The Myth of Child Malnutrition in India

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Abstract

A common continuing criticism of the economic reforms in India has been that despite accelerated growth and all-around poverty reduction, the country continues to suffer from child malnutrition that is worse than nearly all of the Sub Saharan African countries with lower per-capita incomes. Nearly half of India's under-five children are said to be underweight and stunted. Prime Minister Manmohan Singh recently described the problem as 'a matter of national shame.' I argue in this paper that this narrative, nearly universally accepted around the world, is both false and counter-productive from the viewpoint of policy formulation. It is purely an artifact of a faulty methodology that the World Health Organization has pushed and the United Nations has supported. If the numbers are correctly done, in all likelihood, India will have no more to be ashamed of its achievements in child nutrition than vital statistics such as life expectancy, infant mortality and maternal mortality.

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1. Introduction

This paper argues that a widely held belief about malnutrition among Indian children, commonly held by politicians, media persons, non-governmental organizations (NGOs) and academics, fails to stand up to close empirical scrutiny. In other words, this belief is a myth.

The myth in question is that nearly half of Indian children under five years of age are malnourished. A quick search on the Internet should convince the reader that the myth has wide currency among reputable international agencies, NGOs and newspapers. As an example, *The Economist* ran a story in its September 23, 2010 issue stating, "Nearly half of India's small children are malnourished: one of the highest rates of underweight children in the world, higher than most countries in sub-Saharan Africa. More than one-third of the world's 150m malnourished under-fives live in India."

In addition to this high *level* of child malnutrition, *The Economist* story also repeated the common claim that India had made very little progress in *reducing* malnutrition. It noted, "Almost as shocking as the prevalence of malnutrition in India is the country's failure to reduce it much, despite rapid growth. Since 1991 GDP has more than doubled, while malnutrition has decreased by only a few percentage points." Even otherwise measured Prime Minister of India, Manmohan Singh, recently went on to state that 'The problem of malnutrition is a matter of national shame' while releasing the much

publicized Hunger and Malnutrition (HUNGaMA) Report in January 2011, which also contributed to perpetuating the myth.[1]

With evidence now decisively establishing that the reforms have brought poverty down across all social and religious groups and that this reduction has accelerated with the recent acceleration in growth (Mukim and Panagariya 2013), the claim of ultra-high child malnutrition rates and the failure to bring them down has become the latest weapon in the fast-depleting arsenal of anti-reform critics. Remarkably, even much of the New Delhi establishment has bought into these claims with little critical scrutiny. This paper refutes both claims with systematic evidence.

By arguing that the current narrative of child malnutrition in India is a myth, I do not suggest for a moment that child malnutrition is an insignificant problem in the country. Just as life expectancy, infant, child and maternal mortality remain in need of considerable improvement, India needs to urgently and actively address child and adult malnutrition problems. The contention of the paper, instead, is that the numerical incidence of child malnutrition is greatly exaggerated on account of the faulty methodology employed to measure it and that the complaints of a lack of satisfactory progress are also exaggerated. I do not yet have alternative estimates that would allow us to measure the true incidence of malnourishment but my argument establishes a strong presumption that it would turn out to be consistent with other health indicators of India. We are likely to find that India has to be as much ashamed of its child malnutrition levels as of life expectancy, infant mortality, under-five mortality and maternal mortality. Properly calculated malnutrition numbers are also likely to show that the HUNGaMA

[1] The word "hungama" in Hindi means disorder. The quote by Singh has been widely reported and can be found at the link http://www.livemint.com/2012/01/10120900/Malnutrition-8216a-national.html (accessed on August 27, 2012).

that bamboozled the prime minister into expressing shame on behalf of the nation was just that.

No doubt, some will argue that the debate on true numbers is counterproductive since as long as a large proportion of children suffer from malnutrition, the effort required to combat it is the same whatever the precise numbers.[2] This, however, is an erroneous argument for at least three reasons. First, the numbers have serious implications for the allocation of scarce revenue resources among competing objectives, especially in a poor country with limited revenues. Second and even more importantly, if a child who is healthy but is misclassified as malnourished because an erroneous standard is applied to evaluate his nutrition status, we will prescribe increased diet when such adjustment is uncalled for and, moreover, could prove harmful by turning the child obese. Being politically correct does not always translate into policy correctness. Finally, even if the previous arguments are not valid, truth in numbers is an essential element in serious intellectual discourse. Else, we would be tempted to misrepresent all other indicators such as those relating to poverty alleviation, growth, life expectancy, infant mortality and maternal mortality. In intellectual discourse, end does not justify means.

2. Planting the Seeds of Doubt

I begin by offering three comparisons that challenge the common narrative that has now become the conventional wisdom. These comparisons should suffice to at least give the reader a pause and entertain the possibility that something is very wrong with the child-malnutrition numbers routinely bandied around.

[2] For isntance, the argument was made by the discussant of this paper at a conference.

2.1. India versus Chad

Let us begin by comparing a set of commonly used health indices for the child and the mother for India to those for Chad, a much poorer country in Sub Saharan Africa. As Table 1 shows, Chad has just 48 years of life expectancy against India's 65 years; infant mortality rate (IMR) of 124 against India's 50; under-five mortality rate of 209 relative India's 66; and the maternal mortality rate (MMR) of 1200 compared with India's 230. Yet, Chad has a proportionately fewer stunted (low height for age) and underweight (low weight for age) children than India.

Table 1: India compared to Chad and Central African Republic

Indicator	India	Chad	Central African Republic (CAR)	Chad as percent of India	CAR as percent of India
Life Expectancy (2009)	65	48	48	74	74
Infant Mortality per 1,000 live births (2009)	50	124	112	248	224
Under-five mortality per 1,000 live births	66	209	171	317	259
Maternal Mortality per 100,000 live births (2009)	230	1200	850	522	370
Percent children below 5 stunted (2000-09)	47.9	44.8	44.6	94	93
Percent children below 5 underweight (2000-09)	43.5	33.9	21.8	78	50

Source: WHO World Health Statistics, 2011

The reader must ponder the question: Is it at all plausible that the better nourished infants in Chad die at two and a half times the rate in India; that better nourished under-five children in this country die at rates more than three times that in India; and that the mothers who give birth to these better nourished children die at rates five and a quarter

times those in India? A comparison with the Central African Republic, whose health indicators appear in the last column of Table 1, paints the same fantastic picture.

2.2. Kerala versus Senegal

Next, let us compare the Indian state of Kerala with Senegal and Mauritania, both of the latter being in Sub Saharan Africa. Kerala in India has vital statistics matching those of China and approaching those in the developed countries while Senegal and Mauritania are among the better off countries in SSA with per-capita incomes close to that in India but not Kerala.[3] The comparison reinforces the point brought out by the India-Chad comparison above. Senegal, which has four and a quarter times the IMR of Kerala, almost six times its under-five mortality and four and one-thirds of its MMR has lower stunting and underweight rates. Better-nourished children in Senegal die at rates many times those in Kerala and the same holds for their mothers. A comparison with Mauritania yields the same picture.

Table 2: Comparing the States of Kerala in India and Senegal

Indicator	Kerala	Senegal	Mauritania
Life Expectancy	74	62	58
Infant Mortality per 1,000 live births	12	51	74
Under-five mortality per 1,000 live births*	16	93	117
Maternal Mortality per 100,000 live births (2009)	95	410	550
Percent children below 5 stunted (2000-09)	25.0	20.0	24.2
Percent children below 5 underweight (2000-09)	23.0	15.0	16.7

*From National Family Health Survey 2005-06 for Kerala. All other data from WHO World Health Statistics, 2011

[3] Per-capita GDP in 2009 in current dollars was $1192 in India, $1023 in Senegal and $919 in Mauritania. Kerala was the fourth richest among the larger Indian states in 2009 according to per-capita gross state domestic product and enjoyed approximately one and a half times the per-capita income nationwide.

2.3. India versus the 33 Poorer Sub Saharan African Countries

The above comparisons are not isolated example. A comparison of India with virtually every one of the 33 Sub Saharan countries with lower per-capita incomes (as per incomes in 2009 in current dollars) reproduces this comparison. I demonstrate this with the help of Figures 1-7 with each figure comparing India to the 33 countries in Sub Saharan Africa along one health indicator. I arrange the countries from left to right in order of increasing per-capita incomes.

- **Figure 1**: **Life expectancy** at birth in India at 65 exceeds those in all but two of the 33 SSA countries (Eritrea and Madagascar have life expectancies of 66 and 65 years, respectively).
- **Figure 2**: **Infant mortality rate** (IMR) per 1,000 live births in India at 50 is lower than those in all but three of the 33 SSA countries (Eritrea, Madagascar and Ghana have the IMR of 39, 40 and 47, respectively).
- **Figure 3**: **Under-five mortality rate** per 1,000 live births in India at 66 is lower than those in all but two of the 33 SSA countries (Eritrea and Madagascar have the under-five mortality rates of 55 and 58, respectively).
- **Figure 4** **Stillbirth rate per** 1,000 births at 22 in India is lower than those in all but five of the 33 SSA countries (Eritrea, Madagascar, Zimbabwe, Kenya and Ghana have stillbirth rates of 21, 21, 20, 22 and 22, respectively).
- **Figure 5**: **Maternal mortality rate** per 100,000 live births in India at 240 is lower than those in every one of the 33 SSA countries.

But this pattern collapses when it comes to child malnutrition.

- **Figure 6**: The proportion of children under five years of age classified as **underweight** (low weight for age) at 43.5 percent is higher in India than **every one** of the 33 poorer SSA countries.
- **Figure 7**: The proportion of children under five years of age classified as **stunted** (low height for age) at 47.9 percent is higher in India than all but five of the poorer SSA countries (Burundi, Malawi, Ethiopia, Niger, Madagascar and Rwanda have stunting rates of 63, 53, 51, 55, 49 and 52 percent, respectively).

3. Rejecting A False Explanation

When confronted with this evidence, some proponents of the current indicators respond that the lower rates of infant and child mortality in India relative to Sub Saharan Africa despite high malnutrition rates reflect its superior medical facilities. The latter allow India to save many malnourished infants and children whose Sub Saharan African counterparts do not survive.[4]

Seemingly plausible, this is a silly explanation of the phenomenon documented in the previous section. Countries that have better medical resources also have better access to nutrition. Developed countries enjoy low rates of infant, child and maternal mortality as well as low rates of malnutrition. Likewise, declining rates of malnutrition accompany declining rates of infant, child and maternal mortality rates over time in nearly all countries. As I will report towards the end of this paper, malnutrition rates in India have steadily declined side-by-side with declining rates of infant, child and maternal mortality

[4] For isntance, a senior health ministry official offered this hypothesis to the author following a recent presentation of the findings of this paper.

rates over the past several decades. Both average height and average weight of children have been rising over time.

To counteract any lingering doubts, I report in Table 3 under-five child mortality rates and the proportion of under-five children underweight in the larger Indian states with the states ranked in the ascending order of the former indicator. On average, states with superior outcomes in child mortality rates also exhibit superior nutrition outcomes.

Table 3: Mortality Rates and Nutrition Move Together

State	Under-five mortality (2001-05)	Percent of Under-five children underweight (2005-06)
Kerala	16	23
Tamil Nadu	36	30
Maharashtra	47	37
Punjab	52	25
Haryana	52	40
Karnataka	55	38
West Bengal	60	39
Gujarat	61	45
Andhra Pradesh	63	33
Bihar	85	56
Rajasthan	85	40
Assam	85	36
Orissa	91	41
Madhya Pradesh	94	60
Uttar Pradesh	96	42
India	74	43

Source: National Family Health Survey 2005-06.

4. Measuring Malnutrition: Methodology

It is the contention of this paper that the answer to the paradoxical behavior of stunting and underweight indicators in the India-Sub-Saharan-Africa comparison lies in the methodology underlying their measurement. This is the argument developed and defended in the rest of this paper.

Three important indicators of child malnutrition are conventionally reported: the proportion of children stunted, those underweight and those wasted. As already indicated, stunting and underweight refer to low height and weight, respectively, for a given age. Wasting refers to low weight for a given height, regardless of age. Since wasting has received little attention in the public policy discourse, I will not focus on it in the remainder of this paper.[5]

Children in every population of given age and sex exhibit differences in height and weight. Therefore, we need some height and weight norms to identify stunted and underweight children, respectively. In the strictest sense, the norms currently used are premised on the following key assumption:

- **<u>Assumption</u>**: *All differences* ***between*** *populations of children of given age and sex with respect to weight and height occur due to differences in nutrition.*

This assumption implies that populations of children from entirely different races, ethnicities, cultures, time periods and geographical locations would look identical in terms of height and weight distributions provided they are given the same nutrition. That is to say, no differences in the proportion of population below

[5] A problem with the wasting indicator is that it can potentially classify as healthy a child who is both stunted and underweight. Likewise, progress in bringing stunting down without a corresponding progress in alleviating underweight problem would imply increased wasting.

or above any pre-specified height or weight norms would exist between any two populations if they are given identical nutrition.

It may be noted at the outset that in principle, height and weight differences between populations at any point in time may arise for at least three reasons:

(i) The two populations may be receiving different levels of nutrition.

(ii) The overall potential of the populations with respect to these attributes may differ for geneticl, geographical, cultural or environmental reasons. For example, the maximum achievable average height of five-year old Indian boys raised in India may be less than that of their Sub Saharan African counterparts. If so, differences between Indian and Sub Saharan African children raised in their respective locaitons would persist even if the two populations receive the same nutrition.

(iii) Often populations are well below their full potnetial and reaching the full potnetial takes several generations of good nutrition. The improvement in any single generation from improved nutrition is only a small fraction of its full potential. Therfore, at any point in time, differnces betweeen populations also arise because they happen to be at difference stages of the catch-up process.

The current nutrition-measurement practice, which attributes all differences between populations to differences in nutrition, ignors the last two sources of differences. There is agreement that (iii) constitutes an important source of differnces but the current practice of emasurement assumes it away anyway. There are disagreements regarding (ii) with the dominant view being that differences due to geographical, cultural, environmental and genetic factors tdo not exist with all populations having the same height and weight

potential. I will take the minority view in this paper, arguing that differnces across populations of given age and sex of children exist on account of both (ii) and (iii).

To proceed then, suppose we can identify the population of children of a given age and sex that is the healthiest possible. Then, given the above assumption, any deviations in the distributions of height and weight of a population of children of the same age and sex from this population would be attributable to malnutrition. This is the essence of the approach underlying the measures of malnutrition currently in use worldwide.

The first step in making the approach operational is to identify the healthiest populations of boys and girls of different ages. Once this is accomplished, a certain percentage of children at the bottom of the distribution of this population by height or weight are defined as stunted or underweight, respectively. Based on statistical considerations, the conventional cutoff percentage for this purpose is set at 2.14.[6] That is to say, the bottom 2.14 percent of children in the healthiest population of a given age and sex by height and weight are defined as stunted and underweight, respectively.

The height of the child at 2.14 percentile in the healthiest population serves as the benchmark against which all children are measured to classify them as stunted or otherwise. Likewise, the weight of the child at 2.14 percentile in the healthiest population serves as the benchmark weight against which all children are evaluated to determine whether or not they are underweight.

What is required then is the identification of the healthiest population of children of a given age and sex or what is often called the "reference population." The United States first adopted such a reference population in 1977. The National Center for Health

[6] The cutoff point is defined as two standard deviations below the median of the healthy population. Assuming the latter follows the normal distribution, this definition translates into 2.14 percent of the population being characterized as malnourished.

Statistics (NCHS) of the Centers for Disease Control (CDC) developed the height and weight distributions of children by age and sex using longitudinal-data collected in Yellow Springs, Ohio between 1929 and 1975 by the Fels Research Institute (Roche 1992). The NCHS 1977 distributions remained in use to measure malnutrition among children in the United States until 2000. Beginning in the late 1970s, the WHO also encouraged other countries to adopt this same reference population to measure malnutrition.

In the 1990s, the CDC concluded that Fels data came from a sample that was quite limited in geographic, cultural, socioeconomic and genetic variability (Kuczmarski et al. 2002, pp. 2-3). It therefore replaced the NCHS 1977 charts by CDC 2000 charts that were based on a nationally representative sample in which infants came from a broader spectrum of racial/ethnic groups, socioeconomic backgrounds and modes of infant feeding.

The discussions surrounding this change also led the WHO to develop its own height and weight standards on the basis of more diverse reference population. It collected data on 8440 healthy breastfed infants and young children from Brazil, Ghana, India, Norway, Oman and the United States and adopted new standards in 2006. Almost all developing countries including India now use these WHO 2006 standards to measure malnutrition.

5. A critique of the Methodology

Although the methodology assumes no differences in heights and weights between populations other than those resulting from differences in nutrition, it is evident that even its practitioners do not quite believe it. Recall that the United States switched

from NCHS 1977 standards to CDC 2000 standards because the former was derived from a sample that was limited in geographic, cultural, socioeconomic and genetic variability (Kuczmarski et al. 2002, pp. 2-3). The argument rationalizing the shift is, thus, itself an admission of differences according to geographical, cultural, socioeconomic and genetic factors. Clearly, one must wonder if WHO 2006 sample, collected from countries as diverse as Brazil, Ghana, India, Norway, Oman and the United States in terms of their geographical, cultural, socioeconomic and genetic backgrounds, adequately represents the population from India or any other country.[7]

As a preliminary matter, the two standards the WHO has recommended over the decades, NCHS 1977 and WHO 2006, lead to substantially different levels of malnutrition. Using the sample of children under three years of age in the second round of the National Family Health Survey (NFHS-2), Tarozzi (2008) estimates that the NCHS 1977 standard leads to the classification of 42 percent of these children as stunted. But when the WHO 2006 standard is applied to the exact same sample, the estimate rises to 48 percent. One can imagine that over time, populations in the same countries from which the WHO sample is drawn will become healthier so that they would yield an even higher standard, turning yet more children in the sample classified as well-nourished today malnourished tomorrow.

Indeed, the problem turns out to be far deeper than these remarks suggest. If the hypothesis that only nutritional differences separate two populations with respect to weight and height is correct, children who meet all requirements of proper nutrition

[7] Going by the observations collected from India, it stands to reason that the sample was highly selective. The observations from India came entirely from the elite households in South Delhi.

should exhibit the same distribution as the WHO 2006 population. Tarozzi (2008) tests this hypothesis with the help of NFHS-2 data on children of less than three years of age.

NFHS-2 data divide the families of these children into three wealth categories—high, medium and low—on the basis of a Standard of Living Index (SLI) constructed from ownership of a large number of assets and other wealth indicators. Tarozzi isolates the children of parents classified in high wealth category. This brings down the sample of children from a total of more than 100,000 to approximately 5100. Measuring against WHO 2006 growth charts, Tarozzi (2008, Table 4, last row) finds that both among boys and girls in this group, approximately one-third of the children remain stunted and one-quarter underweight.

Tarozzi (2008, p. 463) explores the issue further by 'using only information from families where malnutrition should be unlikely.' Out of the 5100 children in high SLI families, he selects those 'from urban areas, where both parents have at least a high school diploma, live in a house with a flush toilet with a separate room used as kitchen and whose family owns car, color television, telephone, and refrigerator.' This narrowing down shrinks the sample to a mere 212 elite or privileged children in India. Continuing to apply WHO 2006 growth charts, even in this group, 20 percent children remain stunted and 9.4 percent underweight.

A follow-up report by the Government of India (2009) attempts a similar analysis of stunting using data from NFHS-3. It defines elite children as those 'whose mothers and fathers have secondary or higher education, who live in households with electricity, a refrigerator, a TV, and an automobile or truck, who did not have diarrhea or a cough or fever in the two weeks preceding the survey, who were exclusively breastfed if they were

less than five months old, and who received complementary foods if they were at least five months old' (GOI 2009, p. 10). These criteria are even more restrictive than those used by Tarozzi. Applying WHO 2006 standards, the report estimates the proportion of stunted children among these elite children. The findings turn out to be surprisingly consistent with that in Tarozzi (2008): more than 15 percent of the elite children in NFHS-3 are stunted. The gap between this estimate of stunting and the one obtained by Tarozzi (2008) on the one hand and that associated with WHO 2006 reference population (2.14 percent) on the other is too large to be lightly dismissed.

Unless one insists that even the absolute top layer of child population represented in NFHS-2 and NFHS-3 surveys does not receive the nourishment received by WHO 2006 reference population—a highly suspect proposition—the assumption that nutrition is the sole determinant of differences in heights and weights across different populations cannot be true. One or both of sources (ii) and (iii) of differences across populations are necessarily work.

Deaton and Dreze (2009) interpret the findings of Tarozzi (2008) as inconsistent with the proposition that even elite Indian children do not receive the diet and environment received by WHO 2006 reference population and lean in favor of explanation (iii), which they call "gradual catch-up." Rejecting source (ii), they state, "The genetic potential hypothesis, although certainly not disproved, is becoming less accepted in the scientific literature, if only because there is a long history of differences in population heights that were presumed to be genetic, and that vanished in the face of improved nutrition."[8] They find the "gradual catch-up" hypothesis plausible on the

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[8] The authors do not cite the relevant literature here, which makes it difficult to assess this stance. If the stance is based on the differences being just narrowed rather than eliminated, the basis is incomplete. At

ground that nutritional status is greatly influenced by birth weight which in turn is highly correlated with weight and height status of the mother. They add, “This observation, which is at the root of the notion of intergenerational perpetuation of undernutrition, suggests that it would indeed take time for well-fed children to overcome the burden of undernutrition in the past.”

I will argue below that the rejection of the genetic (and cultural, geographic and environmental) differences explanation in favor of “gradual catch-up” hypothesis raises some troubling issues. Before doing so, however, I note that from the short-to-medium-term *policy* standpoint, the distinction between the two hypotheses is not only purely theoretical but actually counter-productive. If it is the case that it “would indeed take time for well-fed children to overcome the burden of undernutrition in the past,” in what sense are they malnourished? Erroneously classifying them as malnourished would imply that we must further beef up their diet posing the risk of obesity.

6. Height Differences Have Not Vanished: Adults

I noted above that the justification Deaton and Dreze (2009) provide for the rejection of genetic differences across populations is that ‘there is a long history of differences in population heights that were presumed to be genetic, and that *vanished* in the face of improved nutrition’ (emphasis added). In providing this justification, the authors do not specify if they have in mind here the differences in adult or child heights or heights at all ages. But since they refer to the contributions by Cole (2003) and Nube (2008) in this context and these authors analyze the data on both adult and child nutrition, in the following, I consider them both.

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least the literature on adult heights only shows the narrowing of gaps with better nutrition over several generations but not the elimination of gaps. I shall return to this issue below.

Begin with the evidence on whether improved nutrition causes the differences in adult heights to vanish. In his lively essay entitled "The Height Gap" in the *New Yorker*, Burkhard Bilger (2004) traces the fascinating history of the literature on the subject. Going by his account, evidence supporting the hypothesis of improved nutrition leading to the *elimination* of height difference remains the Holy Grail of researchers in this filed.

Bilger (p. 7) reports that American soldiers were two inches taller than the average German during the First World War. "But sometime around 1955 the situation began to reverse [with Germans surpassing the Americans in height]. The Germans and other Europeans went on to grow an extra two centimeters a decade, and some Asian populations several times more, *yet Americans haven't grown taller in fifty years*. By now, even the Japanese—once the shortest industrialized people on earth—have nearly caught up with us [Americans], and Northern Europeans are three inches taller and rising." (Emphasis added)

John Komlos, a professor of economics at the University of Michigan and a pioneer in the field, has thoroughly analyzed the data for signs of catch up by American adults but has had no luck. In the words of Bilger (p. 10), "But recently he [Komlos] has scoured his data for people who've bucked the national trend. He has subdivided the country's heights by race, sex, income, and education. He has looked at whites alone, at blacks alone, at people with advanced degrees and those in the highest income bracket. Somewhere in the United States, he thinks, there must be a group that's both so privileged and so socially insulated that it's growing taller. He has yet to find one."

Adult-height differences magnify as we expand the comparison to a larger group of high-income countries. Table 4 reports comparable heights of men and women in

several of these countries with countries arranged in the declining order of height of men. Male height in the Netherlands is shown to be 12.5 centimeters greater than in Japan. Even the gap between male heights in the Netherlands and Portugal is 9.5 centimeters. Similar differences exist in female heights. In broad terms, both men and women in northern Europe are the tallest and those in Asia the shortest. An interesting observation is that South Korea has left Singapore behind even though its per-capita income is still much lower than the latter.

Table 4: height differences across high-income countries

Country	Male	Female	Age	Year
Netherlands	183.2	169.9	20-30	2010
Sweden	181.5	166.8	20-29	2008
Germany	181	168	18-25	2009
U.S.	177.6	163.2	20-29	2003-06
United Kingdom	177.1	164.4	16-24	2010
Canada	176	163.3	25-44	2005
South Korea	173.7	161.1	17-18	2011
Portugal	173.7	163.7	21	2001
Japan	170.7	158	17	2011
Singapore	170.6	160	17-25	2003

Source: Excerpted from the table in http://en.wikipedia.org/wiki/Human_height (accessed October 11, 2012), which also gives the original sources of the data.

This evidence aside, even the references cited by Deaton and Dreze (2009)—Cole (2003) and Nube (2008)—do not support the proposition that the differences between heights of different populations vanish with improved nutrition. Cole (2003, p. 162) documents the steady *increases* in height over the generations in countries such as the United States, the Netherlands and Japan but makes no claims that these differences

eventually vanish. Indeed, he explicitly notes, "Height in the USA, the most affluent nation, currently lags behind that in Northern Europe." He goes on state, "These differences are substantial."

Nube (2008) does not analyze height dimension of nutrition, focusing instead on the Body Mass Index (BMI). He specifically focuses on south Asians living in various parts of the world and reaches the conclusion that genetic factors are partially responsible for the systematically low BMI among them. It is instructive to quote a key paragraph from his paper in entirety (Nube 2008, p. 512):

> "Results from countries that are home to sizeable population segments from different ethnic backgrounds, including people of Asian and African descent, reveal consistently higher prevalence rates of low BMI among people of South Asian descent. These differences cannot be explained on the basis of indicators which relate to access to food, social status of women or overall standard of living. Apart from the presented results on South Africa, Fiji and the USA, similar results are also reported for England, although in these reports information on the socio-economic status of the various ethnic population segments is not presented. On the basis of these outcomes it is hypothesized that *there exists among adults of South Asian descent an ethnically determined predisposition for low adult BMI*. This ethnic predisposition can be based on both genetic and cultural factors." [Emphasis added.]

Interestingly, in an earlier paper, Deaton (2007) himself analyzes height data from 43 developing countries and finds that no variables including those relating to nutrition as measured by calorie intake explain the differences across countries. He finds the high stature of Africans the hardest to explain admitting (p. 13235), "Perhaps the major

puzzle is why Africans are so tall." Variables such as per-capita income in childhood, incidence of infant or child mortality rates, per-capita calorie availability and mother's education, conventionally considered to correlate with height, all fail to explain the exceptionally high stature of African men and women.

Unable to resolve the puzzle, Deaton (2007, p. 13236) goes so far as to state, "Given that Africans are deprived in almost all dimensions, yet are taller than less-deprived people elsewhere (although not than Europeans or Americans), it is difficult not to speculate about the importance of possible genetic differences in population heights. Africans are tall despite all of the factors that are supposed to explain height." But he stops short of accepting the genetic factor arguing that it does not explain the differences between other populations. In effect, he leaves unexplained the high stature of Africans despite deprivation relative to other countries.

7. Height Differences Also Persist between Child Populations

It is puzzling that despite having discussed at length the inexplicably high stature of African adults relative to those from other poor countries in Deaton (2007), Deaton and Dreze (2009) makes no attempt to draw out its implications for the puzzle of lower incidence of stunting among children in nearly all Sub Saharan Africa countries than in India. One imagines that the two puzzles are intimately linked. But nowhere is this possibility recognized in Deaton and Dreze (2009).

A possible explanation of this oversight may be the belief on the part of the authors that the differences in heights for reasons other than nutrition do not appear in childhood. But evidence fails to support this proposition as well. Height and weight differences can

be found even between populations of newborns who are otherwise perfectly equally healthy, as I discuss immediately below.

7.1. Height and Weight Differences between Equally Health Populations of Newborns

In a paper entitled "Birth outcomes of Asian-Indian-Americans," Alexander, Wingate, Mor and Boulet (2007) compare infants born in the United States to resident Asian-Indian-American (AIA) mothers to those born to resident non-Hispanic White and non-Hispanic African-American (AA) mothers. The sample includes more than hundred thousand AIA children, more than three million white children and more than one million AA children. The authors are also able to control for the relevant maternal characteristics. The authors summarize their key findings as follows:

> "Compared to AAs or Whites, AIAs have the lowest percentage of births to teen or unmarried mothers and mothers with high parity for age or with low educational attainment. After taking these factors into account, AIA had the highest risk of LBW [low birth weight], small-for-gestational age (SGA) and term SGA births but a risk of infant death only slightly higher than Whites and far less than AAs. Conclusions: The birth outcomes of AIAs do not follow the paradigm that more impoverished minority populations should have greater proportions of low birth weight and preterm births and accordingly greater infant mortality rates."

The authors speculate that the small body size and low birth weigth of Asian Indian American children may be due to either 'certain genetic factors related to the shortness or smaller size of the mother caused by undernourishment occurring during childhood' or 'a different body habitus among this ethnic group and maybe due to genetic factors, not suboptimal growth.' Whatever the reason, the authors' findings are that the

Asian Indian children in their study are fully caught up with their White and African American counterparts in terms of infant mortality but continue to exhibit higher incidence of low birth weight and small size fo gestational age.

Even so it is tempting to invoke the gradual catch-up hypothesis and argue that over several genrations, Indian mothers will catch up with the American mothers in height and weight and bridge the size and weigth gap currently observed. But there are at least two problems with this argument. First, as I have already documented, there is no guarantee that adult differences can be eleiminated. And, second, The pattern found for the Asian Indian American children by Alexander et al (2007) has also been observed for the japanese American children.

In particular, Mor, Alexander, Kogan, Kieffer and Ichiho (1995) compare the birth outcomes of United States resident white and Japanese-American mothers using 1979–1990 linked live birth and infant death records from the state of Hawaii. The majority of these Japanese-American mothers were born in Hawaii and majority of the white mothers were born in mainland United States. Summarizing their findings, the authors state, "After controlling for maternal sociodemographic and prenatal care factors with logistic regression, Japanese-American infants had significantly higher risks of low birth weight, preterm and very preterm birth and of being small-for-gestational age." It is difficult to attribute these differences to a lack of complete catch-up by the Japanese-American mothers especially since the infant mortality rates for the Japanese children, like those for the American children, were below the US Year 2000 Health Objective.

7.2. Older Children and Persistent Height Differences

Systematic studies of older children of migrant populations settled in the developed countries provide additional evidence of persistent differences across populations despite improved nutrition over some generations. Fredriks et al (2004) collected cross-sectional growth and demographic data on 2880 children of Moroccan origin and 14,500 children of Dutch origin living in The Netherlands in the age range 0 to 20 years in 1997. Their findings are consistent with our previous discussion: "Moroccan young adults were on average 9 cm shorter than their Dutch contemporaries. … Height differences in comparison with Dutch children increase from 2 years onwards." These authors find the differences so compelling that they recommend drawing up separate growth charts for Moroccan and Dutch children.

Indeed, today, it is possible to find separate growth charts for children of Moroccan and Dutch origin living in The Netherlands, making it possible to compare the two populations.[9] Table 5 reports mean heights in centimeters in 2010 for Moroccan and Dutch children living in the Netherlands. Differences are minimal at one year but positive and rising beginning with two years of age. By the third year, the difference is a full centimeter and grows to 1.8 centimeters for boys and 2.7 centimeters for girls in the fifth year. By fifth year, the gaps are thus almost a third of the gaps obtaining at full adulthood: 6 centimeters for boys and 7.9 centimeters for girls.

Table 5: Height of Moroccan and Dutch children living in the Netherlands in 2010 in centimeters

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[9] The charts can be found at (accessed on September 1, 2012) http://www.tno.nl/content.cfm?context=thema&content=prop_case&laag1=891&laag2=902&laag3=70&item_id=1141&Taal=2

	Boys			Girls		
Age in years	Moroccan	Dutch	Difference	Moroccan	Dutch	Difference
1	76.1	76.7	0.6	75	75	0
2	87.7	88.4	0.7	86.5	87.1	0.6
3	96.8	97.8	1	96	97	1
4	104.5	105.5	1	103.5	104.9	1.4
5	111.4	113.2	1.8	110.2	112.9	2.7
21	177.8	183.8	6	162.8	170.7	7.9

Source: WWW.TNO.NL

Fredriks et al (2004) are not alone in finding persistent differences between populations of children of migrants in the developed countries and those of the local families. Smith et al. (2003), who compare the heights and weights of 6-12 years old Maya-American children using samples collected at two different points in time with the National Health and Nutrition Examination Survey (NHANES) reference standards for American children, also find the height gap narrowing over time but not vanishing.

As many as half million Guatemalan Maya, mostly from rural areas, have migrated to the United States since the civil war there in 1978. The bulk of this migration took place in the 1980s. Smith et al. compare the heights of Maya children living in the United States at two points in time, 1992 and 2000, with their Guatemalan counterparts as well as NHANES standard for American children. They find that six-year old Maya children living in the United States in 1992 were on average six centimeters taller than their 1998 Guatemalan counterparts. They had gained another three centimeters after eight years in 2000. Nevertheless, they remained five centimeters shorter than the NHANES standard for American children.

A defender of the worldwide uniform norms for measuring nutrition may still argue that the reason Moroccan children in the Netherlands and Maya children in the United States lag behind their host country counterparts in height is that they still have not had enough time to catch up. It is possible that the remaining gap will be eliminated in another few generations.

But this argument raises two questions. First, given that adult height differences across developed country populations as well as those in the incidence of low birth height and low birth weight between the Japanese and American children born in Hawaii have persisted, how can we be sure that the height and weight differences between children will vanish in due course. Indeed, the weight of the evidence remains in favor the differences narrowing but not vanishing. Second, as previously stated, *from a policy standpoint*, what sense does it make to attribute the height and weight differences that can only be bridged over the future generations to malnourishment? By beefing up the diets of children who already receive healthy diet but remain below the WHO-prescribed norms because they inherited low height and weight from mothers with low weight and height, do we not risk turning them obese? This is not idle speculation. Smith et al. (2003) report that the incidence of underweight children in the 2000 sample of Maya children living in America was just 1 percent compared with the five percent cutoff point in the Center for Disease Control growth chart applied to identify underweight children. At the other extreme, these authors identify as many as 20.5 percent children in the 2000 sample as overweight and 25.3 percent as obese compared with ten and five percent, respectively, for the American children. Evidently, the risk of reinforcing obesity among children if we go by stunting to measure malnourishment is real.

7.3. Children of Indian Migrants in the United Kingdom

At least some analysts who believe that height differences across populations of children can be eliminated by good nutrition have relied on the comparison of the children born to Indian (and Pakistani and Bangladeshi) parents settled in the United Kingdom with those born to white parents in the study by Tarozzi (2008). This necessitates a close examination of the findings in Tarozzi (2008).

Tarozzi (2008) states his finding as follows (p. 464):

> "Overall, these results [shown in his Table 6] provide some *prima facie* evidence in support of the hypothesis that the growth performance of children of Indian ethnicity who live in the UK is comparable to that of the reference population used to construct either the WHO-2006 or the CDC-2000 references." (Emphasis in the original)

A casual reader already sympathetic to the gradual catch-up hypothesis over genetic differences hypothesis is likely to conclude from this statement that the key assumption underlying the WHO-sanctioned methodology to measure malnutrition is valid. Yet, she will be wrong for a number of reasons some of which Tarozzi is himself careful to note.

For starters, observe the qualification "prima facie" in the statement. Tarozzi is tentative and by no means conclusive in his tone. And there are good reasons for this caution. The sample with which he works is extremely inadequate to draw strong inferences about the absence of genetic differences. Thus, for example, the sample of children under two years of age born to Indian parents in the dataset available to him is so small that he does not even attempt a comparison between them and children of the same age born to white parents. For children 2 to 3 years old, his sample has just 19 Indian children and for those between 2 and 5 years, it has 72 children. Such small samples are

quite inadequate to measure even the *average* levels of stunting and underweight among children with any degree of precision, let alone the entire distribution of the underlying population.

Moreover, even these small samples do not yield zero differences between stunting levels among children born to Indian parents and those to local white parents. The proportion of Indian children in 2 to 3 years age group who are stunted by WHO 2006 definition turns out to be 5.3 percent compared with nil among white children. Surely, the difference between 5.3 percent and zero percent is not zero! Moreover, if we were to make the height norm against which stunting is evaluated even more demanding than the WHO 2006 norm, the proportion of Indian children who are stunted would rise whereas it may still remain zero among white children.[10]

There are more qualifications to the conclusion by Tarozzi. Even if it were true that the height gap between Indian children born in the UK and their white counterparts is nil, it does not prove that at some point in time Indian children born and brought up in India will also close the gap. There are at least two reasons for this conclusion. First, there may be a selection problem such that Indian parents who migrated to the UK are disproportionately drawn from the right side of the distribution. Those who chose to migrate may have on average enjoyed some genetic advantage over the population left behind.

Tarozzi himself is aware of this possibility and is careful to highlight it. Immediately following the conclusion quoted above, he states (p. 464), "Of course, these findings are

[10] This last possibility arises because the reported information by Tarozzi only tells us that all children born to white parents are above the WHO 2006 norm but not how much above the norm. This leaves the possibility that raising the norm further might still leave the proportion of the white children classified as stunted at zero.

not sufficient to disprove the claim that genetic factors play a role in explaining the relative disadvantage in growth pattern of children, such as those sampled within the NFHS, who are born and raised in India. To argue that ethnic Indians who live in the UK share the same genetic characteristics in terms of growth potential as their counterparts still living in India, one should argue that migration to the UK is uncorrelated with growth potential. However, there are reasons to suspect that correlation may exist, as migrants are often taller."

Second, even assuming that migrant parents are representative of Indian population, the possibility that the gap will persist in the case of children born and raised within India cannot be ruled out. What if the UK geography, culture and environment are more conducive to height and weight development of children than Indian geography, culture and environment? Therefore, what is needed is evidence that some sub-populations of children born and raised within India have managed to eliminate the gap with WHO 2006 reference population entirely. That evidence has remained elusive so far, as we have seen from the analysis of the sample of elite children from NFHS-2 by Tarozzi (2008) and NFHS-3 by the Government of India (2009).[11]

7.4. The South Delhi Study

Before I conclude this section, it is important to briefly discuss a study by Bhandari et al (2003) analyzing a sample of children strictly between one and two years of age collected from households in South Delhi. Applying the NCHS 1977 standard, this study reports the incidence of stunting at 3.2 percent. Some observers view this finding as vindication of the hypothesis that there are no genetic differences between populations.

[11] Bhandari et al (2003) may be read as providing such evidence but as I dsicuss at the end of this section, this paper is far from compelling.

But there are four problems with such an inference. First, there is a strong possibility of selection bias. India's elite inhabit South Delhi and we cannot rule out that they are drawn disproportionately from the genetically taller part of the country's population. Second, the sample was collected as a test run for the WHO which was trying to ascertain whether a sample from South Delhi would qualify for inclusion in its larger sample that was to eventually form the WHO 2006 reference population for the determination of the uniform height and weight norms. This meant that a tendency for excessive sanitization of the sample so as to exclude shorter or underweight children might have unconsciously crept in even if the researchers were consciously applying only objective criteria for exclusion. Third, the study only included children strictly between one and two years of age. Differences resulting from factors other than nutrition at the age of two years are small and harder to capture. Even for a sample drawn from the wealthy section of the population, it is likely that larger differences would emerge if it included children of ages three, four and five. Finally, even the 3.2 percent stunting incidence is measured using the NCHS 1977 standards and not the WHO 2006 standard. Applying the latter standard would yield a bigger estimate of stunted children.

8. Weight and BMI Differences Across Populations

Recall that the common worldwide standard for the identification of malnourished children as recommended by the WHO 2006 guidelines is also based on the assumption that there are no weight differences across populations other than those resulting from differences in nutrition. I have come across little systematic evidence validating this assumption. The study by Smith et al (2003) of children 6-12 years old reports that even the Maya children in Guatemala in 1998 exhibit average BMI equal to or exceeding the

average BMI in the United States beginning at seven years of age. Applying the CDC five percent threshold, underweight children among these children in Guatemala are just six percent notwithstanding the fact that the proportion of stunted children in the same sample is a gigantic 71.6 percent. When the year 2000 sample of Maya children living in the United States is considered, their average BMI exceeds that of the American counterparts from 10 percent for six year olds to 25 percent for twelve-year olds. In a similar vein, Fredriks et al (2004) also report that the BMI for the Moroccan children living in the Netherlands exceeds that of the Dutch children. Based on these studies and that by Nube (2008), discussed earlier, the scientific basis for applying a uniform BMI or weight standard to determine malnutrition would seem to be on even shakier grounds than a uniform height standard. To be sure, I have found nothing at all by way of scientific justification for the specific WHO 2006 weight standards. Minimally, the practice requires a far closer scrutiny than has been the case to-date.

9. "Catch-up with a Lag" and Three Inconvenient Puzzles

The rejection of the genetic differences hypothesis in favor of the one relying on "catch-up with a lag" to explain continued differences between well-fed Indian children and WHO 2006 reference population, as preferred by Deaton and Dreze (2009), leads to at least three puzzles.

First, the application of the WHO 2006 standards leads to the conclusion that the children in Sub Saharan Africa are subject to lower malnutrition than their Indian counterparts. The catch-up with a lag hypothesis will say that this is because, being farther along in the catch-up process, Sub Saharan African mothers are healthier and consequently give birth to healthier children. But this hypothesis flies in the face of

maternal mortality rates in Sub Saharan Africa that are many times those in India. It is simply not credible that mothers in Chad, who die in child birth at a rate five and a quarter times that of Indian mothers, give birth to healthier children. Equally incredible is the possibility that Senegalese mothers have done greater catch up than their counterparts in Kerala.

Second, the reason we care about stunting and underweight is the strong belief on the part of the policy analysts that it impacts various forms of learning and cognitive achievements in adulthood: high levels of malnourishment reflect themselves in poor learning outcomes in adulthood.[12] Assuming this to be the case, suppose we take the available stunting and underweight trends in India and do a rough and ready extrapolation back in time. It will not be unreasonable to conclude that such extrapolation would place nearly all Indian children born in the 1950s or before in the stunted and underweight category. This would imply widespread deficiency in learning and cognitive achievements among today's Indian adults born in the 1950s or before. But such inference is hard to draw if we go by the achievements of Indians in this cohort who had the opportunities to learn in their childhood and youth.

Finally, Indian children today show far greater incidence of malnutrition than nearly all Sub-Saharan African countries with similar or lower per-capita incomes. Given that India has made far greater progress than Sub Saharan African countries in vital health indicators relating to children such as infant mortality, under-five mortality and

[12] Evidence on this is not as compelling as many policy analysts, politicians and NGOs implicitly or explicitly claim. The study of the subject is at best in its infancy due to the paucity of longitudinal data connecting differences in adult achievements to nutrition differences in childhood (e.g., see Maluccio, Hoddinott, Behrman, Martorell, Quisumbing and Stein, 2005). But the general belief in the hypothesis that stunting and underweight impact adult achievements remains strong. Without it, the disproportionate focus on poor nutrition levels of children in India and Africa would be difficult to explain.

maternal mortality in recent decades, one might hypothesize that its progress during the same decades in child nutrition would be at least as good as the latter. This means that India lagged even farther behind Sub-Saharan Africa two to four decades ago than currently. Given the presumed relationship of malnutrition in childhood to adult learning and cognitive achievements, we should then expect the Indian adults twenty years or older today to be performing significantly worse in terms of the learning and cognitive achievements than their Sub-Saharan African counterparts. But there is no evidence that this is the case.

10. India Does Show a Declining Trend in Malnutrition

While the estimates of nutrition *level* based on WHO 2006 standard and its predecessor NCHS 1977 standard are, thus, of little value, they can still be deployed to assess the *trend* in malnutrition levels in India. The main point that emerges from the data is that contrary to the impression given in public discourse either implicitly or explicitly—see, for example, the quote from the Economist magazine at the beginning of this paper—steady progress has been made in combating child malnutrition throughout the period for which we have data. The claims of lack of progress in or deteriorating nutritional levels constitutes a myth in its own right.

There are two sources of nutrition data in India: surveys of rural populations in nine states by the National Nutritional Monitoring Bureau (NNMB) established by the Indian Council of Medical Research, Hyderabad in 1972 and the National Family Health Survey (NFHS), a collaborative project with the Indian Institute of Population Studies (IIPS) in Mumbai as the nodal agency. The National Nutritional Monitoring Bureau covers the rural areas in nine states and offers comparable indicators of nutrition for

periods 1975-79, 1988-90, 1996-97 and 2003-06 while NFHS covers both rural and urban areas in all states and has had three rounds in 1992-93 (NFHS-1), 1998-99 (NFHS-2) and 2005-06 (NFHS-3).[13]

Figure 8 shows comparable estimates of the proportions of underweight and stunted children above one year and below five years of age under the NCHS 1977 standard used by NNMB. The estimates are based on pooled observations from all nine states surveyed by the NNMB. Both underweight and stunting proportions show a steady decline over time.

NFHS data show a similar trend. This latter source covers both rural and urban areas and covers all major states of India. In Table 6, I report nutrition measures among children below three years of age in years 1998-99 (NFHS-2) and 2005-06 (NFHS-3) in urban and rural areas and the country as a whole.[14] The table provides the proportions of children who are stunted, underweight and wasted as per WHO 2006 reference population.

Table 6: Proportion of under-three Indian who are children stunted and underweight under the WHO 2006 Standard

	NFHS-2 (1998-99)			NFHS-3 (2005-06)		
Measure of nutrition	Urban	Rural	Total	Urban	Rural	Total
Height-for-age (stunted)	41	54	51	37	47	45
Weight-for-age (underweight)	34	45	43	30	44	40
Number of children	5741	18475	24215	6436	20105	26541

Source: Based on International Institute for Population Sciences (IIPS) (2007), Table 8.3.

[13] The nine NNMB states are Andhra Pradesh, Kerala, Tamil Nadu, Karnataka, Maharashtra, Madhya Pradesh, Gujarat, Orissa and West Bengal.
[14] Comparable data for under-five children in NFHS-2 and NFHS-3 are not available.

Three observations follow from the table. First, rural nutrition levels measured in terms of both height and weight are consistently worse than urban ones. This is consistent with the expectation that higher incidence of poverty would translate into higher incidence of malnutrition. Second, improvements can be seen in stunting and underweight in both rural and urban areas though the improvement in the proportion of underweight children in rural areas has been minimal in NFHS data and less than that observed in NNMB data. Finally, the proportions of stunted and underweight children in rural areas in 1996-97 and 2003-06 in the NNMB data are higher than the corresponding proportions in the NFHS-2 and NFHS-3 estimates, respectively. This may be because the two sets of estimates relate to different populations in terms of age and state coverage or because they use different reference populations or simply reflect sampling and non-sampling errors.

11. Progress in Average Height in India

As a final point, I may briefly mention the progress in the average heights of children. Once again, progress is being made on this front. Of course, we encounter differences between NNMB and NFHS estimates on this count as well. According to the former, the average increase in height at age three was a little below 2 centimeters per decade between 1975-79 and 2004-05. According to the latter, the increase was 2.5 centimeters per decade between 1992-93 and 2005-06. The corresponding increase in China between 1992 and 2002 is 3 centimeters for children between two to five years in rural areas and slightly higher in urban areas.[15] So progress in India is slower than China but surely China has also grown a lot faster than India during these decades.

[15] See Deaton and Dreze (2008, pp. 51-2) for more details.

12. Concluding Remarks

In this paper, I have critically examined the claim of higher child malnutrition in India than Sub Saharan Africa. I have shown that this claim is based on a faulty methodology that applies a uniform worldwide standard of nutrition regardless of race, culture, geography or environment. In turn, the methodology yields malnutrition estimates that contradict virtually all other indicators of child health such as infant, under-five and maternal mortality rates and life expectancy.

Two decades ago, Basu (1993) used data from a field survey to classify childhood nutritional measures using the WHO sex-neutral standards. She ound the girls to be doing far worse than boys. Not persuaded by the conclusion, she decided to then use the Harvard sex specific standards and found that the results had turned on thei head: girls fared better than boys. The application of uniform standards is not without hazard.

My review of the evidence in this paper shows that while the height differences across populations do narrow down over generations with improved nutrition, they do not vanish in the case of either adult or child populations. The Japanese adults remain 12 to 13 centimeters shorter than their Dutch counterparts. Likewise, the Japanese newborns are subject to greater incidence of low birth weight and small-for-gestational age. Asian Indian American Indian newbrons of Indian mothers in the United States exhibit an identical pattern. Height differences between Moroccan and Dutch children born in the Netherlands appear as early as two years of age.

Evidence derived from the population of the best-fed Indian children points in the same direction. Malnutrition levels among these children significantly exceed those in the WHO 2006 reference population. Deaton and Dreze (2009) attribute this persistence of

low height and weight to the "catch up with a lag" phenomenon whereby height and weight deficiencies relative to the reference population will disappear over many generations but there is no evidence that such differences entirely vanish.

More importantly, this explanation does proves inconsistent with the children in Sub-Saharan Africa exhibiting higher nutrition levels than their Indian counterparts. It is scarcely possible that African mothers who exhibit two to five times the maternal mortality rates than their Indian counterparts could be farther along the catch-up path than the latter and, thus, give birth to healthier children. And if "catch with a lag" does not explain the differences between Indian and Sub Saharan African children, genetic differences remain the only plausible explanation. It is somewhat surprising that Deaton (2007, p. 13235) acknowledges the existence of the puzzle 'why Africans are so tall' but does not draw out the implications of that puzzle for 'why the African children are so tall relative to Indian children' when discussing child malnutrition in India in Deaton and Dreze (2009).

Even if we accept the untenable hypothesis of 'catch up with a lag,' measurement of malnutrition using the uniform WHO 2006 standard would lead to counter-productive policies. For even this hypothesis accepts that no amount of correction in diet will bring the existing child population to the WHO 2006 standard. In turn this implies that at least some of the children identified as malnourished according to the WHO 2006 standard are classified so not because they are being inadequately fed but because they were born that way. Beefing up diets of such children might lead to obesity instead of improved nutrition.

The common impression that India has not made much progress in child nutrition despite economic progress also turns out to be false. Whether we go by indicators of stunting, which signify low height for age, or of underweight, which indicate low weight for age, significant progress has been made. The proportions of stunted and underweight children have been steadily declining and the average height and weight steadily rising since the late 1970s when data on these measures began to be collected. Progress may be slower or faster than in other countries depending on which country is chosen for comparison but there is no denying that continuous progress has been made.

What does this analysis imply for the measurement of malnutrition? To be sure, a common standard that the WHO and United Nations have pushed to make it easy for the latter to track malnutrition levels to give substance to its quest for the millennium development goals with respect to nutrition does not make sense. Instead, countries including India must develop country- or even region-specific norms. In turn, this requires careful development of alternative standards through collaborative research by pediatricians, economists and sociologists. If this is done, it is nearly certain that malnutrition indicators will turn out to be lower in India and higher in Sub Saharan African than those based on the uniform WHO standard.

Finally, I note in passing that a myth similar to the one considered here has also plagued policy discussion on adult hunger in India. There are widespread claims that more one-fifth of Indian population or approximately 240 million Indians suffer from chronic hunger. This too is a much-exaggerated claim, as discussed in my forthcoming book, Bhagwati and Panagariya (2012).

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Figure 1: Life Expectancy in India and 33 Poorer SSA Countries

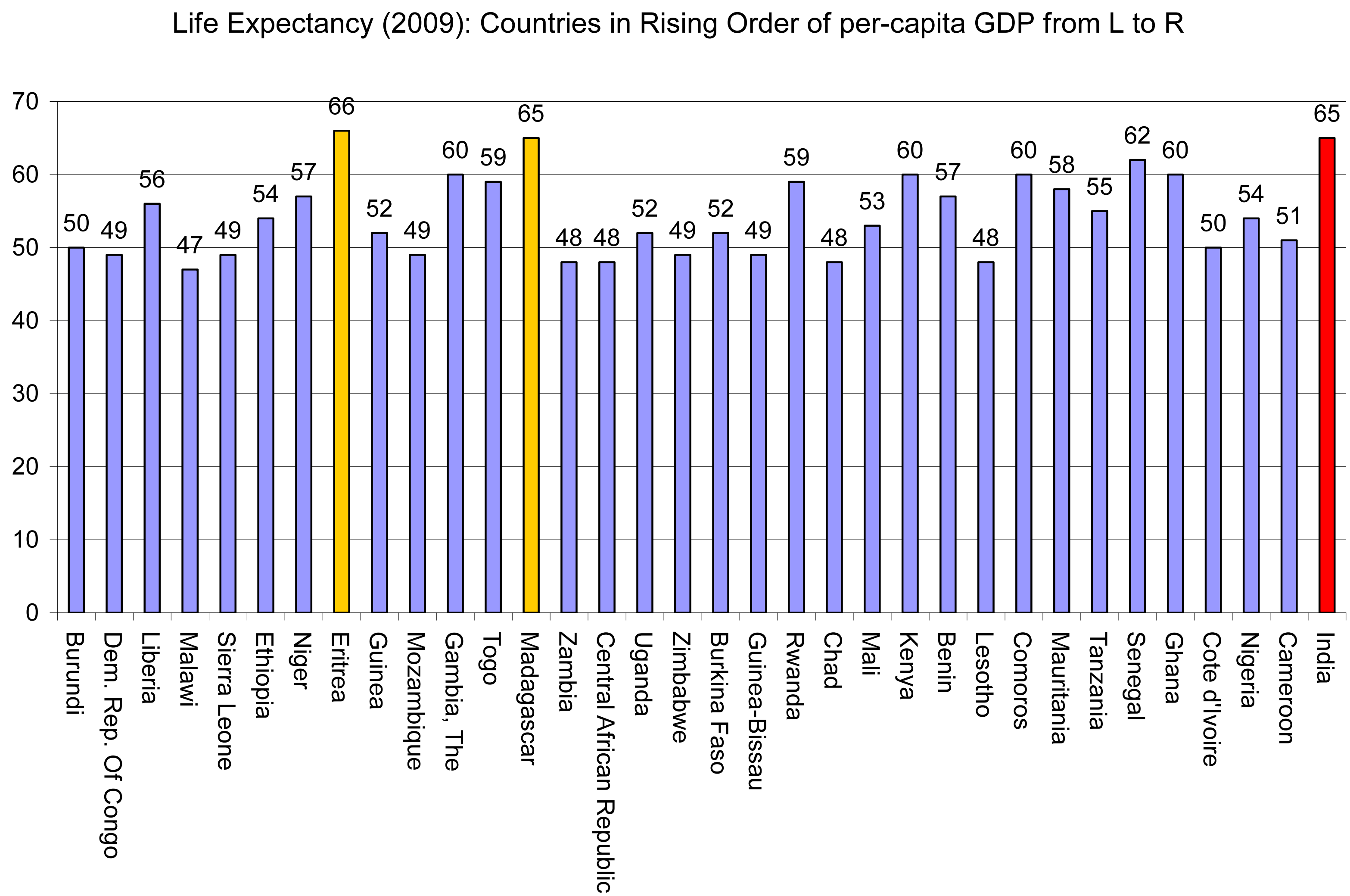


Figure 2: Infant Mortality Rates in India and 33 Poorer SSA Countries

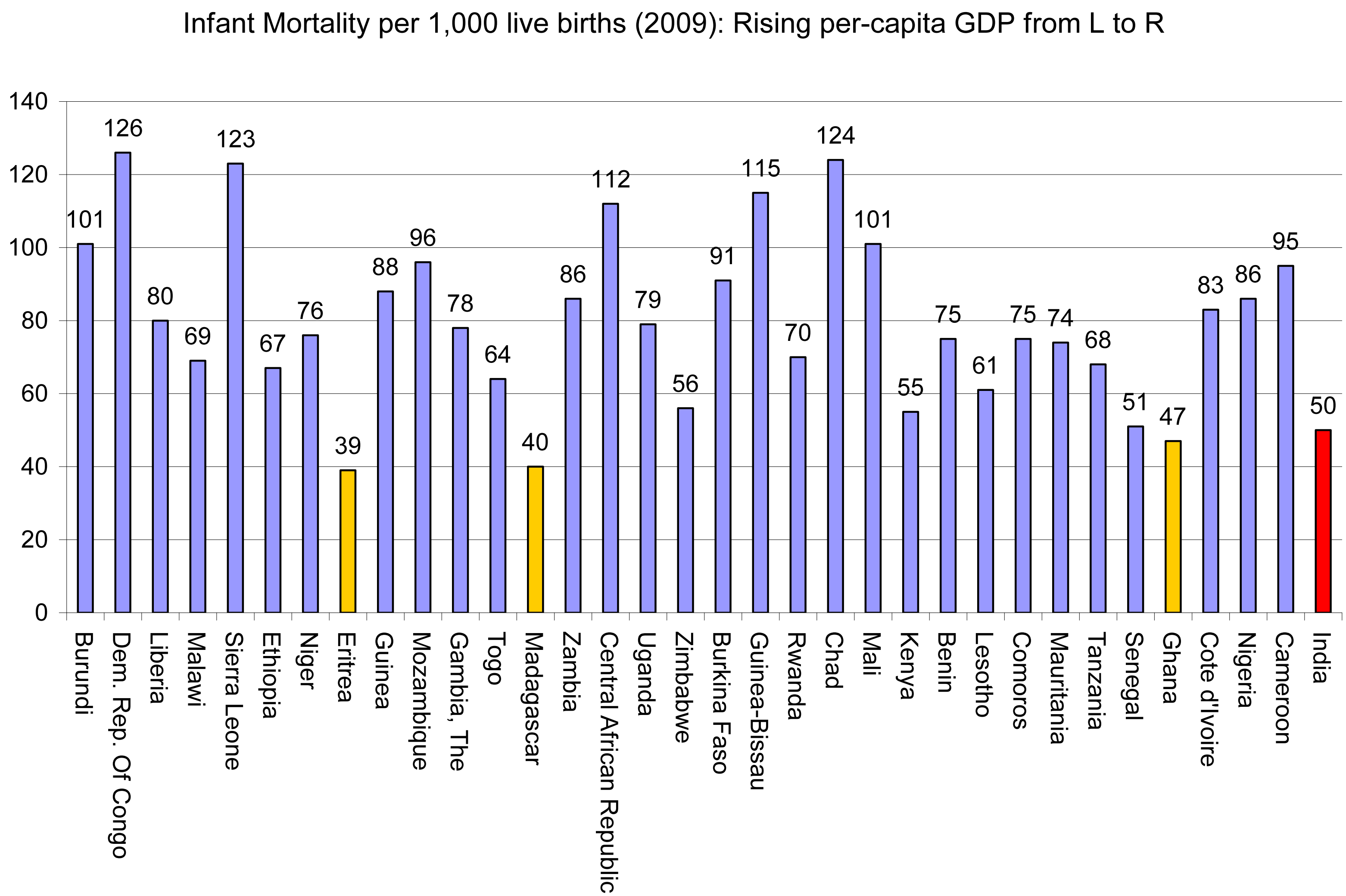


Figure 3: Under-five Mortality Rates in India and 33 Poorer SSA Countries

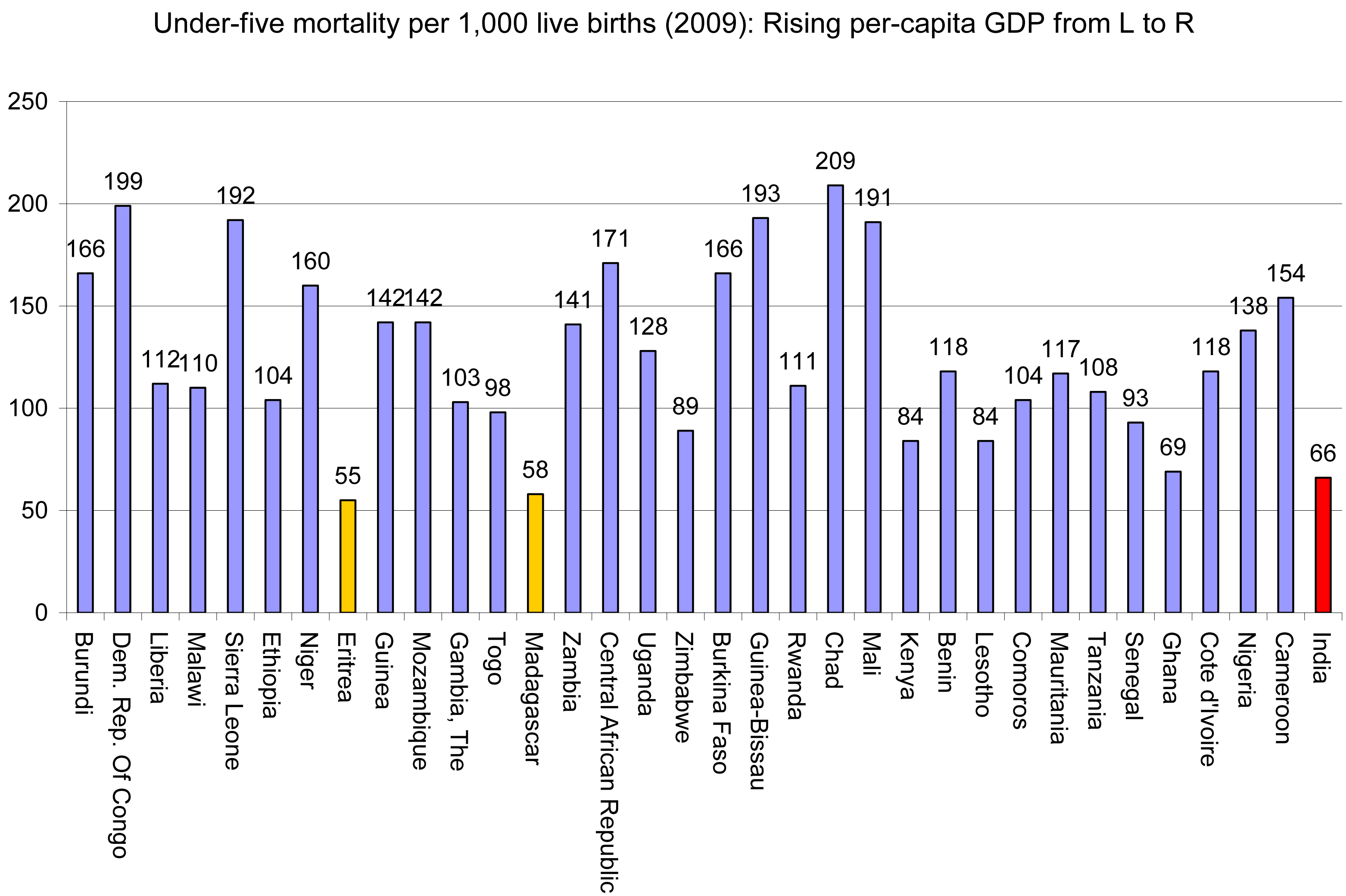


Figure 4: Still Birth Rates in India and 33 Poorer SSA Countries

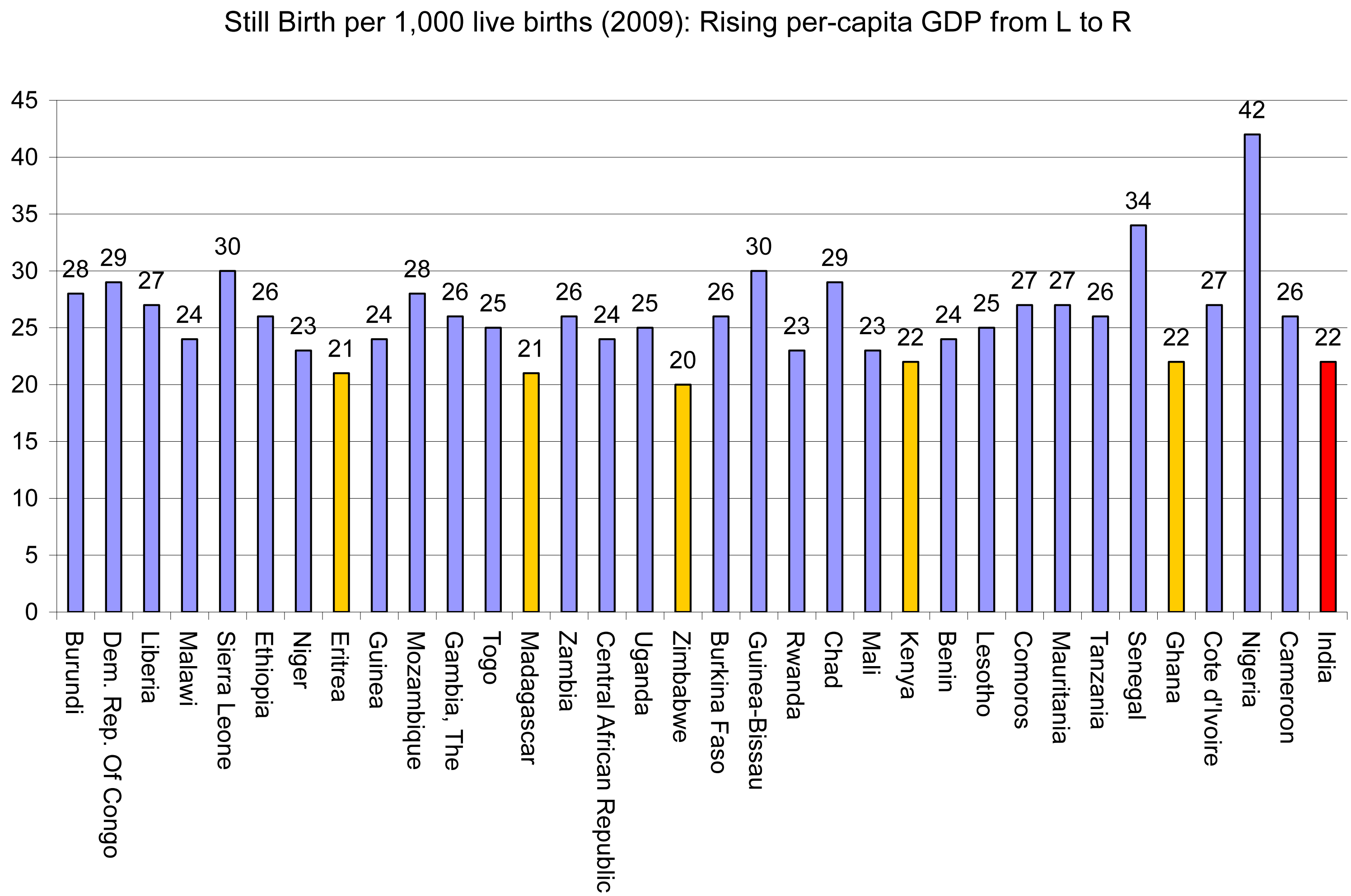


Figure 5: Maternal Mortality Rates in India and 33 Poorer SSA Countries

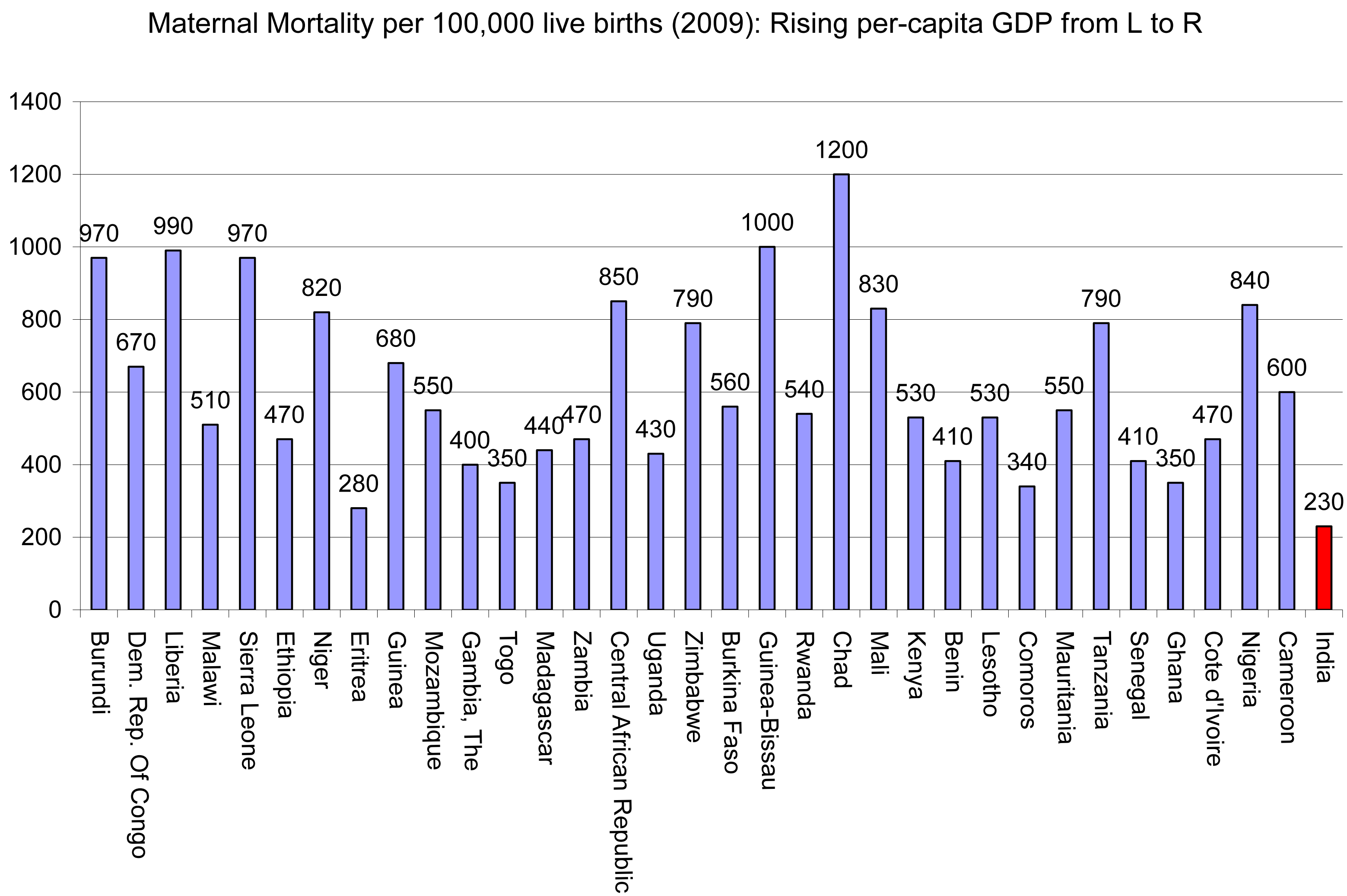


Figure 6: Percent Children Stunted in India and 33 Poorer SSA Countries

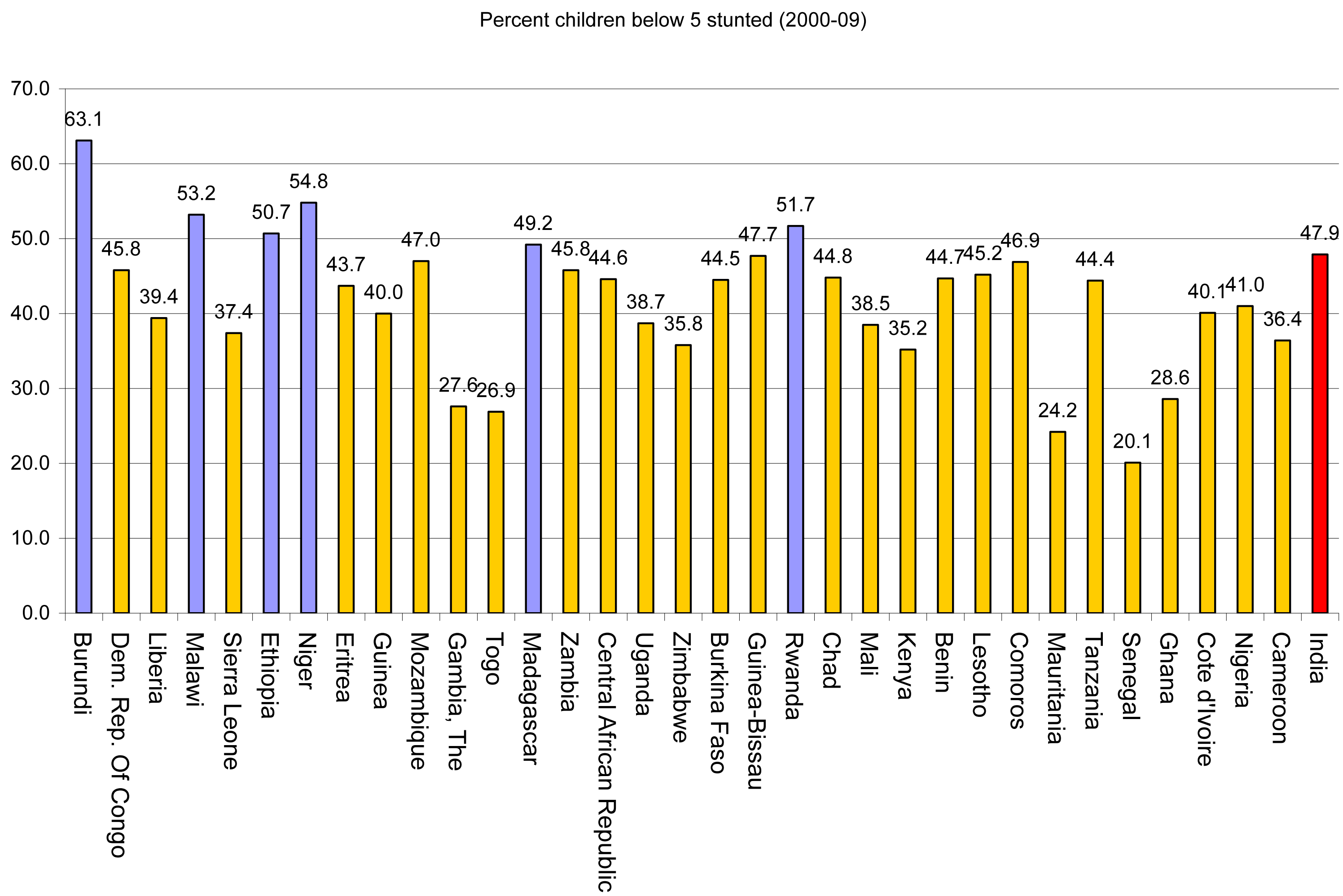
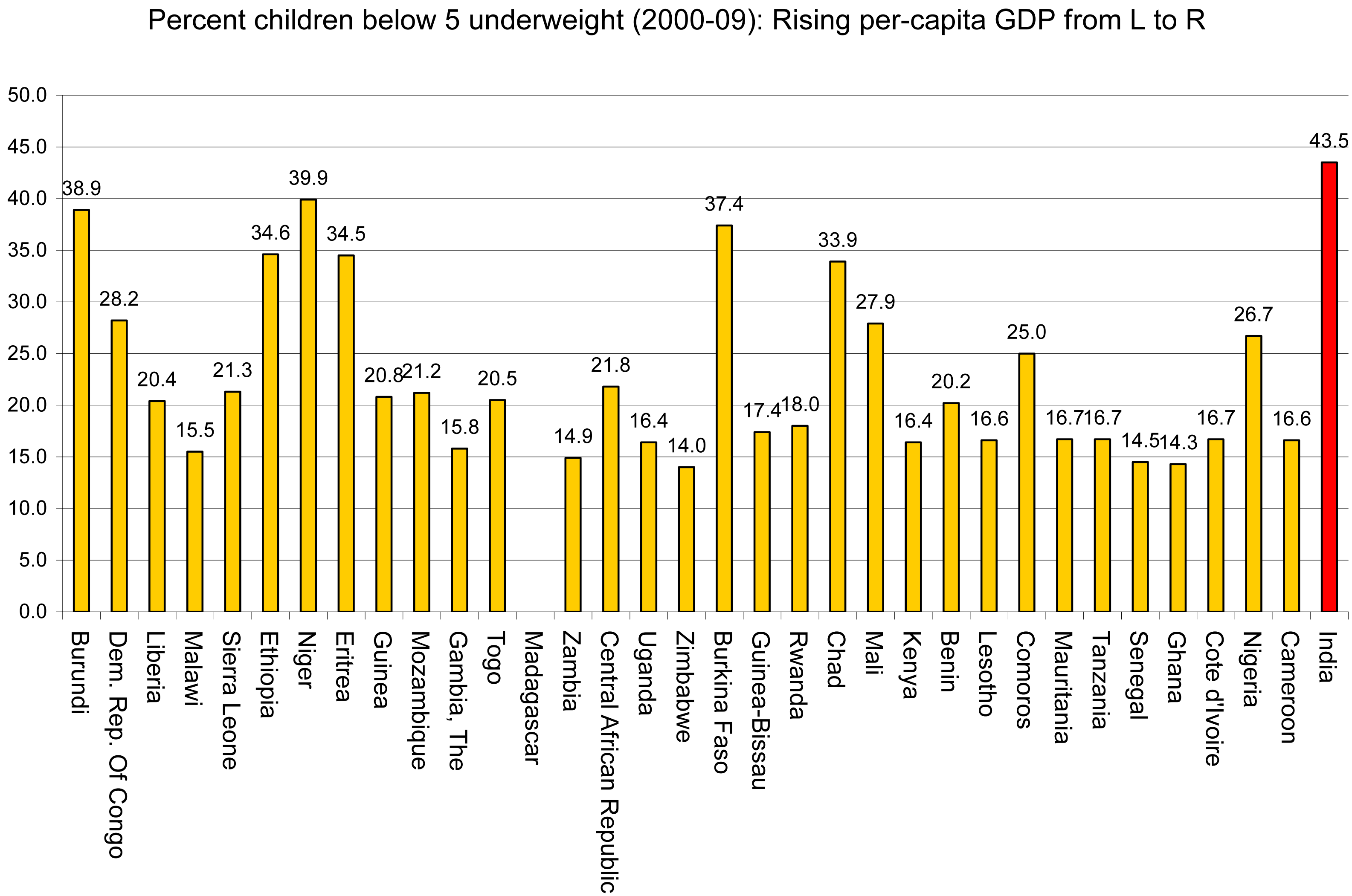


Figure 7: Percent Children Underweight in India and 33 Poorer SSA Countries



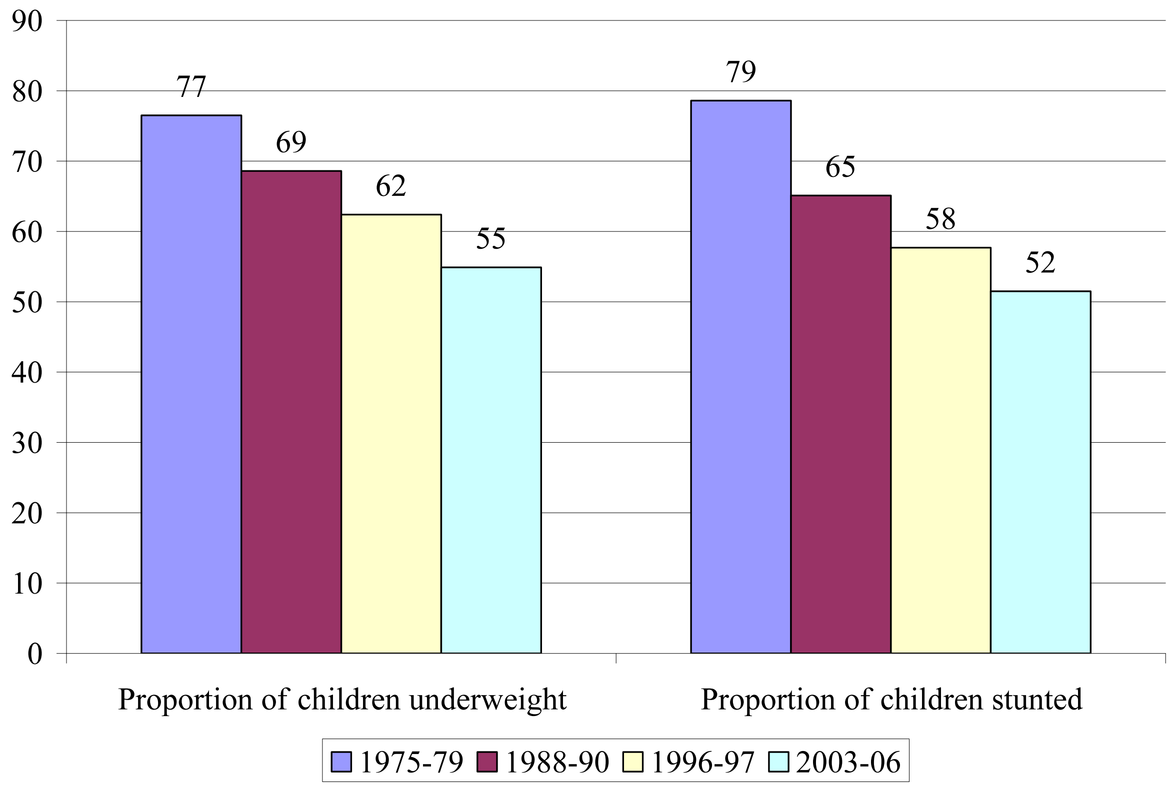


Figure 8: Malnutrition among children above 1 and below 5 years in rural areas of nine states under the NCHS 1977 standard

Source: Authors' construction based on NNMB (1999), *Report of Second Repeat Survey-Rural*, Indian Council of Medical Research, Hyderabad, Table 19 and NNMB Fact Sheet 2003-06 at http://www.nnmbindia.org/downloads.html (accessed June 27, 2011).