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The Myth of Child Malnutrition in India

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1. Introduction

This paper argues that a belief about malnutrition among Indian children commonly held by politicians, media persons and even academics fails to stand up to close empirical scrutiny. In other words, this belief is a myth.

The belief in question is that nearly half of Indian children under five years of age are malnourished. That this belief is widely held with reputable international agencies and NGOs making the claim on their websites and equally reputable newspapers reporting it can be verified by doing a quick Google search for ""Child malnutrition in India." On September 23, 2010, the Economist ran a story with the lead line "How India makes a poor fist of feeding the young, and how it could do better" with a chart showing 48 percent of Indian children under five as chronically malnourished. The figure was a solid seven percentage points higher than that shown for Nigeria, a country in Sub Saharan Africa with lower per-capita income than India. The story went on to state, "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 more dramatically, releasing the much publicized Hunger and Malnutrition (HUNGaMA) Report in January 2011, no less than Prime Minister of India, Manmohan Singh, publicly stated, "The problem of malnutrition is a matter of national shame."[1]

[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).

By arguing that this narrative of child malnutrition in India is a myth, this paper does not aim to suggest for a moment that child malnutrition is an insignificant problem in India. There can be no denying that a substantial child malnutrition problem exists. 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. I do not yet have alternative estimates to give an idea of how much lower the actual numbers are but my argument establishes a strong presumption that the true numbers will reconcile child malnutrition indicators with other health indicators. 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.

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 number. This, however, is an erroneous assertion since the numbers have serious policy implications for the allocation of scarce revenue resources among competing objectives, especially in a poor country with limited tax revenues. 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 not only is such adjustment is uncalled for but is likely to prove harmful by turning the child obese. Being politically correct does not always translate into policy correctness.

2. A Smell Test

Let me 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 everyone a pause and to reflect further on the issue.

2.1. India versus the 33 Poorer Sub Saharan African Countries

Compare some of the latest available vital statistics for India to those for each of the 33 countries in Sub Saharan Africa (SSA) that had lower per-capita incomes in 2009 in current dollars than the former. Other than life expectancy, all indicators relate to the health of the child or the mother.

- **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, respectively).

2.2. India versus Chad and Central African Republic

Comparisons with some specific SSA countries look even more fantastic. For example, consider Table 1, which contrasts India with Central African Republic and Chad.

Table 1: India compared to Chad and Central African Republic

Indicator	India	Chad	Central African Republic
Life Expectancy (2009)	65	48	48
Infant Mortality per 1,000 live births (2009)	50	124	112
Under-five mortality per 1,000 live births	66	209	171
Maternal Mortality per 100,000 live births (2009)	230	1200	850
Percent children below 5 stunted (2000-09)	47.9	44.8	44.6
Percent children below 5 underweight (2000-09)	43.5	33.9	21.8

Source: WHO World Health Statistics, 2011

Chad has just 48 years of life expectancy against India's 65 years, two and a half times India's infant mortality rate, three times its under-five mortality rate, five times its maternal mortality rate. Yet it has lower rates of stunting and underweight among children under five than India. The comparison with the Central African Republic does not look much different.

2.3. Kerala and Senegal

A final comparison in the same vein as previous two is that between Indian states of Kerala and Punjab on the one hand and Senegal and Mauritania in SSA on the other. Kerala in India has vital statistics approaching those in the developed countries and Punjab is the country's breadbasket and dairy. Senegal and Mauritania are among the better off countries in SSA with per-capita income in Senegal being close to the average of India.[2]

Table 2: Comparing the States of Kerala and Punjab to Senegal

Indicator	Kerala	Punjab	Senegal	Mauritania
Life Expectancy	74	69	62	58
Infant Mortality per 1,000 live births	12	38	51	74
Under-five mortality per 1,000 live births*	16	52	93	117
Maternal Mortality per 100,000 live births (2009)	95	192	410	550
Percent children below 5 stunted (2000-09)	25.0	37.0	20.0	24.2
Percent children below 5 underweight (2000-09)	23.0	25.0	15.0	16.7

*From NFHS-3 for Kerala and Punjab. All other data from WHO World Health Statistics, 2011

[2] Per-capita GDP in 2009 in current dollars was $1192 in India, $1023 in Senegal and $919 in Mauritania.

Kerala has a life expectancy of 74 years, infant mortality rate of 12 per thousand live births, under-five mortality rate of 16 and maternal mortality rate of 95 per hundred thousand live births (see Table 2). The corresponding figures for Senegal are far worse at 62, 51, 93, and 410, respectively. But nutrition statistics say that Kerala has 25 percent stunted children compared to 20 percent of Senegal and 23 percent underweight children relative to 14.5 in Senegal. Mauritania has significantly worse vital statistics for children and the mother and yet it beats Kerala in child nutrition indicators. In the Indian state of Punjab, which has a life expectancy of 69 years and is the breadbasket and milk dairy of India, 37 percent of the children are stunted and 25 percent underweight.

These comparisons should suffice to raise some doubts about the plausibility of super-high malnutrition numbers in India. Closer examination of the methodology of measurement of stunting and underweight among children reinforces this doubt.

3. Measuring Malnutrition: Methodology

Three important indicators of child malnutrition are conventionally reported: the proportion of children stunted, those underweight and those wasted. 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. I find this last indicator quite unsatisfactory since a child who is both stunted and underweight could still be classified as free from wasting. Likewise, progress in reducing stunting without a corresponding progress in alleviating underweight problem would imply increased wasting. Given this anomalous behavior of the indicator, I choose not to relay on it as a measure of malnutrition, focusing instead exclusively on stunting and underweight in the remainder of this paper.

To identify the proportion of children suffering from malnutrition, we need threshold weight and height for children of given sex and age against which each child is to be evaluated. In the strictest sense, as currently universally practiced, these thresholds 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 provided they are given the same nutrition. That is to say, no differences in the proportion of population below or above any pre-specified threshold height or weight would exist between any two populations if they are given identical nutrition.

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 distribution of heights and weights of another population of children of the same age and sex from this healthiest population would be attributable to malnutrition in the latter. This is the essence of the approach underlying the measures of malnutrition currently in use worldwide.

Therefore, 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 cutoff percentage of children at the bottom of the distribution 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.[3] 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 conclude whether they are stunted or not. 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 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

[3] 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.

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.

4. 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. 2000). 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 the 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.[4]

Thus, 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

[4] 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.

malnutrition. Using NFHS-2 sample of children under three years of age, Tarozzi (2008) estimates that the NCHS 1977 standard leads to 42 percent of the children as being 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 be 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 should exhibit the same distribution as the WHO 2006. 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 thee 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 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 reduces 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. Some other forces have to be at work.

There are three possible sources of differences other than nutrition between the elite Indian children and WHO 2006 population:

(1) Indian children are genetically smaller on average than those in WHO 2006 reference population;

(2) The population of Indian children could potentially become identical to WHO 2006 reference population but only if born and raised in specific alternative geographical locations and environments such as the united States and Europe; or

(3) The population of Indian children would become identical to the WHO 2006 reference population within its current location and cultural context but will take several generations because catch up takes place only with a lag.

An important distinction between the implications of the first explanation and the other two is that the former rules out any possibility of the population of Indian children mimicking the WHO 2006 reference population whereas the latter admit the possibility of catching up relatively quickly in better locations and environments or after several generations of good nutrition in the current locations and environments.

Deaton and Dreze (2008), who consider the first and the third hypotheses but not the second, 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 the third explanation. They argue that well-fed children of well-fed mothers would "catch-up with a lag" in terms of weight and height. 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."[5] They find the "catch-up with a lag" plausible on the ground that nutritional status is greatly influenced by birth weight which in turn is highly correlated with weight and height 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 differences explanation in favor of "catch-up with a lag" 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 certain children will remain below the chosen height and weight thresholds even when provided the best possible diet, in what sense are they malnourished? Indeed, the conclusion that they suffer from malnutrition would imply that we must further beef up their diet posing the risk of turning them obese.

5. Vanishing Differences in Heights: Is the Evidence Really Compelling?

In a crucial sentence, Deaton and Dreze (2008) observe that 'there is a long history of differences in population heights that were presumed to be genetic, and that *vanished* in

[5] 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 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.

the face of improved nutrition' (emphasis added). But they do not specify if they have in mind here adult heights or the heights of children. But two facts suggest that they have in mind adult heights. First, their reference to 'long history of differences' points in this direction because it is adult rather than child heights that have occupied the economics literature. Second, they refer to the contributions of Cole (2003) and Nube (2008) in this context, which are primarily concerned with the narrowing gap in heights among adults across populations.

But the evidence on adult heights points to only narrowing of height differences and not their elimination. In his lively essay in the *New Yorker* Burkhard Bilger (2004) traces the fascinating history of the literature on the subject. According to his account, evidence supporting the *elimination* of height difference in the face of improved nutrition 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. 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. To quote 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."

While the evidence, thus, fails to support the proposition of vanishing height gaps between adult populations in the face of improved nutrition, it may still be true that these differences appear only after five years of age. In other words, improved nutrition may still eliminate (as opposed to just narrow) the differences in heights across populations of children less than five years of age. A casual reader of Tarozzi (2008) is surely likely to walk away this to be the case.

Tarozzi (2008) studies the hypothesis that good nutrition eliminates the differences in heights and weights across populations by comparing the children born to Indian (and Pakistani and Bangladeshi) parents settled in the United Kingdom with those born to white parents. From this comparison, he draws the following conclusion (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 orginal)

A reader already sympathetic to the "no genetic differenes" hypothesis is likely to conclude from this statement that the key assumption underlying the WHO-sanctioned methodology to measure malnutrition is valid. Yet, he or 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 menas 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, there are 72 children. Such small samples are quite inadequate to measure even the *average* levels of stunting and underweight 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.[6]

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 Indian children born and brought up in India will also

[6] 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.

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 do not adequately represent the Indian population. Those who chose to migrate may have on average enjoyed some genetic advantage over the population left behind. Tarozzi is himself quite 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 *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 environment is a lot more conducive to height and weight development of children than Indian 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.

More systematic studies on children of migrants from other countries, employing significantly larger samples than Tarozzi (2008), provide additional evidence against the assumption of no genetic differences across populations. 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 startling: "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 found the differences so compelling that they recommended drawing up separate growth charts for Moroccan and Dutch children.

Table 3: Height of Moroccan and Dutch children living in the Netherlands in 2010 in centimeters

	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

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.[7] Table 3 reports mean heights in centimeters in 2010 for Moroccan and

[7] 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

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.

6. "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 leads to at least three puzzles.

First, 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.[8] 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 almost 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.

[8] 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.

Second, 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 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 than their Sub-Saharan African counterparts in terms of the learning and cognitive achievements. But there is no evidence that this is the case.

Finally and most compellingly, the prevailing high levels of stunting and underweight (despite improvements over the years as I report below) in India should also accompany much poorer achievements in similar other child- and mother-related health indicators such infant mortality rate, under-five mortality rate and maternal mortality rate. But with rare exceptions India does better in terms of these indicators than all Sub-Saharan African countries with similar or lower per-capita incomes (see Figures 1-5). Comparisons of health indicators in such states as Kerala and Punjab with those in Sub Saharan African countries make the "catch-up with a lag" hypothesis further suspect. How could a state like Kerala with near 100 percent literacy, perhaps least gender discrimination and the highest per-capita expenditure among larger Indian states as per the latest expenditure survey by the National Sample Survey Organization, conducted in 2009-10, be behind a country like Senegal in nutrition?

Unless one assumes that Sub-Saharan Africa has done far more catching up in terms of weight and stature relative to WHO 2006 reference population than India in the past two to four decades despite its poorer performance in terms of nearly all other health indicators, the vastly inferior child nutrition outcomes in India can only be explained by accepting the hypothesis that at any given age Sub-Saharan African children and those defining WHO reference population are on average genetically taller and weigh more than Indian children. Only this latter hypothesis is consistent with both the higher proportion of short and low-weight children in the general population in India than Sub-Saharan Africa and substantially higher proportions of short and low-weight children among even elite Indians than in WHO 2006 reference population.

7. 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. Claims of lack of progress or deteriorating nutritional levels constitute a myth of their own.

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 nine states and offers comparable indicators of nutrition for periods 1975-79, 1988-90, 1996-97 and 2003-06 while NFHS covers all states and has had three rounds in 1992-93 (NFHS-1), 1998-99 (NFHS-2) and 2005-06 (NFHS-3).[9]

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 3, 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.[10] The table provides the proportions of children who are stunted, underweight and wasted as per WHO 2006 reference population.

Table 3: 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

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

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.

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.

8. Progress in Average Height

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.[11] So progress in India is slower than China but surely China has also grown a lot faster than India during these decades.

9. Summary Remarks

In this paper, I have critically examined the claim of higher child malnutrition in India than Sub Saharan Africa. I have sown that this claim is based on a faulty methodology of measuring malnutrition and yield estimates that contradict virtually all other indicators of child health. India does significantly better than Sub Saharan Africa in terms of infant mortality, under-five mortality and maternal mortality, which are all far more objective measures that counting the proportion of malnourished children by applying a common height and weight standard to populations coming from different genetic pools, locations and cultures. None of the arguments made in favor of this approach, critically hinging on the assumption that all differences between populations result from differences in nutrition, stands up to close scrutiny.

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.

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

Finally, I note in passing that a myth similar to the one considered here has also plagued policy discussion in adult hunger. 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 the forthcoming book by Bhagwati and Panagariya (2012).

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

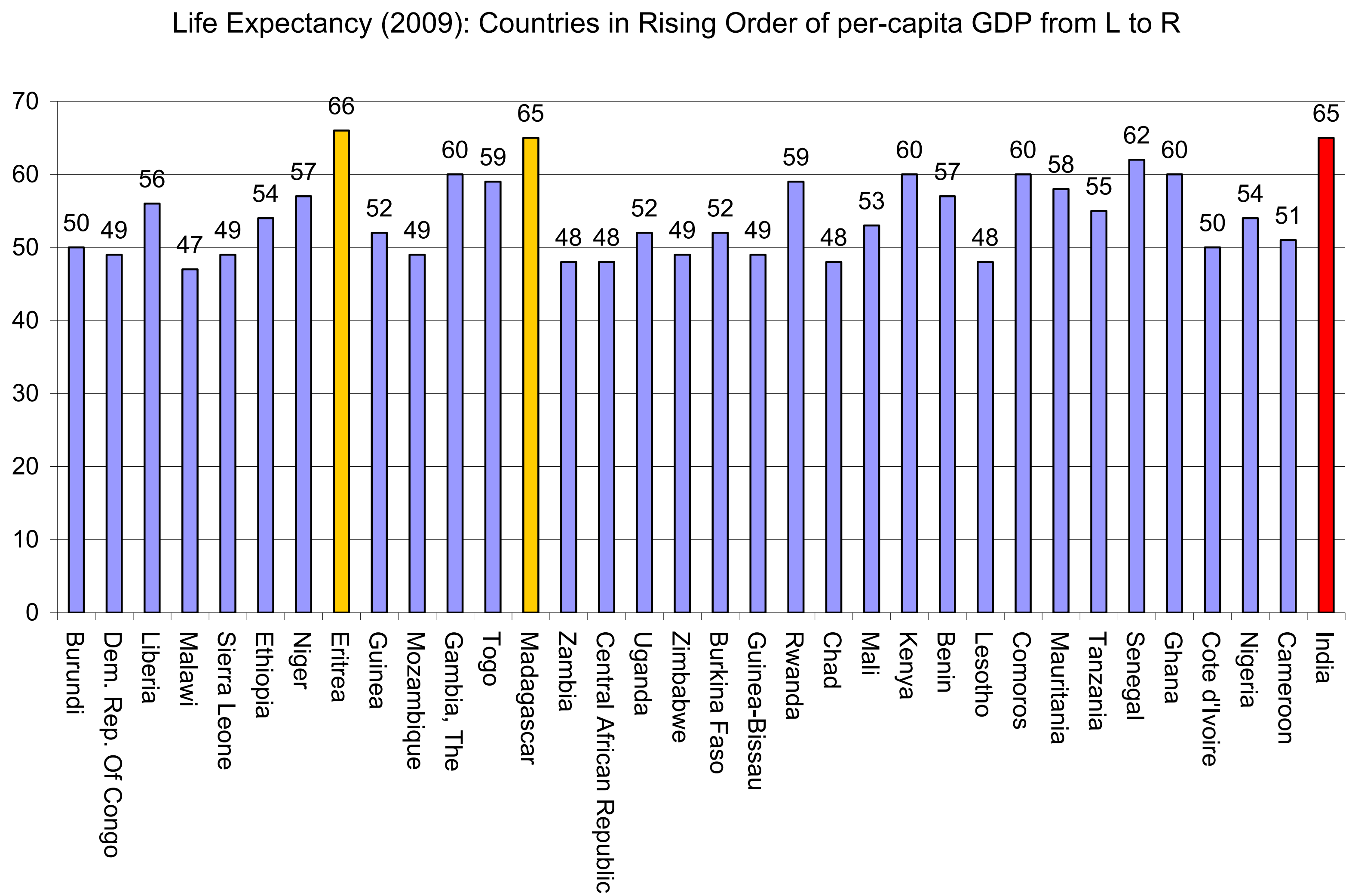


Figure 2: Infant Mortality Rates in India and 33 Poorer SSA Countries

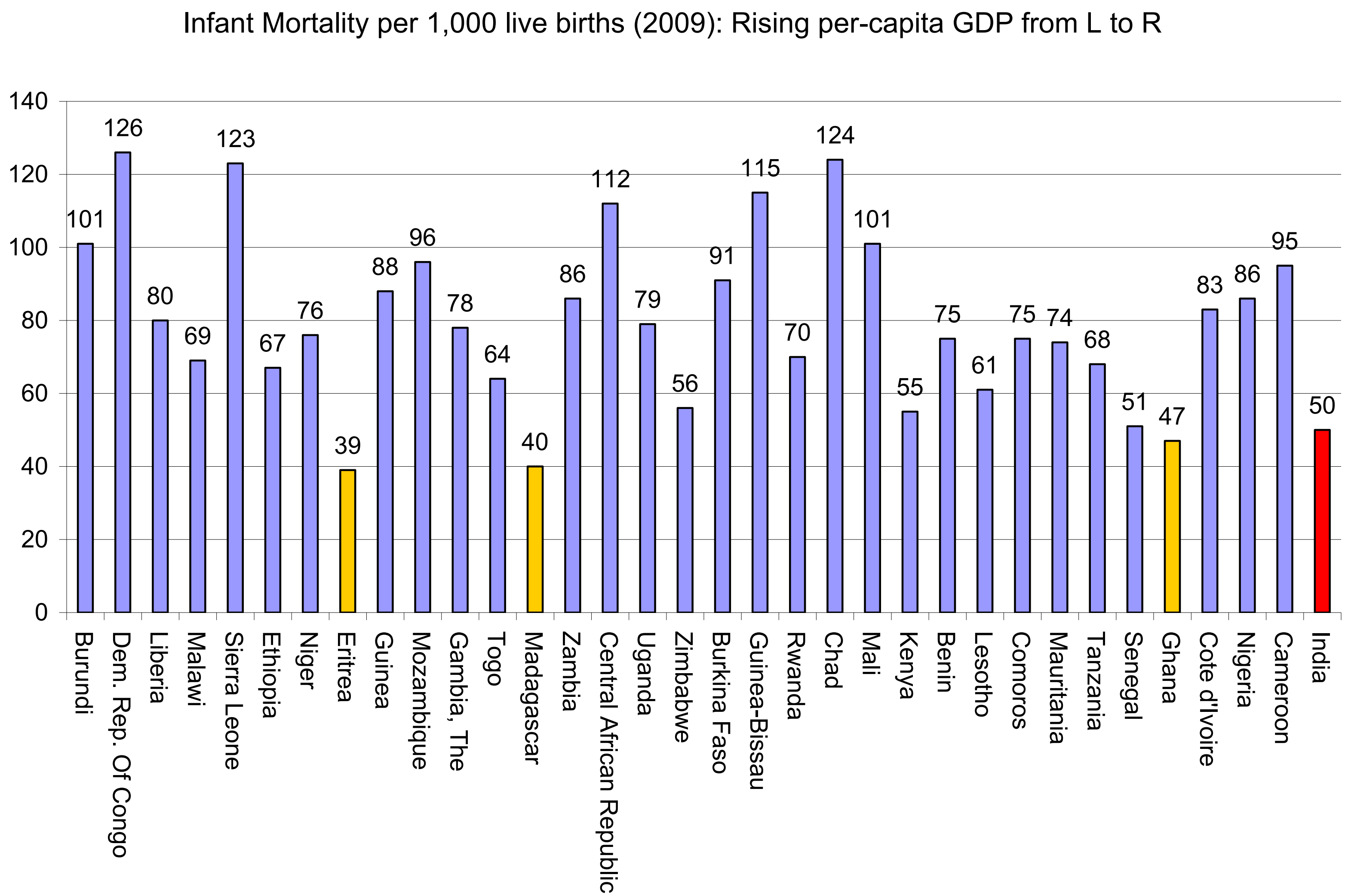


Figure 3: Under-five Mortality Rates in India and 33 Poorer SSA Countries

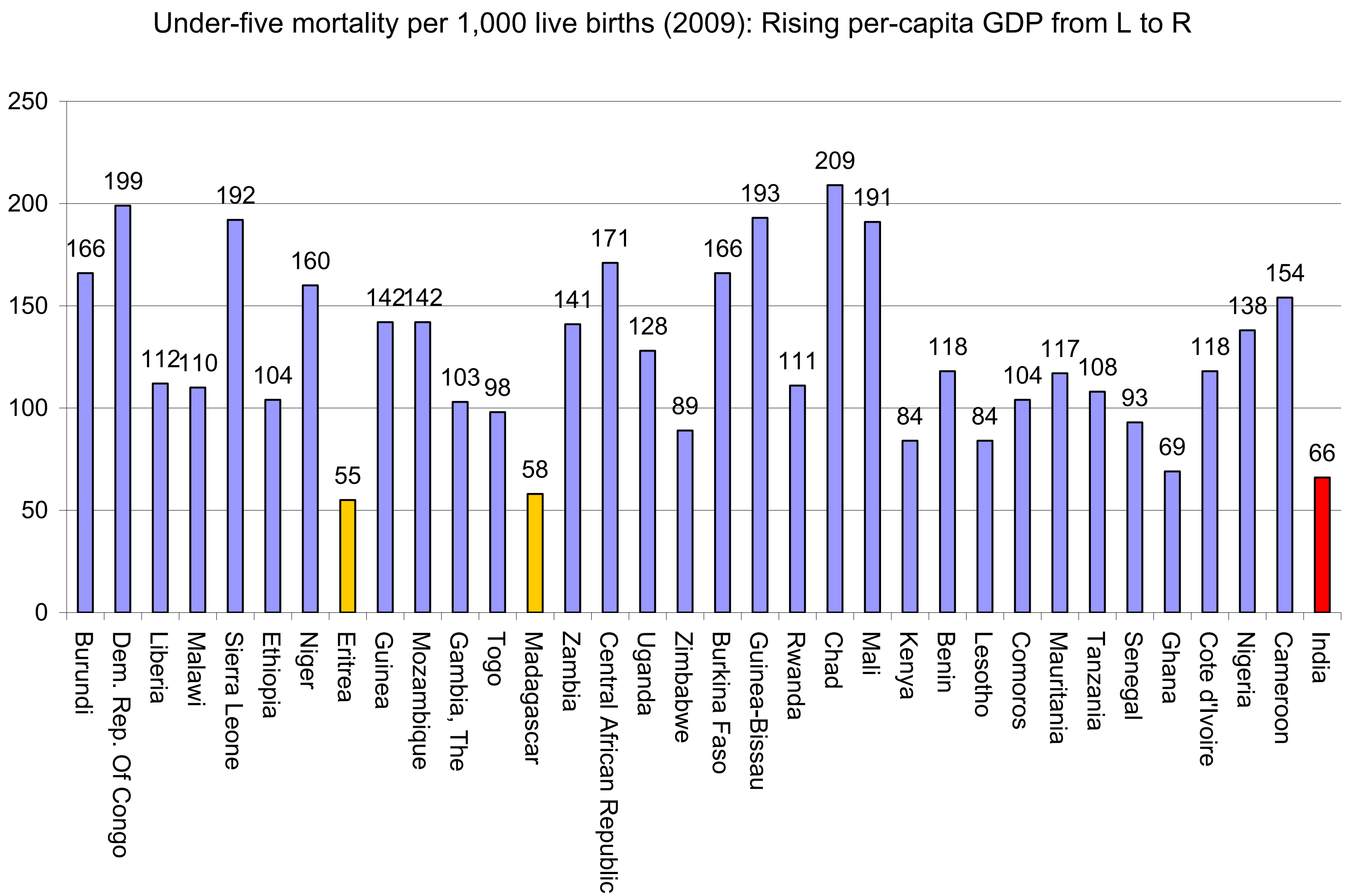


Figure 4: Still Birth Rates in India and 33 Poorer SSA Countries

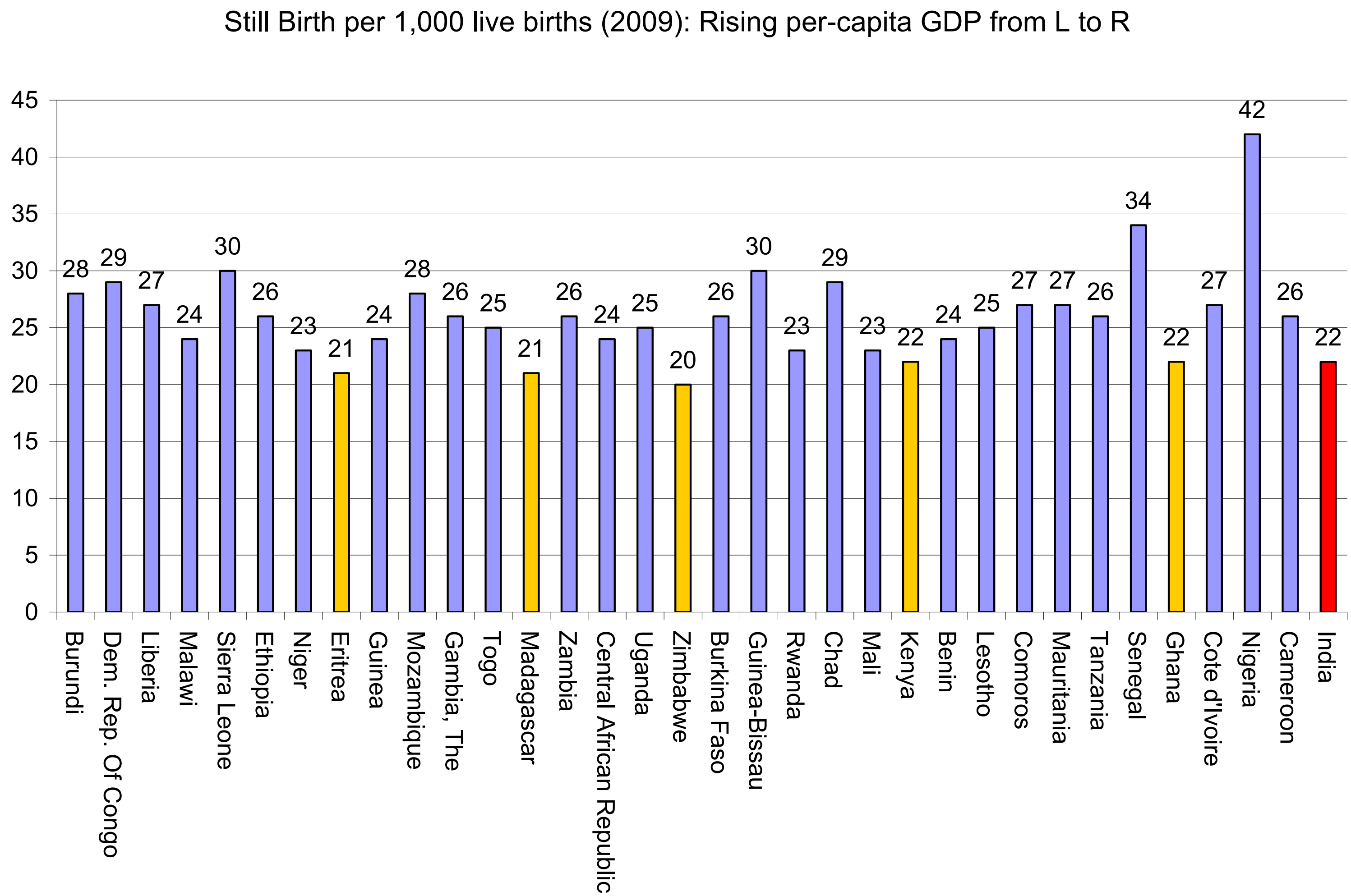


Figure 5: Maternal Mortality Rates in India and 33 Poorer SSA Countries

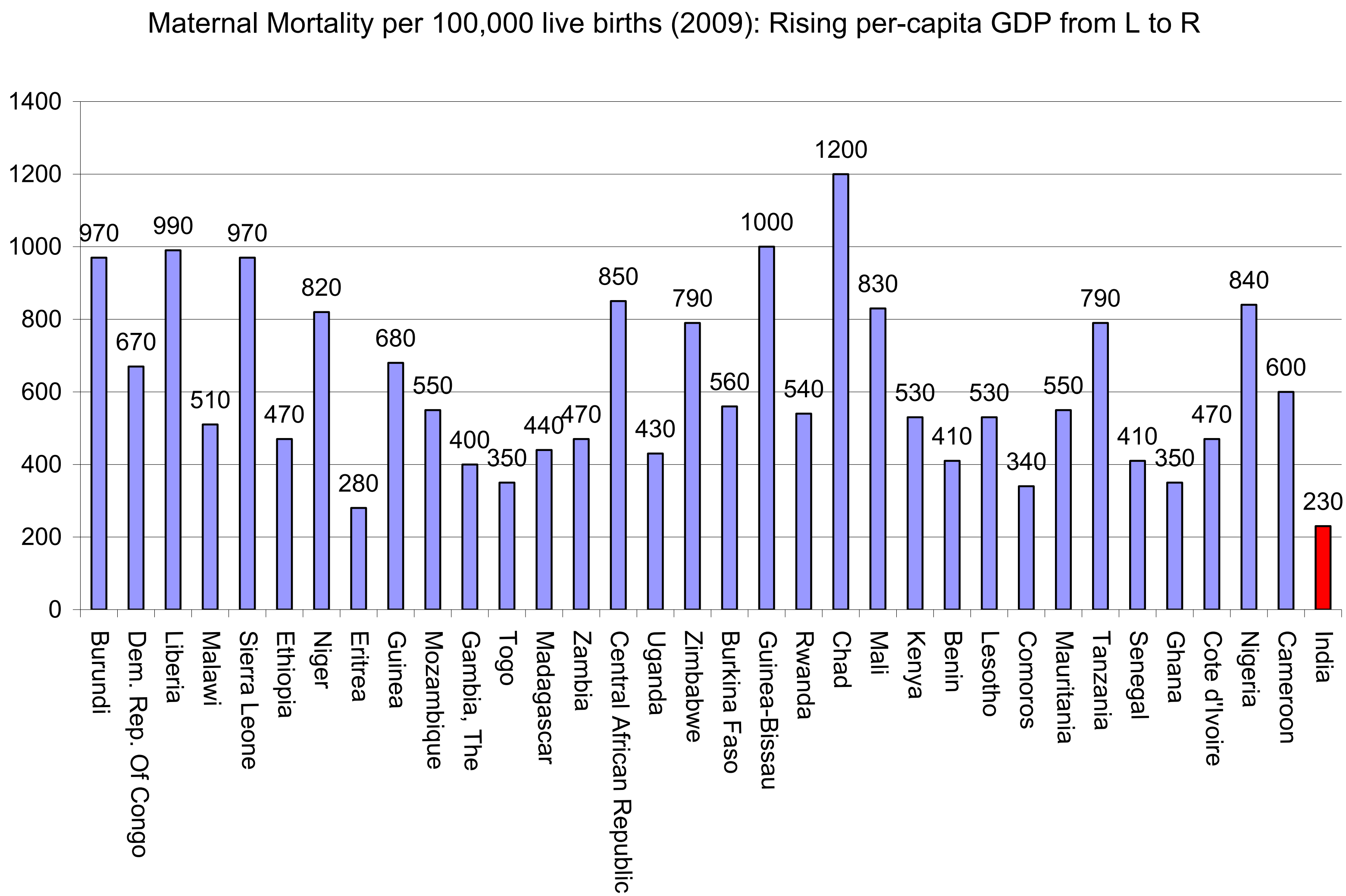


Figure 6: Percent Children Stunted in India and 33 Poorer SSA Countries

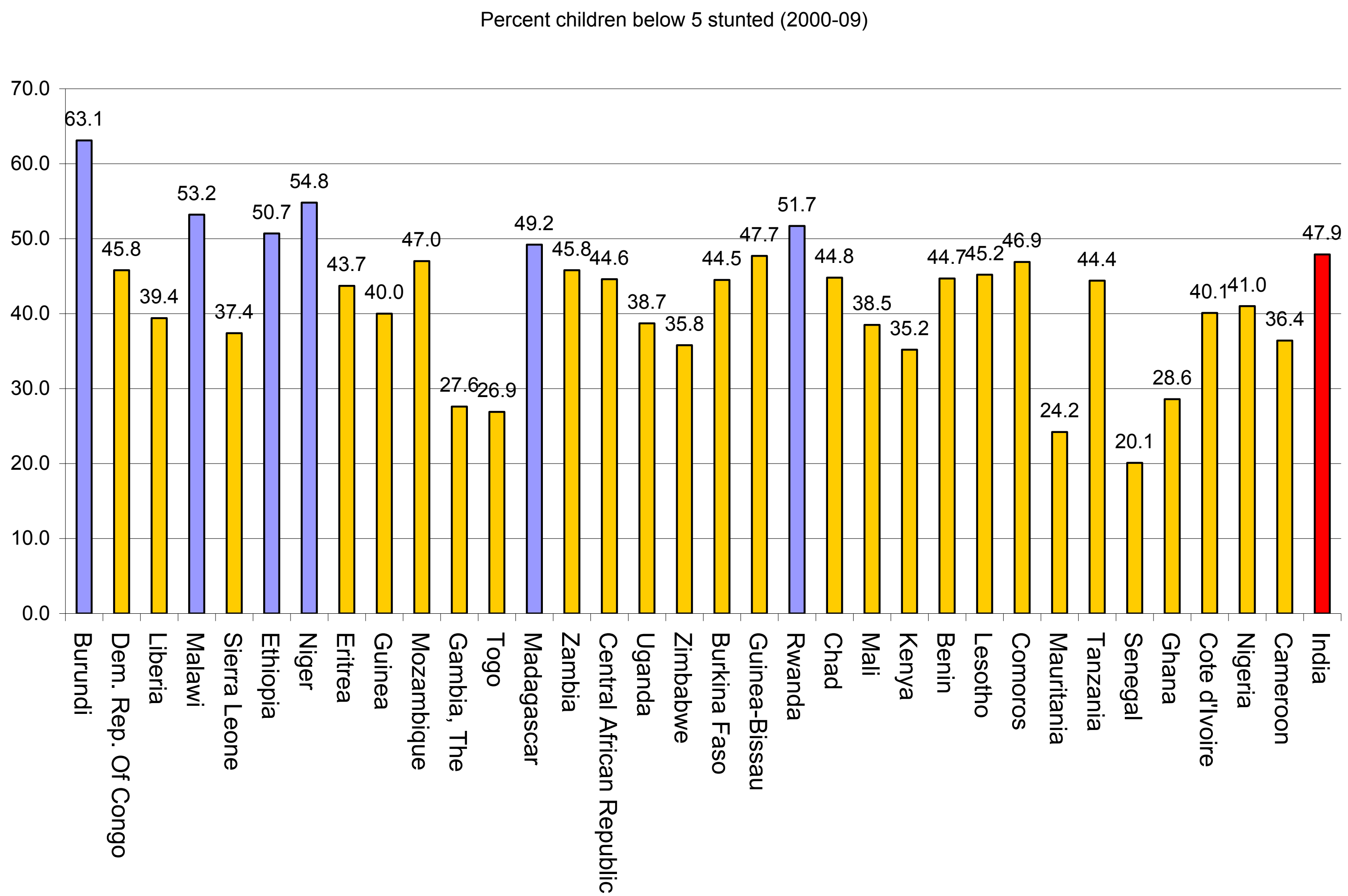
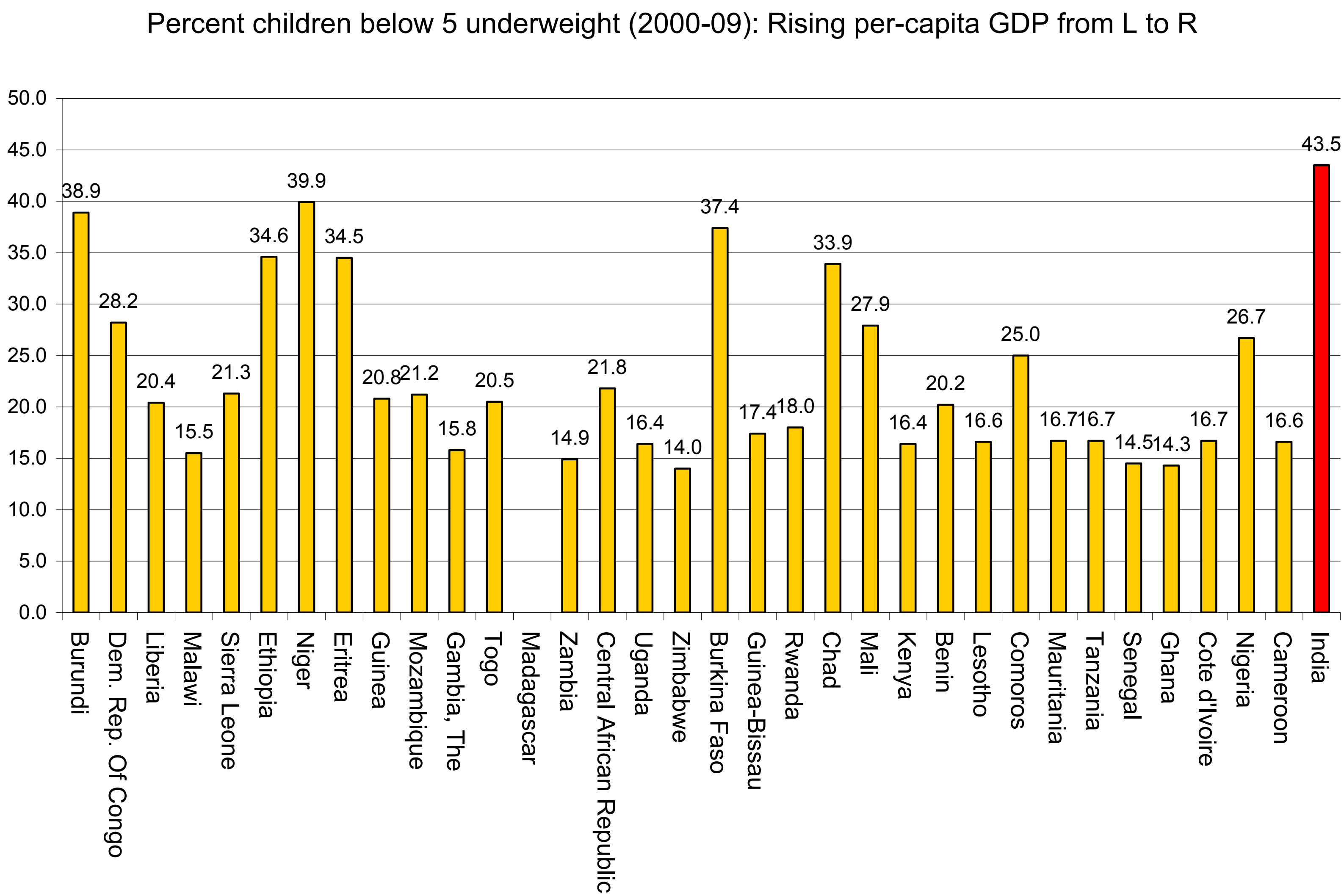


Figure 7: Percent Children Underweight in India and 33 Poorer SSA Countries



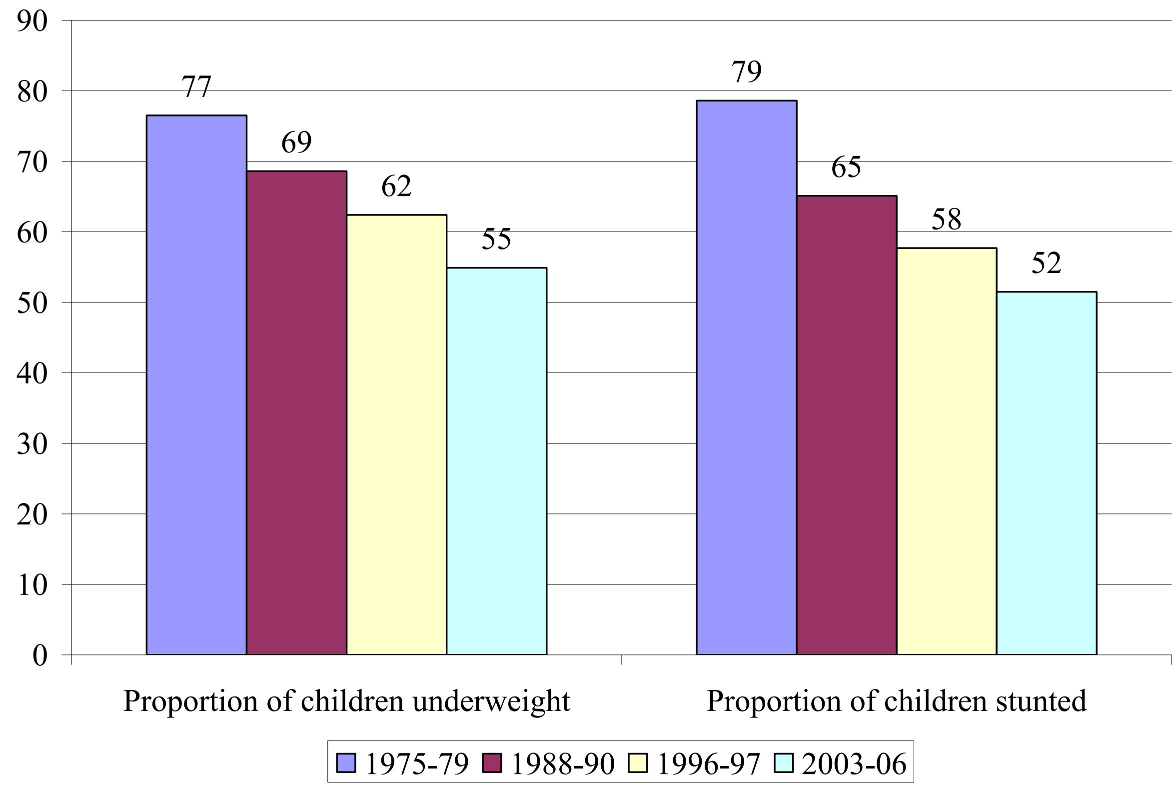


Figure 8: Malnutrition among children above 1 and below 5 years in rural areas of nine states under the NCHS 1977 standard

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).

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