Impact of ICDS scheme on nutritional status among mothers and children in EAG states, India

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Extended Abstract

Introduction

Nutrition is the "Science of Food," the nutrients and other substances in it; It deals with their actions interaction and balance about health and disease. Nutrition plays a significant role throughout life. There is widespread malnutrition among children and females of child bearing age due to a combination of inadequate diet and inappropriate feeding practices. Nutritional deprivation may also slow down the physical growth, compromise physical work efficiency, and at times also manifest as frank clinical symptoms of nutritional deficiencies and excesses. Reduction of mother and child malnutrition is also a major challenge for the government. The "Global Nutrition Report 2016" once again demonstrates India's slow overall progress in addressing chronic malnutrition, manifest in stunting (low weight for age), wasting (low weight for height), micronutrient deficiencies and overweight. NFHS-IV indicates that only 10% children age 6-23 months are receiving an adequate diet. According to NFHS-IV, around 38% and 36% India's children under five years are stunted and underweighted respectively. It is serious anxiety for the local and central government. The children need special nutritional intake during preschool age period for their extensive growth or development. The Integrated Child Development Services (ICDS) scheme is one of the largest national programmes for the promotion of mother and children health and their development. The government of India launched 'Integrated Child Development Services' scheme on 2nd October 1975 on an experimental basis, initially in 33 blocks. The success of the scheme motivated the government to extend the scheme to 2424 blocks by 1990. The main objective of the scheme was to improve the nutritional and health status of children below six years of age and build up proper psychological physical and social development for the children. The ICDS scheme provides a package of services includes supplementary nutrition, immunization, health check-up, referral services, treatment of minor illness, nutrition and health education to women, preschool education to children in the age group of 3-6 years, and convergence of other supportive services like water supply, sanitation, etc.

Literature Review

ICDS services like supplementary nutrition are benefiting only those mothers and children who are receiving daily. The study showed that the girl's age 0-2 years who receive daily supplementary feeding are at least 1 cm taller than similar girls who did not receive supplementary feeding **(Bhutta et al., 2008).** The latest study showed the provision of supplementary food in food insecure populations led to around a 0.41 increase in the age adjusted height z-score for the children between the ages of 6 and 36 months. Also, a study of two recent randomized controlled experiments in India and Malawi indicate that children ages

4-17 months' age group who received 220-260 kilo calorie of supplementary food led to an increase in height in the range of 0.4-0.9 cm **(Bhandari et al., 2011).** Boys 0-2 years who receive daily supplementary feeding seem on average to be 0.4 cm taller than boys who did not receive the supplementary feeding. But in case of girls 0-2 those who receive the complementary feeding daily are around 1 cm taller and weight 140 gram more **(Jain, M., 2015).** Adolescent nutrition is essential to the health of girls and is also relevant to maternal nutrition. Worldwide 1.2 billion adolescent resides in different places, around 90% of whom live in low middle-income countries(Cappa, Wardlaw, Langevin-Falcon, & Diers, 2012). The adolescent is also a period of mental development, rapid growth, and maturation from childhood to adulthood. Some research study shows that adolescent is a period with some potential for height catch-up in children with stunting from early childhood(Prentice et al., 2013). Some studies also found that adolescent fertility is three times higher in low middle-income countries. Among these nations pregnancy in adolescent have a higher risk of complications and mortality in mothers and children and poorer birth outcomes than pregnancies in older women (Gibbs, Wendt, Peters, & Hogue, 2012; Kozuki et al., 2013; UNICEF., 2008). Maternal obesity during the pregnancy increases the risk of childhood obesity that continues into adolescent and early childhood, potentiating the transgenerational transmission of obesity(Catalano, 2003; McGuire, Dyson, & Renfrew, 2010). Women became pregnant with Vitamin and mineral deficiencies can also have negative implications for them and their children when they are not managed properly during and after pregnancy(Haider & Bhutta, 2006; Peña-Rosas, De-Regil, Dowswell, & Viteri, 2012). Iron deficiency occurs when an insufficient amount of iron is absorbed to meet the body's requirements. Iron deficiency is a major nutrient deficiency, globally and most commonly affects children, infants and women of reproductive age(Stoltzfus, 2001). The latest WHO estimates indicate that anaemia affects approximately 43 percent of the world's children below five years of age, 29 percent of non-pregnant women reproductive age group and 38 percent of pregnant women(De-Regil, Harding, & Roche, 2016). Globally, more than 500 million women age group 15-49 year have anaemia, and it is estimated that one-half of the women having anaemia is suffering due to iron deficiency ((De-Regil et al., 2016)WHO, 2015).

Need for the study

Reduction of undernutrition of mother and child is a major challenge that India faces. The burden of malnourished children in India is highest in the world. The latest estimates show that around 36% and 38%of India's children under five years are underweight and stunted respectively. NFHS-IV also indicates around 48% of children under five years of age are stunted while 44% underweight. In Jharkhand the percentage of underweighted and stunted children are 48% and 45% respectively. In other EAG states like Uttar Pradesh, Madhya Pradesh, Rajasthan, Odisha, and Chhattisgarh are also facing a problem with malnutrition. In these states the percentage of under nourishing and stunted children are higher than the national level. Some studies found that in these states due to poor delivery and lack of awareness of anganwadi workers the programme does not work properly. This study will be helpful for policy implication and monitoring the nutritional programmes.

Data and Methodology

National Family Health Survey provides rich information on fertility, mortality, and important aspects of nutrition, health, and health care, especially for children aged 0-5 years. The

distinctive feature of this survey is the collection of anthropometric measurements of height and weight for children 0-5 and women 15-49. It also provides information on utilization of various services of the ICDS programme women and children aged 0-5 in the household. The main indicators of children's nutritional status are based on anthropometric measures: height measure in centimetres, weight measured in kilograms and two indices expressed in standard deviation units (z-score) from, the median for height and weight for the latest international reference population released by WHO in 2006.

Body mass index(BMI) is widely used for indicating the nutritional status of women which are defined as the weight in kilograms divided by the height in meters squared(kg/m^2). This indicator is used to assess the both thinness and obesity. It is also helpful to detect the risk of health or nutritional disorders. A BMI of less than 18.5 indicates chronic energy deficiency. Women with a BMI of 25.0 to 29.9 are considered to be overweight and those with a BMI 30.0 or above are identified as obese.

Propensity score matching method used for evaluating the treatment effects for observational data, when randomized clinical trials are not possible. The propensity score is the conditional probability of assignment to a particular treatment given a vector of observed covariates. Both the large and small sample theory show that adjustment for the scalar propensity score is sufficient to remove bias due to all observed covariates, application includes; (i) matched sampling on the univariate propensity score, which is a generalization of discriminant matching, (ii) multivariate adjustment by sub classification on the propensity score where the same subclasses are used to estimate treatment effects for all outcome variables and in all subpopulations and (iii) visual representation of multivariate covariance adjustment by a two dimensional plot. Multivariate analysis also used to examine the association of supplementary feeding and nutritional status of women and children.

Methodology

In 1983, Rosenbaum and Rubin published a seminar paper on propensity score analysis, that paper articulated the theory and application principles for a variety of propensity score models. The Propensity score is the conditional probability of assignment to particular treatment given a vector of observed covariates. Both large and small sample theory show that adjustment for the scalar propensity score is sufficient to remove bias due to all observed covariates.

For the above objective we want to make comparisons of outcomes between those women and child who have received ICDS services or those who have not.

Let the conditional probability of assignment to treatment one, given the covariates, be denoted by

$$\mathbf{e(X) = Pr(T=1|X)}$$

We assume that

$$\mathbf{Pr\ (T_1, T2 \ldots\ Tn \mid X_1, X2 \ldots\ Xn)} = \prod_{i=1}^{N} e(X_i)^{T_i} \{1- e(X_i)\}^{1-T_i}$$

Where, T= {0, 1} is the indicator of exposure to treatment and X is the multidimensional vector of background characteristics. The function e(X) is called the propensity score that is the propensity towards exposure to treatment 1 given the observed covariates X(Rosenbaum &

Rubin, 1983). The propensity score is the probability of receiving the treatment T conditional on the Covariates X.

The impact of the treatment on the *i*th individual is denoted by $\boldsymbol{\delta_i}$. $\boldsymbol{\delta_i}$ is defined as the difference between the potential outcome in the presence of treatment and the potential outcome in the absence of treatment.

$$\boldsymbol{\delta_i = Y_{1i} - Y_{0i}}$$

The evaluation seeks to estimate the mean impact of ICDS services, obtained by averaging the impact across all individuals in the population, this parameter is known as Average Treatment Effect (ATE).

$$\mathbf{ATE = E(\delta) = E\ (Y_1 - Y_0)}$$

Where, E (.) represents the average.

Counterfactual model

The counterfactual approach which is the part of casual analysis has made important inroads into statistical and econometric work.

The counterfactual model has been constructed for the calculation of average treatment effect. Counterfactual is the potential outcome that would have happened in the absence of the cause. Average treatment effect on the Treated measures the impact of the treatment on treated individuals.

$$\mathbf{ATT = E\ (Y_1|D=1) - E\ (Y_0|D=1)}$$

Where E (Y_1|D=1) is the average outcome of treated individuals and E (Y_0|D=1) is the counterfactual, it shows average outcome that the treated individuals would have obtained absence of treatment, which is unobserved.

Finally, the average treatment effect on the untreated individuals has been measured, which shows the impact of ICDS would have had on those who did not receive.

$$\mathbf{ATU = E\ (Y_1|D=0) - E\ (Y_0|D=0)}$$

Where E (Y_1|D=0) is the average observed outcome for those individuals did not received ICDS services.

E(Y_0|D=0) is the counterfactual and it shows the average outcome for those individuals who did not received ICDS, if they would have obtained in the presence of treatment, which is unobserved

The main aim is to calculate the average treatment effect (ATE)

$$\mathbf{ATE = E\ (Y|D=1) - E\ (Y|D=0) = \Delta}$$

We can write

$$\mathbf{\Delta = ATT + E\ (Y_0|D=1) - E\ (Y_0|D=0)}$$

$$\mathbf{\Delta = ATT,\ if\ E\ (Y_0|D=1) = E\ (Y_0|D=0)}$$

Result

The ICDS scheme provides nutrition and health services for children under age six years and pregnant or breastfeeding women, as well as preschool activities for children age 3-5 years. These services are provided through community based anganwadi centres. In Bihar around 49% of children under 6 years receive services of some kind from an anganwadi centre. The most common services that age-eligible children receive are immunizations (41%), supplementary food (34%), and early childhood care or preschool (33%). Half of the mothers of children who were weighed at an anganwadi centre received counselling from an anganwadi worker or an ANM. Among children under 6 years, slightly more than one-third of their mothers (35-37%) received any services from an anganwadi centre during pregnancy and while breastfeeding. In Jharkhand around 55% of children under 6 years receive services of some kind from an anganwadi centre. The most common services that age-eligible children receive are supplementary food (51%), immunizations (43%), growth monitoring (42%), and health check-ups (33%). Six-tenths of the mothers of children who were weighed at an anganwadi centre (61%) received counselling from an anganwadi worker or an ANM. In uttarakhand around 56% of children under 6 years receive some kind of services from an anganwadi centre. The most common services that age-eligible children receive are supplementary food (54%), growth monitoring (47%), health check-ups (33%) and immunizations (26%). In Madhya Pradesh around 56% of children under 6 years receive some kind of services from an anganwadi centre. The most common services that age-eligible children receive are supplementary food (54%), growth monitoring (47%), health check-ups (33%) and immunizations (26%). In Chhattisgarh More than three-fourths of children under 6 years (77%) receive services of some kind from an anganwadi centre. The most common services that age-eligible children receive are growth monitoring (77%), supplementary food (72%), health check-ups (68%), and immunizations (63%). In Rajasthan around Thirty-nine percent of children under 6 years receive services of some kind from an anganwadi centre. The most common services that age-eligible children receive are supplementary food (32%), immunizations (31%), growth monitoring (28%) and health check-ups (26%). In Odisha around 78% of children under age six years receive services of some kind from an anganwadi centre. The most common services that age-eligible children receive are supplementary food (75%), growth monitoring (75%), health check-ups (66%), and immunizations (61%).

Discussion and conclusion

The result shows that in Bihar around 8% of children under six years received the immunization services. The children under 3-5 years of age around 5% received early childhood care or preschool. Children who belong to the other backward classes received more likely ICDS services as compared to other children. In Jharkhand children 12-35 months are received more likely services as compared to younger and older children from an anganwadi centre. Around 57% eligible children from scheduled tribes in areas covered by an anganwadi centre receive some service. Mothers with no education and mothers from poor households are more likely to take advantage of the services offered at anganwadi centres than are women of other educational and wealth levels. The propensity score matching method shows the ICDS scheme in all EAG states Excluding Bihar have a positive impact but in case of Bihar ICDS have no much impact on nutritional status of mother and children. In Uttar Pradesh there is some improvement during one decade NFHS-III (2005-06) to NFHS-IV (2015-16). Madhya Pradesh and Odisha have also improved their nutritional status during one decade.