Journal of Statistics Applications & Probability
An International Journal

http://dx.doi.org/10.12785/jsap/040311

A Study of Exclusive Breastfeeding and its impact on Nutritional Status of Child in EAG States

Abhishek Kumar[*] *and V. K. Singh*

Department of Statistics, Banaras Hindu University, Varanasi-221005, India

Received: 8 Sep. 2015, Revised: 3 Oct. 2015, Accepted: 19 Oct. 2015
Published online: 1 Nov. 2015

Abstract: Exclusive breastfeeding is an eminent public health tool for primary prevention of child morbidity and mortality. Infant feeding practices have a major role in determining the nutritional status of child. Malnutrition has been responsible directly or indirectly for 60 percent of 10.9 million deaths annually among children under 5 years. Over two-third of these deaths are associated with inappropriate feeding practices occur during the first year of life. The aim of this paper is to examine the role of exclusive breastfeeding on nutritional status of child in the Empowered Action Group (EAG) states of India. The eight EAG states constitute about half of India's population and fall behind in demographic and socioeconomic indicators. The data from NFHS-3 is used. Bi-variate and multi-nomial analyses are used to establish the relationship between the two dependent variables. Height-for-age, weight-for-age and weight-for-height are analyzed with respect to background characteristics. Results indicate that there is negative relationship between wealth quintile and children getting exclusive breastfed. Severity of stunting, wasting and underweight shows a decreasing trend as the children are exclusive breastfed. Severity of undernourishment increases as birth order increases and decreases as income level rises. This implies that exclusive breastfeeding has a significant role in nutritional status of child.

Keywords: Exclusive Breastfeeding, Malnutrition, Nutritional Status of Child, EAG States.

1 Introduction

Breastfeeding is an unequalled way of providing ideal food for the healthy growth and development of infants. It is also an integral part of the reproductive process with important implications for the health of mothers. Though breast feeding is a common practice in India, it is associated with myths and superstitions such as colostrum being harmful for the newborn; breast milk being inadequate for the first 3 days after birth, thats why prelacteal foods, such as honey, sugar water or mustard oil are given immediately after birth which contributes to the low prevalence of exclusive breastfeeding [1,2].

Exclusive breastfeeding has been well-recognized as an important public health tool for the primary prevention of child morbidity and mortality. Exclusive breastfeeding means that the infant receives only breast milk. No other liquids or solids are given, not even water, with the exception of oral rehydration solution, or drops/syrups of vitamins, minerals or medicines (WHO). Before 2001, the World Health Organization (WHO) recommended that infants should be exclusively breastfed for 4-6 months with the introduction of complementary foods (any fluid or food other than breast milk) thereafter. In 2001, after a systematic review and expert consultation, this advice was changed and exclusive breastfeeding is now recommended for the first 6 months of life to achieve optimal growth, development and health [3].

The most important breastfeeding practice includes the initiation of breastfeeding within one hour of birth and frequent and on-demand feeding. Infants should be breastfed more frequently during illness and recovery. At the age of six months, appropriate but nutritionally adequate and safe complementary foods must be introduced. Breastfeeding should still be continued until the child is two years and above, while he/she is getting nutritious complementary foods (WHO 2001). Type and amount of solid foods first introduced into the diet are strongly associated with the growth and development of the child. Although breastfeeding to infants have many advantages but it is not the only factor that affects the growth and development of children. There are several socio-economic factors that affects the way of breastfeeding practices which varies from community to community and that includes low parental education (Hasan et al 1991; Mikiel-Kostyra et al

[*] Corresponding author e-mail: abhionline91@gmail.com

2005) specially low level of mothers education (Bertini et al, 2003), mothers employment (Dearden et al. 2002; Mahgoub et al. 2002) and other poor socio-economic status (Yadava et al. 1999) etc [4].

Malnutrition means poor nutrition and it includes both under and over-nutrition. Most of the developing countries like India, Pakistan, Bhutan, etc. are currently suffering from malnutrition. It results due to lack of macronutrients (carbohydrates, proteins, fat, vitamins and minerals). The problem of under-nutrition is particularly severe for young children [5]. Malnutrition arises from a complex of nutritional, social and biological deprivation and is manifested in various forms such as stunting (short height), underweight, wasting, growth retardation, dimished subcutaneous fat and ill health with high mortality rate [6].

Malnutrition in the form of undernutrition is the underlying cause of a substantial proportion of all child deaths particularly in developing countries like India which has strong association with improper infant feeding practices [7, 8,9]. Infant feeding practices have a major role in determining the nutritional status of a child. About 60 percent of all deaths among children less than 5 years of age are directly or indirectly attributed to malnutrition. About two-thirds of these deaths are associated with inappropriate feeding practices and occur during the first year of life. Poor feeding practices during infancy and early childhood results in malnutrition which not only contributes to child morbidity and mortality but also leads to poor cognitive development and health outcomes in later ages [10,11].

Several studies have suggested that breastfeeding in developing countries is associated with a greater risk of under-nutrition as defined by height-for-age (stunting), weight-for-age (underweight) and weight-for-height (wasting).

2 Review of Literature

Breast milk is a complete food for a normal neonate. It is the best gift that a mother can give to her baby. It contains all the nutrients for normal growth and development of the baby from time of birth to the first 6 months of life. The Global Strategy for Infant and Young Child Feeding adopted by the World Health Organization (WHO) and the United Nations Childrens Fund states that the optimal feeding pattern for overall child survival is exclusive breastfeeding for the first 6 months and continued breastfeeding for up to 2 years and beyond with complementary feeding from age 6 months together with related maternal nutrition and support.

Malnutrition has been responsible directly or indirectly for 60 percent of 10.9 million deaths annually among children under 5 years. Over two third of these deaths are associated with inappropriate feeding practices that occur during the first year of life. The single most cost-effective intervention to reduce infant mortality in developing countries would be the promotion of exclusive breastfeeding. Yet 90 percent of universal practices of exclusive breastfeeding for 6 months continued for 6-11 months could save 13-15 percent of deaths in children below 5 years in India, which means 3, 00,000 child deaths could be prevented in one year. Non-exclusive breastfeeding rather than exclusive breastfeeding can increase the risk of dying due to diarrhoea and pneumonia among 0-5 month old infants by more than two-fold. Benefits of exclusive breastfeeding upto six months duration have been studied all over the world and there is enormous amount of evidence to support this.

Reducing infant and child deaths and improving the level of nutritional status of the child is one of the important priority areas for the government. We aim to reduce IMR by 50 percent under National Rural Health Mission (NRHM) which calls for all those actions that would effectively contribute to reduction in infant mortality and improvement in child nutrition. Further, there are innumerable benefits to the child when the baby is breastfed as compared to not being breastfed. One of the important ways to achieve desired reduction of infant mortality and improvement in nutritional status of child is to ensure 100 percent exclusive breastfeeding for the first six months followed by appropriate complementary feeding along with the continuation of breastfeeding (P Sudharto 2008). Lancet (2008) has estimated that nearly 14 lakh infant deaths can be averted with exclusive breastfeeding for the first six months of life.

A study conducted in Guinea, shows that the risk of morbidity is reduced close to 70 percent when a child is exclusively breastfed. Exclusive breastfeeding is protective against serious morbidities (diarrhoea, respiratory infections and low growth) in the first six months of life [12].

A study in the rural area near Bangalore has observed that 96 percent of infants were being breastfed and majority of infants received sugar water as prelacteal feed. Educational level of mothers had a positive correlation with the duration of breastfeeding while it had no correlation with the age of starting of complementary feeds. 45 percent of infants did not receive any supplementary milk. Among the rest, majority were receiving diluted milk before 6 months of age. 53 percent of infants were not receiving other supplementary foods [13].

Despite the concerted efforts by government in two decades, child malnutrition remains a massive unfinished agenda in developing countries. About half of the deaths to children under five years of age (3 million in 2013) in low and middle income countries is attributed to undernutrition. Undernutrition alone accounts for 45 percent of mortality among children less than 5 years; estimated at 3 million deaths in low and middle income countries annually (Black et al. 2013). Child under nutrition remains a major public health challenge in India [14].

Lawrence Haddad (2002) stated that better-nourished individuals constitute the bedrock of the nation that respect human rights and strives for high labour productivity. Well-nourished mothers are more likely to give birth to the well-nourished children who will attend school earlier, learn more, postpone dropping out, marry and have children later, give birth to fewer and healthier babies, earn more in their jobs, manage risk better and be less likely to fall prey to diet - related chronic deceases in midlife. While saying this, he had also emphasized on the importance of empowering people and the community so as to reduce the poverty which will have positive impact on the nutritional status of the people. Another study conducted in North Parganas district of West Bengal to see the age and sex differential in the nutritional status among the adolescent observed that there were variations by age and sex in the rate of under nutrition and this rate of under nutrition among the studied population were lower than other developing countries and specifically lower than earlier Indian findings.

A study in Bangladesh has shown that exclusive breastfeeding affects the nutritional status of the child from 0 to 24 months of age. Information was collected from mothers of 2781 children between 0 and 24 months of age. It was found that 16 percent of women still exclusively breastfed their children for less than 6 months. Of the children, 38.1 percent were stunted and 38 percent were under weight for their age. Overall, 46 percent of children were suffering from diseases [15].

Mahanta et al. in 2004 undertook a study to evaluate breastfeeding and weaning practices in relation to nutritional status of infants of tea garden workers of Assam after report of high prevalance of under nutrition. They found that 100 percent breastfeeding rate was maintained throughout 0 to 12 months. Exclusive breastfeeding rate was 69.35 percent up to 6 months of age. However, introduction of complementary feedings was generally delayed in tea garden. Frequent breast sucking was perhaps possible even during working hours of mothers as infants are kept in make shift creche near to the work sites. Higher prevalance of malnutrition among older children (6-12 months) may be related to prolong exclusive breastfeeding. Breast milk alone is not sufficient to satisfy the nutritional needs to sustain optimal growth beyond 4-6 months. Moreover, the quality and quantity of supplementary foods are generally not sufficient for promoting normal growth in India. Similar may be the case in tea garden too due to widespread poverty and illiteracy.

3 Need for Study

In developing countries like India, malnutrition is a major health problem and is mainly influenced by infant feeding practices. The present study focuses on the impact of exclusive breastfeeding on nutritional status of child in EAG states of India. A collective term is used for these states is, the Empowered Action Group or EAG states. In 2001, Government of India has formed this group because these states have almost 50 percent of Indias population and they are lagging behind in socio demographic, economic and health dimensions with comparison to other states of India. The eight EAG states are Bihar, Madhya Pradesh, Rajasthan, Orissa, Uttar Pradesh, Chhattisgarh, Jharkhand and Uttaranchal.

4 Objectives of the Study

1. To examine the exclusive breastfeeding by background characteristics.
2. To examine the child nutritional status in EAG states by socio economic status.
3. To explore the inter-linkage between exclusive breastfeeding and child nutritional status in EAG states.

5 Data Source

This study utilizes data obtained from National Family Health Survey (NFHS-3) which was conducted in 2005-06 covering twenty-nine states in India and comprises near about 99 percent of Indias population. The NFHS [16] is the Indian version of Demographic and Health Surveys that aims at providing reliable estimates on demographic and health indicators in developing countries. The first National Family Health Survey was conducted in 1992-93 and NFHS-2 in 1998-99 by International Institute for Population Sciences (IIPS).The NFHS-3 collected information from nationally representative sample of 109,401 households, 124,385 women aged 15-49 years and 74,369 men aged 15-54.

For each state, a multi-stage systematic and stratified sampling design was adopted where the primary sampling units were selected with probability proportional to size. Systematic sampling with equal probability had been used for households selection and all eligible women in each household were interviewed. National and state level sampling weights were created to reflect sampling design (IIPS 2007). The principle objective of NFHS is to provide national and state level estimates on fertility, mortality, family planning and HIV related knowledge and on important aspect of nutrition, health and information about health care services.

6 Methodology

Description of variables

Different variables are used in the study to understand the exclusive breastfeeding, child nutritional status and their association. The variables of the study are briefly described in this section.

Dependent variables

(a). Exclusive Breastfeeding

This variable is computed by taking into consideration months of breastfeeding equal to 6 months and children are supposed to receive only breast milk i.e. no other liquids or solids are given not even water.

(b). Nutritional Status of child

There are three standard indices of physical growth which are used to describe the nutritional status of children. The indices are as follows:-

(i) Height-for-age (Stunting)
(ii) Weight-for-height (Wasting)
(iii) Weight-for-age (Underweight)

Each of the three nutritional status indicators is expressed in standard deviation units (Z-score) from the median of the reference population. Each index provides different information about growth and body composition which is used to assess the nutritional status.

The height-for-age index is an indicator of linear growth retardation and cumulative growth deficits. Children whose height for age Z-score is below minus two standard deviations (-2SD) from the median of the reference population are considered as short for their age (stunted) and the children whose height for age Z-score is below minus three standard deviations (-3SD) from the median of the reference population are considered to be severely stunted. Stunting reflects failure to receive adequate nutrition over a long period of time. Height for age, therefore, represents the long term effects of malnutrition in a population.

The weight-for-height index measures body mass in relation to body length and describes current nutritional status. Children whose weight-for-height Z-score is below minus two standard deviations (-2SD) from the median of the reference population are considered as thin (wasted) and the children whose weight-for-height is below minus three standard deviations (-3SD) from the median of the reference population are considered to be severely wasted.

Weight-for-age is a composite index of height-for-age and weight-for-height. It is a measure of protein energy under nutrition. Children whose weight-for-age is below minus two standard deviations from the median of the reference population are classified as underweight and the children whose weight-for-age is below minus three standard deviations from the median of the reference population are considered to be severely underweight.

Independent variables

The independent variables considered in the present study are as follows: Age of child (categorized into ¡6 months, 6-11 months, 12-23 months, 24-35 months, 36-47 months, 48-59 months), Sex of child (male, female), Birth order (categorized into 1, 2-3, 4-5, 6+), Size of child at the time of the birth (categorized into Very small, Small, Average or Larger, Dont know), Mothers education (categorized into no education, primary, secondary and higher), place of residence (categorized into urban and rural), religion (categorized into Hindu, Muslim, Others), Caste or tribe (categorized into SC, ST, OBC, Other), wealth index (categorized into Poor=Poorest + Poorer, Middle, Rich=Richer + Richest).

Binary Logistic Regression

This model has been utilized for exclusive breastfeeding variable since, it is coded in binary form i.e. Yes and No. Logistic regression model is commonly estimated by maximum likelihood function. For the dependent variable, logistic model takes the following general form:

$$\text{Logit } P = \ln [P/ (1-P)] = b0 + b1x1 + b2x2 + b3x3 + b4x4 + \text{——} + bixi + ei$$

Where b1, b2, b3, b4, —- and bi represents the coefficients of each of the predictor variable included in the model, while ei is an error term. Ln [P/ (1-P)] represents the natural logarithms of the odds of the outcomes. The STATA used yields odds ratios which indicate the magnitude of the predictor variables on the probability of the occuring outcomes. The odds ratios are the measures of the odds that children were exclusively breastfed (response variable) as indicated by the independent variable. This model has been used to reduce the net effects of each of the explanatory variable. The

response variable has been categorized into two mutually exclusive and exhaustive categories: children are exclusively breastfed or not as the reference category. As regards to the direction of the logit coefficients, odds greater than one indicates an increased probability that women will breastfed their child exclusively up to the first six months of the life; while those less than one indicates a decreased probability.

Multinomial Logistic Regression

The multinomial logistic regression model has been used for three dependent variables namely Stunting, Wasting and Underweight. It has been used to analyze the severity of the dependent variable on the children. The response variables has been categorized into three mutually exclusive and exhaustive categories: children are severely stunted (wasted/underweight), children are mild or moderate stunted (wasted/underweight) and children are normal i.e. no stunting (wasting/underweight). The reference category for the multinomial logit model is children are severely stunted (wasted/underweight).

7 Result and Discussion

Table 1

This table shows the percentage of children born during the five years before the survey who were ever breastfed and who started breastfeeding soon after birth and the percentage of children who received a prelacteal feed during the first three days after delivery. This table also gives the percentage of children who are exclusively breastfed for the first six months of life.

About 95 percent of children are ever breastfed and it is almost same in any group. Timely initiation of breastfeeding was not common for any group but it was highest for children born to urban women, more educated women, Hindu women, women belonging to scheduled tribe and children born to women in households in the highest wealth quintile. Ever breastfed children were least likely to be put to the breast within the first hour after birth if the mother was Muslim, if she was not educated, or if she belongs to the other backward class.

Most mothers (68 percent) gave their last born child something to drink other than breast milk in the first three days after delivery. Prelacteal feeds were more common in rural areas than in urban areas, among women with no education, Muslims, OBCs and women in the lowest two wealth quintiles. Exclusive breastfeeding is higher in rural areas as compared to urban areas, mothers who were illiterate breastfed their child exclusively more than the educated mothers, scheduled tribes women breastfed their child more than other castes women and women belonging to the lower wealth quintile breastfed their child more than the women who belong to the upper wealth quintiles. However, there is no difference in breastfeeding among male and female children.

Table 2

This table shows the feeding practices of the children for EAG states. The percentage of children under age five who were ever breastfed is almost universal in every state, with a slightly lower percentage in Uttaranchal i.e. 90 percent. There is considerable variation, however, in the amount of time after birth when breastfeeding started. The percentage who started breastfeeding within one hour of birth ranges from 4 percent in Bihar and 7 percent in Uttar Pradesh to 53 percent in Orissa. The majority of women in Orissa state begin breastfeeding their infants within one hour of birth. Prelacteal feeding also varies substantially from one state to another. Prelacteal feeding is most common in Bihar (91 percent) and Uttar Pradesh (86 percent) and least common in Chhattisgarh (23 percent).

In Chhattisgarh, prevalence of exclusive breastfeeding is found to be the highest among the EAG states of India whereas in Madhya Pradesh, it is found to be the least. In India, 46 percent of women breastfeed their child exclusively up to the first six months of the infants life. Among the eight EAG states, four states were having lower prevalence of exclusive breastfeeding in comparison to the national average.

Table 3

Table 3 shows the percentage of children classified as undernourished by selected demographic characteristics. The proportion of children who are stunted increases rapidly with the childs age through age 24-35 months and that of underweight through age 36-47 months. Under-nutrition decreases thereafter for stunting and levels off for underweight. One of these measures, stunting peaks at 25 months and underweight peaks at 37 months. Wasting generally decreases throughout the age range. Even during the first six months of life, when most infants are breastfed, 20-35 percent of children are undernourished according to the three nutritional indices. It is to be noted that at age 12-23 months, when many children are being weaned from breast milk, 30 percent of children are severely stunted and around 21 percent are severely underweight.

Table 1: Percentage distribution of children who were ever breastfed, who started breastfeeding within half an hour, one hour, and one day of birth, who received a prelacteal feed, and who were exclusively breastfed, by background characteristics, EAG states, (2005-06).

		Percentage who started breastfeeding:				
	Ever breastfed	Within half an hour of Birth	Within one hour of Birth[1]	Within one day of Birth[2]	Received prelacteal feed[3]	Exclusive Breastfeeding
Residence						
Urban	95.1	16.7	17.9	49.1	65.7	32.8
Rural	95.3	13.7	14.7	41.4	68.6	47.4
Sex of child						
Male	95.0	14.5	15.5	43.2	68.2	45.3
Female	95.5	14.0	15.0	42.5	67.8	44.2
Mother's Education						
Illiterate	95.3	10.8	11.5	35.8	73.3	47.3
Primary	94.9	17.1	18.4	48.0	62.7	44.2
Secondary	95.3	20.4	22.0	55.8	60.2	38.9
Higher	95.6	25.9	28.4	66.4	52.3	42.1
Religion						
Hindu	95.2	15.2	16.3	43.8	66.5	45.3
Muslim	95.9	9.1	9.8	35.2	80.0	40.9
Others	95.6	9.4	11.2	56.1	52.1	42.9
Caste or Tribe						
Scheduled Caste	94.5	13.8	14.6	37.0	72.4	50.0
Scheduled Tribe	96.8	19.7	20.4	57.2	47.3	56.6
Other Backward Class	95.5	11.4	12.4	37.7	74.0	41.9
Other	94.7	17.2	18.7	50.6	64.3	38.3
Wealth Index						
Poor	95.6	12.6	13.3	38.5	69.4	50.0
Middle	94.7	14.1	15.2	42.3	69.6	42.7
Rich	95.0	18.7	20.5	54.3	63.5	33.5

Note:

1. Includes the children who started breastfeeding within half an hour of birth.
2. Includes the children who started breastfeeding within half an hour and one hour of birth.
3. Percentage of children who receives something other than breast milk during the first three days of life is considered that they receive prelacteal feed.

By and large, girls and boys are about equally undernourished. Under-nutrition is generally lower for first births than for subsequent births and consistently increases with increasing birth order for all measures of nutritional status. Children who are judged by their mother to have been small or very small at the time of birth are more likely to be undernourished than those who had average size or larger size at the time of birth. Under-nutrition is substantially higher in rural areas than in urban areas. Even in urban areas, however, 42 percent of children are stunted and 38 percent are underweight. Under-nutrition has a strong negative relationship with the mothers education. The percentage of children who are severely stunted and underweight is almost six times and five times respectively as high for children whose mothers have no education as for children whose mothers have higher years of education. Hindu and Muslim children are about equally likely to be undernourished, except in the case of stunting, but others are undernourished as compared with them. Children belonging to scheduled castes, scheduled tribes or other backward classes have relatively high levels of under-nutrition according to all three measures. Children from scheduled tribes have the poorest nutritional status on almost every measure expect for stunting, and the high prevalence of wasting in this group i.e. 34 percent is of particular concern. All of the measures decrease steadily with an increase in the wealth index of the household. Children from households with a low standard of living are twice as likely to be under-nourished as children from households with a high standard of living.

Table 4

This table shows the percentage of children under age five classified as undernourished according to EAG states. Table 4 shows that in India, 48 percent of children were stunted, around 43 percent of children are having underweight whereas

Table 2: Percentage distribution of children who were ever breastfed, who started breastfeeding within half an hour, one hour, and one day of birth, who received a prelacteal feed and who were exclusively breastfed, according to state, EAG states, (2005-06).

States	Ever breastfed	Percentage who started breastfeeding: Within half an hour of Birth	Within one hour of Birth[1]	Within one day of Birth[2]	Received prelacteal feed[3]	Exclusive Breastfeeding
Uttaranchal	89.9	28.6	31.8	67.1	45.1	31.5
Rajasthan	96.0	13.2	13.5	51.6	71.6	33.2
Uttar Pradesh	96.0	6.9	7.1	23.0	86.1	51.1
Bihar	94.3	2.6	3.5	29.1	90.8	27.1
Jharkhand	95.3	9.9	10.2	44.5	66.6	57.0
Orissa	94.5	49.0	52.8	80.9	42.2	50.6
Chhattisgarh	96.3	23.1	25.6	63.7	23.3	82.2
Madhya Pradesh	95.7	13.5	14.5	51.1	58.1	21.9
EAG States	95.3	14.2	15.3	42.9	68.0	44.6
India	95.7	22.1	23.0	52.7	57.3	46.0

Note:

1. Includes the children who started breastfeeding within half an hour of birth.
2. Includes the children who started breastfeeding within half an hour and one hour of birth.
3. Percentage of children who receives something other than breast milk during the first three days of life is considered that they receive prelacteal feed.

one out of five was wasted. At the same time, in EAG states, around 52 percent of children were shorter as for their age, 48 percent were underweight and 22 percent were wasted. Under-nutrition is most pronounced in Madhya Pradesh, Bihar and Jharkhand. Stunting is substantially higher than average in Uttar Pradesh along with Bihar, Jharkhand and Madhya Pradesh. In all states that constitute to be EAG states, levels of under-nutrition are unacceptably high. Percentage of children who were wasted is highest in Madhya Pradesh and least in Uttar Pradesh.

Table 5

Table 5 shows the odds ratios from logistic regression of exclusive breastfeeding by selected background variables. Here dependent variable has been categorized into two mutually exclusive and exhaustive categories: children were exclusively breastfed and children were not exclusively breastfed as a reference category. It is observed that rural women are 1.61 times more likely to exclusively breastfed their children compared to urban women. As the mothers education increases, the odds of exclusive breastfeeding also increases, it is found to be significant at higher level of education. With respect to Hindu category, women belonging to other religious community were 21 percent less likely to exclusively breastfed their child. Taking scheduled caste as reference category, the odds of exclusive breastfeeding is found to be decreasing in comparison to other castes, and it is found to be significant among general category. As the income increases, the odds of exclusively breastfeeding decreases; in middle wealth quintile, it decreases by 33 percent and among rich it decreases by 49 percent as compared with the poor wealth quintile. There is no significant difference in exclusive breastfeeding among male and female infants.

Table 3: Percentage distribution of children according to their nutritional status by background characteristics, in EAG States (2005-06).

Background characteristics	Severe stunting	Stunting	Severe underweight	Underweight	Severe wasting	Wasting
Age in months						
<6	8.7	22.0	13.3	34.3	14.4	34.8
6-11	12.6	30.4	16.6	40.7	11.6	32.0
12-23	30.4	57.2	21.4	49.8	9.2	26.9
24-35	34.3	60.6	22.0	50.4	5.5	19.1
36-47	32.9	59.0	20.5	51.1	5.4	17.4
48-59	28.3	54.7	18.5	50.0	4.8	17.3
Sex of the child						
Male	27.4	51.6	18.9	47.2	8.0	23.4
Female	27.5	51.7	20.1	48.5	7.0	22.0
Birth order						
1	21.2	45.2	15.3	41.3	6.6	20.8
2-3	25.4	50.5	17.8	46.2	7.3	22.7
4-5	32.3	55.5	23.1	52.8	8.2	23.5
6+	38.1	61.8	27.2	57.8	9.2	25.3
Size of child						
Very Small	31.1	55.4	28.9	60.1	11.5	32.7
Small	30.3	55.6	24.0	56.3	9.2	29.0
Average or Larger	26.6	50.6	17.9	45.3	6.9	20.7
Residence						
Urban	21.3	42.5	13.9	37.9	6.7	19.9
Rural	28.8	53.8	20.8	50.1	7.7	23.4
Mother's Education						
Illiterate	33.4	58.2	24.0	54.4	8.7	24.4
Primary	24.5	49.3	16.9	46.2	6.6	23.6
Secondary	16.7	40.8	11.3	36.2	5.4	19.6
Higher	5.7	19.6	5.3	17.9	4.2	12.3
Religion						
Hindu	26.7	51.1	19.1	47.8	7.5	22.7
Muslim	32.5	55.2	20.5	47.5	8.0	21.5
Others	25.2	52.1	27.6	53.6	7.5	31.0
Caste or tribe						
Scheduled caste	31.5	57.6	22.2	52.2	7.3	22.6
Scheduled tribe	31.0	54.8	29.5	60.3	11.2	33.8
Other backward class	28.1	52.5	18.1	47.8	7.1	21.5
Other	20.0	42.3	13.7	36.0	6.4	18.7
Wealth index						
Poor	33.1	57.9	24.7	55.8	8.7	25.8
Middle	25.1	52.0	15.9	44.1	7.0	20.9
Rich	15.4	36.4	9.5	31.3	5.1	16.7

Note:

1. Table is based on children less than five years of age.
2. Stunting, Wasting and Underweight includes the children who are severe stunting, severe wasting and severe underweight respectively.

Table 4: Percentage distribution of children according to their nutritional status, among EAG states, (2005-06).

States	Severe stunting	Stunting	Severe underweight	Underweight	Severe wasting	Wasting
Uttaranchal	23.3	44.7	15.5	38.1	5.2	18.8
Rajasthan	23.1	44.1	15.5	40.4	7.3	20.5
Uttar Pradesh	32.3	56.5	16.4	42.3	5.2	14.9
Bihar	29.1	55.7	24.0	56.1	8.3	27.3
Jharkhand	26.6	49.8	26.2	57.1	11.9	32.6
Orissa	19.8	45.0	13.4	40.8	5.2	19.6
Chhattisgarh	25.1	53.8	16.6	47.7	5.7	20.1
Madhya Pradesh	26.5	49.8	27.4	59.9	12.5	35.4
EAG States	27.4	51.7	19.5	47.9	7.5	22.7
India	23.7	48.0	15.8	42.5	6.4	19.8

Note:

1. Table is based on children less than five years of age.
2. Stunting, Wasting and Underweight includes the children who are severe stunting, severe wasting and severe underweight respectively.

Table 5: Odds ratios from logistic regression of exclusive breastfeeding, by selected background characteristics in EAG states, (2005-06).

	Exclusive Breastfeeding	
Background Characteristics	**Odds Ratio**	**Confidence Interval**
Residence		
Urban®		
Rural	1.61*	(1.264 - 2.057)
Sex of child		
Male®		
Female	0.96	(0.794 - 1.151)
Mother's Education		
Illiterate®		
Primary	1.08	(0.808 - 1.437)
Secondary	1.12	(0.861 - 1.447)
Higher	1.88*	(1.173 - 3.009)
Religion		
Hindu®		
Muslim	1.01	(0.759 - 1.356)
Others	0.79	(0.387 - 1.594)
Caste		
SC®		
ST	1.32	(0.935 - 1.865)
OBC	0.81	(0.632 - 1.042)
Others	0.76***	(0.556 - 1.034)
Wealth Index		
Poor®		
Middle	0.77**	(0.588 - 0.997)
Rich	0.51*	(0.384 - 0.688)

® Reference category, ***p<0.1, **p< 0.05 and *p<0.01

Table 6: Relative risk from multinomial logistic regression for stunting, underweight and wasting by selected background characteistics, EAG states, (2005-06).

Background Characteristics	Stunting		Underweight		Wasting	
	Mild stunting	No stunting	Mild underweight	No underweight	Mild wasting	No wasting
Exclusive Breastfeeding						
No ®						
Yes	1.59*(1.197-2.115)	4.10*(3.241-5.189)	0.98(0.763-1.269)	1.83*(1.472-2.284)	0.84(0.641-1.101)	0.52*(0.409-0.653)
Birth Order						
1®						
2-3	0.92(0.823-1.034)	0.83*(0.748-0.916)	0.96(0.851-1.091)	0.89**(0.794-0.996)	1.06(0.884-1.260)	0.98(0.841-1.14)
4-5	0.77*(0.669-0.875)	0.75*(0.664-0.840)	0.85**(0.734-0.976)	0.76*(0.668-0.867)	0.99(0.800-1.225)	0.97(0.806-1.16)
6+	0.75*(0.644-0.877)	0.63*(0.553-0.727)	0.81*(0.688-0.951)	0.68*(0.585-0.790)	0.95(0.741-1.213)	0.9(0.733-1.114)
Residence						
Urban®						
Rural	1.02(0.905-1.146)	0.98(0.883-1.087)	0.99(0.869-1.122)	1.02(0.910-1.150)	1.08(0.900-1.304)	1.16***(0.989-1.356)
Mother's Education						
Illiterate®						
Primary	1.23*(1.073-1.402)	1.37*(1.220-1.543)	1.25*(1.083-1.446)	1.39*(1.213-1.583)	1.31**(1.058-1.627)	1.18***(0.982-1.429)
Secondary	1.49*(1.310-1.700)	1.89*(1.685-2.118)	1.37*(1.189-1.584)	1.81*(1.588-2.060)	1.35*(1.096-1.654)	1.31*(1.099-1.568)
Higher	2.09*(1.498-2.928)	5.64*(4.216-7.557)	1.43***(0.997-2.050)	4.19*(3.054-5.758)	0.88(0.592-1.304)	1.45**(1.049-1.998)
Religion						
Hindu®						
Muslim	0.80*(0.707-0.907)	0.79*(0.705-0.876)	0.91(0.797-1.041)	0.96(0.854-1.090)	0.92(0.753-1.132)	1.04(0.873-1.23)
Others	1.21(0.908-1.611)	1.01(0.780-1.320)	0.69*(0.522-0.915)	0.59*(0.452-0.759)	1.53**(1.011-2.316)	0.81(0.557-1.187)
Wealth Index						
Poor®						
Middle	1.31*(1.161-1.478)	1.29*(1.159-1.438)	1.26*(1.105-1.441)	1.65*(1.460-1.862)	0.98(0.803-1.199)	1.27*(1.068-1.505)
Rich	1.51*(1.312-1.732)	2.10*(1.862-2.371)	1.42*(1.217-1.652)	2.45*(2.136-2.817)	0.94(0.758-1.176)	1.43*(1.185-1.725)

® Reference category, ***p<0.1, **p< 0.05 and *p<0.01

Table 6

The multinomial logistic regression model has been used to analyze the stunting, wasting and underweight. The response variables stunting, wasting and underweight has been categorized into three mutually exclusive and exhaustive categories: severe, mild and no. The reference category for the multinomial logit model is severe group.

The multinomial logistic regression analysis for the stunting variable results that, if the children were exclusively breastfed then they were significantly more likely to be mild stunting or not stunt as compared to severe stunting. Among birth order category, the probability of being mild stunt as well as not stunt was significantly less likely among 4-5 and 6+ birth order of children than children whose birth order is 1 and 2-3. The children who belong to the rural category are having slightly more probability to be mild stunt or not stunt as compared with urban category children. If the mother is educated then the children were having more risk to be mild stunt and no stunt as compared with illiterate mothers at 99 percent level of significance. Children who belong to Muslim category were significantly less likely to be mild stunt and not stunt as compared with severe stunting and children who belongs to the other religious community. Children whose mother belongs to the lower wealth quintile, they were significantly more likely to be mild stunt or not stunt as compared with the children whose mothers belongs to higher wealth quintile.

For the underweight variable, the outcomes as per the background characteristics are as follows: the children who are exclusively breastfed were found to be 2 percent less likely to be mild underweight and 83 percent more likely to be not underweight in comparison to the severe underweight. As the birth order increases, the relative risk of mild and not underweight is significantly decreasing with reference to the lower birth order. With increase in education level of mothers, the relative risk of being mild underweight among children was found to be significantly increasing than the mothers who were illiterate. In comparison to the Hindu category, children belonging to the other religion were having lower relative risk of being mild and not underweight and it is significant at the 99 percent level of significance. Children whose mother belongs to the lower wealth quintile, they were significantly more likely to be mild or not underweight as compared with the children whose mother belongs to higher wealth quintile.

Similarly for the wasting variable, the consequences are as follows: the children who are exclusively breastfed were found to be 16 percent less likely to be mild wasted and 48 percent less likely to be no wasted in comparison to the severe wasting. With reference to the urban children, the relative risk of having no wasting is 16 percent more likely as compared with the severe wasting. If the mothers have primary education then the children were having more risk to be mild and no wasting as compared with illiterate mothers at 90 percent level of significance. Children whose mother belongs to the lower wealth quintile, they were significantly more likely to be not underweight as compared with the children whose mothers belong to higher wealth quintile.

8 Conclusion

Exclusive breastfeeding is the major variable which influences children's height for their age than weight-for-age or weight-for-height. Among the EAG states, Uttar Pradesh was found to have highest prevalence of stunting and lowest prevalence of wasting. Madhya Pradesh has highest percentage of children who are underweight while Uttaranchal was found to have the lowest among underweight. From the analysis, it was found that exclusive breastfeeding was more prevalent in rural areas as compared with urban areas; and with increasing education level of mothers, the chances of exclusive breastfeeding was found to be increasing. Muslim children are less likely to get exclusive breastfeed as compared to other religious community. There is a negative relationship between wealth quintile and the children getting exclusive breastfeed. As the wealth quintile increases, the prevalence of exclusive breastfeeding decreases.

Severity of stunting, wasting and underweight shows a decreasing trend as the children are exclusively breastfed. As the birth order increases, the severity of undernourishment also increases. Similarly, with increasing mothers education, the severity of undernourishment decreases. Severity of undernourishment is inversely proportional to the income level. Overall results conclude that the exclusive breastfeeding is a major factor that influences the childs nutritional status.

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