GLOBAL, REGIONAL AND SUBREGIONAL TRENDS IN UNDERNOURISHMENT AND MALNUTRITION

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GLOBAL, REGIONAL AND SUBREGIONAL TRENDS IN UNDERNOURISHMENT AND MALNUTRITION

1.1) INTRODUCTION

This paper provides a broad picture of global, regional and subregional trends in food security and malnutrition over the past two to three decades. It is based on secondary data compiled by FAO, the WHO, the UN's Standing Committee on Nutrition, and independent research. These data are drawn from a very wide range of sources including Demographic Health Surveys and other health examination surveys, epidemiological studies and national food balance sheets[1].

Most sections of the paper focus on a single type of malnutrition, sketching out global, regional and subregional trends based on estimates and projections provided by one or more of the sources above. In regards to food security, a section on FAO's undernourishment statistics is provided. Although causation is not the primary focus, a quick overview of malnutrition's main drivers is presented immediately below, and short explanations regarding trends in specific indicators are included for some sections.

1.2) CAUSES OF MALNUTRITION

Malnutrition is a broad term that refers to all forms of poor nutrition, including underweight and micronutrient deficiencies as well as overweight and obesity. Its most immediate causes are inadequate dietary intake and infectious disease. Inadequate dietary intake can include deficits in quantity and/or quality, where quantity refers to total caloric intake and quality to variety, diversity, nutrient content and safety.

Inadequate dietary intake weakens the immune system and increases susceptibility to disease. Infectious disease, in turn, increases nutrient requirements and weakens the immune system. There are three drivers of this vicious cycle: (1) food insecurity, (2) poor health mediated by poor water and sanitation and inadequate health services, and (3) lack of appropriate care in terms of inadequate breastfeeding, complementary feeding and other maternal and child caring practices. In addition to these proximate causes, nutrition is distally affected by economic, political, social and economic factors. These include patterns of income distribution, agricultural practices, trade and food policies, religion, socio-demographic trends, effects of climate change, and cultural beliefs.

Improving nutrition is one of the targets for Millennium Development Goal 1, as the two indicators used for measuring progress in reduction of non-income poverty are prevalence of underweight children and the proportion of the population that is undernourished. In addition to underweight and undernourishment, a number of other indicators are used to assess malnutrition. Some apply only to children under five; while others can be used to assess the situation for a variety of demographics (see Box 1).

[1] Data sources are subject to some measurement error and comparable data across multiple time bands are lacking for some indicators. In addition, Asian and African subregions have been categorized in different ways depending on the indicator, so although subregions are the same within metric type (e.g. undernourishment, child growth, Disability Adjusted Life Years (DALYs)), they are not uniformly comparable. Despite these caveats, in all cases the data presented below are considered among the best available for international comparison.

Box 1. Commonly used indicators

Undernourishment refers to food intake that is insufficient to meet dietary energy requirements. Undernourishment calculations are based on three key parameters at national level: the average per capita dietary energy supplies available for consumption as derived from FAO's Food Balance Sheets, the minimum number of calories required for an average person, and an estimation of the level of inequality in access to that food as calculated by income inequality. Undernourishment levels within a country vary from year to year, depending on food availability, the gender and age structure of the population, and changes in income distribution. Undernourishment is not assessed at individual level.

Underweight
Low weight-for-age defined as 2 standard deviations below the WHO's 2006 child growth standards. Underweight often implies stunting or wasting (see below) and is indicative of undernutrition among children under five.

Stunting
Low height-for-age defined as 2 standard deviations below the WHO's 2006 child growth standards. Stunting indicates chronic or long-term undernutrition and poor health among children under five.

Wasting
Low weight-for-height defined as 2 standard deviations below the WHO's 2006 child growth standards. Wasting indicates a recent or current weight loss due to acute undernutrition or illness among children under five.

Overweight and obesity among children under five
High weight-for-height defined as 2 (overweight) or 3 (obese) standard deviations from the WHO's 2006 child growth standards.

Body Mass Index (BMI)
Body weight in kilograms divided by height in meters squared (kg/m^2). BMI is commonly measured in adults to assess underweight, overweight and obesity. The international references are as follows:

- Underweight = BMI<18.5
- Overweight = BMI ≥25
- Obese = BMI≥30

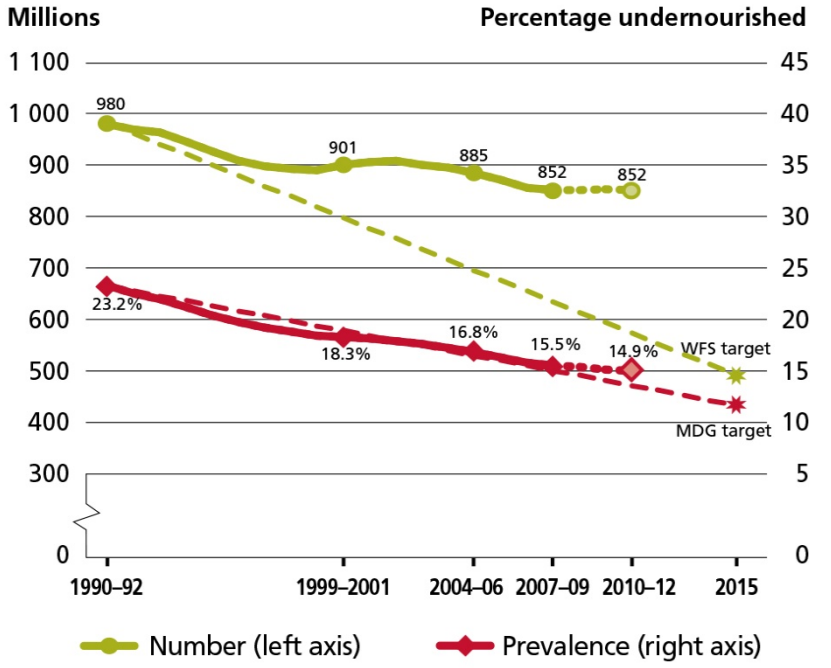
Micronutrient deficiencies
Inadequate intake of a specific vitamin or mineral, not always accompanied by clinical symptoms. When tissue or serum levels of a given micronutrient are inadequate, the individual in question is considered to be deficient and at risk of adverse health consequences, including increased morbidity and mortality, poor reproductive health, and impaired physical growth and cognitive function. Anaemia (caused primarily by iron deficiency although other factors do contribute) vitamin A deficiency (VAD) and iodine deficiency are the most commonly measured in both children and adults.

2.1) UNDERNOURISHMENT[2]

Prevalence of undernourishment in developing countries has declined over the past two decades, from approximately 23 percent in 1990-92 to just under 15 percent in 2010-12. In terms of total numbers, approximately 980 million people were undernourished in developing countries in 1990-92. The number dropped substantially, to 885 million, by 2004-06 but since then the rate of decline has leveled off. This slowdown is undoubtedly due, at least in part, to the financial crisis, economic downturn, persistent food price volatility, and climate change.

Although achievement of the World Food summit goal (halving the number of undernourished people in the world between 1990-92 and 2015) now appears out of reach, achievement of the Millennium Development Goal undernourishment target (halving prevalence by 2015) remains possible, if appropriate actions are taken to reverse the current slowdown.

Figure 1. Number and percentage of undernourished people in developing countries, 1990-92 to 2015



Source: FAO, 2012

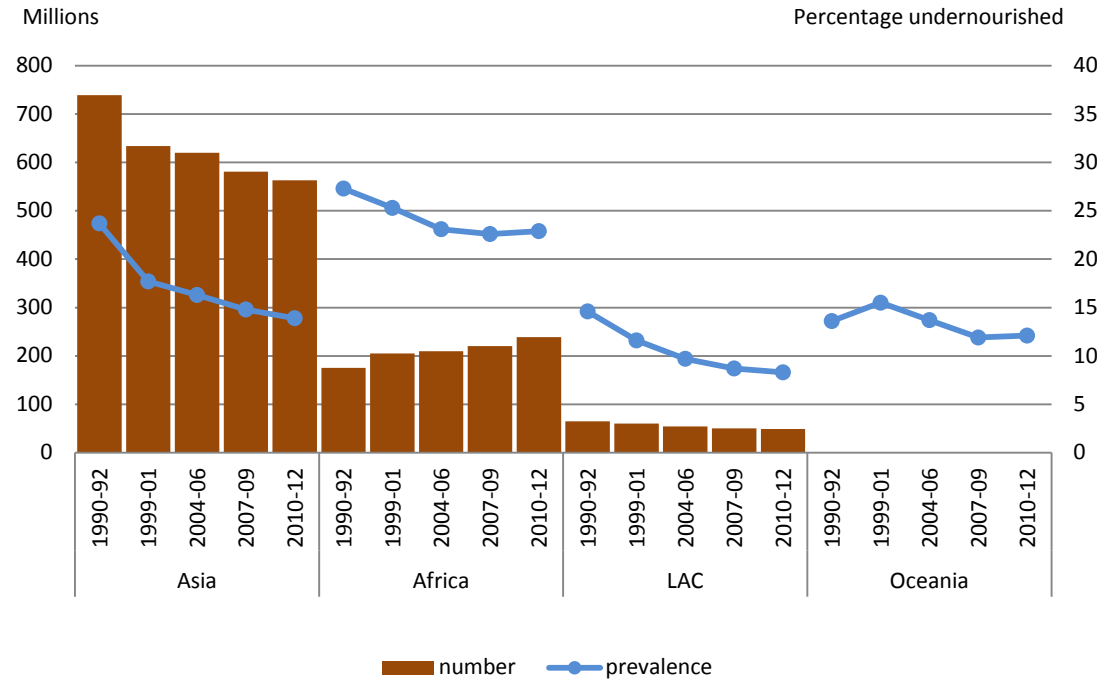
Regionally, progress in reducing undernourishment has been greatest in Asia and Latin America and the Caribbean (LAC). Prevalence in Asia decreased by about 10 percentage points (from approximately 24 to just under 14 percent) between 1990-92 and 2010-12. Prevalence in LAC, which in 1990-92 already boasted one of the lowest rates of undernourishment (14.6 percent) among developing country regions, had decreased by approximately 6 percentage points by 2010-12 down to 8.3 percent. Progress in Africa has been less marked (a decrease of 4.4 percentage points), moreover this region had by far the highest prevalence during this period, starting at around 27 percent in 1990-92 and ending in 2010-12 at just under 23 percent.

[2] All data in this section from FAO, 2010 ,FAO, 2011 and FAO, 2012

Africa is also the only region where absolute numbers have steadily increased: from 175 to 239 million between 1990-92 and 2010-12. Asia, in contrast, shows a substantial downward trend in numbers, from 739 to 563 million over the same time period. LAC also shows a downward trend in absolute numbers, from approximately 65 to 49 million, again over the same period.

Given its size, it is not surprising that the absolute numbers for undernourishment in Oceania have been relatively low for the last two decades (approximately 1 million for the entire period). However this region has seen less steady improvement than any other. The trend is especially marked in regards to prevalence, which was lower than LAC's in 1990-92 but then actually increased in the early nineties and has shown little improvement since 2004-06. Over the entire period, prevalence of undernourishment dropped by a mere 1.5 percentage points in Oceania.

Figure 2. Number and proportion of undernourished people, by region, 1990-92 to 2010-2012



Source: FAO, 2012

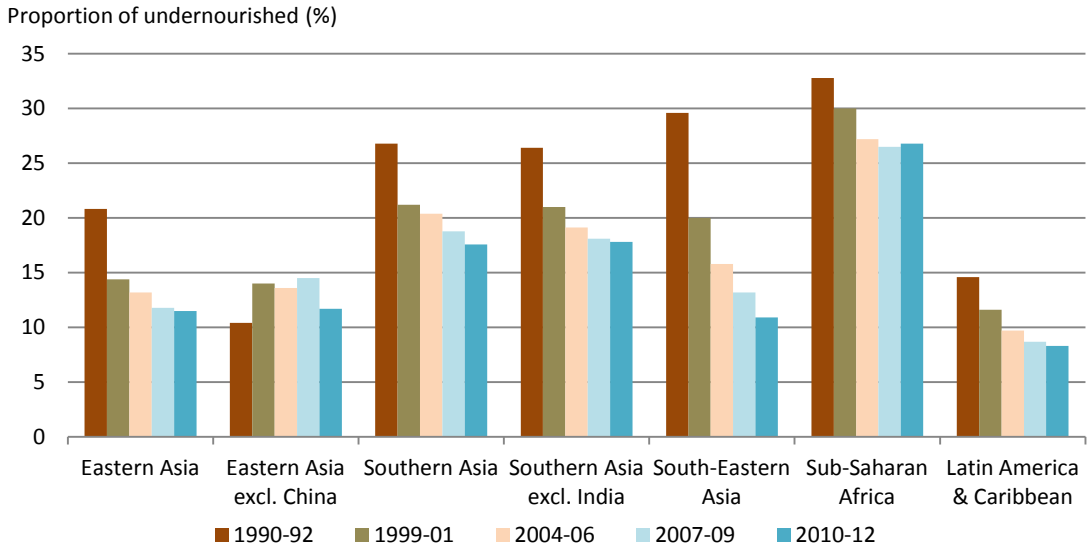
Note: Oceania's number of people undernourished is approximately 1 million.

Subregionally, undernourishment prevalence decreased steadily from approximately 21 to 11.5 percent in Eastern Asia between 1990-92 and 2010-12. This trend is due in large part to rapid growth in China. When the data are disaggregated to exclude the latter, the trend destabilizes, revealing substantial volatility and a slight *increase* from 10.4 to 11.7 percent. The same is not true in South Asia. Regardless of whether India is excluded, this subregion shows substantial progress in reducing prevalence of undernourishment.

However South Asia's prevalence rates are also very high, second only to sub-Saharan Africa's (SSA), which were the worst in the world during the period in question (approximately 33 percent in 1990-92 to just under 27 percent in 2010-12). Moreover, although both subregions have made progress in reducing prevalence, absolute numbers in both subregions have actually risen or shown only marginal improvement (not shown). In SSA there has been a steady upward trend in the number of

people who are undernourished (from 170 million in 1990-92 to 234 in 2010-12). In South Asia, the trend is less linear and indicates less progress than other regions: In 2010-12 absolute numbers for South Asia were estimated at 304 million, down from 323 million in 2004-06 but starting from a baseline of 327 million in 1990-92 (numbers not shown). Continued high rates of subregional population growth are one obvious explanation for this problem.

Figure 3. Proportion of undernourished people in selected subregions, 1990-92 to 2010-2012



Source: FAO, 2012

South-Eastern Asia has made dramatic progress in regards to both prevalence and absolute numbers. Prevalence in this subregion decreased significantly over the past two decades by about 18 percentage points (from 29.6 to approximately 11 percent). Absolute numbers have also decreased, from 134 to 65 million (not shown). Progress has been led by extraordinary reductions in Thailand and Vietnam (decreases in prevalence of 43.8 to 7.3 percent and 46.9 to 9 percent, respectively). These reductions are presumably due in large part to rapid economic growth driven by reforms in trade and agriculture policy

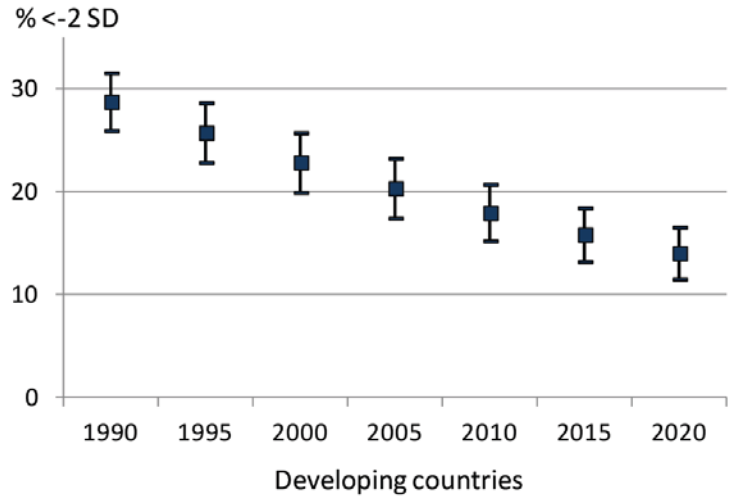
Trends in Latin America seem straightforward. Over the past two decades, both prevalence and absolute numbers have decreased steadily, presumably due in large part to strong economic growth in countries such as Brazil.

Overall, Latin America, Eastern Asia (when China is included), and South-Eastern Asia are three major developing subregions which show marked declines in both absolute numbers and prevalence of undernourishment.

3.1) CHILD GROWTH - UNDERWEIGHT[3]

Between 1990 and 2010, prevalence of underweight declined by an estimated 11 percentage points - from 29 percent to 18 percent – in developing countries. Overall, this rate of progress is insufficient to meet the MDG target of halving 1990 levels of underweight by 2015 (De Onis, Blossner & Borghi, 2011).

Figure 4. Estimated prevalence of underweight children (<5 years) in all developing countries with 95% confidence interval, 1990-2020



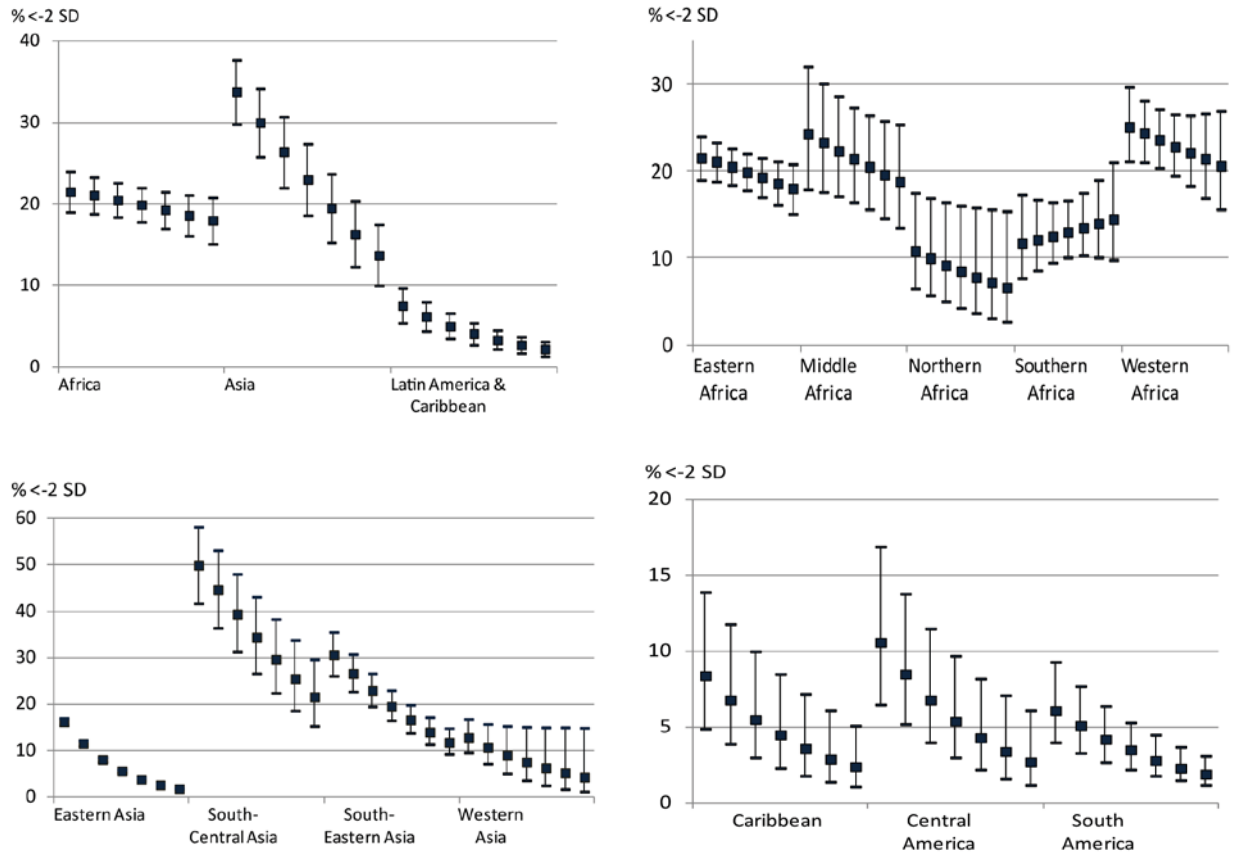
Source: WHO Global database on Child Growth and Malnutrition
Notes: WHO classifications: Underweight <10percent = low; 10-19percent = medium; 20-29percent = high; >29percent = very high; box-whisker plots are at 5-year intervals.

Within regions, projections for 2015 indicate that Africa's reduction (from 21 to 19 percent) will be too slow to meet the MDG target. This is due to slow progress in most subregions and increased prevalence in Southern Africa. Estimates for Asia show it to be on track and to have made the most progress; underweight will have decreased in this region from approximately 34 percent in 1990 to a projected 16 percent in 2015. Notably, Asia's rates of underweight were higher than Africa's in 1990 and are projected to be lower by 2015. However as of 2010 these regions showed almost identical prevalence rates as both were estimated at 19 percent. LAC started from a much lower baseline (8 percent) and exceeded its MDG target in 2010 (3 percent). Underweight prevalence is projected to be as low as 2 percent by 2020 in LAC.

Subregionally**,** trends in Africa have been mixed. As mentioned above, prevalence has decreased in most areas, but only marginally, and actually increased slightly in Southern Africa, from 12 percent in 1990 to 14 percent in 2010. Projections to 2020 for Southern Africa indicate this upward trend will continue. The highest rates of underweight however, are not in Southern Africa but in East, West and Middle Africa. Prevalence in Southern Africa over the last two decades has actually been the lowest in SSA, only in Northern Africa were underweight rates estimated to be lower.

[3] Unless otherwise indicated, data in this section from WHO's Global Database on Child Growth and Malnutrition and the WHO's Department of Nutrition. Some discussion of regional and subregional trends adapted from De Onis, Blössner & Borghi, 2011

Figure 5. Estimated prevalence of underweight children (<5 years) by region and subregion with 95% confidence interval, 1990-2020



Source: WHO Global database on Child Growth and Malnutrition

Notes: WHO classifications: Underweight <10percent = low; 10-19percent = medium; 20-29percent = high; >29percent = very high; box-whisker plots are at 5-year intervals.

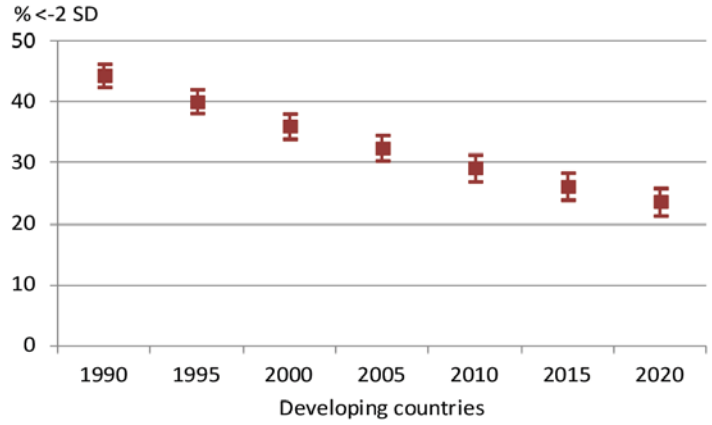
Trends in Asia appear positive overall. Prevalence in Eastern Asia decreased by 12 percentage points (from 16 down to 4 percent) between 1990 and 2010 and is projected to decline to under 2 percent by 2020. As of 2010 Eastern Asia had the lowest underweight rates in the region. However it is important to note that the decrease in Eastern Asia is driven by progress in China. As with undernourishment, when China is excluded from the regional 2010 estimate, underweight rates increase substantially, from 19 to 25 percent (data not shown, Lutter et al., 2011). Western Asia, which started from the lowest baseline, met the MDG target in 2010 (reduction from 13 to 6 percent) and South-Eastern Asia is on track, prevalence in this subregion decreased from 31 to 17 percent between 1990 and 2010. Finally, while South-Central Asia continues to suffer extremely high prevalence rates, it has also made major progress, reducing underweight by 20 percentage points between 1990 and 2010. This is the highest level of reduction in the region. However even though South-Central Asia is on track to meet the MDG target, more underweight children live in this region than anywhere else. Projections to 2020 for South-Central Asia predict reductions at a rate similar to that of the past two decades.

Underweight rates in LAC have remained relatively low over the past two decades. Central America, which started with the highest baseline, has made the most progress. All subregions in LAC are on track to meet the MDG target and projections through 2020 estimate continued reductions.

3.2) CHILD GROWTH - STUNTING[4]

Between 1990 and 2010, prevalence of stunting declined by an estimated 15 percentage points - from 44 percent to 29 percent – in developing countries. Further reductions, to 24 percent, are projected for 2020.

Figure 6. Estimated prevalence of stunted children (<5) in all developing countries with 95% confidence interval, 1990-2020



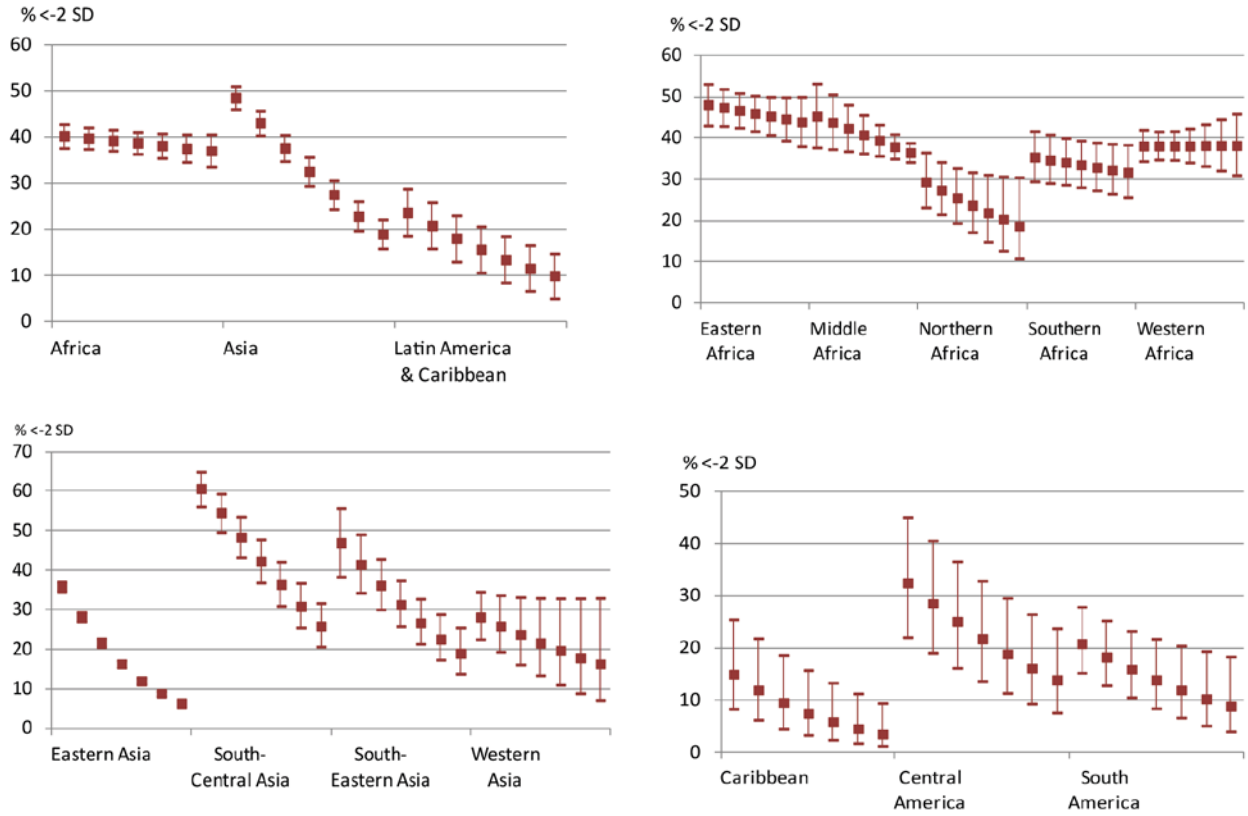
In most of Africa, prevalence of stunting has stagnated over the past two decades at around 40 percent, and only minimal improvement through 2020 is anticipated. In contrast, Asia showed a substantial decrease from 49 percent in 1990 to 28 percent in 2010, nearly halving that region's number of stunted children from 190 million to 100 million. This trend is projected to continue and it is anticipated that by 2020 Asia and Africa will have similar numbers of stunted children (68 million and 64 million, respectively). LAC, which began with the lowest baseline (24 percent), has shown a steady downwards trend; prevalence reduced to roughly 14 percent by 2010 and is projected to reach 10 percent by 2020. Prevalence of stunting between 1990 and 2010 was considerably higher than underweight rates in all regions.

Subregional trends in stunting over the past two decades have been generally comparable to those for underweight. However, there are a few important exceptions. As of 2010, stunting remained disproportionally high in parts of Latin America, reaching 30 percent in several Andean countries and over 50 percent in Guatemala (Lutter et al., 2011). Conversely, the trend for stunting in Southern Africa, which indicates marginal progress, is in direct conflict to that for underweight, which as discussed above is increasing. In both cases, dietary quality may possibly be a key factor. Persistent high rates of stunting in the Andes and other areas of Latin America may be due to diets which are adequate in terms of total caloric intake (thus reducing underweight) but which remain low in diversity and nutrient content. Similarly, stunting in Southern Africa may have decreased due to improved diet quality over the long term, while underweight rates have increased due to short-term nutritional insults caused by drought, civil unrest, very high HIV prevalence, and other shocks[5].

[4] Unless otherwise noted, data in this section from WHO's Global Database on Child Growth and Malnutrition

[5] As mentioned in Box 1, underweight (low weight-for-age) is a composite indicator of low height-for-age (stunting) and low weight-for-height (wasting). Wasting occurs in situations where energy intakes are inadequate to maintain normal bodyweight (see 3.3) and if repeated incidents of wasting occur this will contribute to increased levels of underweight.

Figure 7. Estimated prevalence of stunted children (<5) by region and subregion with 95% confidence interval, 1990-2020



Source: WHO Global database on Child Growth and Malnutrition.
Notes: WHO classifications: Stunting <20 = low, 20-29 = medium, 30-39 =high, >=40 = very high, box-whisker plots are at 5-year intervals.

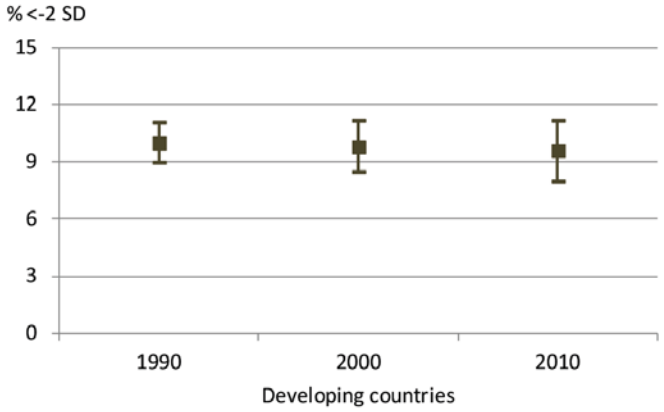
In most other African subregions, trendlines show little or no progress. The most marked case of stagnation is in Western Africa, where stunting rates have remained unchanged and high at 38 percent since 1990. Projections to 2020 indicate no anticipated change for this subregion. Northern Africa appears to have had the most success, as well as having substantially lower overall prevalence.

Eastern Asia has made impressive reductions in stunting over the past two decades, from 36 percent in 1990 to 12 percent in 2010. However, as with both undernourishment (East Asia) and underweight, stunting in Asia as a whole appears to be increasing (from 28 to 33 percent) when data from 1990 to 2010 are disaggregated to exclude China (Lutter et al., 2011). Also as with underweight, stunting in South-Central Asia is the highest in the region but reductions have been substantial, approximately 25 percentage points between 1990 and 2010 (61 to 36 percent). Trends for Southeast and Western Asia are also similar to those for underweight. Prevalence in the former decreased markedly between 1990 and 2010 (47 to 27 percent). In Western Asia, progress has also been steady, although as with underweight this subregion began with a relatively low baseline and progress has been less dramatic than elsewhere.

3.3) Child Growth - Wasting[6]

While stunting is considered the best indicator of chronic, long-term malnutrition, wasting describes a recent or current severe process leading to significant weight loss. As such wasting is an indicator of acute malnutrition and is closely associated to increased risk of mortality and functional impairment. Since weight loss occurs quickly (as opposed to slow growth in height), wasting is extremely sensitive to short-term shocks such as famine and severe disease. Consequently wasting can be used as a proxy indicator of the severity of emergencies. It is also commonly used to assess the impact of seasonality on nutrition outcomes among children.

Figure 8. Estimated prevalence of wasted children (<5) in all developing countries with 95% confidence interval, 1990-2010



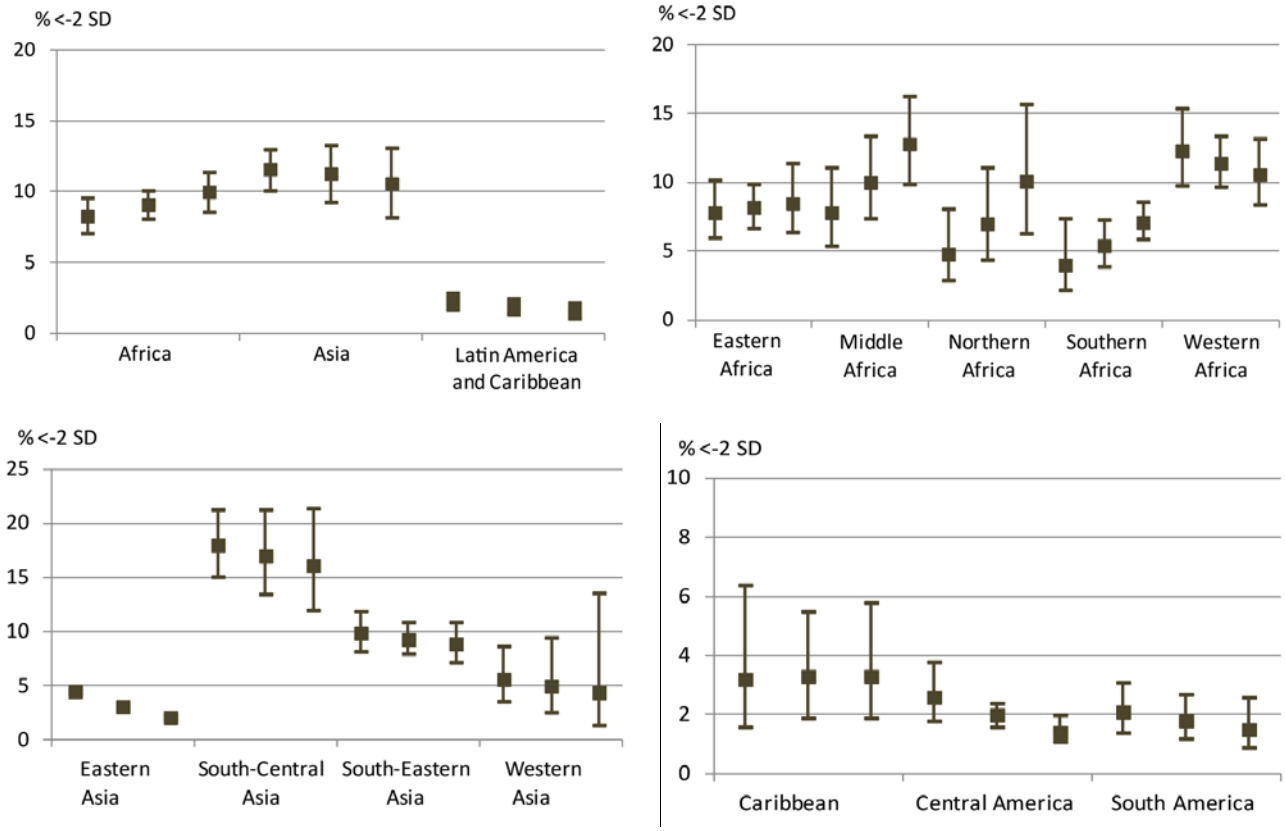
Given its sensitivity, wasting is especially difficult to forecast and consequently no projections past 2020 are provided. However, the trendline derived from survey data (1990-2010) across developing countries is practically flat; implying that short-term volatility caused by seasonality or shocks may mask an overall long-term trend of minimal change. Prevalence during this time band hovered around 9 percent for all developing countries. The WHO classifies wasting rates between 5 and 10 percent as "medium" and over 10 percent as "high". An overall wasting rate of 9 percent implies that far too many children were wasted between 1990 and 2010, given the severe health implications of this indicator.

Regional and subregional prevalence rates reveal some variability, however even so the relative changes are much more incremental than for stunting or underweight. This is to be expected given the nature of the indicator, prevalence rates are far lower to begin with. Wasting was highest in Asia between 1990 and 2010 and declined by 1 percentage point (from 12 to 11 percent). Prevalence in Africa remained slightly lower than Asia but rates increased, from 8 to 10 percent. Wasting in LAC during this period was substantially lower than in other regions and declined marginally, from 2 to approximately 1.5 percent.

Subregionally, wasting rose across Africa, perhaps most notably in Northern Africa, where prevalence doubled (from 5 to 10 percent). The one exception is Western Africa, where wasting decreased from 12 to just under 11 percent. However Western Africa also had higher prevalence rates for most of the period in question, although by 2010 Middle African rates were higher (13 percent, respectively), perhaps due in part to the repercussions of ongoing civil unrest.

[6] All data in this section from the WHO's Global Database on Child Growth and Malnutrition

Figure 9. Estimated prevalence of wasted children (<5) by region and subregion with 95% confidence interval, 1990-2010



Source: WHO Global database on Child Growth and Malnutrition.
Notes: WHO classifications: Wasting <5 = low, 5-10= medium, 11-14 =high, >14= very high, box-whisker plot are at 10-year intervals

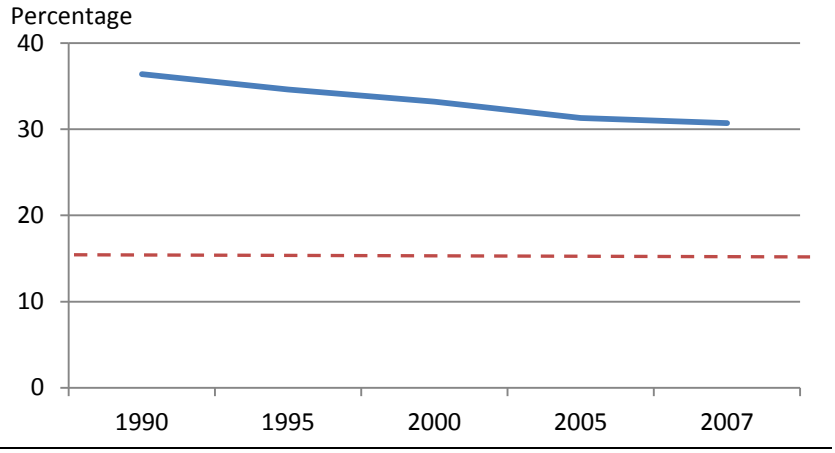
As with underweight and stunting, wasting in South-Central Asia was the highest in the region between 1990 and 2010, but reductions were also relatively substantial, from 18 to 16 percent during the period in question. Eastern Asia started from a significantly lower baseline but had a comparable rate of reduction; wasting prevalence for that subregion decreased from 5 to 2 percent within the same timeframe. Again as with stunting and underweight, wasting in South-Eastern Asia remains the second highest in the region. Western Asia also appears to show a similar trend in wasting to those for stunting and underweight.

Wasting trends within LAC show less decrease than those for stunting and underweight. Most marked is lack of progress in the Caribbean (static at 3 percent from 1990 to 2010). However it is important to reiterate that estimated prevalence rates for LAC as a whole are very low overall compared to Asia and Africa, as is also the case for stunting and wasting.

4.1) MICRONUTRIENTS - VITAMIN A DEFICIENCY[7]

136 million children under five in developing countries were estimated to be vitamin A deficient[8] (VAD) with a prevalence of about 31 percent, in 2007, down from approximately 36 percent in 1990.

Figure 10. Estimated prevalence of VAD among children (6 months- 5 years) in developing countries, 1990-2007



Source: SCN, 2010
Note: The criterion for establishing a public health problem is >15% prevalence of vitamin A deficiency

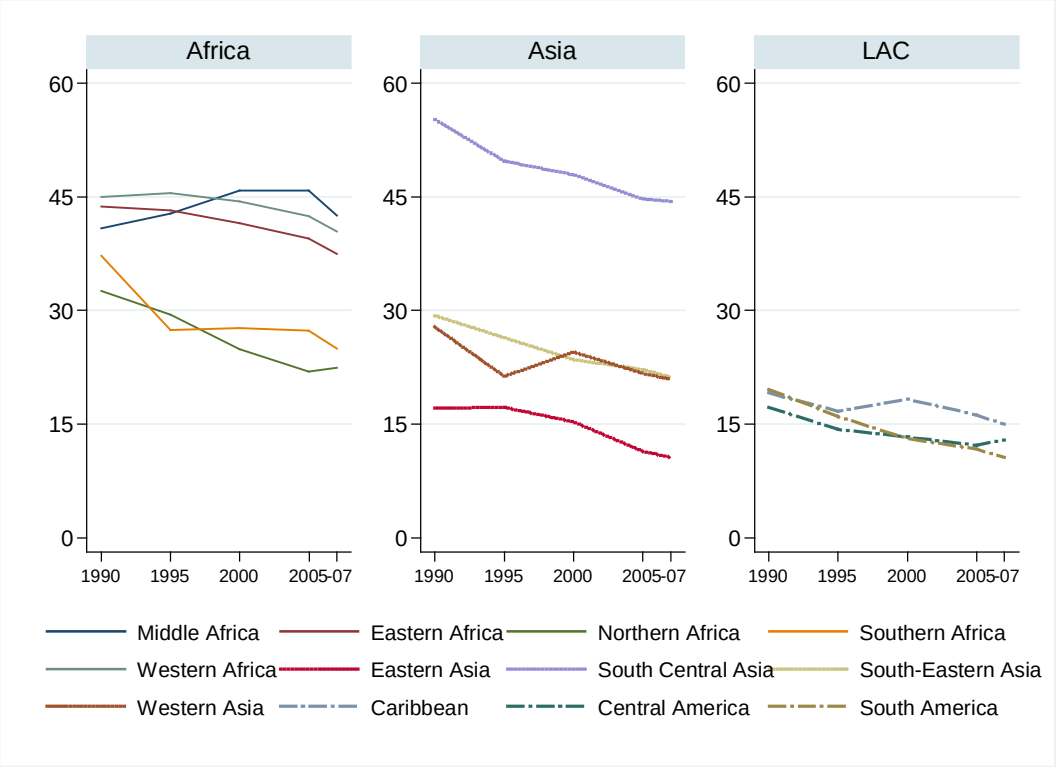
Within the same period, prevalence rates for this population remained around 30-40 percent in both Africa and Asia, and around 10-20 percent in LAC. However, no real trend is apparent from these averages, as they do not usually contain the same countries across time bands, and thus are not comparable by region (data not shown).

Subregionally, South-Central Asia had the highest prevalence between 1990 and 2007. As with other indicators, this subregion has made substantial progress in reducing VAD, prevalence decreased by approximately 11 percentage points (from 55 percent to 44 percent) over this period. Note however that the 1990 estimate is only roughly comparable with later estimates for this subregion as the central Asian countries were coming into existence during this period and hence reducing India's impact on the estimate. As with other indicators, this subregion also had far more children who were Vitamin A deficient – 82 million in 2007 - than any other part of the world. Other Asian subregions started from substantially lower baselines, although Eastern Asia is the only area where, as of 2007, estimates indicate that VAD was no longer a public health problem.

Central and Western Africa had very high (over 40 percent) prevalence of VAD during the last 2 decades. The former shows no downward trend and estimates for the latter indicate only minimal progress. Eastern Africa also had very high rates although for this subregion there does appear to be a clear decreasing trend, albeit a minimal one. VAD appears to have declined substantially in Northern Africa, and Southern Africa made dramatic progress relative to other SSA subregions between 1990 and 1995, but between 1995 and 2007 the trendline is almost flat.

[7] All data and some of the discussion in this section adapted from the SCN's 6th Report on the World Nutrition Situation
[8] As measured by low serum retinol, <20 g/dL

Figure 11. Estimated prevalence of VAD among children (6 months - 5 years) in selected subregions, 1990-2007



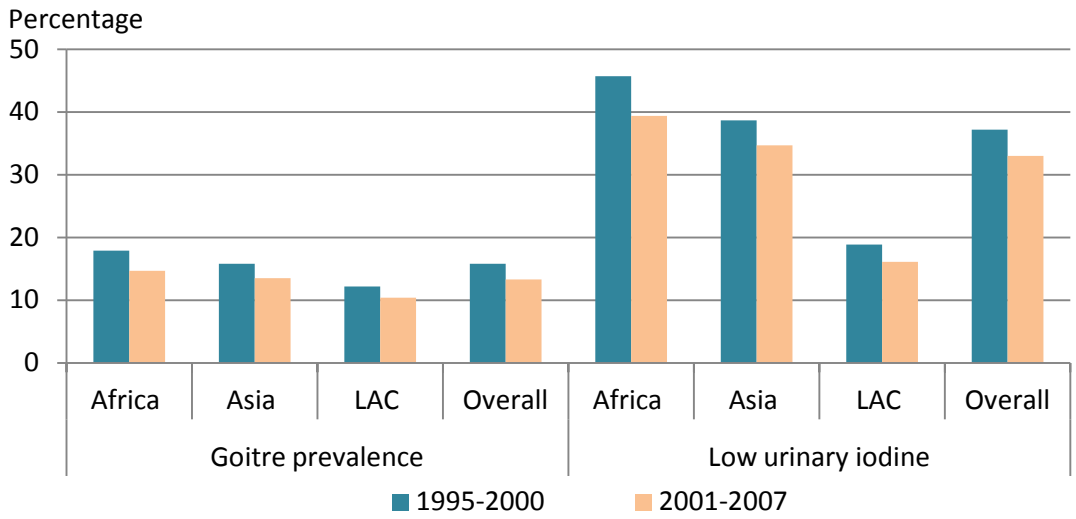
Source: SCN, 2010

As with most other indicators, trends in much of LAC indicate improvement overall. South America has made the most progress, beginning with the highest prevalence (almost 20 percent) and ending with the lowest (just under 11 percent). As of 2007 Latin America had prevalence rates indicating that VAD was no longer a public health problem, while the Caribbean hovered at the cut-off point of 15 percent. It is possible that recent and current events in Haiti have further increased VAD in Caribbean children.

4.2) Micronutrients - Iodine Deficiency (ID)[9]

Overall, iodine deficiency - as measured by both total goitre rate and low urinary iodine (UI)[10] - appears to be decreasing. Modeled estimates indicate that goitre prevalence (indicative of an extended period of deprivation, assessed in adults and/or children) in developing countries fell from roughly 16 to 13 percent between 1995 and 2007. Low UI (indicative of a current deficiency) fell from roughly 37 to 33 percent. Improvement in iodine intake is due almost completely to fortification via salt iodization.

Figure 12. Estimated goitre and low urinary iodine prevalence rates in children (6-12 years[11]) by region, 1995-2000 and 2001-2007



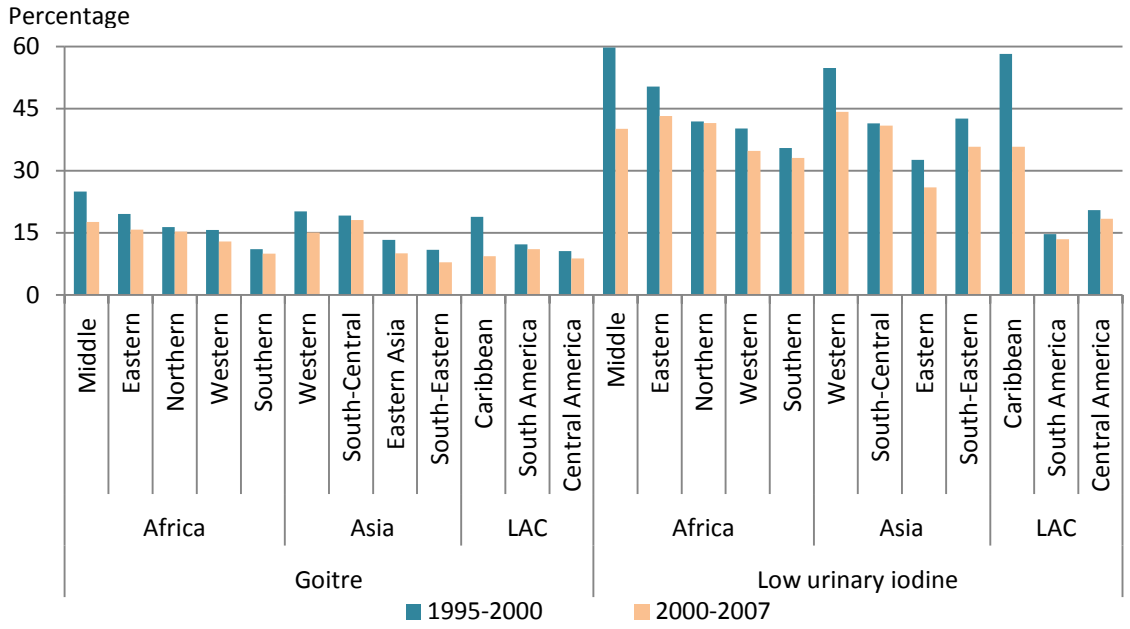
Source: SCN, 2010
Note: It is recommended that a total goitre rate of 5% or more in schoolchildren 6 to 12 years of age be used to signal the presence of a public health problem. Iodine deficiency is considered to be a public health problem in countries in which the median UI is below 100 µg/L (WHO/UNICEF/ICCIDD, 2007)

Regionally, although trends appear to be positive overall, it should be noted that relatively few surveys post-2003 measure goitre prevalence (indeed none appear to have been administered in LAC after 2001) and looking at low UI is necessary for estimating recent trends. Low UI rates are consistently higher than goitre prevalence. However both measures indicate decreases in all regions across the time bands in question.

Estimates[12] of subregional trends in both indicators also indicate improvement. Nonetheless, throughout the period when goitre data were more widely available, goitre prevalence appears to have remained above the threshold (5 percent) at which it is considered a public health problem. Prevalence of low UI appears to have decreased between 2000 and 2007, although estimates remained over 40 percent in a number of subregions in 2007, notably central, north and Eastern Africa and west and South-Central Asia. Estimates are in line with expansion of iodized salt coverage in all subregions.

[9] All data and some of the discussion in this section adapted from SCN, 2010
[10] < 100 µg iodine/l
[11] Data for children aged 6-12 years were included in the original analysis when available. If not available, data for other age groups were included in the following order of priority: closest age group of children, adults (including pregnant women), general population, and preschool-age children.
[12] For details of the modeling underlying these estimates, please see Annex 1 of SCN, 2010.

Figure 13. Estimated goitre and low urinary iodine prevalence rates in children (6-12 years) by subregion, 1995-2000 and 2001-2007



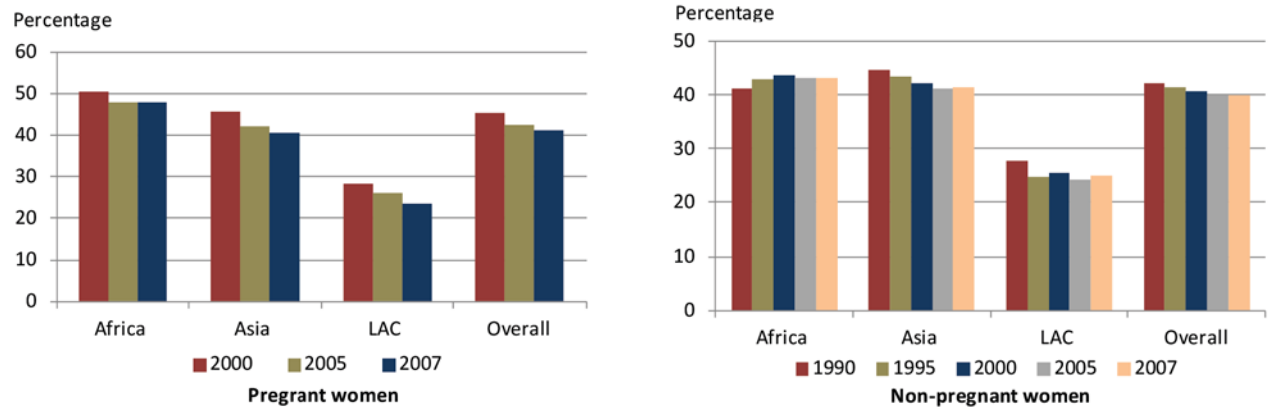
Source: SCN, 2010

4.3) MICRONUTRIENTS –ANAEMIA[13]

Anaemia is assessed by measuring haemoglobin levels and thus requires drawing blood; as a result representative survey data are especially limited and also highly variable. Estimates[14] which fill in the gaps indicate little progress overall among children under five, pregnant and non-pregnant women[15].

Estimates from 2000-2007 indicate that prevalence among pregnant women and children (data not shown for the latter) may be improving slightly (in line with estimated improvements in birth weight, stunting and underweight).

Figure 14. Estimated prevalence rates of anaemia in pregnant women, 2000-2007 and non-pregnant women, 1990-2007



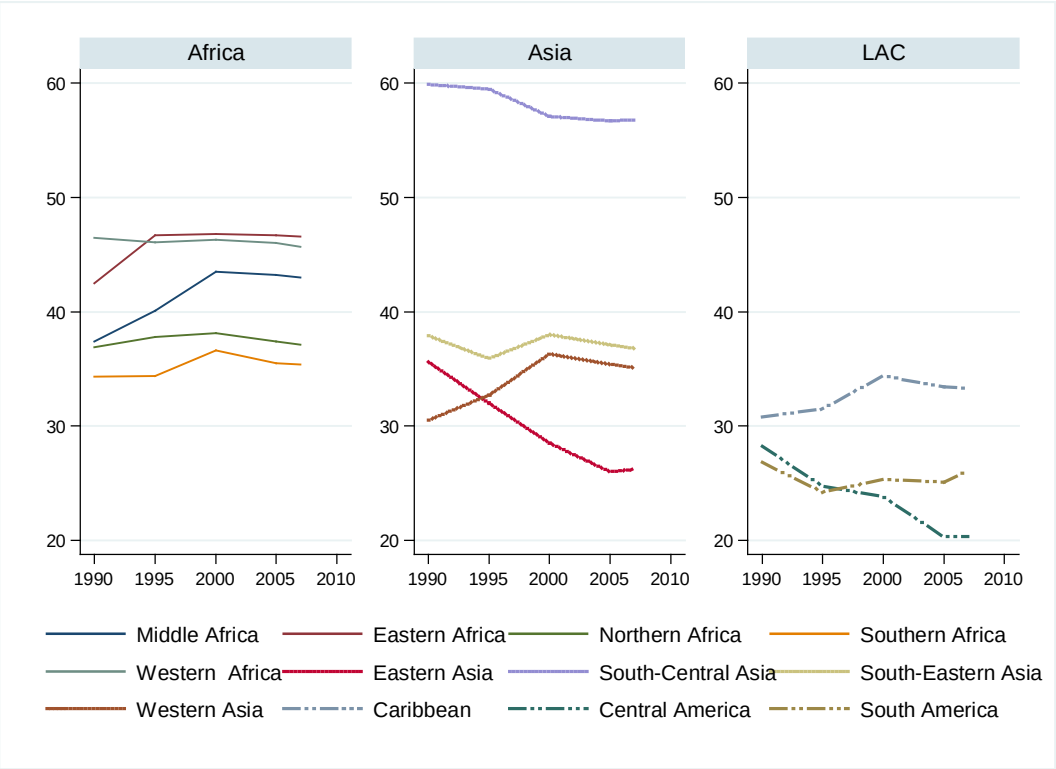
Source: SCN, 2010

However, practically no progress appears to have been made among non-pregnant women since 1990. In Africa, estimated prevalence rates appear to have actually increased slightly between 1990 and 2007, fluctuating between roughly 41 and 43 percent. In Asia, numbers are similar. However, having started from the highest baseline (45 percent) Asia is the one region where anaemia prevalence among non-pregnant women appears to have decreased, albeit slightly. As with other indicators, baseline prevalence was lowest for LAC but again the trendline is close to flat. Overall, the estimates indicate a decrease of only 1 percent in prevalence per decade. One consequence of this lack of progress is increasing numbers of anaemic women in line with population growth (SCN, 2010).

Subregionally, estimated prevalence rates for non-pregnant women between 1990 and 2007 were highest in South-Central Asia, followed by East and Western Africa. As mentioned above, the overall trend in Africa for women appears to be static or slightly increased prevalence. Deterioration is most marked in estimates for East and Middle Africa, the former by around 5 percentage points and the latter by around 6 percentage points over the period in question.

[13] All data and some of the discussion in this section adapted from the SCN's 6th Report on the World Nutrition Situation
[14] For details of the modeling underlying these estimates, please see Annex 1 of SCN, 2010.
[15] Anaemia among pregnant women is assessed as haemoglobin less than 12 g/dL; among non-pregnant women and children under five it is assessed as haemoglobin less than 11 g/d.

Figure 15. Estimated prevalence of anaemia in non-pregnant women by subregion, 1990-2007



Source: SCN, 2010

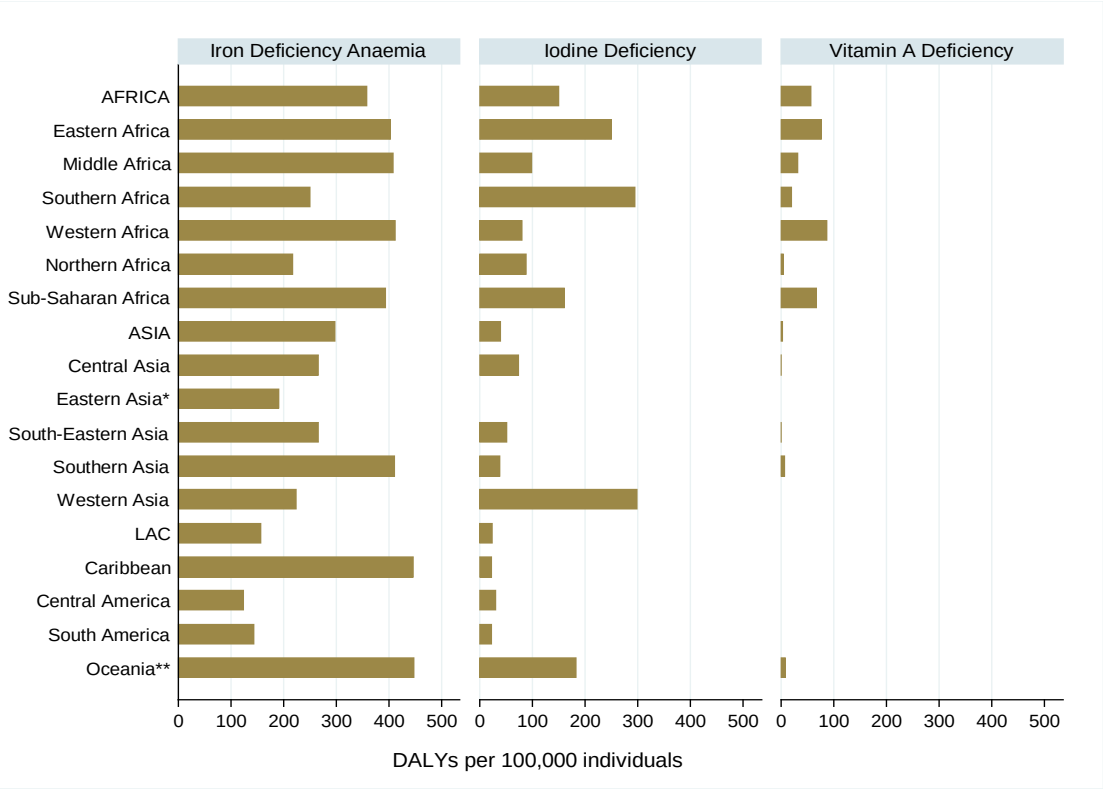
As with most other indicators, Eastern Asia appears to have made progress. Estimated prevalence decreased consistently and substantially, from 36 percent in 1990 to 26 percent in 2007. Eastern Asia is one of the few subregions where there appears to be a clear decreasing trend in anaemia.

Central America also appears to have made steady progress, prevalence reduced from 28 to 20 percent during the period in question. However both the Caribbean and South America have not followed suit. Anaemia prevalence in the former appears to have increased and the latter appears to have made little or no progress.

4.4) USING DALYS TO MEASURE THE BURDEN OF ANAEMIA AND OTHER MICRONUTRIENT DEFICIENCIES

Disability adjusted life years (DALYs) can be used to assess the burden of anaemia and other micronutrient deficiencies at global, regional and national level. Calculated as the sum of years of life lost due to premature mortality and years lost to morbidity (due to disability caused by a health condition), DALYs lost to iron deficiency[16] anaemia were far more than those lost to either iodine deficiency or VAD in all developing regions between 1990 and 2010. Africa lost 359 DALY's per 100,000 individuals due to iron deficiency anaemia, Asia lost 297 and LAC lost 158. In contrast, DALYs lost to iodine deficiency totaled 151 per 100,000 in Africa, 41 in Asia, and 24 in LAC. DALYs lost to VAD numbered 56 per 100,000 in Africa, 3 in Asia and 0 in LAC. Although these numbers are representative of the total population as opposed to more precise statistics describing population groups typically targeted by direct nutrition interventions (such as pregnant women or children under five years of age), they are useful in terms of providing guidance about what deficiency requires the most urgent attention within the population at large, and are also often in line with disaggregated data. Simply put, the gap between DALYs lost to iron deficiency anaemia and those lost to iodine deficiency and VAD are indicative of the former's dubious status as the most common as well as the most damaging micronutrient deficiency in the world.

Figure 16. Burden of major micronutrient deficiency by region, DALYs per 100,000 individuals



Source: WHO database on Health statistics and health information systems
*Notes:** Eastern Asia excluding Japan ** Oceania excluding Australia and New Zealand

As with other indicators, regional statistics mask substantial variation between subregions. For example, DALYs lost to iron deficiency anemia in the Caribbean number 448, far higher than those lost in Central and South America (124 and 144, respectively). While Southern Africa is estimated to lose 295 DALYs to iodine deficiency, Western Africa is estimated to lose 81, and sub-Saharan Africa as a whole loses far more DALYs to deficiencies, most notably VAD, than Northern Africa. Oceania, which is not always included in micronutrient

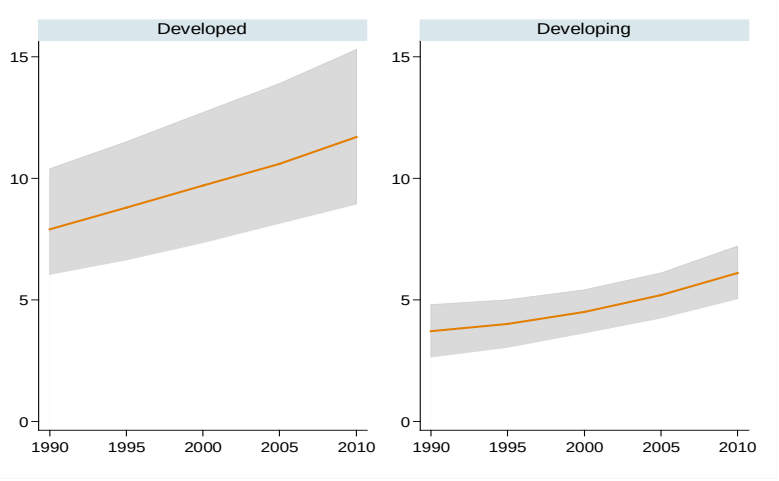
[16] See Box 1 for the role played by iron deficiency in anaemia

analyses among target populations, shows more DALYs lost to all three deficiencies overall than any other LAC subregion.

5.1) Overweight and obesity - Children[17]

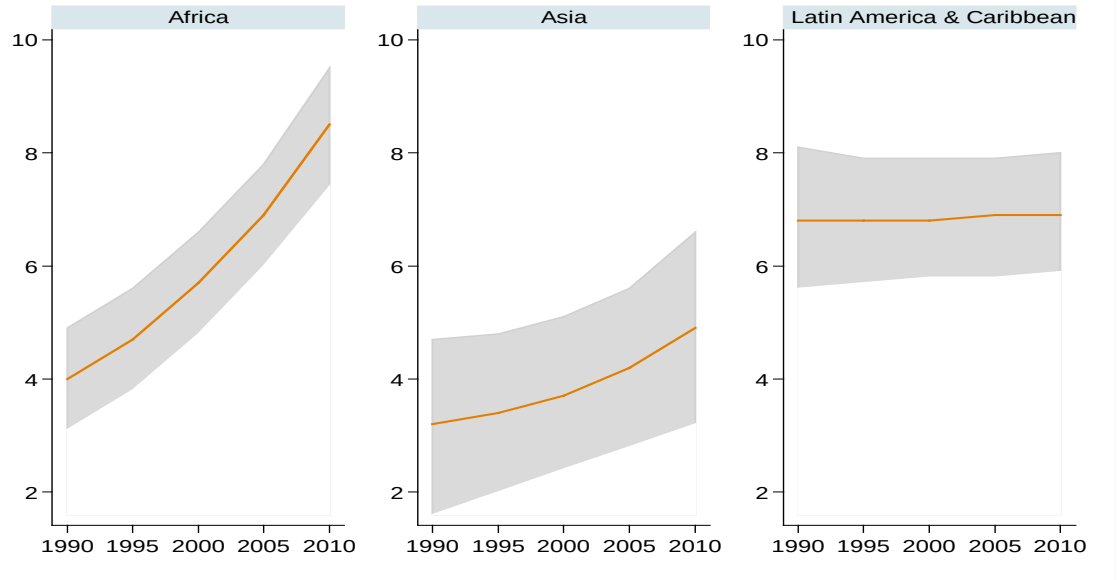
Globally, estimates for overweight and obesity combined among children under 5 increased from 4 percent in 1990 to approximately 7 percent in 2010. This represents a relative increase of 21 percent (first decade) and 31 percent (second decade). Projections from 2010 to 2020 indicate an increase of 36 percent, from 7 percent to 9 percent (global data not shown, De Onis,Blossner & Borghi, 2010).

Figure 17. Prevalence of overweight and obesity combined in children (<5 years) and 95% CIs: 1990-2010, developed and developing countries



Source: De Onis , Blossner & Borghi, 2010
Note: The solid line represents the posterior mean and the shared area the 95% uncertainty interval.

Figure 18. Prevalence of overweight and obesity combined in children (<5 years) and 95% CIs: 1990-2010, by region

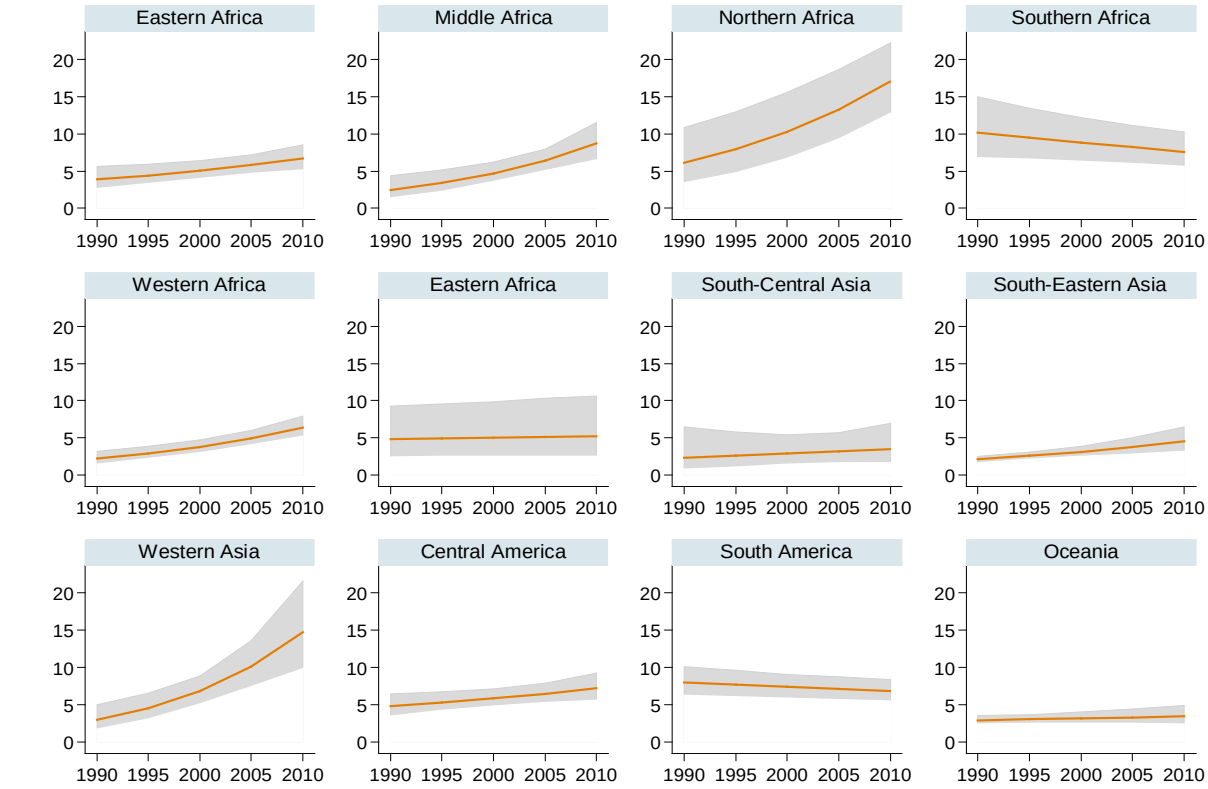


Source: De Onis , Blossner & Borghi, 2010
Note: The solid line represents the posterior mean and the shared area the 95% uncertainty interval.

[17] All data and most discussion in this section adapted from de Onis, M, Blossner, M., Borghi, E. 2010. Global prevalence and trends of overweight and obesity among pre-school children. *Am J Clin Nutr*; 92:1257-64. All statistics cited from De Onis et al. have been rounded, and include both overweight and obesity.

Unsurprisingly, prevalence in developed countries is approximately double that in developing countries (12 and 6 percent, respectively, in 2010), however, the latter is home to the vast majority of affected children. Moreover, the relative increase in the past 2 decades has been higher in developing countries (65 percent, from 4 percent in 1990 to 6 percent in 2010) than in developed countries (48 percent, from 8 percent to 12 percent; De Onis,Blossner & Borghi, 2010).

Figure 19. Prevalence of overweight and obesity combined in children (< 5 years) and 95% CIs by subregion: 1990-2010



Source: De Onis , Blossner & Borghi, 2010
Note: The solid line represents the posterior mean and the shared area the 95% uncertainty interval.

For developing regions, Africa appears to have the highest prevalence of overweight and obesity combined, an estimated 9 percent in 2010. In Asia, the estimated prevalence is lower (5 percent in 2010) but absolute numbers are higher, over half of affected children from developing countries live in Asia. Prevalence in LAC appears to be second only to Africa but unlike Africa the rate of increase appears close to zero during the period in question. Prevalence rates in Oceania[18] are also stagnant and appear to be lower than those for any other region (between 3 and 4 percent in 2010).

Trends in LAC and Oceania present some contrast to those reported for adult obesity and overweight, especially for women. Prevalence rates for adults in these two regions were substantially higher than anywhere else between 2002 and 2010, indicating that if estimates are correct, trends for adults and children may be divergent. The contrast could be indicative of one aspect of the nutrition transition: increased overweight among adults in a population with much lower weights (indeed sometimes even underweight and stunting) among the same population's children, leading to a "double burden" of malnutrition (Doak et al, 2005; see Box 2). Regional trends for African adults and children also appear

[18] Although not typically included as a separate region in discussions of undernutrition, Oceania is included in this and the following section given its very high rates of adult overweight and obesity.

divergent, prevalence of overweight and obesity for adults between 2002 and 2005 was the lowest in the world while, as mentioned above, combined prevalence rates among children were higher than for any other developing region.

Box 2. What is the "Nutrition Transition"?

The nutrition transition is currently occurring in many developing countries around the world, and is characterized by a shift away from diets based on indigenous staples, legumes, and fruits and vegetables, and towards more "globalized" intake patterns that include increased quantities of processed and imported animal source foods, sugar, fats and (sometimes) alcohol. The nutrition transition is closely related to both the demographic and epidemiological transitions. Demographic transition is defined as a switch from a predominantly rural lifestyle characterized by low life expectancy and high rates of maternal parity to a predominantly urban lifestyle characterized by smaller families and improved life expectancy. Epidemiological transition occurs subsequent to demographic transition and is defined as a switch in the burden of disease. Prevalence shifts from communicable, infectious diseases (e.g. malaria, measles) to non-communicable diseases, or NCDs (e.g. diabetes, coronary heart disease). All three shifts are largely driven by economic development and globalization, and each transition informs the other. For example, the epidemiological transition follows on the heels of demographic transition, as risk of NCDs increases concomitant with age. Age, however, is not the only important risk factor for chronic disease. The vast majority of NCDs are now accepted to be closely associated with diet; tooth decay, overweight, obesity, hypertension, coronary heart disease, diabetes, and many cancers are all diet-related.

Urbanization and shifts in physical activity patterns typically accompany the transition "chain." Demographic transition is characterized by urbanization, which is in turn often characterized by reduced physical activity. Moreover, independent of urbanization, physical activity levels are dropping throughout the world via expansion of television and other mass media. Urbanization, sedentary lifestyles, and expansion of mass media are also associated with increased ubiquity of junk and fast foods in rapidly developing countries.

However, not all nutrition transition effects are negative. Increased consumption of total energy and of animal-source foods are positive trends for historically food insecure populations whose diets have traditionally been characterized by monotony and low quality.
(Mendez & Popkin, 2004; SCN, 2010)

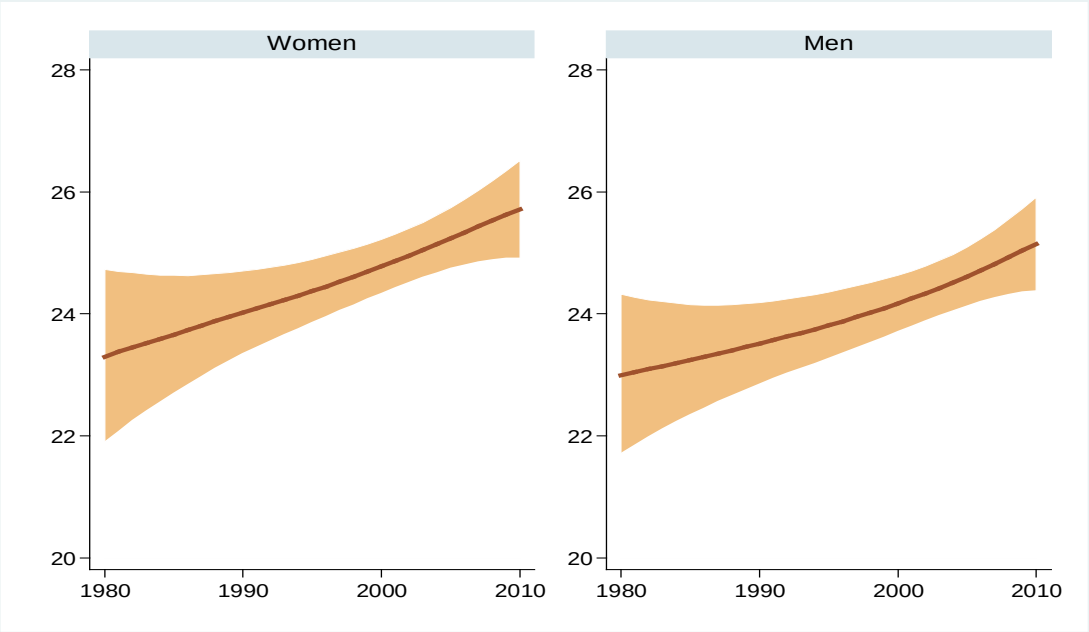
Northern Africa had very high prevalence in 2010 (17 percent) and has the highest prevalence within developing country regions overall. Egypt and Libya are the two main drivers behind this trend, with prevalence rates of 20 percent in 2008 and 22 percent in 2007, respectively.

Of course, subregional trends can mask important heterogeneity. Sudan, also in Northern Africa, had an estimated prevalence of 5 percent as of 2006. Moreover, as mentioned above, in terms of numbers (not shown), the vast majority of overweight and obese children are in Asia, namely in South-Central Asia where, despite low estimated prevalence rates, very large populations create higher numbers than anywhere else in the developing world, an estimated 6.6 million in 2010 (de Onis et al, 2010). In terms of prevalence, Western Asia had very high estimated rates as of 2010 (15 percent), and also appears to have one of the most rapid rates of increase in the region and overall. Trends in LAC and Oceania indicate a consistent increase except in South America, where prevalence appears to have decreased slightly between 1990 and 2010 (from 8 to 7 percent).

5.2) Overweight and obesity - Adults[19]

Globally, estimates of adult overweight (BMI >=25) and obesity (BMI >=30) have increased since 1980. Among adults over 20, age-standardized prevalence of obesity was estimated at 10 percent in men and 14 percent in women in 2008, nearly twice the estimated 1980 prevalence rates of 5 percent for men and 8 percent for women (data not shown, see Finucane 2011). Overall, age-standardized mean global BMI has been shown to have increased by 0.4 and 0.5 kg/m2 per decade in men and women, respectively, during this time period.

Figure 20. Global trends in mean BMI for men and women (>20 years), 1980-2008

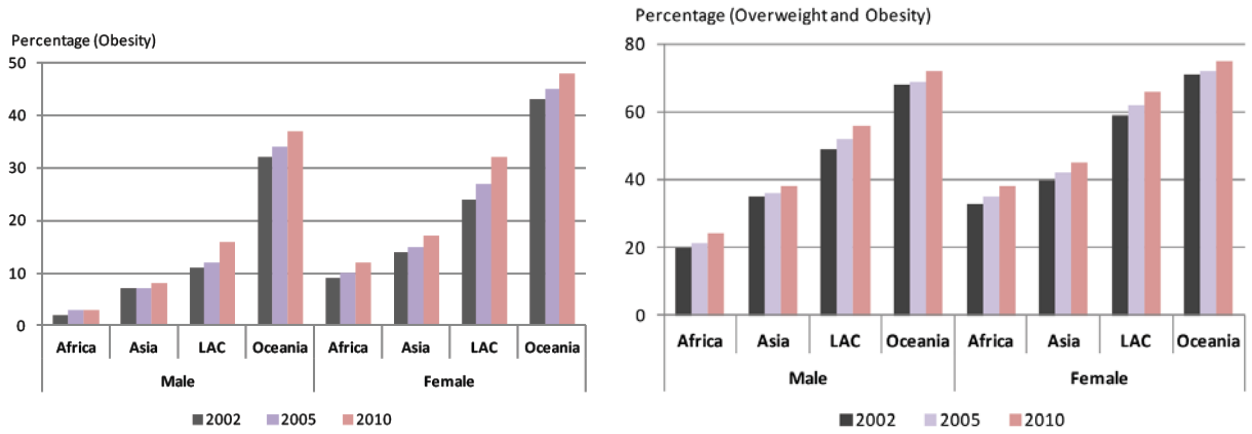


Source: Finucane et al.2011
Note: mock-up graph (BMI and CI indicative only)
Note: The solid line represents the posterior mean and the shared area the 95% uncertainty interval.

Trends are also generally increasing at regional level. There are, however, substantial differences in terms of prevalence rates within and across genders. Within developing country regions, Oceania had the highest estimated rates of obesity for both genders between 2002 and 2010 (from 32 to 37 percent for men, 43 to 48 percent for women); Africa had the lowest (from 2 to 3 percent for men, 9 to 12 percent for women). Obesity appears to have risen most rapidly in LAC, increasing 5 and 8 percentage points for men and women, respectively (from 11 to 16 percent and 24 to 32 percent). In Asia, obesity prevalence rose from 7 to 8 percent for men, and 14 to 17 percent for women between 2002 and 2010. Within the same period, obesity rates among women in all regions appeared to be higher – double or more that of men in LAC, Africa and Asia - and to be rising slightly faster than for men in all regions.

[19] Regional data in this section from WHO's Global Infobase. Discussion of global and subregional trends as well as some figures adapted from Finucane et al. 2011. Readers should note that these two sources are not comparable: WHO data are from 2002-2010 and refers to individuals 15 years and older; data reported in Finucane et al are for adults 20 years and older and date from 1980 to 2008. All statistics cited from Finucane et al have been rounded.

Figure 21. Prevalence of obesity; and overweight and obesity among adults (> 15 years), unweighted, 2002-2010



Source: WHO Global Infobase

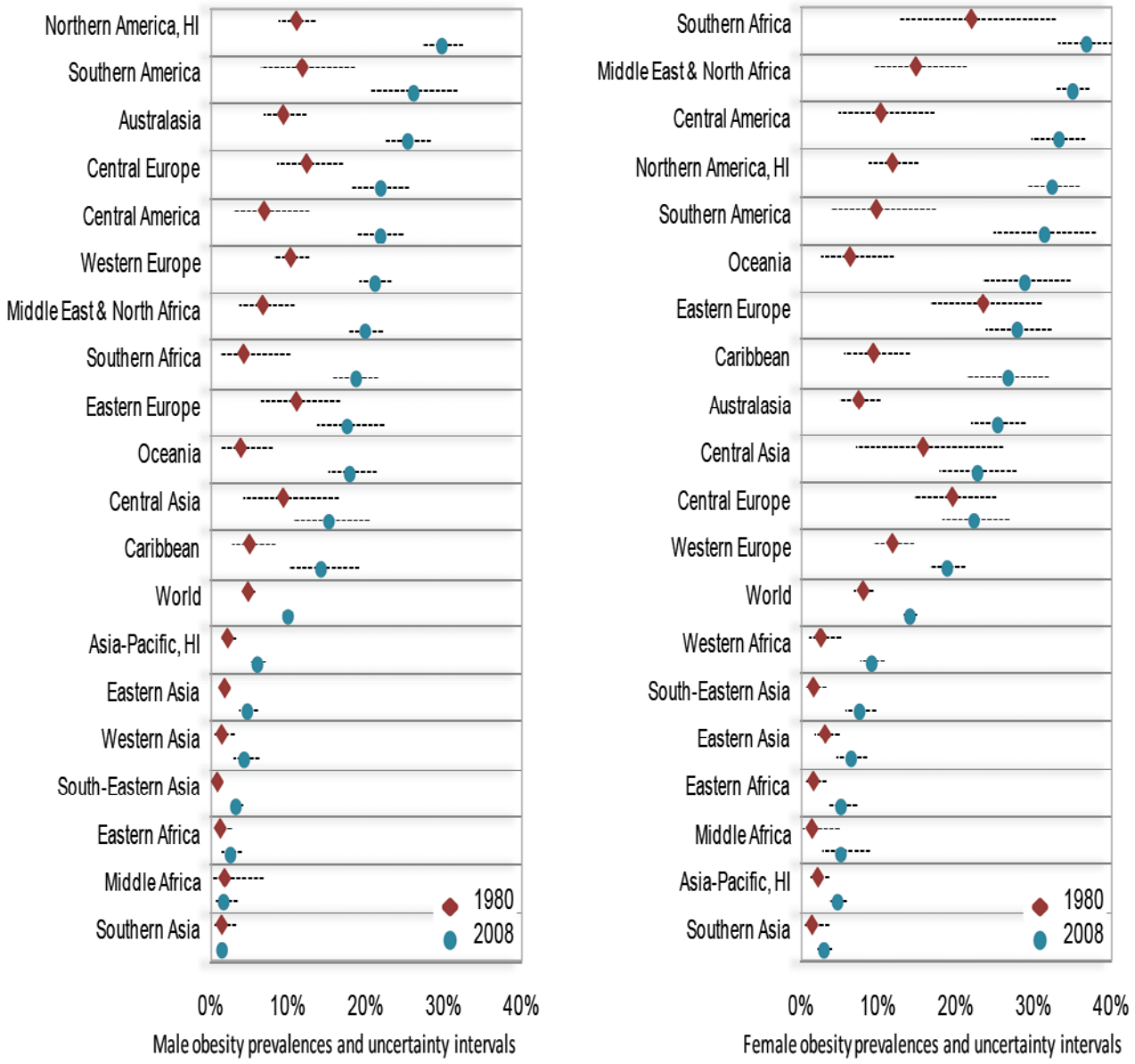
When overweight and obesity are aggregated (BMI >=25), overall prevalence during the period in question increased substantially, indicating that overweight is more prevalent in all regions than obesity, perhaps most notably among African men .

In regards to the gender divide, overweight and obesity combined exceeded underweight among adult women (BMI <18.5) in most developing countries in the early 2000s. This shift is another aspect of the nutrition transition (Mendez, Monteiro & Popkin, 2005). There may also be a related cultural explanation, as in many countries where food insecurity and undernutrition has historically been the norm, a larger body size may connote good health and beauty, especially among women (Furnham & Alibhai,1983; Brewis, 2003; Bentley et al., 2005).

As noted in the previous section, trends for overweight and obesity appear to be very different for children than for adults. While adult prevalence rates for the latter were highest in LAC and Oceania between 2002 and 2010, overweight and obesity among children appears to have been highest in Africa and lowest in Oceania before, during and after that time band (see previous section).

Not surprisingly, subregional trends in adult BMI show more heterogeneity than regional ones. For example, between 1980 and 2008, prevalence of obesity among both genders in South Asia and among men in Middle Africa rose very little or not at all (data not shown). Changes in point prevalence in 1980 and 2008, while not as comprehensive as trend data, tell a similar story for these subregions and imply that trends in obesity prevalence vary substantially across subregions and by gender.

Figure 22. Prevalence of obesity among men and women (>20 years) by subregion, 1980 and 2008

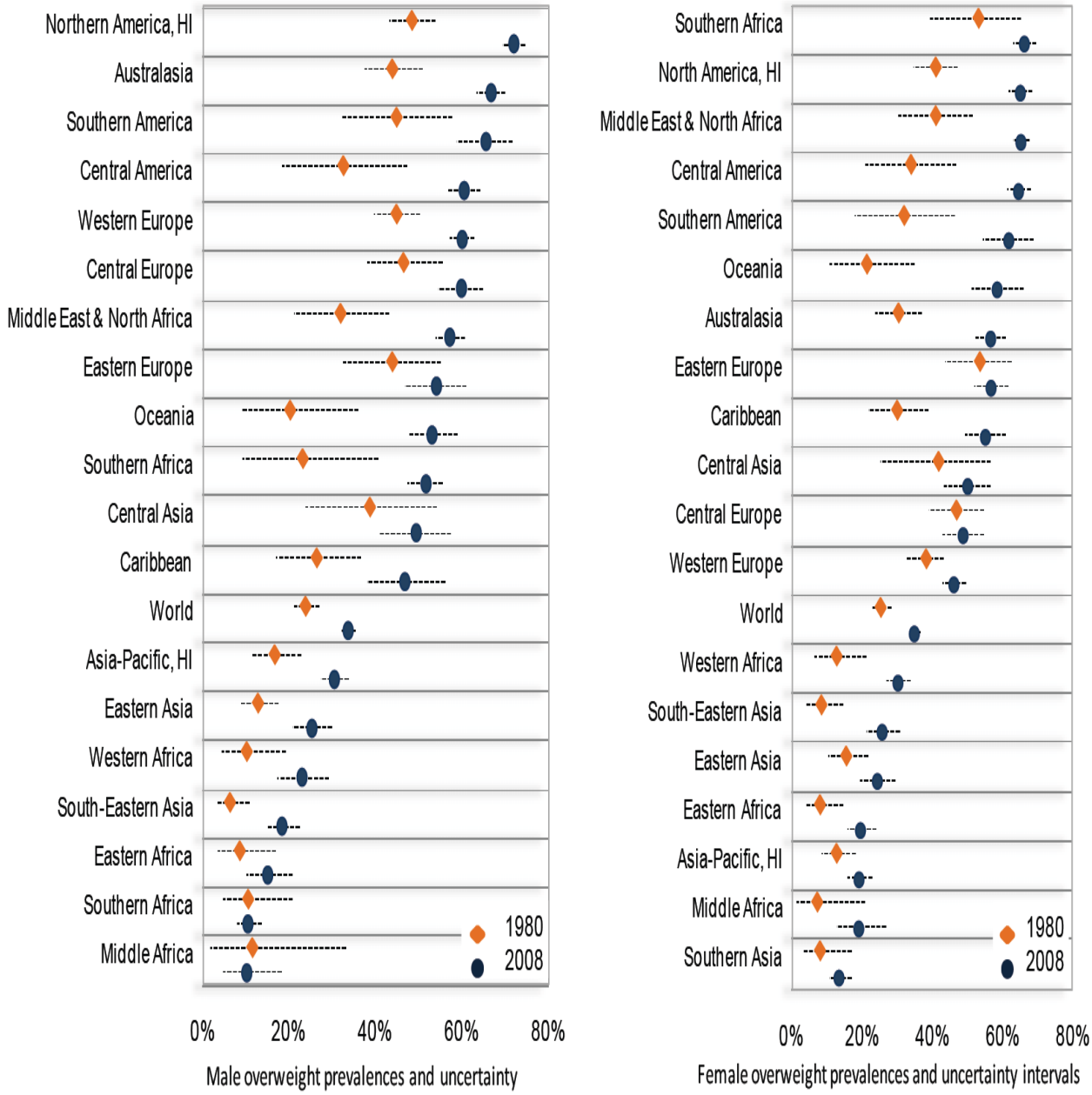


Source: Finucane et al.2011

Note: The solid line represents the posterior mean and the shared area the 95% uncertainty interval.

Notably, although both overweight and obesity were highest among North American men and Southern African women in 2008, most subregions end up ranking somewhat differently depending on whether one is categorizing by overweight or obesity, implying that the majority of the world's population with high BMI falls into one or the other category, but not both. However, the magnitude of change appears fairly similar for most subregions, and most areas end up falling within the same general area of the spectrum for both indicators. For the majority of the world's subregions, over 40 percent of the adult population (>20) was overweight in 2008, and over 20 percent was obese.

Figure 23. Prevalence of overweight among men and women (>20 years) by subregion, 1980 and 2008



Source: Finucane et al.2011

Note: The solid line represents the posterior mean and the shared area the 95% uncertainty interval.

6) CONCLUSION – SUMMARY OF KEY TRENDS

Estimates of **undernourishment** prevalence have decreased fairly consistently, albeit slightly, since 1990. However there does not appear to be a clear trend regarding absolute numbers, these have fluctuated substantially over the past two decades. That said, the financial crisis, persistent food price volatility, drought and other repercussions of climate change have undoubtedly driven undernourishment numbers up in recent years.

Almost all undernutrition indicators have shown slight to moderate improvement. **Underweight** and **stunting** have both decreased, although not fast enough to meet the MDG target of halving malnutrition rates by 2015. **Vitamin A** and **iodine deficiencies** have also decreased Important exceptions to this rule are **wasting** and **anemia**. Global trendlines for both appear practically flat. DALYs lost to the burden of anaemia are far more than those lost to deficiencies in iodine or vitamin A.

Global estimates of **overweight** and **obesity** have increased overall. BMI appears to have risen slowly but steadily between 1980 and 2008 for both genders; obesity rates in adults are estimated to have almost doubled within this time period. Obesity and overweight among children are also on the rise, projections from 2010 to 2020 indicate an increase of 36 percent.

Estimates for **Asia** show substantial progress in most areas. The greatest reductions in undernourishment prevalence appear to have occurred in this region and this is also the case for estimates of underweight. Asia's rates of underweight were higher than Africa's in 1990 and are projected to be lower by 2015. Asia has also made significant progress in reducing stunting and some progress in reducing micronutrient deficiencies. However, despite these gains, in terms of absolute numbers, more malnourished children live in Asia than anywhere else. Moreover, when data are disaggregated to exclude China, progress in undernourishment, stunting and underweight is reversed. Some subregional trends, most markedly in South Central and South Eastern countries, indicate continued high to very high prevalence rates of undernutrition. However it is equally important to note that both these subregions have also made substantial reductions in most indicators, and are on track to meet the MDG target for underweight.

Estimates for **Africa** indicate fewer gains than Asia and an overall lag in progress. Africa had the highest prevalence and made the least reductions in undernourishment in the developing world between 1990 and 2008. Slow or no progress in some regions and rising prevalence in others has also retarded gains in underweight; regionally Africa is off-track to meet the MDG underweight target. Stunting trendlines have been high and flat over the past two decades. However, progress does appear to have been made in reducing iodine deficiency, and subregional trends in serum retinol levels indicate reductions in Vitamin A deficiency across East, Southern and Northern Africa. Indeed trends in Northern Africa are generally far more positive than in sub-Saharan countries. This subregion has seen overall declines in undernutrition indicators over the past decades, except for wasting, which doubled between 1990 and 2010. Finally, Africa has the lowest estimated rates of adult overweight and obesity in the world, although in 2008 Southern and Northern Africa (along with North America and the Middle East) was home to the highest rates of female BMI.

Latin America and the Caribbean (LAC) boasted one of the lowest estimated prevalence rates of undernourishment in the developing world in 1990 and appears to have made consistent progress over the past two decades in this area. LAC also started from a relatively low baseline for underweight and exceeded its MDG target in 2010. Underweight prevalence is projected to be as low as 2 percent by 2020 in LAC. Estimates also indicate a steady downwards trend in stunting for the region as a whole, although stunting remains disproportionately high in some areas of Latin America. LAC has also made progress in reducing Vitamin A deficiency, as of 2007 Latin America had prevalence rates indicating that VAD was no longer a

public health problem. LAC has made less progress in reducing iodine deficiency and anaemia. Minimal to no progress has been made in Latin America. However estimates of goitre prevalence in the Caribbean, which otherwise has lagged behind Latin America for most nutrition indicators, dropped substantially between 1990 and 2007. Overweight and obesity appear to have risen rapidly in Latin America since 2008 for both men and women. For children, obesity and overweight are high in Latin America relative to most other developing regions; perhaps as a result, prevalence does not appear to have increased much between 1990 and 2010.

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