

## DOES DEMOLITION OF SLUMS AFFECTS ON PRE-SCHOOL CHILDREN'S HEALTH IN MUMBAI?

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### Abstract

This paper compares the incidence of malnutrition among below five age group children in demolished and not demolished slums in Mumbai. After demolition of kuttcha slums, the incidence of stunting and wasting increases among boys. The incidence of underweight is observed very high for girls. Incidence of severe malnourishment becomes double after demolition of kuttcha slums. The logit regression model shows that the incidence of malnourishment among 0-5 age group children is negatively related to per capita income, age of the child, mother's education, and positively related to mother's body mass index. As far as malnourishment among pre-school children is concerned then, dummy variable for demolished slums is positive and statistically significant. The policy mix of redevelopment of kuttcha slums, income improvement through training to women, opening up of new Anganwadi centers, provision of health care facilities and sanitation will certainly reduce the incidence of child malnutrition in Mumbai.

**Keywords:** demolished slums, malnutrition, underweight.

### 1. Introduction

The prevalence of child malnutrition is very high and half of the preschool children are underweight in Maharashtra (IIPS and Macro 2007). Malnutrition among children retards physical and cognitive growth. The physical growth retardation occurs either during pregnancy or during first two years of life. The cognitive deficit affects school outcome, includes a reduced capacity to learn and fewer total years of schooling. Such lower physical and cognitive growth affects on educational attainment, future productivity and income.

In Mumbai, almost sixty percent of population lives in slums. Slums are mainly classified as pucca, semipucca and kuttcha slums. Government of Maharashtra and Brihan Mumbai Municipal Corporation (BMC) has been provided all basic facilities to pucca and semi-pacca slums. But they did not provide basic facilities such as drinking water, electricity and roads etc. to kuttcha slums. This is mainly because kuttcha slums are located either on government or private land. Therefore these slums are considered as illegal settlements. In kuttcha slums, most of the people are migrants from various states and rural Maharashtra. They work in unorganized sector, where there are lower wages and uncertain nature of

jobs. The women are supplementing income through participating in income generating activities. They work on construction sites, housekeeping or selling commodities (vegetables, fish, garlic, etc) in the market. Daily income from such activities is uncertain and very low. The women labor has to perform different tasks at home and work. At home, they have major responsibilities of taking care of all members, food preparation, carry water, vegetables, cleaning house, obtaining health care to all and supervision of children etc. In kuttcha slums there is no access to safe regular and convenient supply of good quality drinking water at an affordable cost. Reliable drinking water can be purchased at Rs. 1 to 2 per liter. If the distance of water tap from house is longer then it is an onerous and time consuming task. Women do not have time to wait in a long queue and water is available only for a few hours a day. Due to limited time of water, women and children are forced to carry water, signifying a high level of physical hardship. Women cannot do the repeated visits because of high opportunity cost in terms of childcare, income generating activities and household chores. It is imperative to remain present on time at the work place, women are either transferring their responsibility of carrying water to older siblings or they wake up early in the morning to collect water. Everyday, it is a struggle to obtain just few liters of water for whole family. Inadequate quality and quantity of drinking water is a major cause of water borne and water washed diseases. Sanitation across the kuttcha slum is another issue. Young children become more vulnerable to water related diseases as a result of weak body defenses, high susceptibility and greater exposure, an inadequate knowledge of how to avoid risks etc. The presence of young children imposes constraints on the mother's time because they require care at all time. Most of the mothers are transferring their responsibilities of supervising food and care on older siblings, relatives or neighbors. Young children are fed insufficient number of times per day and get an inadequate diet. Finding reliable and affordable childcare is a challenge for mothers who reside in slums across Mumbai. The mothers involved in a highly labor intensive task do not get sufficient time to recuperate after delivery. This further stresses the mother's nutritional status and reduces her bodily reserves. The reductions in body energy affect on the lactation performance of the mothers. Therefore such mothers cannot breastfeed their children for a longer period of time. Infections are rampant among children because of lack of access to clean water, sanitation, hygiene, health care etc.

Health facilities serving them are often dilapidated in accessible, inadequately stocked with basic medicines. Public health facilities in the urban area are great heavily demanded, which results in longer waiting periods. Therefore facilities like pre-post natal care, immunization, family planning, control of communicable diseases and curative medical care has a lower coverage. As far as a child's treatment is concerned then mothers have to go early in the morning wait in the longer queue to meet a doctor. The amount they pay proves expensive, thereby reducing the demand for health care through the

substitution effect. Such household may rely more on self-medication buying across the counter medication, traditional home remedies or simply in action. The cost associated with the utilization of public health services includes direct and indirect monetary costs. The direct cost is low but the indirect costs (monetary and non monetary) such as forgone income, the possibility of losing job and cost associated with not performing normal activities i.e. paid and unpaid work tending to children and transportation costs are much higher for such mothers. The mothers opportunity cost of time seems to play more of a role than user fees although both waiting time and travel time are less elastic. The requirement of mothers to remain present at the work place often prevents them from using the public health facilities. Mothers cannot frequently visit such health facilities because the characteristic of urban informal labor market is that the worker can easily be replaced, consequently the job can be lost through even on occasional absence. In addition, mothers involved in the casual labor market do not have time to prepare daily necessary meals, which are required for the family. Therefore the children of urban slums grow up without hygiene, medical care, exclusive breastfeeding or a balanced diet.

The Integrated Child Development Services (ICDS) program is well focused and functioning in Mumbai but it has very lower coverage of supplementary feeding and immunization against childhood diseases, health checkups, referral health and nutrition education to adults women or pre-school education to 3 to 6 years old children. In urban kuttcha slums, the density of population is very high. Therefore the total number of children below five years, pregnant women and lactating mothers are also very high. A single overburdened anganwadi worker can not be able to provide supplementary feeding as well as home visits for the younger children because of time constraints and also because of perceived knowledge limitations regarding child health and nutrition. Most of the kuttcha slums are neglected and without supplementary feeding and health services. In Kuttcha slums, most of the ICDS centers are small and do not have growth monitoring equipments, food preparation instruments, toilet etc. Most of the anganwadi workers are untrained and their remuneration is very low and it is not paid on time. Even most of the anganwadi workers are not ready for training or spend more time in centers. This is because after demolition they remain unemployed and people get shift to other slums. Therefore no permanent staff or structure is available across kuttcha slums. The problem of urban slum is generally evaluated from the point of view of the non-slum urban population, which sees slums as a problem to be solved rather than as an integral and necessary part of urban environment. In order to make Mumbai as modern world-class city that would be new Shanghai, the government has urged the policy of slum eradication. Most of the squatters do not have residential proof such as ration card, voting cards etc. The government of Maharashtra and Brihan Mumbai Municipal Corporation (BMC) has been consistently involved in giving notification of slum demolition. Slum eradication is a constant threat to urban kuttcha

slums due to increasing population density and real estate prices. The massive demolition of Kuttcha slums by bulldozing them is a regular phenomenon in Mumbai. Poor people of kuttcha slums always remain in fear and tension that their slums will get demolished and assets will be burned by government and Brihan Mumbai Corporation (BMC) officials. Therefore poor access to basic facilities such as water supply, health, sanitation and electricity indirectly contribute to higher incidence of child malnutrition in Mumbai. Demolition has major impact on income, employment, water supply and school drop out rate. Poor people do not have financial resources to pay for health services, food, clean drinking water and good sanitation. It is a basic requirement of good health.

First part of this paper deals with measurement of child malnourishment. Second section examines the incidence of malnourishment among pre-school children in demolished and non demolished slums. Last section deals with policy implication.

## 2. Measurement of Child Malnutrition:

The most commonly used anthropometric indicators in order to access the nutritional status of children are expressed in three ways.

- Gender specific height for age;
- Gender specific weight for height;
- Gender specific weight for age;

Each of these indicators evaluates a different aspect of the child's nutritional status. Height for age reflects a child's past or chronic nutritional status. Children who are too short for their age are called "*stunted*". 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 a cumulative indicator of slow physical growth.

Weight for height reflects more a child's current nutritional status, because weight can fluctuate because of acute disease whereas height cannot. 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, 1990). 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”.

### 3. Measurement of Anthropometric Indicators:

#### The Z score:

All three measures are commonly expressed in the form of Z score (Harold, 2000; Kostermans 1994, Galloway 1991, Gillespie and Lawrence 2003), which compares a child's weight and height with the weight and height of a similar age, sex, 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  $i^{th}$  is the difference between the height of that child  $H_i$  and the median height of a group of healthy children of the same age and sex from the reference population  $H_r$  divided by the standard deviation of the height of those same group of children (same age and sex) from the reference population  $SD_r$ . 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,

$$Z_{score} = \frac{\text{Child's Anthropometric Value} - \text{Median of Reference Population}}{\text{Standard Deviation of Reference Population}}$$

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 scores. Thus moderately stunted children are classified as those that have Z score below two standard deviation. Severely stunted children are classified as those that have Z score below three standard deviation of reference population.

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 children 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 children 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, Koch and Nguyen 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 WHO, UNICEF and other international organizations concerned with the health status of children.

#### 4. Data collection and methodology:

We collected data of 1012 households from kuttcha slums in Mumbai. Total 502 household’s data was collected from three recently demolished slums. In order to reduce the geographical, socio-economic differences and compare the incidence of child malnutrition with not demolished slums, we selected another three nearest kuttcha slums, which were not demolished during the demolition drive. We collected data of 510 households from such slums. The sample was undertaken in October 2005.

Due to dichotomous nature of dependent variable that is malnourished or not malnourished children, we used logit regression model to examine the socio-economic factors behind the incidence of malnourishment.

#### 5. Incidence of Stunting:

Stunting is an indicator of deficit in linear growth. It reflects past or chronic inadequate nutrition and frequent illness but cannot measure short-term changes in malnutrition. Low height for age relative to a child of the same sex and age in the reference population are referred as to “shortness”. Shortness is referred to as “stunting”

The child who lay below two standard deviation below the reference population is classified as stunted. Following table shows the incidence of stunting in demolished and not demolished slums. Such incidence is according to type of slums and sex of the child.

TABLE 1 INCIDENCE OF STUNTING AMONG DEMOLISHED AND NOT DEMOLISHED SLUMS

Sex	Demolished slums (%)	Not demolished slums (%)
Boys	24.28	22.46
Girls	21.33	22.00

Source: Primary survey 2005

The incidence of stunting among girls in demolished slums is 21.33 per cent whereas it is 22.00 per cent in not demolished slums. Such incidence is similar even after the demolition of slums. But incidence of stunting has been increased for boys after demolition of slums. It has increased from 22.46 per cent to 24.28 per cent.

### 6. Incidence of Wasting

Low weight for height relative to a child of the same sex and age in a reference population is referred to as thinness. Wasting may be consequences of starvation or severe disease (in particular diarrhea) but it can be also due to chronic conditions.

TABLE 2 INCIDENCE OF WASTING

Sex	Demolished slums (%)	Not demolished slums (%)
Boys	4.28	3.62
Girls	1.33	2.50

Source: Primary survey 2005

Above table shows that incidence of wasting among boys is 3.62 per cent in not demolished slums. But after demolition of slums, it has increased up to 4.28 per cent. For girls, the incidence was 2.50 per cent in not demolished slums. After demolition of slums, such incidence is lower. It is 1.33 per cent among girls in demolished slums. The reasons for such lower incidence are explained in the following paragraph.

### 7. Incidence of Underweight

Underweight is a composite measure of stunting and wasting. Child who lay below 2 standard deviation of reference population in terms of weight for particular age is classified as underweight. ICDS, UNICEF, and WHO is using this indicator in order to classify the nutritional status of children.

TABLE 3 INCIDENCE OF UNDERWEIGHT

Sex	Demolished slums (%)	Not demolished slums (%)
Boys	25.33	20.28
Girls	31.33	21.66

Source: Primary survey 2005

Incidence of underweight among boys in not demolished slums is 20.28 per cent. After demolition, such incidence increases up to five percent among boys that is 25.33 per cent. For girls such incidence increases up to 10 per cent. It is 31.33 per cent in demolished slums. The WHO has been proposed a classification scheme for degree of malnutrition. The prevalence of underweight is above or equal to 30 per cent then the degree of malnutrition is very high. Our results show that there is high degree of malnutrition among boys and very high degree of malnutrition among girls. Such high degree of malnutrition is observed after the demolition of slums in Mumbai. Very high malnutrition among girls has life cycle and generation effects. Under nutrition among girls may cause more severe episodes of diarrhea and a higher risk of pneumonia. Underweight adolescent girls can continue to grow for longer and they may not finish physical growth before their first delivery. A still physically growing women may more likely to give birth to a smaller baby. The reason is that the physically growing adolescent and the fetus are competing for nutrition. Therefore next generation also ends up with high level of child malnutrition.

#### 8. Incidence of Simultaneous stunting, wasting and underweight

The above explanation shows that the short stature for age (stunting) is conventionally held to reflect chronic undernutrition. Low weight for normal height “wasting” is taken to indicate acute under-nutrition. The lower weight for age (underweight) combines the chronic under-nutrition (stunting) and acute under-nutrition (wasting) or both. If a child is stunted, wasted and underweight for its age then he or she is considered to suffer form acute, chronic or both type of under nutrition.

TABLE 4 INCIDENCE OF SIMULTANEOUS STUNTING, WASTING AND UNDERWEIGHT

Percent of children who are simultaneously stunted wasted and underweight	Demolished slums (%)		Not demolished slums (%)	
	Boys	Girls	Boys	Girls
	3.88	0.95	2.89	2.50

Source: Primary survey 2005

In the above table, the incidence of simultaneous stunting, wasting and underweight among boys in not demolished slums is 2.89 per cent .The similar incidence increases after demolition and it increases up to 3.88 per cent. For girls, the simultaneous incidence is 2.50 per cent in not demolished slums. After demolition of slums, such incidence becomes lower and it declines from 2.50 to 0.95 per cent. It is because of following reasons.

Firstly, girls are more robust as compare to boys. Slum demolition is not affecting much on nutritional status of girls. They easily cope up with this phenomenon. Secondly, mothers of the girls may favor in terms of food intake or medical care. More physical care might be taken of girls. That is why such incidence is lower among girls.



Lastly, wasting is a short-term phenomenon even though it is lower among the girl and higher among the boys but it can be recovered in long term. Such difference is very much exists in our sample.

### 9. Incidence of Severe malnourishment

Severe malnutrition affects brain growth and development. It influences mental capabilities through damages to the nervous system during the period when the brain is growing. It is also affects future capabilities by reducing the energy that children have available for learning through interacting with their environment for example their motor development is impeded. Following table shows the incidence of severe malnutrition in demolished and not demolished slums.

TABLE 5 INCIDENCE OF SEVERE MALNOURISHMENT IN DEMOLISHED AND NOT DEMOLISHED SLUMS.

Indicators	Demolished Slums (%)		Not demolished Slums (%)	
	Boys	Girls	Boys	Girls
Underweight	4.76	2.66	0.00	0.83
Stunted	3.33	6.00	3.42	4.16
Wasted	0.00	0.00	0.00	0.00

Source: Primary survey 2005

Incidence of severe malnourishment is classified as the child falls below three standard deviation of reference population. The above table shows that total incidence of underweight among boys and girls is 3.71 per cent and stunting is 4.66 per cent. The total incidence in demolished slums is 8.37 per cent. Whereas the total incidence of severe malnourishment in not demolished is only 4.20 per cent. Therefore we can say that the total incidence becomes almost double after kuttcha slum demolition in Mumbai.

Maharashtra state is highly industrialized and second highest per capita income state in India. Slum demolition unnecessarily increases incidence of child malnutrition in Mumbai. Such physical and cognitive deprivation of children is foul for future development.

### 10. Logit regression results

We used Logit regression model (Greene, 2003) in order to examine the socio-economic reasons behind the child malnutrition. Such model is used to all below five age group children in demolished and not demolished slums. The child is classified as malnourished if the Z score falls below 2 standard deviation of reference population in terms of underweight, stunting and wasting.

Logit model for below five age group children in demolished and not demolished slums

$$Prob(a \text{ given child is malnourished} = 1) = \frac{Exp(b^x)}{1 + Exp(b^x)}$$

$b^x = 1.8446 - 0.0009*PCI - 1.0015*AGE + 0.3091*BMI + 0.3737*MED$

Likelihood Ratio=148.275 with 4 degrees of freedom

All variables are individually significant at 5 per cent.

In this analysis;

PCI: per capita income measured in actual rupees

AGE: age of the child is measured in actual months

BMI: BMI of mother is calculated as weight upon height square, if BMI>16 then classified as 3, BMI 16-16.99 then 2 and BMI 17-18.49 then classified as 1.

MED= A dummy variable is used as 0 if the mother is illiterate and 1 if mother is illiterate but father is literate, lastly if mother is literate then dummy variable is used as 2.

The above model indicates that the probability of malnourishment among 0-5 age group is negatively related to per capita income, age of the child, mother's education and positively to mother's body mass index.

In kuttcha slums, due to low per capita income, women can not purchase more of the inputs which are necessary for good child growth. The additional income is useful for canceling out through by harmful feeding and lack of care taking practices. Infectious diseases are often related to poor environmental hygiene or the absence of adequate health services in slums. Age of the child is negatively co-related with the probability of child being malnourished. It shows that probability of malnourishment is higher at birth and then slowly declines. There is positive relationship between the BMI and child malnourishment. If the BMI of mother is below 16 then the probability of child malnourishment is very high. At lower BMI mothers can not breastfeed longer for their children. There is direct relationship between BMI and poor lactation performance and poor growth in infants. Mother's education plays an important role in terms of child health. Educated mothers are usually healthier and give birth to healthier babies. They can provide a healthier environment to children and their greater knowledge about childcare affect children's health. But if the mothers are illiterate then there are more chances of the child being malnourished.

### 11. Effect of demolition

In Mumbai, there is continuous demolition drive of kuttcha slums. The large-scale demolition took place in February to August 2005. Near about 95 thousand kuttcha houses were demolished during a drive. This survey was undertaken immediately after the demolition of kuttcha slums in Mumbai, India. In the

following model, we have tried to examine the effect of demolition on children's health through dummy variable. We have pooled the data of demolished as well as not demolished slums.

$$Prob (a\ given\ child\ is\ malnourished = 1) = \frac{Exp(b'x)}{1 + Exp(b'x)}$$

$b'x = 0.4170 - 0.8254 * AGE - 0.2459 * MED + 0.3148 * BMI + 0.6857 * IMM + 1.0012 * DEMOL.$

Likelihood Ratio = 218.140 with 5 d.f (significant at 1%)

P value = 0.0000

All variables are individually significant at 5%.

The above model shows that the probability of a child malnourishment is negatively related to age of the child, mother's education, BMI of mother, immunization and it is positively co-related to the demolished slums.

From the previous model, only the added variables are immunization and demolished slums. The relationship of doses and malnourishment is positive. If the child is malnourished then immunization coverage will not affect much on health status. Such relationship is complicated and cannot be explained at this point. The coefficient of the demolition dummy variable is statistically significant and positive. This implies that holding all other variables constant, demolition of kuttcha slums has greater impact on pre-school children's health. This finding is important and runs counter to government of Maharashtra and Brihan Mumbai Municipal Corporation's (BMC) action of kuttcha slums demolition in Mumbai.

## 12. Policy Implication:

This paper finds that after demolition of kuttcha slums, the incidence of stunting and wasting increases among boys. Incidence of underweight is observed very high for girls in demolished slum. An incidence of simultaneous stunting, wasting and underweight is also increases among boys in demolished slums. Incidence of severe malnourishment is almost becomes double after demolition of kuttcha slums in Mumbai. The logit model shows that the slums demolition has positive effect on malnourishment of preschool childrens. Demolition of kuttcha slums is a regular activity of government and BMC. Poor people of kuttcha slums cannot fight against such drive. They are engaged in unorganized sector jobs. Participation against the demolition drive is an expensive task for them. Firstly such people get easily replaced from their jobs because they are working in informal sector. Secondly they cannot sustain for longer period of time due to high cost of living in the city. Therefore it is strongly recommended that, government and BMC must stop the demolition drive against kuttcha slums in Mumbai. There is need of

strategic planning to solve the problem of kuttcha slums in Mumbai. There is need of strong political commitment and flexible policies for kuttcha slums in the city. Government must discuss this problem with various academicians, institutions, NGO'S and slum dwellers. BMC and government can not keep kuttcha slums in isolation that is without water, electricity, health care facilities, roads etc. Training women and youths with some basic skills such as tailoring, mechanical and computer skills is required. Government needs to open more sub centers across the kuttcha slums in order to provide health care facilities. Similarly behavior and communication interventions will bring better results in terms of child malnutrition. Health care access to women and children will make much difference in terms of ability to survive and flourish as human being. But without health care access households will face unforeseen and unsolicited health shocks. The government must open new anganwadi centers across kuttcha slums in Mumbai. It needs to target ICDS program towards most vulnerable section of kuttcha slums that is pregnant, lactating women and 0-2 age group children. Anganwadi workers need training to understand the problem of kuttcha slums, pre-school children's health and nutrition, immunization, maternal health etc. The aim of the paper is to make aware of the effect of demolition on pre-school children health in Mumbai. In a highly urbanized, industrialized, socio-economically, culturally well state, such demolition drives are not expected and it has negative impact on future economic growth and human development.

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