |
| z-stat | | 0.73 | | | -0.18 | | | 8.55 | |
| Difference in concentration index values | | 0.022 | | | -0.004 | | | 0.073 | |
| <i>P</i> -value ^β | | 0.464 | | | 0.855 | | | <0.001* | |
| Mother's education | | | | | | | | | |
| No formal education (%) | 30.7 | 21.3 | 22.9 | 11.6 | 8.2 | 8.8 | 43.7 | 34.3 | 35.9 |
| Primary (%) | 32.0 | 27.0 | 28.6 | 12.3 | 11.4 | 11.8 | 50.2 | 44.5 | 46.5 |
| Secondary (%) | 45.8 | 37.2 | 41.5 | 14.2 | 15.6 | 14.9 | 51.7 | 51.7 | 51.7 |
| Higher (%) | 45.8 | 52.5 | 48.1 | 21.7 | 17.1 | 20.4 | 54.9 | 51.8 | 54.0 |
| Overall (%) | 40.4 | 27.4 | 31.8 | 14.5 | 10.8 | 12.1 | 50.3 | 40.8 | 44.2 |
| Concentration index | 0.086 | 0.149 | 0.157 | 0.109 | 0.157 | 0.156 | 0.037 | 0.097 | 0.091 |
| Standard error | 0.021 | 0.019 | 0.014 | 0.015 | 0.012 | 0.010 | 0.006 | 0.005 | 0.004 |
| <i>P</i> -value ^α | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* |
| Rural-urban comparison | | | | | | | | | |
| z-stat | | 2.26 | | | 2.46 | | | 7.43 | |
| Difference in concentration index values | | 0.063 | | | 0.048 | | | 0.060 | |
| <i>P</i> -value ^β | | 0.033* | | | 0.014* | | | <0.001* | |

*Significant at $p < 0.05$; SE standard error; *P*-value^α and *P*-value^β were obtained using Concentration Index for overall inequalities across socioeconomic groups and measuring rural vs. urban differences, respectively

Fig 1-6 showed the household wealth related inequalities for EBF, SSC and EIBF. The more the Lorenz curves sags away from the line of equality, the greater the degree of inequality. The inequalities in household wealth level was more among EBF, SSC and EIBF rural

children, as the areas between the curve and the line of inequality was maximal. This is consistent with the results obtained from the concentration index model.

Fig 7-12 showed mother's educational attainment inequalities for EBF, SSC and EIBF. The farther the Lorenz curves draws away from the line of equality, the higher the degree of inequality. The inequalities in mother's educational attainment varied among children by breastfeeding practices and SSC, as the areas between the curve and the line of inequality was maximal. This clearly showed EBF, SSC and EIBF were higher among those with improved educational attainment.

Discussion

The findings from this study bring to the limelight, that practices to reduce high newborn or infant mortality, such as EBF, SSC and EIBF are still under-utilized and remained an issue to worry about in Nigeria. Despite the known benefits of EBF, the findings of this study showed that only about one-third of women and less than half of them (44.2%) practiced EBF and EIBF respectively. However, this showed some improvement over results of previous studies. For example, using 2003 data, an average EBF of about 16.4% was reported in Nigeria (43), but in another study using 2008 data, EBF was 14% and EIBF was about 38.0% (44). In the results from 2013 data, the proportion of infants who initiated breastfeeding early was 34.7% (45). These levels including the findings of this study are far less than the program target of 90% of women exclusively breastfeeding their infants in the first 6 months of life, a practice that is associated with 10% reduction of under 5 deaths (46). The low coverage among educated women may be attributed to current economic challenges in Nigeria, where mothers may be forced to return to full time work very quickly after childbirth which can result to sub-optimal breastfeeding practices (47).

The impact of SSC in providing an appropriate and affordable yet high quality alternative to technology is well known. More so, it can easily implemented, even in primary health care centres in resource-constrained settings, and has the potential to save newborns' and mothers' lives amongst other benefits (8). Unfortunately, only approximately one-tenth of women reportedly practiced it in Nigeria as found in this study. In a previous study in various African sites including Nigeria, on the beliefs and practices related to neonatal thermal care, a lack of opportunities for SSC, beliefs that the *vernix caseosa* was related to poor maternal behaviours to practice SSC were reported as major barriers. Based on the findings, early bathing of newborn was a very common practice especially in Nigerian sites due to a deep-rooted belief that delay to bath the newborn would result in body odour. Worst still, when asked about keeping the baby warm, respondents across the sites rarely mentioned the recommended thermal care practices (SSC), suggesting that these were not perceived as salient (48). Such norms can clearly be responsible for poor coverage of SSC in the general population.

Clearly, higher socioeconomic status would help improve EBF, SSC and EIBF by way of enhancing accessibility to health information which could positively influence health care seeking behaviour through enlightenment. In this study, we found that women who had formal education or higher household wealth level had higher utilization of EBF, SSC and EIBF. The findings are similar to the report of a previous study which found maternal education to significantly improve SSC and EIBF (34). A simple and low-cost

educational intervention achieved the inclusion of SSC and EIBF as part of standard care due to the observed significant impact in maternal health care continuum (34). Mothers from socioeconomically privileged class would have higher coverage of EBF in contrast to their folks in lower socioeconomic class. This is in line with a previous study which found a connection between household wealth, maternal education and infant breastfeeding, as only about one-tenth of mothers who practiced EBF came from poor households and without formal education, in contrast to their well-off and educated folks with over one-quarter coverage of EBF (43). Therefore, our evidence of a positive association between maternal education and improvement in EBF is well founded. Women of higher socioeconomic status would find better access or act more positively to health promotion messages due to the availability of resources.

The improvement in breastfeeding practices among educated mothers, indicates the substantial impact of mother's education on infant well-being, health and development. This is consistent with the findings from previous studies whereby elementary education became the basic threshold needed to gain health information, as well as provided women specifically the disadvantaged, with self-confidence and the autonomy required to act appropriately. Conversely, women without formal education are known to have poor knowledge and attitude about proper breastfeeding practices. In spite of the role of education in child welfare, frequent contacts with a health care provider would enhance information about proper breastfeeding practices (49). Therefore, stakeholders in public health are obliged to design interventions or policies to aid mothers of low socioeconomic class for example, those with poor or no formal educational background to access health facility for information to improve proper breastfeeding practices in Nigerian.

Strength And Limitation

We used large sample data to reach plausible conclusions on infant breastfeeding practices and SSC. Furthermore, this study has become the foremost to examine socioeconomic inequalities in EBF, SSC and EIBF using vital socioeconomic tools. The results from this study fill the knowledge gap for socioeconomic inequalities in EBF, SSC and EIBF. Nonetheless, there is potential recall bias that could lead to overestimation or underestimation of the outcome variables. Also, DHS used asset-based wealth index as proxy to household income and expenditure, which supposedly should be the most appropriate indicators used to measure wealth. Though, this approach of creating wealth variable is common when analyzing the DHS data, it was not an absolute measure of wealth instead a measure of ownership of vital household assets and the accessibility to basic community-level services such as electricity and water.

Conclusion

There was low coverage of EBF, SSC and EIBF in Nigeria. Moreover, these practices were influenced by mother's educational attainment and their household wealth quintile. Notably, educated women and the well-off had better coverage of EBF, SSC and EIBF. Based on these findings, we suggest that postnatal care interventions immediately after childbirth, such as SSC and EIBF as well as EBF should be taught

and encouraged by health care professionals especially during antenatal care contact, at delivery and postpartum stay period. Lack of formal education and poverty would increase the chance of home delivery, which could result in women missing out in skilled maternal and child health care practices. Therefore, women without formal education, the underprivileged as well as those from hard-to-reach communities should be well considered during health care programme design, planning and implementation. Providing the opportunity for community involvement in baby friendly initiatives would lead to higher coverage in skilled care practices, given the large number of Nigerian women who opt for home deliveries and traditional care due to poverty or ignorance and would rarely visit health facilities for counseling on proper child care.

Abbreviations

BFHI: Baby Friendly Hospital Initiative; EBF: Exclusive Breastfeeding; EIBF: Early Initiation of Breastfeeding; ICF: Inner City Fund; IYCF: Infant and Young Child Feeding NDHS: NHREC: National Health Research Ethics Committee; Nigeria Demographic and Health Survey; NPC: National Population Commission; PCA: Principal Components Analysis; SDGs: Sustainable Development Goals; SSC: mother and newborn skin-to-skin contact; WHO: World Health Organization.

Declarations

Ethics approval and consent to participate

This study is a secondary data analysis of the NDHS, which is publicly available, approval was sought from MEASURE DHS/ ICF International and permission was granted for this use. The original DHS data were collected in conformity with international and national ethical guidelines. Written consent was obtained from mothers/caregivers and data were recorded anonymously at the time of data collection during the NDHS 2016. More details regarding DHS data and ethical standards are available at:

<http://dhsprogram.com/data/available-datasets.cfm>

Consent for publication

Not applicable

Availability of data and materials

Data for this study were sourced from Demographic and Health surveys (DHS) and available here:

<http://dhsprogram.com/data/available-datasets.cfm>.

Competing interests

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Author contributions

ME and AA contributed to the conceptualisation and manuscript preparation, the study design, review of literature and wrote the results. ME, AA and AB conducted data analysis, discussed the findings and critically reviewed the manuscript for its intellectual content. All authors read and approved the final manuscript.

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Figures

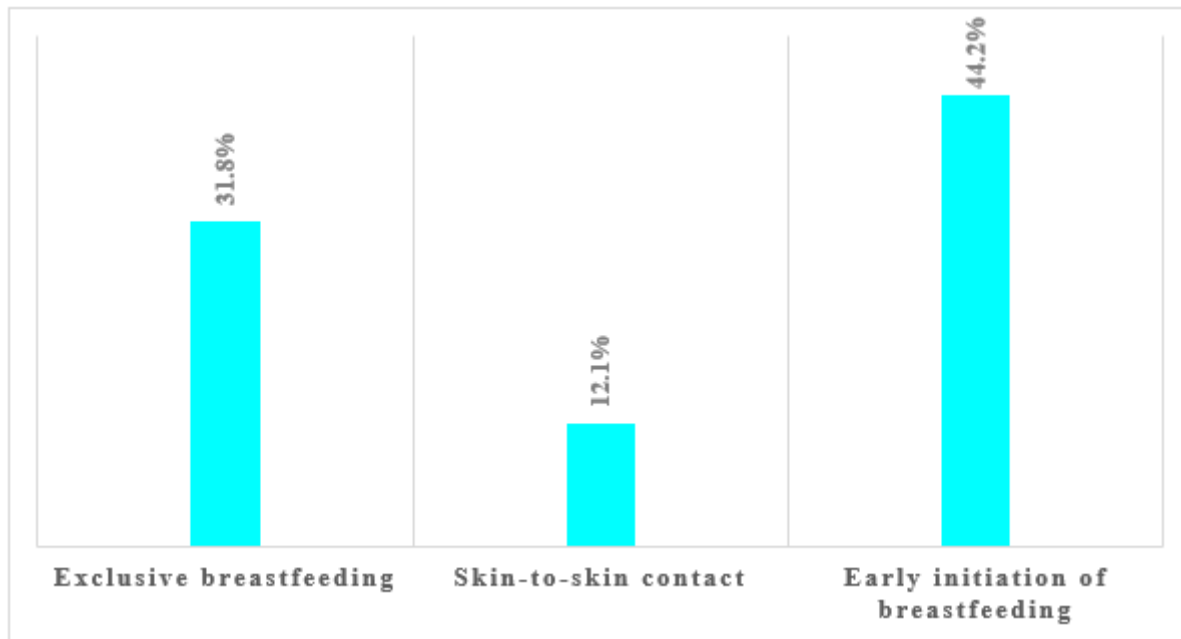


Figure 1

Prevalence of EBF, SSC and EIBF in Nigeria

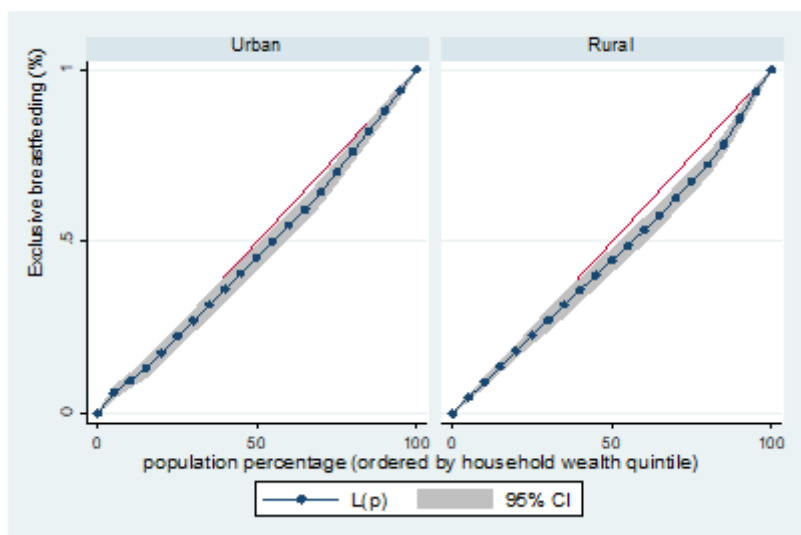


Figure 2

Urban-rural Lorenz curve for exclusive breastfeeding by household wealth level

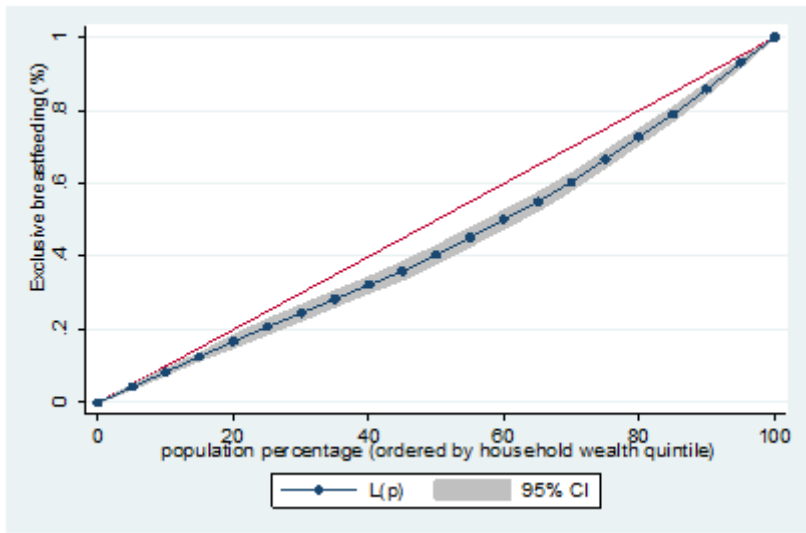


Figure 3

Lorenz curve for exclusive breastfeeding by household wealth level

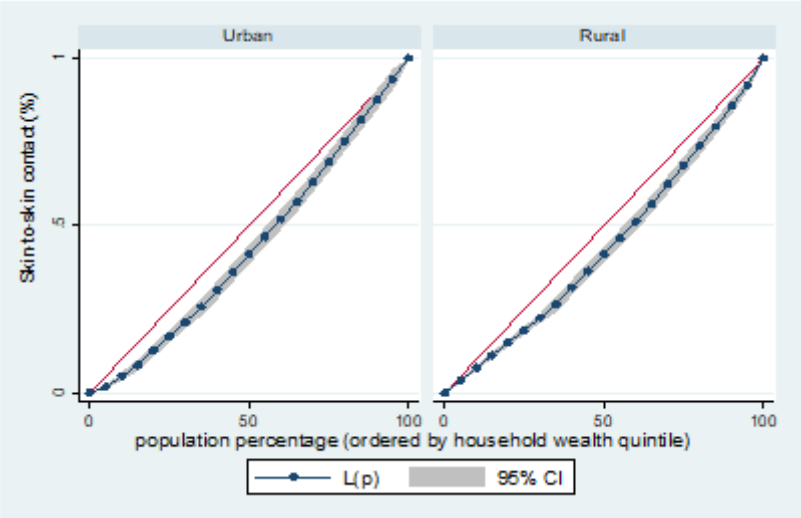


Figure 4

Urban-rural Lorenz curve for skin-to-skin contact by household wealth level

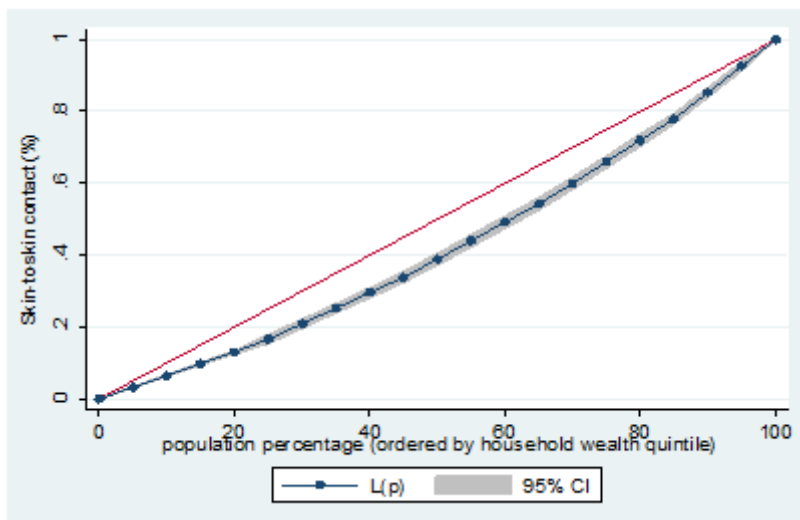


Figure 5

Lorenz curve for skin-to-skin contact by household wealth level

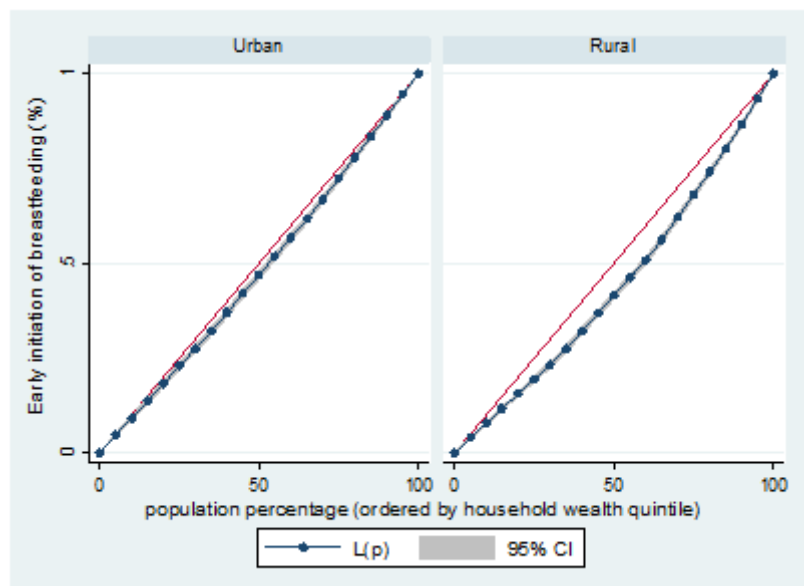


Figure 6

Urban-rural Lorenz curve for early initiation of breastfeeding by household wealth level

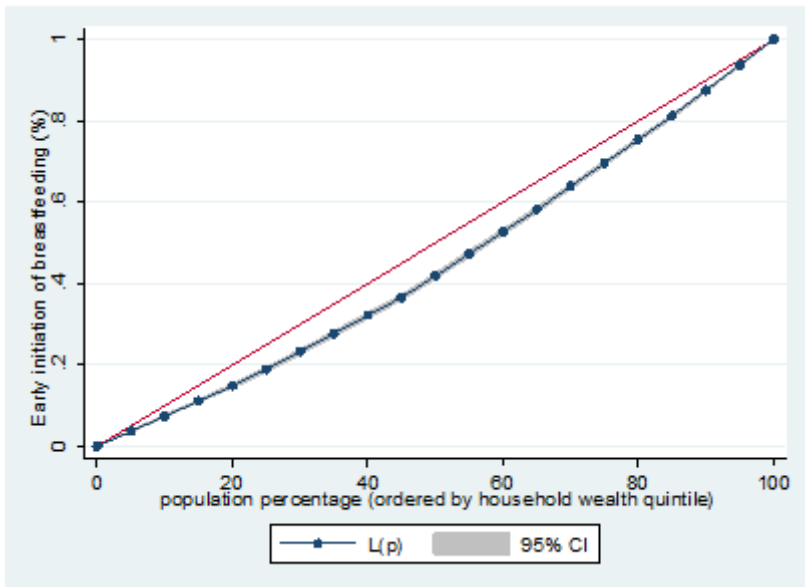


Figure 7

Lorenz curve for early initiation of breastfeeding by household wealth level

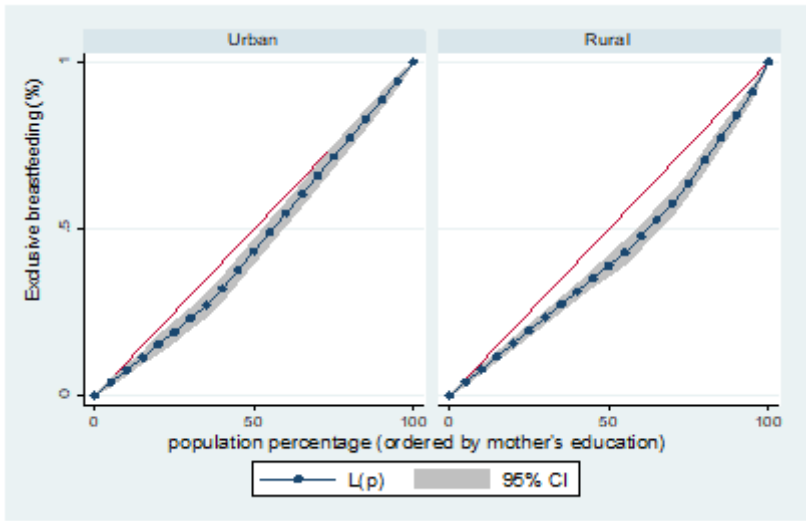


Figure 8

Urban-rural Lorenz curve for exclusive breastfeeding by educational level

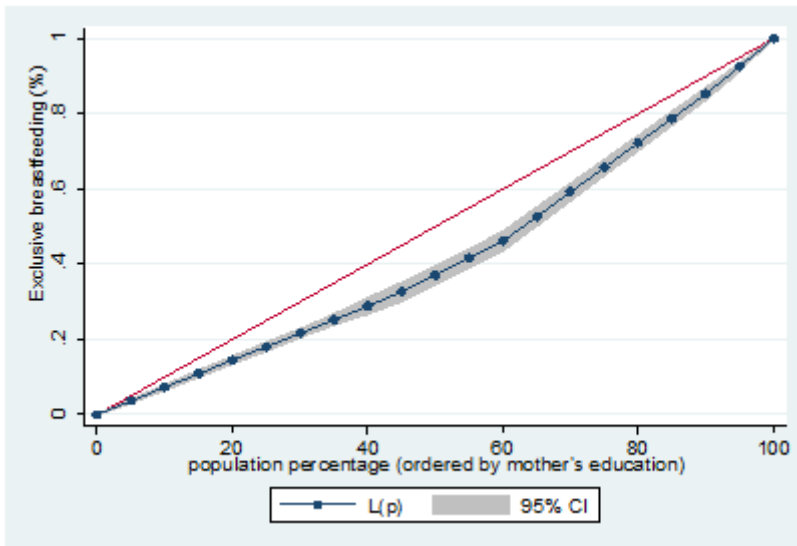


Figure 9

Lorenz curve for exclusive breastfeeding by educational level

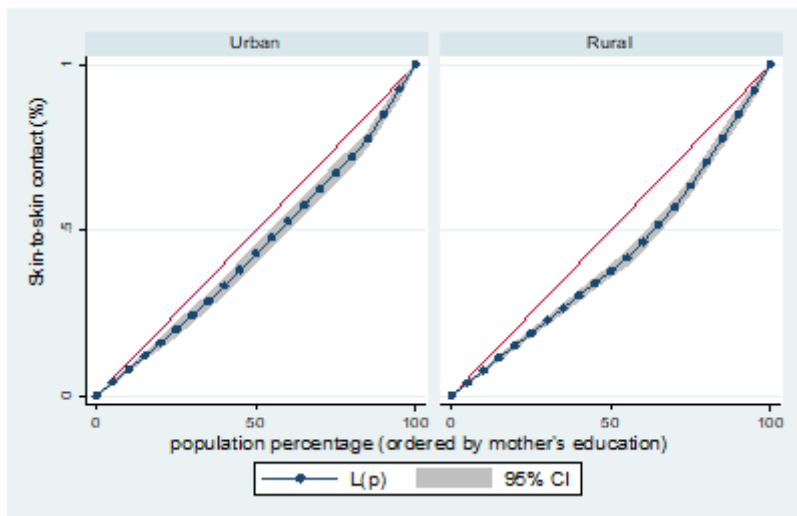


Figure 10

Urban-rural Lorenz curve for skin-to-skin contact by educational level

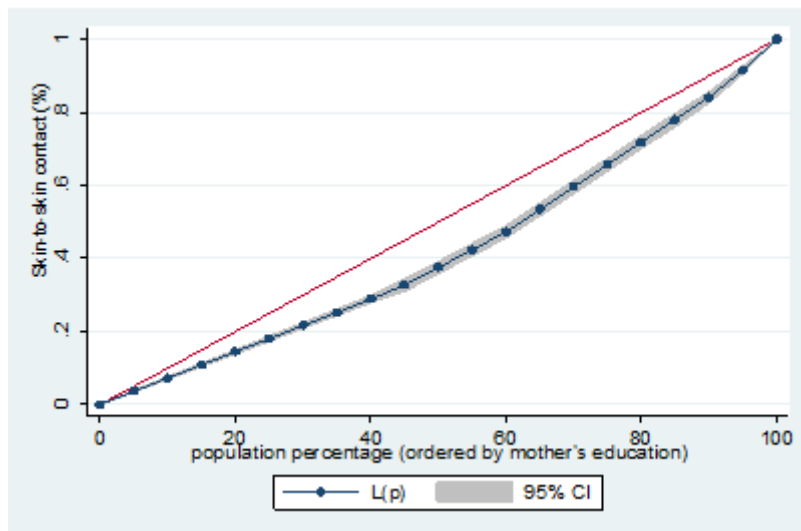


Figure 11

Lorenz curve for skin-to-skin contact by educational level

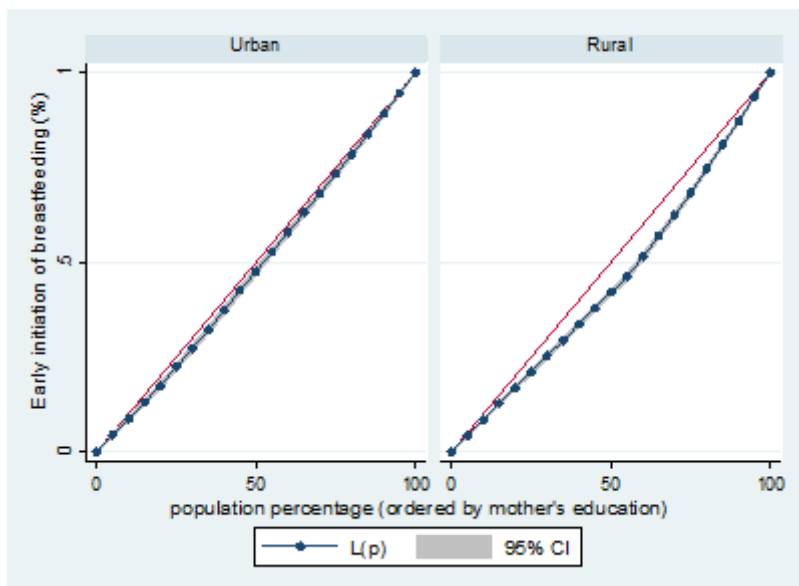


Figure 12

Urban-rural Lorenz curve for early initiation of breastfeeding by educational level

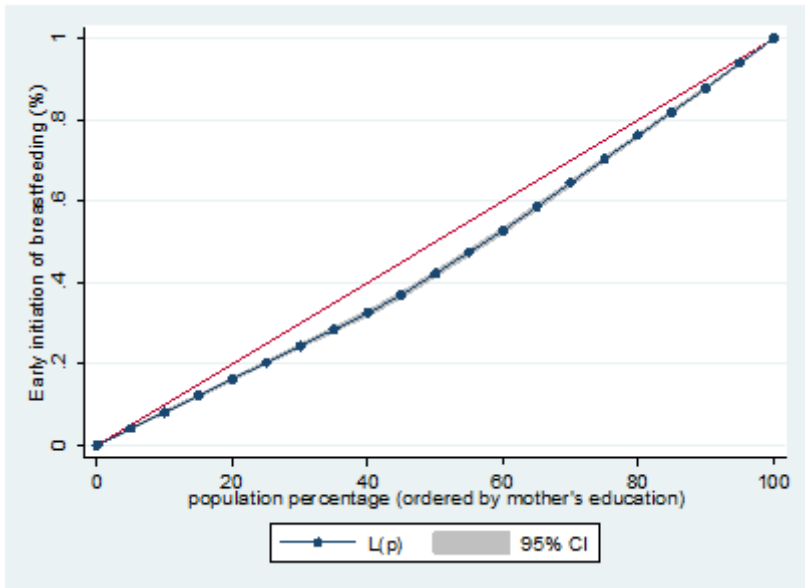


Figure 13

Lorenz curve for early initiation of breastfeeding by educational level