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Social and demographic determinants for breastfeeding in a rural, suburban and city area of South East China

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Abstract

Breastfeeding is a traditional practice in China, yet few studies have explored its current trend after socioeconomic reform. This study aims to characterize breastfeeding rates and possible associations with sociodemographic factors using a breastfeeding questionnaire administered to 1,385 mothers of 6-year-old children. Rates were lowest among city residents and negatively associated with parental and grandmother education levels as well as mothers' professional occupational status. These findings highlight the impact of urbanization on maternal and child health and the effect of marketing tactics for breast milk substitutes (BMS). Public health education promoting breastfeeding should target urban families, particularly those educated.

Keywords

breastfeeding; breast milk substitutes (BMS); China; infant formula

Breastfeeding is a traditional practice in China, but rates have declined during the recent economic boom. According to a joint United Nations Children's Fund (UNICEF) and World Health Organization (WHO) press release, the breast-feeding rate for the first 4 months of life in China dropped from 76% in 1998 to 64% in 2004 (UNICEF, 2004). Despite considerable efforts to promote breastfeeding practices in China, most cities and provinces did not reach the national target of 'exclusive breastfeeding' of 80% within 6 months (Xu, Qiu, Binns, & Liu, 2009). In contrast, the national immunization survey from 2004–2008 indicates that in the United States breastfeeding initiation rates have dramatically increased

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Conflict of interest statement

No conflict of interest has been declared by the authors, and no portion of the work has been or is currently under consideration for publication elsewhere.

from 51.5% in 1990 (Ryan, Wenjun, & Acosta, 2002) to 73.4% in 2004–2008 (Centers for Disease Control and Prevention, 2010).

Extensive research has been done to identify factors that influence breastfeeding initiation and duration. The literature, however, suggests that predictors of breastfeeding may vary in different parts of the world. For instance, studies in Australia, Iceland, Ireland, Scotland, as well as the USA have found that breastfeeding rates are higher among women who are older and have higher levels of education (Baghurst et al., 2007; Cairney & Barbour, 2007; Tarrant & Kearney, 2008; Taylor, Risica, Geller, Kirtania, & Cabral, 2006; Thome, Alder, & Ramel, 2006). Additionally, higher incomes have also been associated with increased breastfeeding rates in areas such as Sweden (Wallby & Hjern, 2009), and rural Jamaica (Chatman et al., 2004). A study by Qiu, Zhao, Binns, Lee, and Xie (2009) in Zhejiang China, which looked at initiation and prevalence of breastfeeding, however, suggests that younger mothers with lower educational levels and family income are more likely to breastfeed. The influence of grandmothers on breastfeeding practices is also mixed. In Brazil, a mothers' daily contact with their own mother had a negative impact on breastfeeding (Susin, Giugliani, & Kummer, 2005), while a study performed by Grassley and Eschiti (2008) on mothers in Texas, USA suggested that grandmothers' values or philosophies regarding breastfeeding was considered to positively influence their daughters' breastfeeding practices. In the Susin et al. (2005) study, a majority of grandmothers (56%) advised the use of a non-milk substance; contact frequency was determined through interviews conducted at the first home visit when children were completing their first month. Almost 40.0% of the mothers had daily contact with their own respective mother, and analyses demonstrated an association between contact and occurrence of breastfeeding abandonment (Susin et al., 2005). In the study by Grassley and Eschiti, focus group interviews were held and then analyzed using the content analysis method. In South Asia, an intervention, which involved a leaflet with information on health benefits of breastfeeding as well as on good practice, to educate both mothers and grandmothers increased the likelihood of breastfeeding (Ingram, Johnson, & Hamid, 2003). Meanwhile, when comparing urban versus rural areas, the results of studies comparing breastfeeding initiation are not consistent. For example, (Kamudoni, Maleta, Shi, & Holmboe-Ottesen, 2007) used a cross-sectional household study that consisted of 157 rural and 192 semi-urban mother–infant pairs in Malawi and found that semi-urban mothers were more likely to engage in exclusive breastfeeding; however, other studies found women in rural areas more likely to practice breastfeeding (e.g., Batal, Boulghourjian, Abdallah, & Afifi, 2006; Qiu et al., 2009). Given that the predictors for breastfeeding vary around the world suggests the need to understand how these potential predictors operate and contribute to different perspectives and practices of breastfeeding.

Economically, China has undergone a rapid surge and transition. This economic growth may have affected the practice of breastfeeding, and the increased marketing of breast milk substitutes (BMS) could have possibly contributed to the decrease in breastfeeding (Xu et al., 2009). In addition, China experiences a high rate of internal immigration – conventionally referred to as China's 'floating population' – due to migration to cities in search of work produced by the country's rapid economic growth. Lifestyle and nutrition practices of individuals from all socioeconomic levels in China have subsequently changed

dramatically during the past two decades. The study reported here investigated breastfeeding rates in China and possible correlated social and demographic factors. Understanding the factors which have contributed to the decreased rates of breastfeeding in China can offer valuable insight into how to promote breast-feeding not only in China but other countries that have also experienced or will experience similarly rapid, economic growth. Thus, the aims of the present study are to characterize breastfeeding rates in a specific area of Jiangsu province in the southeast region of China and investigate possible associations with sociodemographic factors in city, suburban, and rural settings.

Methods

Sample

Data was collected by means of a cross-sectional survey administered to participants in a large cohort study (Jintan Child Health Project) in an economically booming area in Jiangsu Province of China. The Jintan Child Study consists of a preschool cohort of 1,656 children, including 55.5% boys and 44.5% girls. Parents of children aged 3–5 years provided consent to participate and were sampled from four area preschools (one city, one suburban, and two rural). This cross-sectional survey was administered to parents when children reached the age of 6. Among the original group of 1,656 children, complete data on breastfeeding and sociodemographic was available for 1,385 families (83.6%). The Jintan Cohort Profile is described in detail elsewhere (Liu et al., 2011; Liu, McCauley, Zhao, Zhang, & Pinto-Martin, 2010).

Data collection

Breastfeeding questionnaire—The questionnaire was developed by the authors. Mothers were asked if they breastfed in the first 6 months after childbirth, and if so, for how long. Maternal recall has been demonstrated to be a valid measure of breastfeeding duration (Li, Scanlon, & Serdula, 2005). Infant feeding method was defined as ‘breastfeeding only’, ‘formula feeding only’, or ‘mixed (breastfeeding and formula)’. Since the number of respondents who had never breastfed was small, these respondents were grouped together with the respondents who mixed breastfeeding with formula feeding into the category of ‘not exclusively breastfeeding’. So, overall, the respondents were categorized as either ‘exclusive breastfeeding’ or ‘not exclusively breastfeeding’. Therefore, the operational definition of ‘breastfeeding’ in this study refers to exclusive breastfeeding. A minimum of 1 month of exclusive breastfeeding duration was required for classification into the exclusive breastfeeding group. If exclusive breastfeeding was reported by the mother, but duration was <1 month, then the respondent was placed into the not exclusively breastfeeding category. We have examined duration as our outcome, and the impact of those variables are consistent with those from using binary breastfeeding as the outcome. That is, exclusively breastfed children have a longer duration of breastfeeding, and not exclusively breastfed children have a shorter duration. Since duration may be subject to recall error more easily and have more missing data points, we selected breastfeeding as an outcome for the duration analysis.

Sociodemographic information—Sociodemographic information was obtained from a self-administered questionnaire. The education level of parents was classified into five

categories: primary school (1st–6th grades), middle school (7th–8th grades), high school (9th–12th grades), college level (including vocational training), and university or higher. Grandmother's education was classified into two categories: grandmothers with ≥1 year of education were marked as having received an education, and grandmothers with <1 year were marked as not having received an education. In the past, very few elderly people in China had higher level education; thus it was not practical to use higher level education as a cutoff point. The father's occupation was classified as unemployed or unskilled labor (e.g., janitor), skilled labor (e.g., taxi driver), and regular professional and advanced professional (e.g., teacher, professor). Mother's occupation was classified as unemployed (housewife), labor (e.g., assistant, secretary), and professional or advanced professional.

Data was analyzed to calculate breastfeeding rates and to identify factors influencing initiation and duration of breastfeeding. Factors explored included: the level of parental education and occupation; grandmother's education; birth order; location of current residence as well as location of residence at the time of the birth of the child; who raised the child; and the presence of air conditioning (to reflect economic status).

Ethical considerations

Institutional Review Board (IRB) approval was obtained from the appropriate institutions (University of Pennsylvania and Jintan Hospital). Furthermore, a local research focus group (which consisted of pediatricians, school teachers, principals, parents of cohort subjects, and researchers) was actively involved in instrument preparation and formulating culturally relevant explanations of the data (Liu et al., 2011).

Data analysis

Breastfeeding initiation rates were calculated and chi-square tests performed to assess the unadjusted association between each factor and breastfeeding. Breastfeeding was a self-reported category determined by the respondents. A logistic regression model with all potential predictors was fitted to identify independent contributors. A final model was constructed using a stepwise selection method, in which only significant variables remain. Interaction between education and gender of the child and current and previous residence were also examined. A p -value of <0.05 was chosen as the significance level. Statistical analysis system (SAS) was used in data analysis (SAS 8 institute, Cary, NC, USA).

Results

Responses were received from the mothers of 1,292 children (93.4%). Table 1 displays the sample's sociodemographic characteristics as well as the results from the univariate analysis. In this sample, 76.9% of women reported 'breastfeeding only', 7.7% reported 'formula feeding only', and the remaining 15.3% used 'mixed' (15.3%) practices. Combining the latter two methods, two categories were chosen; these included: 'exclusively breastfed infants (76.9%)' and 'not exclusively breastfed infants (23.1%)'. Female children were slightly more likely to be exclusively breastfed than male children (79.8 vs. 74.6%, $p = 0.029$). Parents and grandmothers with higher education levels tended to have lower exclusive breastfeeding rates. Correspondingly, parents with lower skilled occupation levels

were associated with higher levels of exclusive breastfeeding than those with higher skilled occupations, and this was more significant in regards to the mother's occupation ($p = 0.002$) than the father's ($p = 0.03$). Children were also more likely to be exclusively breastfed if they were the first-born children (77%, $p = 0.045$), raised by biological parents (77.5%, $p = 0.045$), and lived in rural settings (84.7%, $p = 0.009$).

Table 2 presents the results from logistic models: the complete model contains all the potential variables (significant variables presented only), and the final model contains the significant predictors only (p -value < 0.05). After adjustment for the other variables listed in Table 1, the independent predictors were: gender, grandmother's educational status, who raised the child, birth order, and mother's occupation. Based on the final model, female children were more likely to have been exclusively breastfed than boys with OR = 1.38 (95% CI: 1.05–1.81). In a family with an educated grandmother, the exclusive breastfeeding rate was only about 50% of that in a family where the grandmother has little or no education (OR = 0.53; 95% CI: 0.36, 0.79). Children raised by non-biological parents were less likely to be exclusively breastfed (OR = 0.51; 95% CI: 0.31, 0.83). The exclusive breastfeeding rate for mothers with professional jobs was only 60% (OR = 0.59; 95% CI: 0.41, 0.85) of the breastfeeding rate for mothers who were not employed.

Table 3 presents the Spearman correlation coefficient results from the mother's occupation and other variables including father's degree, occupation and education, mother's degree and education, grandmother's education, current residence, and families who had access to air conditioning. Parental education and father's occupation were positively correlated with the mother's occupation ($p < 0.001$) with the coefficient = 0.30. The grandmother's education was also positively correlated with the mother's occupation, but with a lower coefficient = 0.11.

Figure 1 portrays the mean duration of breast-feeding within each category of the mother's occupation. As a reference, the mean duration of exclusive breastfeeding is 9.5 (SD = 2.50) months and 6.0 (SD = 3.67) months for exclusively breastfed and not exclusively breastfed children, respectively. Mothers who did not work or who had lower-skilled employment breastfed their babies longer (9.2 and 8.8 months, respectively) than mothers with a professional job (8.5 months).

Stratified analysis was conducted to further explore if correlation of exclusive breastfeeding behavior differed by type of previous residence (city vs. suburb vs. rural) (Table 4). The analysis revealed relatively consistent effects across the areas. In suburban areas, the grandmother's educational level, who raised the child, and birth order were the most important correlates. In city areas, the mother's occupation was significant, while in rural areas, gender of the child was significant. Regardless, in a combined model, all the interaction terms between areas and other factors were not significant (data not shown). Therefore, the mother's occupation and gender of the child are not significant moderators on the rates of breastfeeding.

Discussion

In this population-based study, a majority of mothers in city, suburban, and rural settings in a southeast region of China reported exclusive breastfeeding, though rates were slightly higher in rural areas compared to cities. Exclusive breast-feeding was less likely in the presence of higher maternal grandmother education, a demanding maternal occupation, and when the main caregiver was not the biological mother. Exclusive breastfeeding initiation and duration were lower among city residents as compared to rural residents, reflecting the impact of urbanization on maternal and child health practices. Although the causes of these differences are not clear, one factor may be the increased marketing of BMS through commercial advertising on television and increased availability in cities. Aggressive marketing, along with extravagant claims of superiority over breastfeeding, has led to a decrease in breastfeeding as the cultural norm (Riordan, 2004). Further, difficulty in breastfeeding at the workplace and the perception of infant formula as representing a higher social status may also contribute to the decline amongst city residents, while, conversely, the more difficult economic status may necessitate breastfeeding in rural mothers.

Parents with a high level of education were less likely to exclusively breastfeed as compared to less educated parents. There are several possible reasons for this finding. Firstly, educated parents often hold busy professional jobs and therefore may not have time to breastfeed their child (Hawkins, Griffiths, Dezateux, Law, & Millennium Cohort Study Child Health Group, 2007), though this finding has not been consistently demonstrated: A US study of 462 women in employer-sponsored lactation programs showed that 97.5% of these women initiated breastfeeding and 78.9% tried to continue to pump milk after returning to work, which suggests that with the proper support programs, parents with busy professional jobs are able to continue breastfeeding (Ortiz, McGilligan, & Kelly, 2004). Secondly, in China, highly educated mothers and professional women have higher incomes and are therefore better able to afford BMS, which are viewed as indicators of high status. In addition, BMS are considered highly convenient, increasing the likelihood of use among parents with busy professional lifestyles. Thirdly, highly educated mothers and professional women may be concerned with maintaining a professional image. Having to express milk in the work place may be perceived negatively by themselves as well as others, and mothers who plan to return to the workforce may not wish to start breastfeeding. In fact, a longitudinal study in the UK, which implemented a large cohort sample ($N = 18,553$ families), found that full-time employed women were less likely to initiate breastfeeding than unemployed or student mothers, even after adjusting for socioeconomic status, maternal education and other potential confounding factors (Hawkins, Griffiths, Dezateux, & Law, 2007).

Our finding in China of better financial status being associated with a decreased likelihood to exclusively breastfeed contradicts findings reported in many Western cultures. It may be that in China, BMS marketing practices have differentially contributed to the decrease in breastfeeding rates (UNICEF, 2004). Mothers with a lower income may not have the money to buy BMS. It is also possible that mothers with professional jobs and a good income may be more concerned about their body image and perceive breastfeeding as a barrier to returning to their pre-pregnancy figure. Furthermore, mothers with professional jobs may not have the flexibility to breastfeed because of occupational demands.

Education level of the grandmother appears to be an important independent determinant of exclusive breastfeeding in this sample. This is consistent with other findings that reported initiating breastfeeding was influenced by grandparents' approval. For example, a Taiwan study of 251 new mothers and the factors that influenced their breastfeeding decisions found that grandparents' approval had a positive correlation with breastfeeding (Chang & Chan, 2003). However, other studies (e.g., Susin et al., 2005; Ingram et al., 2003) did not show this same influence of grandparents' involvement on breastfeeding initiation. In addition, with China's one-child policy, grandparents play a larger role in child-rearing. The fact that highly educated grandmothers were associated with decreased exclusive breastfeeding may indirectly reflect the previously discussed relationships between better family socioeconomic status and decreased exclusive breastfeeding rates as well as higher parental education and decreased exclusive breastfeeding.

Girls were more likely to be exclusively breastfed than boys in rural areas. However, this gender difference was not found in city or suburban areas. The male/female ratio in the current study is very high (121:100). Although we could not corroborate this finding with data from the local government, we speculate that son preference may be a concern in the area since it has been observed in China as well in other South and East Asian countries (Gupta et al., 2003). As previously discussed, parents believe BMS is superior to breast milk and therefore may prefer to provide BMS to their male children due to son preference, which has been found to influence Chinese children's growth in height (Song & Burgard, 2008). A gender difference was only found in rural areas, possibly indicating that in urban and suburban settings where families have ample resources, there is no sex difference in exclusive breastfeeding. In contrast, in rural areas, where families have fewer resources and children may have to compete for those limited resources, females may be at a disadvantage and are more likely to be exclusively breastfed (since formula is believed to be superior to breast milk). Nevertheless, a preference for sons may not result in girls being more likely to be breastfed. For example, a model by Jayachandran and Kuziemko (2011) suggests that daughters may actually be breastfed for a shorter duration. Because breastfeeding decreases future fertility, women in cultures with a preference toward sons (such as India or China) may shorten breastfeeding duration for a current daughter in hopes of conceiving a son in the future (Jayachandran & Kuziemko, 2011). In addition to this finding, the prevalence of overweight/obesity was higher among boys than girls. To what degree son preference influences breastfeeding practice and whether there is a direct link in this population between breastfeeding and overweight/obesity requires further research. Current evidence shows the association of breastfeeding in the prevention of obesity (Arenz, Ruckerl, Koletzko, & von Kries, 2004; Dewey, 2003). From the perspective of obesity prevention in China, encouraging breastfeeding is important.

Conclusion

Results from this study carry several important public health implications and demonstrate how sociodemographic issues relate to the duration and initiation of breastfeeding, as well as the effect of a higher social status on breastfeeding in a rapidly developing country. Breastfeeding education should be provided to all women, with particular attention directed toward highly educated, professional women in urban populations. The WHO points to poor

maternal education about feeding or lack of support in overcoming breastfeeding problems as underscoring the absence of breastfeeding practices (WHO, n.d.). The American Academy of Pediatrics (AAP, 2005) recommends that all babies be breastfed for at least the first year of life, and exclusively for the first 6 months. Our study suggests that a variety of breastfeeding education strategies is needed among educated Chinese city mothers and grandmothers. Breastfeeding has both short- and long-term effects on positive health outcomes. Benefits of breastfeeding extend to mothers (e.g., reduced risk of breast cancer, decreased post-partum depression), children (e.g., increased immunity; increased IQ due to docosahexaenoic acid [DHA]), and the mother-child relationship (e.g., increased bonding). More specifically, breast milk contains complex immune factors as well as nutrients that are essential for immune system development (Iyengar & Walker, 2012). Breastfeeding has been linked to increased protection against the development of childhood type 1 diabetes mellitus (Rosenbauer, Herzig, & Giani, 2008), asthma (Scholtens et al., 2009), and obesity (Yin, Quinn, Dwyer, Posonby, & Jones, 2012). Emphasizing these significant benefits of breastfeeding compared to BMS may help to promote breastfeeding among educated and urban women and increase the prevalence of breastfeeding in China.

Several environmental interventions that maternal-child health nurses and public health nurse can help may potentially influence breastfeeding practices and in turn increase awareness of providing human milk as a public health priority. The government should consider incentives for employers to promote breastfeeding with women who need to return to work. Employers should be aware of occupational components that make breastfeeding in the workplace successful (i.e., support, time, education, and designated safe, quiet environment [Kogan, Singh, Dee, Belanoff, & Grummer-Strawn, 2008]) and take an active role in ensuring these components are present. Moreover, studies in the United States have shown that encouraging breastfeeding immediately after birth is positively correlated with breastfeeding initiation and exclusivity. For example, one such study looked at 28 baby-friendly hospitals (hospitals that promoted breastfeeding) and found that breastfeeding initiation (83.8%) and exclusive breastfeeding (78.4%) rates during the hospital stay in these hospitals were higher than the initiation (69.5%) and exclusivity (46.3%) rates of US hospitals in general (Merewood, Mehta, Chamberlain, Philipp, & Bauchner, 2005). In China, all birth hospitals have been named 'baby-friendly' hospitals, meaning they do not accept free or low-cost BMS, feeding bottles, or teats, and have implemented steps to support successful breastfeeding (UNICEF, 2009). This program has been shown to increase the breastfeeding rate in other areas (Gau, 2004).

Our study is not without limitations. One limitation is the potential for inaccurate recall due to retrospective reporting. However, in the current literature, it is not rare for studies examining breastfeeding practices to use maternal recall data after much longer periods. For example, a study by Promislow looked at maternal recall of breastfeeding duration of elderly US women from 34–50 years ago (Promislow, Gladen, & Sandler, 2005). Another limitation is that the region of study has a generally higher economic status than other regions in China, and this may decrease generalizability of our findings. Nevertheless, this population-based study was conducted in an area with a large population (e.g., 650,000 residents) that included city, suburban, and rural areas. Finally, grandmothers were not classified as paternal or maternal, and therefore effects cannot be considered in that context.

Although this study investigated breastfeeding practices in China, our findings and their implications may extend to countries undergoing similar development and reform. Educators in public and community health should understand and pay attention to the ways in which urbanization, marketing, and cultural factors affect maternal and child health care. While further research is needed to more deeply investigate the factors affecting breastfeeding in China, the present study urges public health educators to start targeting city families, with a particular emphasis on educated families, in breastfeeding promotion. Lastly, encouraging breastfeeding is especially important in modern day China, where BMS has recently been deemed unsafe for children due to the findings of elevated concentrations of melamine in formula powders (Qian, Guo, & Klein, 2010).

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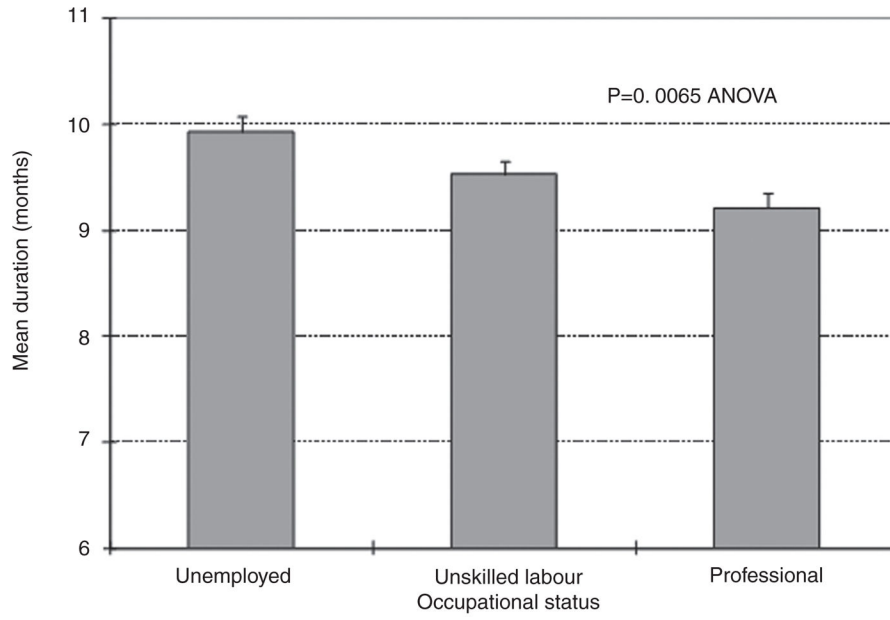


Figure 1.
Duration of breastfeeding and mother's occupation (among those breastfeeding)

Table 1

Non-adjusted association of sociodemographic factors and breastfeeding

| Characteristics | No breastfeeding | Breastfeeding | Significance (<i>p</i> -value) |
|--|------------------|---------------|---------------------------------|
| Sex, <i>N</i> (%) | | | |
| Males | 180 (25.4) | 529 (74.6) | 0.029 |
| Females | 118 (20.2) | 465 (79.8) | |
| Mother's age when infant born | | | |
| <25 | 74 (19.5) | 306 (80.5) | 0.062 |
| 25–29 | 190 (24.1) | 597 (75.9) | |
| >30 | 30 (29.4) | 72 (70.6) | |
| Grandmother received an education? | | | |
| No | 40 (16.6) | 201 (83.4) | 0.003 |
| Yes | 161 (26.2) | 454 (73.8) | |
| Father's highest degree, <i>N</i> (%) | | | |
| Primary school | 9 (21.4) | 33 (78.6) | 0.057 |
| Middle school | 88 (19.5) | 364 (80.5) | |
| High school | 95 (23.1) | 316 (76.9) | |
| College | 69 (27.2) | 185 (72.8) | |
| University or higher | 36 (30.2) | 83 (69.8) | |
| Mother's highest degree, <i>N</i> (%) | | | |
| Primary school | 11 (15.1) | 62 (84.9) | 0.012 |
| Middle school | 115 (20.0) | 459 (80.0) | |
| High school | 96 (25.3) | 281 (74.7) | |
| College | 53 (29.4) | 127 (70.6) | |
| University or higher | 23 (30.3) | 53 (69.7) | |
| Father's occupation, <i>N</i> (%) | | | |
| Unemployed/unskilled labor | 27 (17.3) | 129 (82.7) | 0.030 |
| Skilled labor/driver | 122 (21.4) | 447 (78.6) | |
| Teacher/professional/advanced professional | 135 (26.4) | 376 (73.6) | |
| Mother's occupation, <i>N</i> (%) | | | |
| Unemployed/house wife | 65 (19.5) | 269 (80.5) | 0.002 |
| Labor/assistant/secretary | 115 (21.1) | 429 (78.9) | |
| Professional/advanced | 109 (29.5) | 260 (70.5) | |
| Birth order | | | |
| 1 | 236 (22.3) | 823 (77.7) | 0.045 |
| >1 | 33 (30.8) | 74 (69.2) | |
| Main caregiver | | | |
| Biological parents | 268 (22.5) | 924 (77.5) | 0.032 |
| Others | 28 (32.6) | 58 (67.4) | |
| Current place | | | |
| City | 237 (25.2) | 703 (74.8) | 0.009 |
| Town | 35 (18.7) | 152 (81.3) | |

| Characteristics | No breastfeeding | Breastfeeding | Significance (<i>p</i> -value) |
|------------------|------------------|---------------|---------------------------------|
| Countryside | 23 (15.3) | 127 (84.7) | |
| Preschool area | | | |
| Hauchen (suburb) | 113 (22.2) | 396 (77.8) | 0.093 |
| Janshe (city) | 135 (25.9) | 387 (74.1) | |
| Xiubu (rural) | 50 (19.2) | 211 (80.8) | |
| Air conditioning | | | |
| No | 243 (23.8) | 780 (76.3) | 0.204 |
| Yes | 13 (17.3) | 62 (82.7) | |

Table 2

Results from the final model – independent risk factor: Odds ratio (OR) and 95% confidence interval (CI)

| Characteristics | Full model* | Final model (stepwise regression) |
|---|-------------------|-----------------------------------|
| Sex | | |
| Males | 1.00 | 1.00 |
| Females | 1.43 (1.08, 1.88) | 1.38 (1.05, 1.81) |
| Grandmother received an education? | | |
| No | 1.00 | 1.00 |
| Yes | 0.57 (0.37, 0.85) | 0.53 (0.36, 0.79) |
| Mother's occupation | | |
| Unemployed (e.g., house wife) | 1.00 | 1.00 |
| Skilled labor (e.g., assistant/secretary) | 0.89 (0.62, 1.28) | 0.91 (0.64, 1.30) |
| Professional/advanced professional | 0.70 (0.44, 1.11) | 0.59 (0.41, 0.85) |
| Main caregiver | | |
| Biological parents | 1.00 | 1.00 |
| Others | 0.56 (0.34, 0.93) | 0.51 (0.31, 0.83) |
| Birth order | | |
| 1 | 1.00 | 1.00 |
| >1 | 0.56 (0.34, 0.93) | 0.57 (0.36, 0.91) |

* Also adjusted for mother's age when infant born, father's highest degree; mother's highest degree; father's occupation; current place of residence; preschool area and air quality at home.

Table 3

Correlation between mother's occupation and other factors

| Factor | Spearman correlation coefficient with mother's occupation | p-Value |
|-----------------------------|--|----------------|
| Father's degree | 0.3242 | <0.001 |
| Grandmother's education | 0.1112 | <0.001 |
| Mother's degree | 0.4608 | <0.001 |
| Father's occupation | 0.3532 | <0.001 |
| Father's education | 0.3168 | <0.001 |
| Mother's education | 0.4198 | <0.001 |
| Current residence * | -0.1809 | <0.001 |
| Air condition in the family | 0.0583 | 0.036 |

* City has more professional mothers while rural area has more no job mothers.

Table 4

Effects of influential factors on breastfeeding in different area

| Characteristics | Hauchen (suburb) | Janshe (city) | Xiubu (rural) |
|---|--------------------|--------------------|--------------------|
| Sex | | | |
| Males | 1.0 | 1.0 | 1.00 |
| Females | 1.07 (0.69, 1.64) | 1.38 (0.92, 2.09) | 2.10 (1.08, 4.08)* |
| Grandmother received an education? | | | |
| No | 1.0 | 1.0 | 1.00 |
| Yes | 0.49 (0.28, 0.86)* | 0.61 (0.30, 1.22) | 0.65 (0.24, 1.74) |
| Mother occupation | | | |
| Unemployed (e.g., housewife) | 1.0 | 1.00 | 1.00 |
| Skilled labor (e.g., assistant/secretary) | 0.68 (0.39, 1.19) | 0.88 (0.49, 1.58) | 1.42 (0.67, 2.98) |
| Professional/advanced | 0.54 (0.29, 1.01) | 0.55 (0.32, 0.97)* | 0.74 (0.30, 1.85) |
| Primary caregivers | | | |
| Biological parents | 1.0 | 1.00 | 1.00 |
| Others | 0.36 (0.18, 0.73)* | 0.70 (0.29, 1.66) | 0.41 (0.15, 1.15) |
| Birth order | | | |
| 1 | 1.0 | 1.00 | 1.00 |
| >1 | 0.40 (0.19, 0.84)* | 0.66 (0.21, 2.07) | 0.79 (0.27, 2.31) |

* p -Value < 0.05.