PREVALENCE AND DETERMINANTS OF MALNUTRITION AMONG BELOW FIVE AGE GROUP CHILDREN OF SLUMS IN MUMBAI CITY

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Abstract

Child malnutrition affects on the learning abilities, physical growth and future work capacity. The incidence of child malnutrition is higher in urban slums of Mumbai city. This study finds that the incidence of underweight among male and female is high in Sathe Nagar of Mankhurd. The stunting incidence among male in Maharashtra Nagar and Sathe Nagar is high of Mankhurd. The incidence of stunting among female is high in Chheda Nagar and Baiganwadi of Govandi suburb. The stunting and underweight incidence is high in one to two age groups in both suburbs. The household assets, knowledge of women, contraceptive use and health care access is low among women of slums. The child care, supplementary food and treatment are not available in slums. The logistic regression shows that underweight is positively co-related to sex of child and home delivery. It is negatively co-related to age of child, pills taken by women and normal delivery. The stunting is positively co-related to domestic violence and it is negatively co-related to age of child, supplementary food and child care at work. Therefore more supplementary food at anganwadi is recommended in these slums. Government must start the child day care centers at slums as well as at work places. The health services must be provided in kuttcha slums of city. Government must appoint more health staff to visit slums and provide health treatment. Health staff must provide treatment to women and children, counseling, encourage pre and postnatal care, institutional deliveries. Government must change policies towards slums and provide them good infrastructural facilities. It will help to reduce the child malnutrition at significant level in city.

Keywords: Health, Urbanization, Services.

1. INTRODUCTION

One in three preschool children in the developing world is undernourished. They are more likely to have impaired immune systems, poorer cognitive development, lower productivity as adults, and greater susceptibility to diet- related chronic diseases such as hypertension and coronary heart disease later in life. Undernourished female preschoolers are likely to grow into undernourished young women who are more likely to give birth to babies who are undernourished even before they are born, thus perpetuate the intergenerational transmission of deprivation (Smith and Lawrence, 2000). Child malnutrition is widely viewed all over India. Nearly half of the under five age group children are malnourished (IIPS and Macro 2007) Malnutrition at lower age certainly reduces the learning abilities of the children and it

reduces the future skills and work capacity. Over the period of time, malnourishment among children has received attention in India. But malnourished children are excluded from essential goods and services, vaccines, micronutrients, schools, healthcare facilities, water and sanitation, among others and denied protection from exploitation, violence, abuse, and neglect, and thus deprived of the ability to participate fully in society which is their right (Khan, 2006). The policies are not framed up to local level to eradicate complete child malnutrition. At local level, there are different causes related to malnutrition among children. In Mumbai city, malnutrition among children is not expected. This is because Mumbai is the financial capital of India. Apart from corporate head-quarters of number of Indian companies and multinational companies (MNCs), most of the financial institutions such as stock exchange and central bank are located in the city. The growth of service sector which includes finance, information technology (IT), telecom, tourism, entertainment, advertising, communication is higher than any other sector. Due to its vast potential to provide enormous employment opportunities to people, it lures people to from rural areas to the city. Therefore skilled and unskilled people migrate in the city. They are easily consumed in the vast labor market in the city. However, due to lack of formal employment, these workers are doing various economic activities and live in the various slums across the city. New and old construction activities provide a number of informal sector jobs to different kinds of workers, both male and female. The male workers are involved in different construction activities. The women workers also work as causal laborers. They cart materials to and from building sites. They usually wake up early in the morning and prepare food for the family. If drinking water facilities are not available near the house, then it is a laborious activity to carry water from long distances. In such circumstances, women and children usually carry water from extended distances in the slums. The number of trips to carry enough water depends on the family size, the distance to the source of water, the price of water, the hygiene of family, the availability of time etc. For each household, the water requirement and use is different. Generally, the households engaged in causal labor market have fewer skills and work only in nearby areas around their house. Most of the women usually walk to their workplace. Competition is considerably high for the unskilled jobs in the city because of availability of workers through large-scale migration into this region. The girls are neglected in most of the families. They are not offered care and supplementary food and breastfeeding as it is provided to boys. They are not taken to doctor for different health problems. Genetically girls are stronger as compare to boys. But they are neglected of food and care which makes them more vulnerable. At lower age, children are exposed to unfavorable socio-economic conditions. They do not get adjust with slum atmosphere. The women are exposing children much early to surrounding unhealthy environment. At older age, children's immunity power get develop and therefore they are less likely to be malnourished. Women in slums do not use modern contraceptives. They are exposed to further risk of pregnancy and child birth. Most of the contraceptives are beyond the reach of

the poor women. Health workers do not visit slums and provide counseling and contraceptives to women. Women complete the expected number of children in short span of time and they perform family planning operation. At lower age, they perform family planning operation without keeping proper gap between siblings. The first child is not properly feed and provided supplementary food, the next child get delivered. Such deliveries in short span of time affect on the health of women as well as number of children. In slums, most of the girls marry early and give birth to underweight babies. Most of the women deliver the baby at home. Public health care facilities are overcrowded. In order to deliver baby in government health care facilities pregnant women need to go at least two days ahead of delivery and stay with relatives or in laws at hospital. Poor women do not have money to spend for transportation, food etc. The public health care facilities are overcrowded and proper care is not taken of poor pregnant women. If poor women reach health facility at the last stage then doctors do not have choice but to perform cesarean. It further affects on the health status of women and children. Most of the women are busy with household chores and daily work. The water supply and market is far away from slums. After delivery, they take few days rest and join their daily work and household chores. Children are taken at work for breastfeeding and care. There are no day care centers available at work places. If the children are kept at home then it is left to neighbor, relative, older siblings and older people. They are not properly look after and they are exposed to different kind of risk. Most of the poor women face the problem of violence with husband and in laws. They are hard working but in laws do not help and take care of such women. The husband often fights with them due to economical reasons and they beat women even for small reasons. It affects on their health as well as children's health.

In case, the workers fall sick and have to visit a health centre, then public health facilities are usually overcrowded and visiting them consumes a lot of precious time which they otherwise could utilize for their work. The direct and indirect cost of visiting health facility, including travelling and medicines is often to forego their daily wages. Regular check-ups may raise the economic burden caused by medical care even further. In order to avoid getting sacked and in hope of regular income, the workers might option for private health facilities and medical treatment. However, visiting private health facilities is costly because of high consultancy fees and medicine charges. Most of the time, poor people borrow money for medical treatment from their relatives, friends, contractors, etc. To avoid such debts and save money, many workers also try to find solutions to their health problems with home remedies.

The anganwadi centers provide supplementary feeding and health care to below five age group children in India. They measure weight and height and provide medical care and food to undernourished children. The anganwadi workers are expected to cook food, serve and provide health care to children. But in slums, there is no space for anganwadi centers. Food is not prepared and medical care is not

provided to children. Most of the slum areas are declared as new settlements and illegal squatters. Therefore the slums are either demolished or notified as illegal squatters. Most of the slums are neglected in terms of provision of infrastructural facilities. Most of the basic services such as water supply, electricity, housing and sanitation are beyond the reach of poor living in slums. Poor people living in these slums have no choice but to purchase such services from the private providers who charge exorbitant prices. In the light of above discussion, this paper looks at the child malnutrition in the urban slums of Mumbai. The first part of the paper explains the data and methodology used in this study. Second section describes the incidence of child malnutrition and the household characteristics of undernourished children. Third section examines the association of child malnutrition with socio-economic characteristics of using logistic regression. Finally, the concluding section explores the policy implications of the study.

2. DATA

Data for this study is collected from two *kutcha* slums in Mumbai city. The *kutcha* slums houses are of plastic sheet and they are without piped water supply, electricity and sanitation facilities. The sample was undertaken in March-April 2014. We administered detail questionnaire and collected data of 269 households in Mankhurd and Govandi suburbs. Such suburbs are very famous for the high level of child malnutrition and poverty incidence. We have surveyed four settlements. The two settlements were from the Mankhurd that is Maharashtra Nagar and Sathe nagar. The Cheda Nagar and Baiganwadi are from Govandi suburb. We had chosen stratified random sampling for collecting primary data for this study. After selecting particular household, we have interviewed household head and took weight and height of each member. The primary data has been analyzed in Stata@12 software. We used logistic regression to examine the socio-economic characteristics of malnourished children.

3. MEASUREMENT OF CHILD MALNUTRITION

A child's nutritional status is mainly expressed in terms of height for age, weight for height and weight for age. We compare the child's weight, height with reference population. Such reference population is given by the World Health Organization (WHO). Children who are too short for their age are called "stunted". The height for age reflects a child's past or chronic nutritional status. The slow growth in height over longer period of time causes children to fall further and further behind the height of the reference population. Thus "stunting" is also called as the cumulative indicator of slow physical growth. Weight for height reflects more a child's current nutritional status. This is because weight can fluctuate

of acute disease whereas height cannot. Height gets fluctuate in long term. Children whose weight is too low, relative to their heights are called "wasted". This is an indicator of acute malnutrition and thus, may be a sensitive indicator of short-term response to changing conditions. While stunting is usually not reversed, children who become stunted typically remain so throughout their lives and thus never "catch up". The weight loss associated with "wasting" can be restored quickly under favorable conditions. "Wasting" represents depletion of body tissue whereas "stunting," indicates a slower rate of new tissue deposition (Osmani, 1989). The third indicator, weight for age, combines information of "stunting", "wasting" or both. In short, weight is influenced by thinness and by height. Children whose weight is too low for their age are called "underweight".

The Z score

All the above three indicators are commonly expressed in the form of Z score (Harold, 2000; Kostermans, 1994; Galloway, 1991; Giliespie and Lawrence, 2003). This score compares a child's weight and height with the weight and height of a similar age and sex of child from a reference healthy population. More precisely weight and height of children of a certain age group follow more or less the normal distribution. The stunting Z score of a child is the difference between the height of that child Hi and the median height of a group of healthy children of the same age and sex from the reference population Hr divided by the standard deviation of the height of those same group of children (same age and sex) from the reference population SDr. The value of the Z score can be conceived as the number of standard deviations that the child is away from the median of the concerned indicator of the children of that age/sex group from the standard population.

Mathematically,

$$Z\ score = \frac{Child's\ anthropometric\ value - median\ of\ reference\ population}{Standard\ deviation\ of\ reference\ population}$$

The basic idea is to assume that the given child comes from a healthy population. Under this null hypothesis, the Z score should follow the standard normal distribution. If the value of the Z score is sufficiently low that it has a very small probability of occurring, we reject the null hypothesis and classify the child as malnourished. Relatively short children have negative height for age, Z score and thus moderately stunted children are classified as those that have Z score –2 and severely stunted children are classified as those that have Z score –3.

The Z score for low weight for age "underweight" is calculated in the same way using the weight of the child (instead of height) and the median weight (and standard deviation) of the child of the same age and sex from a healthy reference population. Finally Z score for "wasting" (low weight for height) is obtained by comparing the weight of the child with the median weight (and standard deviation) of child from the reference population who have the same height as this child. The international reference population advocated by the US, Centers for Disease Control (CDC) is based on data from the National Center for Health Statistics (NCHS). The two preferred anthropometric indices for the measurement of nutritional status of children are stunted and wasted, since they distinguish within long run and short run of physiological processes. The "wasting" (low weight for height) index has the advantage that it can be calculated without knowing the child's age. It is particularly useful in describing the current health status, of a population and in evaluating the benefits of intervention programs, since it responds more quickly to changes in nutritional status than does stunting. "Stunting" measures in the long run reflects social condition, because it is reflecting past nutritional status. Thus the WHO recommends it as a reliable measure of overall social deprivation (Glewwe et al., 2002) and it is proxy for multifaceted deprivation. By consequences, being wasted is a better indicator for the determination of short-term survival, whereas sensitivity and specificity of survival in a one or two year period is highest for weight for age (Kostermans, 1994). The weight for age indicator is intended to capture both long term (stunting) and short term (wasting) under nutrition. It has been the indicator used most frequently by World Health Organization (WHO), United Nations International Children's Emergency Fund (UNICEF) and other international organizations concerned with the health status of children.

4. STATISTICAL MODEL

A statistical model for healthy children in any region is defined as follows.

CH= f(Y, A, K, C, Id, CC, T)   (1)

Health of any child (CH) is depending on the parent's income, household assets, knowledge of mother and contraceptive use by couple, institutional delivery, care of child and health treatment provided to child. All these major components of child health are further depending on the number of other factors.

Y= (F, NF, A)   (2)

The parents spend income on regular purchase of food and non food items. Some household assets are purchased from the household saving. The household buy physical assets which are further divided in broader way as follows.

A= (T, R, F, B, C)   (3)

Physical asset of any family comprises as television, radio, refrigerator, bike and car. It is affecting on the knowledge of women and health of child. The ownership of bike and car improves the mobility of family in city.

K= (M, T, R, H)   (4)

Knowledge of women is related to reading of magazines and books, watching television, listening radio, and visiting health facility. Women gets health related knowledge for self and child from all these sources.

C= (P, C, I)   (5)

Contraceptive use by couple is defined as use of any family planning method such as pills, condom, IUD. They are defined as the modern contraceptive methods and they are more safe and reliable methods.

ID= (P, G)   (6)

Institutional delivery is defined as delivery taken place either in private or public hospital. It is considered as more safe delivery as compare to the home delivery.

SD= (D, N, M)   (7)

Safe delivery is further defined as the delivery attended by health professional such as doctor, nurse and midwife. They are specialized staff in attaining the deliveries.

CC= (B, S, C)   (8)

Child care is defined as the immediate and exclusive breastfeeding by the mother, supplementary feeding after six months and physical care to child. They are critical factors for first year of child.

T= (P, G, Y)   (9)

Treatment of a child is defined as the medical treatment given either in private or public hospital and any health center. It is also depend on the income of the parents.

Based on the above model and indicators, we have tried to found the incidence of malnutrition among below five age group children in Mumbai city.

5. INCIDENCE OF CHILD MALNUTRITION IN SLUMS

Based on the above child health indicators, we have classified the children as underweight and stunted. The incidence of wasting is not found in our study. Therefore it is not reported in the following table.

TABLE 1 – INCIDENCE OF MALNUTRITION (PERCENT)

Suburb	Area	Underweight		Stunting	
		Male	**Female**	**Male**	**Female**
Mankhurd	Maharashtra nagar	25.00	5.26	37.50	7.69
	Sathe nagar	41.67	52.63	37.50	15.38
Govandi	Cheda nagar	16.67	36.84	12.50	38.46
	Baigan wadi	16.67	5.26	12.50	38.46

Source: Primary data collected

Above table shows that the incidence of underweight among male in Sathe nagar of Mankhurd is 41.67 percent. It is highest as compare to other area. The underweight incidence among girls is 52.63 percent. The incidence of underweight among male in Maharashtra nagar is 25 percent. In Cheda nagar and Baiganwadi the incidence of underweight among male is almost same (16.67 percent). The incidence of stunting among male is almost same (37.50 percent) in Maharashtra and Sathe Nagar. The incidence of stunting among female is found same in Baiganwadi and Cheda Nagar (38.46 percent) of Govandi suburb. In the overall sample, we found that 13.95 percent male and 25.33 percent female are underweight. As far as stunting is concerned then 9.30 percent male and 17.33 percent female are stunted. In our sample, the female have high incidence of underweight and stunting. In literature also plenty of evidences documented that girls receive less nutrition both quantitatively and qualitatively due to society's preference for boys (Gaur S. and Katamgari B. 2013).We have also compared the incidence of underweight and stunting as per the age and sex of the children. This is because at lower age children have high probability of malnutrition in slums. The lower socio-economic conditions and low immunity makes them more vulnerable of nutrition.

TABLE 2 – AGE WISE INCIDENCE OF UNDERWEIGHT AND STUNTING AMONG CHILDREN (PERCENT)

Age of children(months)	Underweight		Stunting	
	Male	**Female**	**Male**	**Female**
0-11	0.00	26.32	11.11	44.44
12-23	50.00	47.37	66.67	33.33
24-35	16.67	10.53	11.11	11.11
36-47	8.33	10.53	0.00	0.00
48-59	8.33	0.00	11.11	0.00
60<	16.67	5.26	0.00	11.11

Source: As per table one

Above table shows that the incidence of stunting is 50 percent among boys of 12-23 months. Among girls, the incidence of underweight in same age group is reported as 47.37 percent. Incidence of underweight and stunting is not found in 48-59 months for girls. The incidence of stunting is 66.67 percent among boys in 12-23 months. It is not found in the age group of 36-47 months. Incidence of stunting in 0-11 months among girls is 44.44 percent. The incidence of underweight in the age group of 12-24 months is high among boys and girls. But the incidence of stunting is higher among girls below 0-11months. We have also compared the incidence of underweight and stunting as per the household assets.

TABLE 3 – HOUSEHOLD ASSETS IN MALNOURISHED CHILDREN (PERCENT)

Household assets	Underweight		Stunting	
	Male	**Female**	**Male**	**Female**
Television	50.00	52.63	44.44	55.56
Bike	0.00	10.53	0.00	11.11
Car	0.00	5.26	0.00	11.11

Source: As per table one

We found that half of the underweight and stunted children do not have television at home. Ownership of television certainly improves the health related knowledge of women. They watch many programs related to child care and nutrition. Only 10.53 per cent underweight female have bike at home. As far as stunting among female is concerned, then 11.11 percent have bike and car at home. Ownership of bike and car helps mobility of family in city. But low income and poverty do not allow families to buy such assets. Above table clearly shows that the malnourished children have lower household assets in slums. We have also asked different questions related to source of knowledge to women. In order to improve health of the children, women knowledge is important. Most of the women do not read books and magazines; they only watch movies on television.

TABLE 4 – KNOWLEDGE OF WOMEN AND MALNOURISHED CHILDREN (PERCENT)

Knowledge of women	Underweight		Stunting	
	Male	**Female**	**Male**	**Female**
Read magazine	33.33	10.53	33.33	11.11
Watch television	66.67	68.42	55.56	66.67
Watch cinema	66.67	68.42	66.67	66.67
Know nutrition	16.67	47.37	11.11	33.33

Source: As per table one

We found that 33. 33 percent women read magazines but male children are stunted and underweight respectively. Almost 66.67 percent women watch cinema but male children are underweight and female children are stunted respectively. Only 16.67 percent women have knowledge of nutrition but the male children are underweight. Nearly, 47.37 percent of the women have knowledge of nutrition but the

female are underweight. Nearly 33.33 percent women have nutritional knowledge but the girls are stunted.

Family planning methods have limited access to women in slums.

TABLE 5 – USE OF FAMILY PLANNING METHODS (PERCENT)

Family planning methods	Underweight		Stunted	
	Male	Female	Male	Female
Pills	0.00	21.05	0.00	33.33
Condoms	16.67	10.53	22.22	11.11
Female sterilization	33.33	26.32	0.00	11.11

Source: As per table one

Above table shows that 21.05 percent female use pill as contraceptive method but female children are underweight. Nearly 33.33 percent women use pill but female children are stunted. Nearly 16.67 percent women use condom as contraceptive but male children are underweight. The 22.22 percent women use condom as contraceptive but females are stunted. Total 33.33 percent female use sterilization but male children are underweight. Total 26.32 percent women had sterilization but they have underweight female children. Total 11.11 percent women have sterilization but the female children are stunted.

There is no access to health care to women in slums. The private health care facilities are expensive and they are beyond the capacity of poor women. The public health care facilities are overcrowded in city. The World Health Organization has recommended at least four ANC visits during pregnancy. But poor pregnant women of slums do not get time to visit health facility and get all ANC visits.

TABLE 6 – HEALTH CARE ACCESS TO WOMEN (PERCENT)

Health care access to women	Underweight		Stunting	
	Male	Female	Male	Female
Antenatal care	75.00	52.63	66.67	44.44
Delivery in private hospital	0.00	10.53	0.00	11.11
Delivery in government hospital	75.00	68.42	88.89	77.78
Home delivery	25.00	21.05	11.11	11.11
Assistance of doctor	8.33	5.26	11.11	11.11

Source: As per table one

We found that 75 percent women received antenatal care but the male children are underweight. The 52.63 percent women have received the prenatal care but the female children are underweight. Nearly 66.67 percent women received the antenatal care but the male children are stunted. The 10.53 percent women said that they had delivery in public hospital but the female children are underweight. Nearly 11.11 percent women said that their delivery took place in private health care facility but the female children are stunted. Nearly 75 percent deliveries took place in government hospital but the male children are underweight. For female, it is 68.42 percent. Nearly 88.89 percent women said that their delivery took place in government hospital but the male children are stunted. For female, it is 77.78

percent. Almost 25 percent deliveries took place at home but the male children are underweight. The home delivery took place of women but 11.11 percent boys and girls are stunted. Only 8.33 percent women said that the assistance of doctor received during delivery but the male children are underweight. The assistance during delivery received by the doctor is 11.11 percent but the male and female are stunted. Nature of delivery is also important for the health of women and children.

TABLE 7 – NATURE OF DELIVERY TOOK PLACE (PERCENT)

Nature of delivery	Underweight		Stunting	
	Male	**Female**	**Male**	**Female**
Normal	83.33	84.21	100.00	77.78
Cesarean	8.33	10.53	0.00	11.11

Source: As per table one

Nearly, 83.33 percent women said that their delivery was normal but male children are underweight. For female it is 84.21 percent. The cesarean delivery took place of 8.33 percent of women but male children were underweight. For female, it is 10.53 percent. All women said that their delivery was normal but male children were stunted. For female, it is 77.78 percent. Around 11.11 percent women said that their delivery was cesarean but female children were stunted. Breastfeeding is must for below six month children. Supplementary food also required after six month to children. But it is not provided regularly to children in slums.

TABLE 8 – BREST FEEDING AND OUTSIDE FOOD TO CHILDREN (PERCENT)

Breastfeeding and supplementary food	Underweight		Stunting	
	Male	**Female**	**Male**	**Female**
Immediate breastfeeding	91.67	94.74	88.89	100
Still breastfeeding	58.33	42.11	55.56	33.33
Except milk outside food	16.67	10.53	22.22	0.00
Anganwadi food	50.00	10.53	0.00	22.22

Source: As per table one

Above table shows that 91.67 percent women said that male children are immediately breastfeed after delivery but they are underweight. For female, it is 94.74 percent. The 88.89 percent women said that the male children are immediately breastfeed but they are stunted. All female are stunted but the mothers said that they breastfeed immediately after birth. Nearly 58.33 percent women are still breastfeeding but male children are underweight. Nearly 42.11 percent female are underweight but the mothers are still breastfeeding. The 55.56 percent male are stunted but the mothers are still breastfeeding. The female are 33.33 percent in this category. It has been recognized that inappropriate feeding practices include absence of exclusive breastfeeding in children below 6 months old, premature lactation after 6 months, and giving complementary foods too late may cause malnutrition (Zhou H. et.al 2000). The another finding indicated that although mothers were aware of breastfeeding benefits and regarded it as their responsibility, in few cases, neonates were fed by items other than breast milk.

Exclusive breast feeding was not followed precisely. Pregnancy of mothers, lack of knowledge, misinformation and physician instruction were among the reasons why mother may stop breast-feeding. Mothers' and caregivers were aware of the importance of breast feeding in sick children (Amini A.et.al.2013). In our study only 16.67 percent underweight male are given outside food except milk. For female, it is 10.53 percent. It means outside food is less or not given to the female children. Almost half of the underweight males have received the supplementary food from anganwadi center. The stunted males have not received anganwadi food in our sample. For female, it is only 22.22 percent. Child care is must and important from birth till two years.

TABLE 9 – CHILD CARE ACCESS AND UTILIZATION (PERCENT)

Child care access	Underweight		Stunting	
	Male	**Female**	**Male**	**Female**
Child stay at home	16.67	36.84	11.11	66.67
Taken on work	91.67	47.37	66.67	33.33

Source: As per table one

Above table shows that 16.67 percent underweight male stay at home but the women are working on daily wage. Nearly 36.84 percent female children are underweight but stay at home and the women are working outside. Nearly 11.11 percent male are underweight but women work on daily wage. The female those stunted stay at home are 66.67 percent but their mothers work on daily wage. Nearly 91.67 percent male children are underweight but women are working whole day. For female, it is 47.37 percent. The male stunted are 66.67 percent but they are with mother on work. For female, it is 33.33 percent. It means there are no day care centers available to these children. There is no choice but to carry such children at work place. The malnourished males are taken to work for care more as compare to female. Malnourished girls are kept at home without care.

6. ECONOMETRIC MODEL

In order to examine the socio-economic co-relation with the malnourished children, we have used the logistic regression (Greene W. 2003). The logistic regression gives the odd ratio for malnourished children with compare to non malnourished children. The model is explained as follows

$$f(z) = e_z/e_{z+1} \tag{10}$$

$$= 1/1 + e_z$$

$$z = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \ldots\ldots + \beta_k x_k, \tag{11}$$

Where

z = Dependent variable

β_0= Intercept

β_1, β_2, β_3 are "regression co-efficient" of x_1, x_2, x_3 respectively. The variables x_1, x_2, x_3 are considered as the independent variables. Such independent variables are of socio-economic and demographic category. The results are presented in following table.

TABLE 10 – REGRESSION RESULT FOR UNDERWEIGHT AND STUNTED CHILDREN

Variables	Underweight			Stunted			
	Co-efficient	Standard error	Z test	Variables	Co-efficient	Standard error	Z test
Sex	0.82**	0.46	3.21	Age	-1.29*	0.34	14.54
Age	-0.71*	0.17	16.94	Domestic violence	1.81**	1.03	3.09
Pills	-0.93***	0.68	1.89	Supplementary food	-1.49**	0.88	2.87
Home delivery	0.13***	0.10	1.67	Child at work	-0.94**	0.60	2.47
Normal delivery	-1.38**	0.72	3.63				
Constant	0.80	0.86	0.86	Constant	0.83	0.64	1.69
	-2 log likelihood=125.70 Cox and Snell R2=0.18 Nagel kerke R2=0.29				-2 log likelihood=77.78 Cox and Snell R2=0.19 Nagel kerke R2=0.39		

* Significant at 1 percent, ** significant at 5 percent, *** significant at 10 percent

We found that the female are more underweight because the female are neglected in terms of supplementary food, milk and care. The male children are offered more care, milk and supplementary food at home. The girls have 82 percent more chance that they will be underweight as compare to boys. Age of the children is negatively co-related to underweight because at lower age, child does not cope with the surrounding atmosphere. The socio-economic as well as women's knowledge is inadequate to take care of the children. Therefore at lower age, the possibility of underweight becomes high. At higher age, seventy one percent is the chance that the children will not be underweight. The women those take pills, the children have 93 percent less chance that they will be underweight and it is statistically significant and negatively co-related. Those women who have home delivery, the children have 13 percent more chance that they will be underweight. It is statistically significant and positively correlated. Women those do not have normal delivery then the children have 38 percent more likely to be underweight. Cesarean may affects the health of the women and children. The age of the children is positively co-related to the stunting. At lower age, the children have 29 percent more likely to be stunted as compare to high age group children. The children are stunted if there is domestic violence in family. The children are 81 percent more likely to be stunted if there is violence with women. The domestic

violence against women affects malnutrition especially in pregnant women and young children. Because young children rely heavily on maternal care, their exposure to domestic violence is disproportionate among children. Such exposures have adverse effects on children's development (Yount K.M.et.al 2011). Those children are stunted; they do not get the supplementary food from anganwadi centers in slums. It is statistically significant and negatively co-related. Stunted children are 49 percent less likely to get the supplementary food. Those women do not take child with themselves at work then the children are 94 percent more likely to be stunted. There are no day care centers available at slum level or at work place. The children are left at home, relatives and neighbor and therefore they get stunted.

7. POLICY IMPLICATION

The rising population in the city adds pressure on existing civic amenities in Mumbai city. Inadequate civic amenities such as water supply, housing, transportation, health care, solid waste, sanitation affect the quality of life inversely. The poor people of slums are neglected from the provision of basic infrastructure services. The present study finds that the children below five years of slums are more malnourished in city. The female children are more vulnerable to malnutrition. Malnutrition is observed high at one to two age groups. Therefore it is affecting on future educational attainment, physical growth and work capacities of such children. The household assets, knowledge and health care access to slum women is low. The state government and Municipal Corporation must provide health care, supplementary food, water supply to poor households across slums in city. Government policies towards slums must be flexible. Government treats most of slums as illegal squatters in city. It neglects infrastructural facilities to slums. In general, government should not differentiate the households based on area and nature of houses. They must maintain uniform infrastructural services to all households in city. The results confirm that water and sanitation provision have a positive effect on nutritional status, but these effects are not substantial. Community-based piped water provision and flush toilets have the greatest potential to reduce malnutrition. Household access to point source water and latrines are more likely to reduce the probability of birth malnutrition among poor households than other public infrastructure (Jose, 2007).Government must prepare radio and television programs to women of slums. Such programs must be given top priority of the child care, nutrition and contraceptive knowledge pre and post natal care. Government must appoint more Asha workers across slums and they must encourage delivery in public health care facilities. Women must be provided the antenatal and postnatal care, checkups and medicines in slums. The poor women must be given food and financial assistance at the time of delivery in the public health care facility. Women must be taught importance of breastfeeding till first six month of child. Breastfeeding women must be given flexibility at work places.

The incidence of diarrhea is high among slums. The duration of diarrhea, including that associated with enterotoxigenic Escherichia coli and Shigella, increasing progressively as nutritional status indicators worsens (Black R.E et.al 1984). We have not found high incidence of diarrhea but health workers must treat diarrhea cases on priority basis. Government must start the child day care center at slums as well as at work places. Government must open more anganwadi centers at slums. More effective supplementary food and health care at anganwadi centers will reduce the child malnutrition at slums in Mumbai city. Such polices will certainly help to reduce child malnutrition at some extent in city. This paper will achieve its objective if one policy is framed for undernourished children of slums in Mumbai city.

ACKNOWLEDGEMENT

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