Standing Committee
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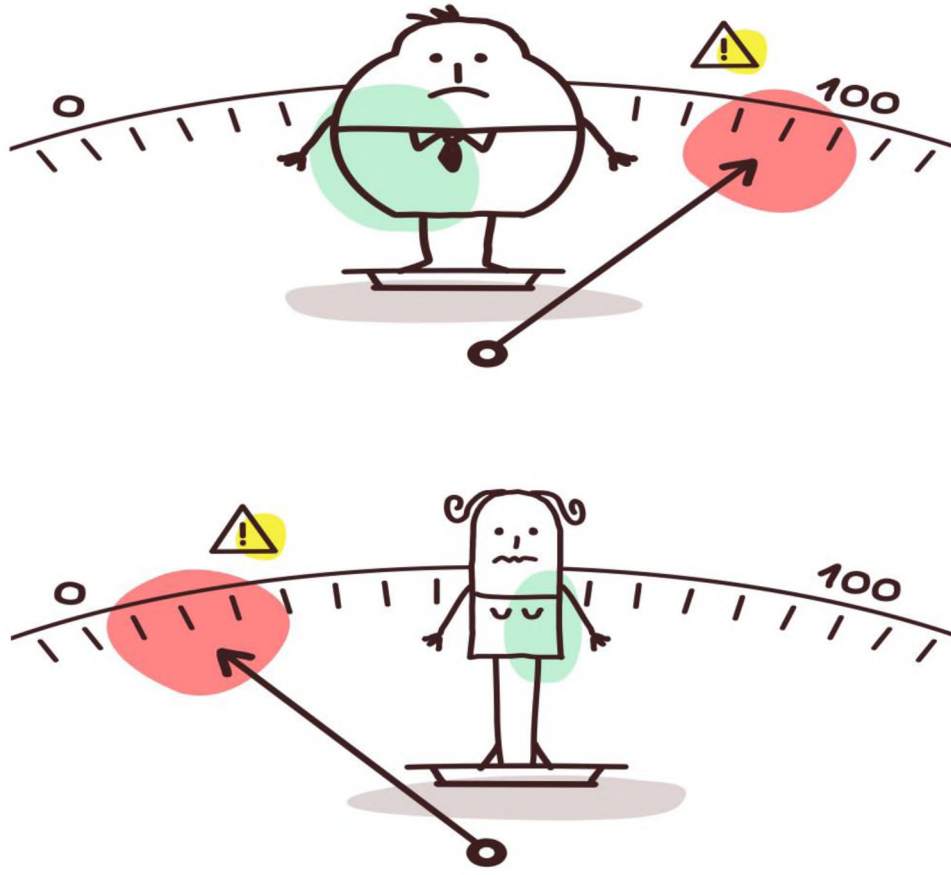
Malnutrition in the OIC Member Countries: A Trap for Poverty



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EXECUTIVE SUMMARY

The study aims to understand how malnutrition and poverty are related in the member countries of the Organisation of Islamic Cooperation (OIC), and what policy responses are most adapted to fight against malnutrition. The study used a mix of secondary literature review and data analysis to establish a conceptual framework, describe the state of malnutrition – and its relationship with poverty - in OIC countries, and discuss global, regional and national policies to fight against malnutrition.

The study also selected five countries for conducting in-depth analysis: Senegal, Indonesia, Egypt, Bangladesh and Tajikistan. In each country, a combination of secondary literature review, data analysis and stakeholders' interviews was used to shed light on the relationships between malnutrition and poverty in empirical and policy perspectives. The countries were chosen to reflect the geographical spread of and the range of under- and over-nutrition found in OIC countries.

Conceptual Framework and International Best practices

The Millennium Development Goals (MDGs) contributed to bring malnutrition and food insecurity to the attention of policymakers. Since 1990, rates of under-five children who are underweight have dropped by two, almost in line with the MGD specific goal of hunger reduction.

However, the MDGs were too focused on underweight, and ignored other facets of malnutrition. Linkages between nutrition and other sectors were insufficiently recognised.

The Sustainable Development Goals (SDGs), for the post-2015 period, include more precise measures of malnutrition, such as stunting and wasting. However, they still do not retain all six targets from the World Health Assembly.

Apart from specific hunger and malnutrition goals, nutrition is absent from the rest of the SDGs. The absence of nutrition mainstreaming within other sectors in the SDGs framework risks undermining inter-sectorality, which is critical for the fight against malnutrition.

Multi-sectoral planning, Common Results Framework, and Community Management of Acute Malnutrition feature among the best practices to fight malnutrition. The UN Reach and SUN movements contribute to advocate and ease the implementation of these, including in OIC countries.

Malnutrition in the OIC Member Countries

OIC Countries are more affected by undernutrition than non-OIC countries. This remains true when high-income countries are excluded. In OIC countries, 33% of under-five children are stunted (too short for their age), 11% are wasted (too thin for their height) and 53% suffer from anaemia in OIC countries. The corresponding figures for non-OIC countries are 29%, 10% and 43%.

The rate of undernutrition decline in OIC countries has been either on par with or lower than that of non-OIC countries since the early 1990s. Significant progress has been made to reduce stunting and anaemia prevalence in OIC countries since the early 1990s. Stunting has been reduced by one-third in OIC countries (from 41% to 27%), a similar record than in non-OIC

countries (from 36% to 24%). Anaemia prevalence has been reduced by almost 20% over the period in OIC countries (from 61% to 49%) and by 17% in non-OIC countries (from 42% to 36%). Wasting has decreased by 19% in OIC countries since the early 1990s (from 10.7% to 8.6%), which is a slower rate than the 30% observed among non-OIC countries (from 7.1% to 4.9%), despite OIC countries starting with higher prevalence of wasting.

Prevalence of child overweight is currently lower in OIC countries than in the rest of the world (5.8% against 6.8%). However, adult obesity has increased at an alarming rate during the last three decades in OIC countries, especially in the Arab world.

14 OIC countries have made progress on both undernutrition and overnutrition since the early 1990s. These tend to be low income or lower middle-income countries. 16 OIC countries have reduced undernutrition but witnessed a deterioration of overnutrition. These tend to be high income or upper middle income countries. 18 OIC countries have reduced stunting, but experienced a rise in wasting (and, often, overweight). 2 OIC countries have seen a deterioration of both undernutrition and overnutrition.

A wide range of underlying and basic risk factors of malnutrition are more pronounced in OIC than non-OIC countries. This is especially true of health-related and food security factors.

Malnutrition and Poverty in the OIC Member Countries

Prevalence of chronic malnutrition, i.e. stunting and anaemia, tends to go down in countries where economic growth was sustained. Among the report's case studies, Bangladesh and Indonesia have substantially reduced stunting in conjunction with robust growth performance of their economy and steady decline of poverty rates. However, the relationship between stunting and poverty rate is weaker among OIC countries than in the rest of the world. It will take more than just waiting for economic growth to eradicate chronic malnutrition.

Prevalence of acute malnutrition is very weakly correlated with poverty and economic growth in OIC countries. Among the case studies, countries with strong and sustained economic growth such as Bangladesh or Indonesia have not experienced any decline in wasting. In Egypt, rates of wasting increased among the wealthier households.

Taken together, these results suggest that relying on economic growth does not suffice and that tackling structural risk factors of malnutrition need to be prioritised, independently of poverty levels. In all case studies, strong evidence was found that food security; health, water and sanitation; and nutritional best practices matter a lot to determine malnutrition rates. These factors may or may not be directly caused by poverty. Nutrition-specific policies need thus to be accompanied with strong nutrition-sensitive policies.

Economic growth is also accompanied with rising prevalence of overweight. The strength of this association is stronger in OIC than in non-OIC countries. The double burden of malnutrition thus need to be tackled in an integrated manner, which was often found not to be the case in practice.

Fight Against Malnutrition

There is no specificity of OIC countries regarding the relevance of the internationally recognised best-practices. Most OIC countries have embarked upon adopting universal recommendations such as the Common Results Framework (CRF), multi-sectoral nutrition

plans and community management of severe acute malnutrition. However, OIC countries are acutely exposed to human and man-made disasters.

Strong regional policies are in place within OIC countries. But these need to be better coordinated and to link more closely with national and global monitoring and evaluation frameworks to make a bigger impact.

The challenge of malnutrition reduction lies more in the implementation of nutrition-specific and nutrition-sensitive policies than in identifying effective policies. The fight against malnutrition needs to be coordinated due its multi-sectoral nature. Such coordination requires high levels of political commitment from national policymakers and a large degree of "buy-in" from ministries and agencies. Collaboratively establishing multi-sectoral plan and common results framework is an excellent way to strengthen both, to maximise coordination in the long run, and to ensure the mainstreaming of nutrition in all ministries.

Many countries seem to prioritise stunting in their national development plans. Acute malnutrition is seen as an emergency topic, and the commitment to fight overnutrition is not as prominent as long as undernutrition remains very high. Yet, it is necessary to fight malnutrition in all its forms.

A strong implementation of nutrition-specific and nutrition-sensitive policies requires to increase commitment, knowledge and capacity of local governments. Whereas the commitment and knowledge of national policymakers have often gone up substantially in recent years, thanks to the SDGs, the publication of high profile reports such as the Global Nutrition Report, and growing awareness of the costs of malnutrition, this is not always true at the local level.

INTRODUCTION

Malnutrition and poor diets are the number one risk factors for diseases worldwide (GNR 2016). Malnutrition can have many facets, including stunting, wasting, overweight, obesity, micronutrient deficiency and non-communicable diseases. Malnutrition generates significant costs, especially when it is experienced early in life. Undernutrition and associated risks such as suboptimal breastfeeding, vitamin A deficiency, and deficiencies of zinc, iron and iodine often coexist and contribute to staggering numbers of disabilities and deaths in children under five years of age. WHO (2009) estimated that these overlapping risks led to an estimated 3.9 million deaths (35% of total deaths) of children less than 5 years old in 2004. Furthermore, to the extent that nutrition affects the lives and productivity of individuals (Behrman et. al, 2006), it also has a negative effect on the economic growth of nations, especially those with a high incidence of chronic undernourishment.

In 2016, 2 billion people are estimated to suffer from micronutrient malnutrition and nearly 800 million to suffer from calorie deficiency worldwide. 2 billion adults are believed to be overweight or obese, and every twelfth adult has type 2 diabetes. Finally, out of 667 million children under the age of five worldwide, 159 million – 23.8% – are too short for their age (are "stunted"), 50 million – 7.5% – do not weigh enough in relation to their height (are "wasted") and 41 million – 6.1% – are overweight (*Ibid*).

In line with Sen's capability framework, malnutrition is one facet of poverty, which deprives individuals from the freedom to conduct the lives they want for themselves. Its centrality to human well-being and standard of living is exemplified by its inclusion in the Universal Declaration of Human Rights, which states "Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food." (UN Millennium Project, 2005). Given the interaction of poor-quality diets, health, care environments and behaviours as drivers of malnutrition, people in countries with low economic development or political instability are particularly vulnerable to malnutrition. There is a strong presumption that material poverty and malnutrition reinforce each other: On the one hand, poverty is associated with poor diets, unhealthy environments, physically demanding labour, and high fertility, all of which increase risks of malnutrition. On the other hand, malnutrition reduces health, education, as well as immediate and future income, thus perpetuating poverty. This vicious cycle tends to pass from one generation to the next, not least because poor malnourished women are more likely to give birth to babies with low-birth weight. Addressing malnutrition thus also helps stop the intergenerational transmission of poverty and malnutrition (World Bank 2006).

The OIC Member Countries bear a disproportionate share of the global burden of malnutrition. The average proportion of wasting among children under-5 years of age is 8.6% in the OIC countries, against 4.9% in non-OIC countries. The proportion of stunting is also higher in the OIC world (27% versus 24.2%) as is the prevalence of anaemia - a consequence of micronutrient deficiency - (49% in OIC countries versus 35% outside OIC). Likewise, 24 out of 46 OIC countries for which the Global Hunger Index is available – a composite indicator based on undernourishment, child stunting, child wasting, and child mortality - suffer from serious or alarming hunger levels (von Grebmer et al. 2016).

The OIC is the second largest inter-governmental organization after the United Nations, and comprises 57 member states across four continents. Its aim is to safeguard and protect the interests of Muslims across the world as well as to promote international peace and harmony.[1] Besides global efforts to tackle malnutrition, OIC member states have mobilised many joint efforts in recent years to help address the problem. For example, the theme of the Fourth Islamic Conference of Health Ministers held in 2013 was "Better Nutrition, Better Health, Better Ummah". One of the outcomes of the conference was adoption of the OIC Strategic Health Programme of Action 2014-2023 (OIC-SHPA) and the definition of one of the six thematic areas for cooperation and joint action area as "Maternal, New-born and Child Health and Nutrition".

Objectives and Methodology of the Study

The aim of the study is to analyse the current status, causes and consequences of malnutrition as well as efforts addressing malnutrition in OIC countries, with a focus on poverty, maternal malnutrition and malnutrition of children under the age of five. In light of these objectives, the study aims to answer the following research questions:

(1) What is the international experience in tackling malnutrition?
(2) What is the current international thinking on the causes of malnutrition?
(3) What are the levels and trends of malnutrition across the OIC member states?
(4) What regional and national policies related to malnutrition are relevant across the OIC member states?
(5) How is child malnutrition across the OIC member states related to issues of maternal nutrition and poverty?

The study pursued three strands of enquiry: First, a summary of the conceptual discussions around the relationships between malnutrition and poverty and between maternal and child malnutrition. This summary answers questions 1 and 2 above. The findings of this part of the research are described in section 2.

In the second strand of enquiry, the research group focused on OIC member states and collected secondary nutrition data to paint a detailed picture of the general situation of malnutrition in OIC countries. This information was combined with indicators of economic development in order to generate knowledge on the relationship between development, poverty and malnutrition. Furthermore, regional policy documents were studied in order to understand the state of global policies regarding malnutrition in OIC countries. Findings from this strand are presented in section 3.

Finally, 5 OIC countries were selected for in-depth case studies: Senegal, Bangladesh, Indonesia, Tajikistan and Egypt. These countries represent different world regions and trends of malnutrition. For each of these countries, a statistical analysis of the correlates of child malnutrition and a statistical analysis of the intergenerational transmission of malnutrition are provided, based on the latest available data. Key stakeholder interviews were also conducted in each of these countries as well as a review of the secondary literature to better understand the levels and dynamics of malnutrition, the key drivers of malnutrition, the links between

[1] http://www.oicun.org/2/23/

poverty and malnutrition, the inter-generational transmission of malnutrition, and the policies aimed at fighting malnutrition. The findings related to this strand of the study are in section 3.

Key messages and policy recommendations based on the analyses are presented in section 4. Throughout the report the focus is on malnutrition among children under five years of age, as this corresponds to the period of life when malnutrition is most damaging and for which the most detailed data exist. We also systematically consider chronic and acute malnutrition and distinguish between under- and over-nutrition.

1. CONCEPTUAL FRAMEWORK

In this section of the report is laid out the current thinking around and experiences of tackling malnutrition internationally. In order to appreciate the current understanding, the report first presents a short overview on the changing nature of the international agenda over time, briefly summarises current international targets. The report then details the defining types of malnutrition and discusses what is known about determinants of malnutrition, with a special focus on the role of poverty.

1.1. Short History of the International View of Malnutrition

The international agenda has changed considerably over the last few decades. After years of neglect in global policy agendas, nutrition is increasingly being recognized as a key driver of development. There is now a stronger focus on the cognitive and economic consequences of malnutrition, as well as a more nuanced understanding of the causes of malnutrition and the best statistics for tracking progress than in the past.

The practice of international nutrition has gone through distinct phases of understanding and action. The primary focus on starvation, protein, and medical models of intervention and treatment in the 1950s and 1960s gave way to multi-sectoral planning, before the focus shifted toward micronutrients in the 1990s and 2000s. In recent years the picture has become more complex as more actors, with a wider recognition of the multiple issues surrounding nutrition, have become involved (Gillespie and Harris, 2016).

The 1970s saw the focus shift away from seeing protein as the key issue in malnutrition towards recognising the multifaceted nature of malnutrition. This led to the concept of multi-sectoral nutrition planning, marking a reaction to largely food supply–oriented interventions that did not address the wider, non-food drivers of malnutrition and had little impact. To advocates of multi-sectoral planning, the challenge was not launching more and better nutrition interventions, but rather influencing policies and programs in a broad range of development sectors. This thinking led to the establishment of "nutrition cells," often in the office of a president or prime minister. A total of 26 nutrition planning entities were established in the 1970s, supported primarily by the U.S. Agency for International Development (USAID) and the Food and Agriculture Organization of the United Nations (FAO) (Gillespie and Harris, 2016).

However, by the 1980s, most of these nutrition cells had been abandoned. The hard-learned lesson here was that a multifaceted challenge like malnutrition requires action from many sectors, but it does not necessarily require such actions to be elaborately choreographed by any one entity. The failure of multi-sectoral planning gave rise to the era of "nutritional isolationism" in which the pendulum swung back to nutritionists who increasingly focused on two sets of interventions that needed little involvement from other sectors: micronutrient supplementation and breastfeeding (Gillespie and Harris, 2016).

The start of the 1990s saw a giant step forward in the form of the UNICEF's development of a coherent nutrition framework that provided a common language and suggested specific roles for different actors. The 1990s was also a decade of focus on micronutrients, in particular, vitamin A, iodine, and iron. The 1990 World Summit for Children set a goal of reducing anaemia by one-third by the end of the decade (practitioners later concluded it could not be achieved because of the widespread difficulty of delivering supplements as well as recipients'

poor adherence to supplementation due to side effects). It also established a goal of virtually eliminating iron deficiency diseases by 2000, and many agencies, donors, and the salt industry took to this challenge. In 1991 the conference "Ending Hidden Hunger" helped strengthen micronutrient programming, and in 1993 the Micronutrient Initiative was formed. Overall, micronutrient control programs achieved considerable success during the 1990s: by the end of the decade, 60% of developing-country households were using iodized salt and 30% of children were receiving vitamin A capsules twice a year (Quinn, 1994).

In recent decades, the international nutrition community has been split between "emergency" nutritionists, who focus predominantly on treating malnutrition due to acute or recurring emergencies through various medical models, and "development" nutritionists, who focus on preventing malnutrition by addressing its more basic social, economic, and political drivers (Gillespie and Harris, 2016).

1.2. Global Targets

Over the past four decades, the UN, through its various bodies, has played a key role in drawing attention to global nutrition challenges, brokering agreements and convening role players, developing normative guidelines, analytical tools and monitoring trends in nutritional status; and providing technical assistance and direct programming support at country level. Changes in the broader development landscape, a larger and diverse set of role players in the field of nutrition, complex emerging nutrition challenges and a large number of humanitarian crises, pose significant challenges, and create an opportunity to reposition the UN, to ensure that it is 'fit for purpose,' and can make the best possible contribution to realizing the goal of a world free of all forms of malnutrition. Box 1 below gives an overview on the core principles upon which the UN's interagency work is based.

Box 1: 10 Core Principles of the UN's Interagency Work on Nutrition

1. Nutrition is a pervasive development issue requiring action across the globe
2. Multiple forms of malnutrition are interrelated and co-occur in a large number of countries
3. Nutrition is a multi-sectoral issue
4. Food system change is fundamental to addressing nutrition challenges
5. Health system strengthening is essential to achieve nutrition goals
6. Good nutrition also requires, and is necessary for, functioning education systems, social protection, and efforts to eradicate poverty and reduce inequality
7. The UN is steered by a Human Rights-Based approach to nutrition
8. UN nutrition activities are informed by a commitment to gender rights
9. The UN acts in support of country priorities. Local adaptation of strategies is needed, according to varying country nutrition situations
10. The UN System is one role player among several, playing unique convening, networking, brokering, and technical support roles

Source: McLachlan, 2015

Malnutrition and the MDGs

The global mobilization behind the Millennium Development Goals has produced the most successful anti-poverty movement in history. It generated new and innovative partnerships, galvanized public opinion, reshaped decision-making in developed and developing countries

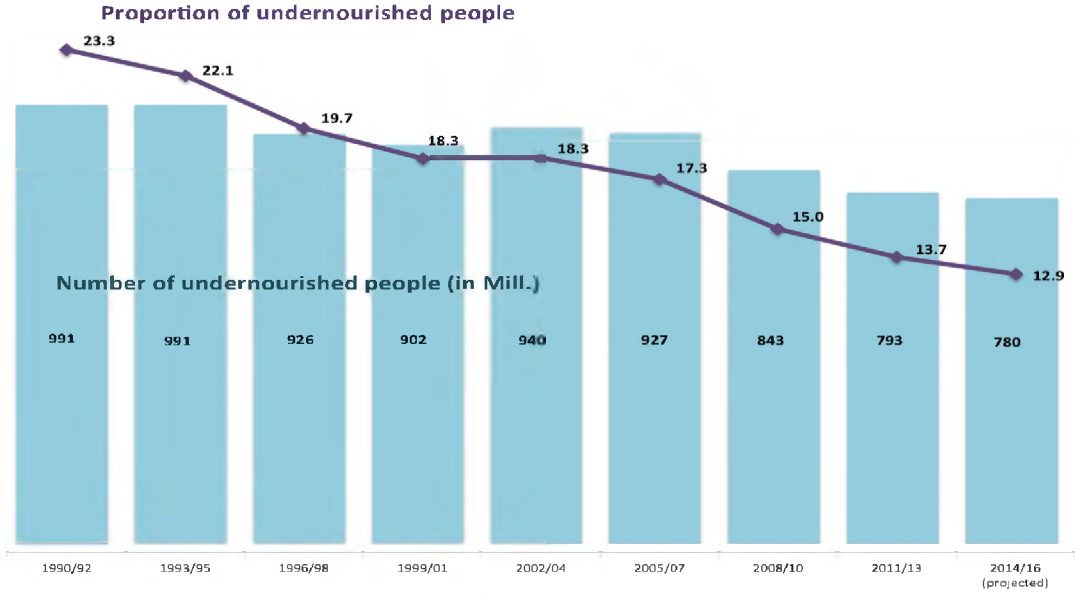
alike and showed the immense value of setting ambitious goals. Yet, despite remarkable gains, inequalities persisted and progress has been uneven, with over 60% of the world's poor living in just five countries (MDG 2015 report). To date, while unprecedented progress has been made in terms of poverty eradication and human development, many of the targets, including MDG-1C (to halve the proportion of people who suffer from hunger), are far from being achieved (Korenromp, 2015).

MDG-1C brought attention to the need to improve food and nutrition security. It was comprised of two indicators for monitoring progress: the prevalence of underweight children under five years of age and the proportion of the population below the minimum level of dietary energy consumption. The nutritional status of children was recognized as a key indicator of poverty and hunger which was an important step in acknowledging that national policies and programmes which improve nutrition have a role to play in development beyond the resolution of individual nutrient deficiencies (Webb, 2014).

Since 1990 the world has seen a drop of almost half of the proportion of undernourished people in developing regions (measured by underweight): from 23.3% in 1990–1992 to 12.9% in 2014–2016. This is very close to the MDG hunger target. Rapid progress during the 1990s was followed by a slower decline in hunger in the first five years of the new millennium and then a rebound starting around 2008.

There have been barriers to progress, including volatile commodity prices, higher food and energy prices, rising unemployment and economic recessions, frequent extreme weather events and natural disasters. In a growing number of countries, political instability and civil strife have aggravated the effects of natural disasters, resulting in numerous and significant humanitarian crises. These developments have slowed progress in reducing food insecurity in some of the most vulnerable countries and regions of the world ("The Millennium Development Goals Report," 2015).

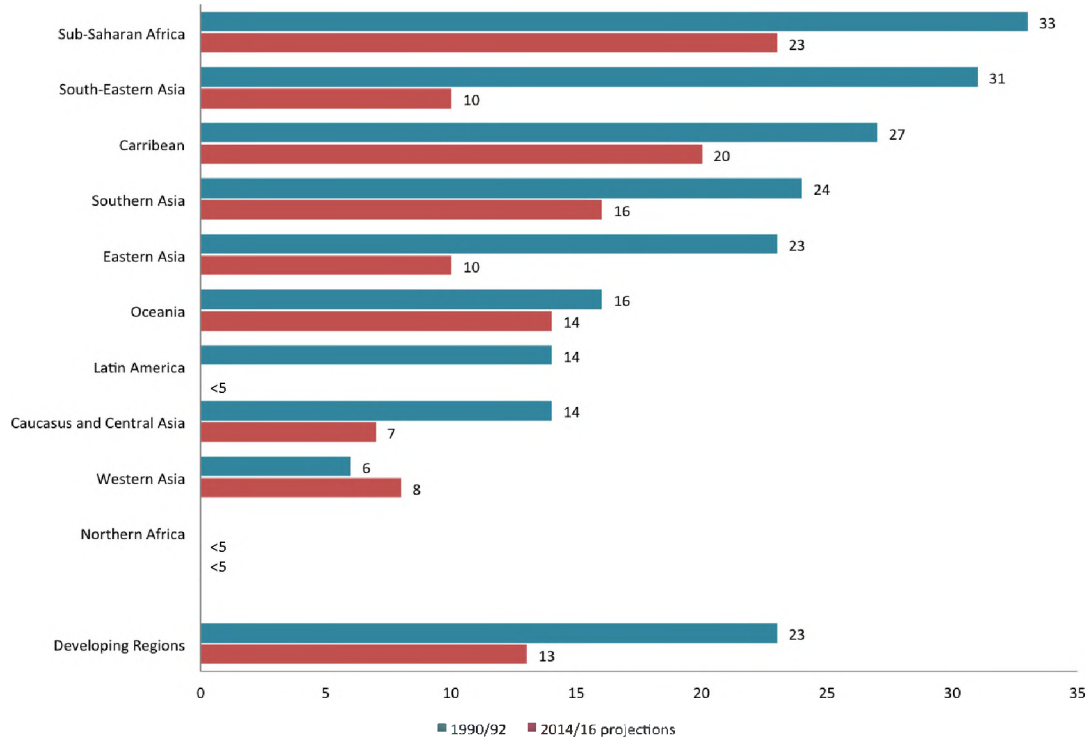
Figure 1: Number and Proportion of Undernourished People in Developing Regions



Source: Based on "The Millennium Development Goals Report", 2015

Therefore, the rate of hunger reduction varies widely by region. The Caucasus and Central Asia, Eastern Asia, Latin America and South-Eastern Asia regions have reached the MDG hunger target, due mainly to rapid economic growth in the past two decades. China alone accounts for almost two third of the total reduction in the number of undernourished people in the developing world since 1990. Northern Africa is close to eradicating severe food insecurity, having attained an overall level of undernourishment below 5%. In contrast, the pace of reduction in the Caribbean, Oceania, Southern Asia and sub-Saharan Africa has been too slow to achieve the target. Southern Asia faces the greatest hunger burden, with about 281 million undernourished people. Progress in Oceania has been slow because of heavy dependence on food imports by the small islands that constitute the majority of countries in that region. Food security in this region is also hampered by natural and man-made disasters, which often result in volatile prices and sudden and unpredictable changes in the availability of important staple foods. In sub-Saharan Africa, while the hunger rate has fallen, the number of undernourished people has increased by 44 million since 1990, reflecting the region's high population growth rate. The situation varies widely across the sub-regions. Northern, Southern and Western Africa have already met or are close to meeting the target. But in Central Africa progress has been hampered by rapid population growth and environmental fragility as well as economic and political upheavals. The number of undernourished people in the sub-region has doubled since 1990. In Western Asia, a starkly different pattern emerges. Despite a relatively low number of undernourished people and fast progress in reducing food insecurity in several countries, the prevalence of undernourishment is likely to rise due to political instability and a rapidly growing number of refugees ("The Millennium Development Goals Report," 2015). The progress in reduction of underweight across the different regions is shown in Figure 2.

Figure 2: Proportion of Undernourished People by Region (%)



Source: "The Millennium Development Goals Report," 2015

MDG-1 measured malnutrition as the share of children in a population who are underweight; that is, the prevalence of under-five year olds whose weight is too low for their age (low weight-for-age) in relation to a WHO-defined international child growth standard (WHO 2006). The use of underweight as the indicator has come under criticism as weight gain can indicate children becoming taller, or fatter, or both. Stunting, (based on height-for-age), and wasting (based on weight-for-age) are more specific measures of undernutrition.

Today, it is acknowledged that there are several distinct, albeit linked, facets of poor nutrition, and each carries its own implications for impaired human productivity, development and well-being. It is widely considered that the focus on nutrition in the MDGs was minimal (Korenromp, 2015). Moreover, failing to specify how to achieve the nutrition - and other – targets led to a limited country ownership of the goals.

Nutrition-specific lessons learnt from the MDG framework include the realisation that the focus on undernutrition was too narrow, and that synergies between nutrition and other sectors were underexploited. For example, many national nutrition strategies in the 2000s focused almost exclusively on treatment of acute malnutrition (wasting). Anchored in ministries of health, these strategies often did little to encourage food based approaches to reducing malnutrition. In many countries, the disconnect was further exacerbated by food security policies whose primary objective was increased production of staple grain (Korenromp, 2015). Today, in contrast, a huge body of knowledge exists on the benefits of a multi-sectoral approach (Tiwari et al., 2013). It is important to note that the "uni-sectoral" approach which fragmented nutrition strategy in the 2000s not only limited progress toward the achievement of MDG1 targets, but probably also slowed progress in achieving other related targets such as poverty reduction, education, child mortality and maternal health (Korenromp, 2015).

Malnutrition and the SDGs

The post 2015 agenda and development of the Sustainable Development Goals (SDGs) targets and indicators saw a huge amount of advocacy for the inclusion of more precise nutrition indicators, which include stunting and wasting, as opposed to the previously used indicator of underweight. Nutrition in the SDGs is addressed primarily under Goal 2, which aims to "end hunger, achieve food security and improved nutrition and promote sustainable agriculture". Within this goal, target 2:2 reads "By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons". The goal of ending malnutrition in all its forms reflects a major change in thinking since the MDGs, with the international community now responding to the evidence about the devastating personal and societal costs of all forms of malnutrition (Lateef et al., 2015).

Box 2: WHA's Six Global Nutrition Targets for 2015

1. Reduce by 40 percent the number of children under 5 who are stunted
2. Achieve a 50 percent reduction in the rate of anemia in women of reproductive age
3. Achieve a 30 percent reduction in the rate of infants born low birth weight
4. Ensure that there is no increase in the rate of children who are overweight
5. Increase to at least 50 percent the rate of exclusive breastfeeding in the first six months
6. Reduce and maintain childhood wasting to less than 5 percent

Source: WHOhttp://www.who.int/nutrition/topics/nutrition_globaltargets2025/en/

The SDGs and targets are an important step in the right direction for nutrition. However, they do not include all six World Health Assembly (WHA) targets. It is therefore possible that actors will focus on only part of the full set of internationally agreed actions needed to sustainably ensure maternal and child nutrition. Box 2 shows the six global nutrition goals agreed on in 2012 unanimously by the WHA.

While having a goal which specifically addresses nutrition is widely considered an improvement with respect to the MDGs, and may well be most effective for galvanizing commitment for nutrition and for guiding action, an even stronger position for nutrition could be achieved by including in the indicators other 'nutrition sensitive' goals. The nutrition community, and its natural allies in the food systems, agriculture, WASH, gender, social protection and health communities, advocated strongly for action oriented, measurable targets for improved nutrition across the SDG framework. While malnutrition is included under the hunger, food security and nutrition goal, there is no reference to it under any other goal or target, including the target to end preventable new-born and child deaths (target 3:2), even though 45% of all preventable child deaths under the age of five are due to malnutrition (Black et al., 2013). The risk is thus that the concept of "improved nutrition" is restricted to hunger reduction and food security, leading to sole focus on the access to food. The absence of nutrition across the SDGs could send the signal that other sectors such as health and water and sanitation are not as critical in improving nutrition as food security and agriculture. This would cause institutional silos whereas there is global consensus that a multi-sectoral approach is essential. In an analysis of all 230 SDG indicators, over 50 of them were identified as highly relevant to nutrition (Haddad, 2013).

The evidence-based solutions to end malnutrition are known. Therefore, it would be advisable to have an indicator measuring the state of implementation of nutrition-specific and nutrition-sensitive actions according to national plans. This would also strengthen the belief that nutrition is foundational for sustainable development (Korenromp, 2015). Nutrition advocacy groups, including the International Coalition for Advocacy on Nutrition (a coalition of international NGOs, advocacy organisations and foundations united around the shared goal of improved nutrition) strongly advocated for the inclusion of all six WHA targets, women's dietary diversity and sufficient budget allocated for nutrition as national level targets.

Overall, the SDGs represent a window of opportunity for the global community to work together to improve nutrition. To achieve success, nutrition actions in the SDGs must be evidence-based and promoted at scale, successes during the SDG timeframe must be well-documented and disseminated to allow experiential learning and nutrition progress as part of the SDGs must be well measured (Webb, 2014). The inclusion of malnutrition in all its forms also poses a data challenge. Quality, coverage and availability of disaggregated data must be significantly improved to support actions aimed at improving nutrition across the SDGs.

1.3. Forms of Malnutrition and Intergenerational Transmission of Malnutrition

The term 'malnutrition' is used to describe a number of problems including deficiencies, excesses or imbalances in energy, protein, and/or other nutrient intakes and include both undernutrition, and overweight and obesity. All forms of malnutrition have important consequences for global health and survival with long-lasting impacts on development and economic productivity (Black et al., 2013).

Malnutrition is passed on from one generation to the next through a number of mechanisms. We present below how micronutrient deficiency, undernutrition and over-nutrition and dynamically related.

Micronutrient Deficiency

Micronutrients are nutrients which are required by the body in small amounts and are essential for growth and health. Maternal deficiency in one or more micronutrients at the time of conception, during pregnancy or whilst breastfeeding can have significant effects on pregnancy outcomes and can affect the quality of breastmilk. This factor is most evident in the case of vitamin A, where the content in breastmilk is the main determinant of infant status because stores are low at birth. Maternal supplementation with these micronutrients increases the amount secreted in breast milk, which can improve infant status (Black et al. 2008).

Xerophthalmia, a condition resulting from vitamin A deficiency, is a major cause of child blindness. 500,000 vitamin A deficient children become blind every year, half of them dying within 12 months of losing their sight ("WHO | Micronutrient deficiencies," n.d.). Vitamin A deficiency is also a major risk factor of measles and respiratory infections.

Iron deficiency is the most common and widespread nutritional disorder in the world. As well as affecting a large number of children and women in developing countries, it is the only nutrient deficiency which is also significantly prevalent in industrialised countries. Iron deficiency anaemia is particularly prevalent among women of childbearing age due to menstrual blood loss and anaemia during pregnancy increases the risk of intrauterine growth retardation (IGR), pre-term births and maternal and infant mortality ("WHO | Micronutrient deficiencies," n.d.).

Zinc deficiency in children results in impaired growth and increases the risk of diarrhoea, pneumonia, and malaria. In total about 800,000 child deaths per year are attributable to zinc deficiency (Black, 2003).

Iodine deficiency causes hyperthyroidism, a swelling of the thyroid gland. Mental retardation and cretinism in children, caused by maternal deficiency during pregnancy, is the single largest cause of preventable mental impairment (Delange, 2001). Iodine deficiency is common in areas with high rainfall/flooding and landlocked/ mountainous countries where the soils are poor and mineral or areas where iodisation of salt is not mandatory.

Deficiency in folate at the time of conception increases the risk of neural tube and other birth defects. Neural-tube defects (NTD) are the most frequent and the most tragic congenital abnormality of the central nervous system (Czeizel et al., 2013). Adequate intake of folate (folic acid) from the time of conception and throughout the first 3 months of pregnancy has been shown to reduce the risk of NTD by 90% (Czeizel et al., 2013). The challenge here is that many pregnancies are unplanned, and so targeting pregnant women with folic acid supplements from the moment of conception is often difficult. The fortification of staple foods such as wheat flour is used in some countries as a public health intervention to prevent folate deficiency and the associated birth defects.

Vitamin D deficiency in utero can cause poor foetal growth and skeletal mineralisation and can also affect the concentrations of the vitamin in breast milk. This may lead to rickets and poor bone mineralisation during the first years of life. An estimated 35–80% of children in countries

such as Turkey, India, Egypt, China, Libya, and Lebanon are vitamin D deficient owing to the practice of shrouding, avoidance of skin exposure to sunlight, and the fact that few foods are fortified with vitamin D (Hollick, 2006).

Overweight and Obesity

Overweight and obesity is an issue which is becoming a major public health concern in both developed and developing countries. Whereas in previous years undernutrition was the major concern in low income countries, there has been a nutrition transition and it is becoming common to observe both under and overnutrition within the same country, community and even within the same household.

Whilst the change in diets, away from traditional and towards more westernised foods is a major factor in the increase in overweight and obesity, there are a number of factors linked to maternal nutrition which affect the propensity for a child to become overweight.

Birthweight and linear growth retardation are positively related to adult lean mass, meaning that babies who are born small are less likely to become lean adults. Overweight and obesity are risk factors for a plethora of non-communicable diseases including diabetes, cardiovascular disease and some cancers (breast, colon). Maternal overweight and obesity can also cause significant birth complications and pregnancy related disorders like pre-eclampsia and gestational diabetes. During labour and delivery, maternal obesity is related to maternal death, haemorrhage and a higher risk of infant death (Black et al., 2013).

It is now understood that poor nutrition in early childhood may also be a factor in overweight and obesity later in life. Lower birth weight and stunting both relate to central adiposity (fat carried around the middle of the body) and higher waist circumference. Both are risk factors for metabolic syndrome, increasing the risk of diabetes and with lifelong effects on the risk of cardiovascular disease (Victoria, C. 2008).

Maternal overweight and obesity during pregnancy also increases the risk of childhood obesity that continues into adolescence and adult life. This leads into another intergenerational cycle of malnutrition.

The consequences of early childhood undernutrition in terms of overweight and obesity later in life are particularly important when taken in the context of the nutrition transition to high fat, salt and sugar (HFSS) foods. Children who are undernourished in the first 2 years of life and who put on weight rapidly later in childhood and in adolescence are at high risk of chronic diseases related to nutrition (Victora et al., 2008). This finding has significant implications for countries where the diets are transitioning from traditional foods to western HFSS foods and physical activity levels are decreasing.

Undernutrition

Babies born at term (i.e. who have completed 37 weeks of gestation), but of low birthweight (less than 2.5 kg) are likely to have had their growth restricted whilst in utero. This is of public health significance because infants born at term weighing 1.5–1.99kg were over 8 times more likely to die, and those weighing 2–2.49 kg were 2·8 times more likely to die during the neonatal period than were those weighing more than 2.5kg at birth (Black et al, 2008). Maternal body size is strongly associated with the size of new-born children, with short stature

of the mother and poor maternal nutrition stores associated with increased risk of intrauterine growth retardation (IGR).

Maternal short stature is also a risk factor for caesarean delivery, largely related to cephalopelvic disproportion (when the capacity of the pelvis is inadequate to allow the foetus to negotiate the birth canal). This increases the risk of complication during delivery for both mother and baby.

In developing countries the prime causes of low birth weight, gestational age, prematurity and intrauterine growth retardation were (after racial origin): maternal nutrition, low pre-pregnancy weight and short maternal stature (Kramer, 1987), highlighting the importance of good maternal nutrition and adequate maternal height.

Undernutrition can have an intergenerational effect: a mother who is undernourished is more likely to give birth to a small child. Infants born with low birth weight remain short into adulthood, becoming small mothers and are at increased risk of developing chronic diseases in later life.

Poor foetal growth or stunting in the first 2 years of life leads to irreversible damage, including shorter adult height, lower attained schooling, reduced adult income, and decreased offspring birthweight. Undernutrition can affect cognitive development by causing direct structural damage to the brain and by impairing infant motor development (Wintour and Owens, 2006). There is also an effect on the amount of education a child will receive. The number of years a child will spend in schooling is directly linked to height-for-age, underweight and low birth weight (Victora et al., 2008).

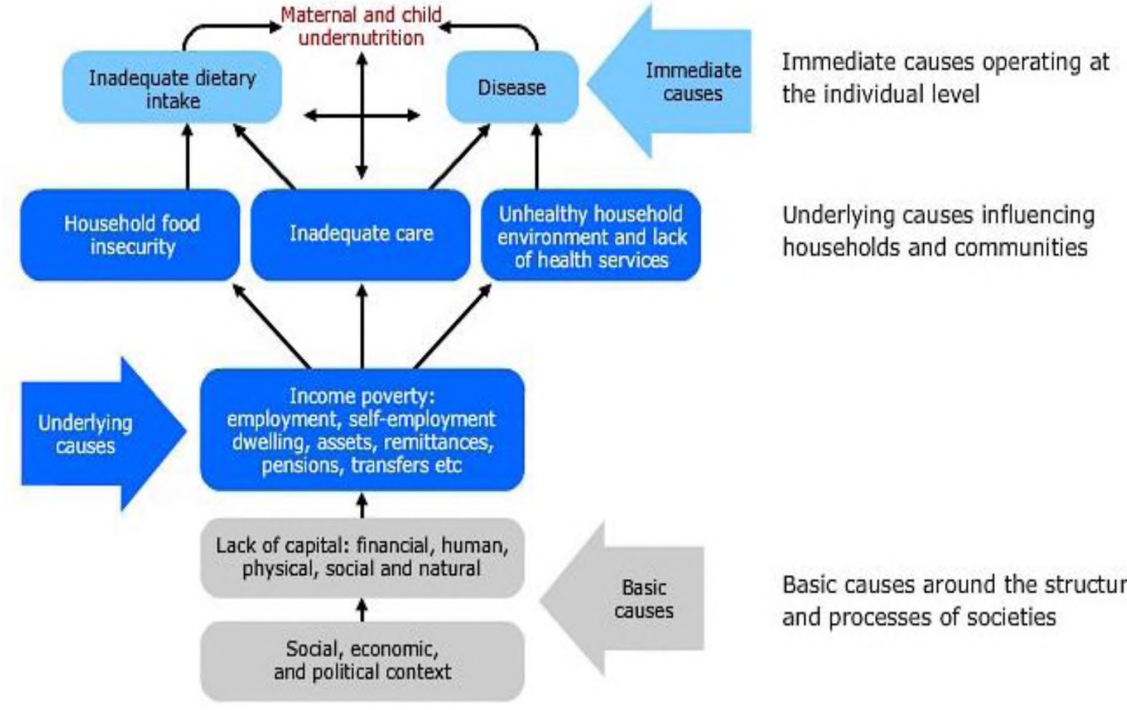
There is no evidence that rapid weight or length gain in the first 2 years of life increases the risk of chronic disease, even in children with poor foetal growth. **Interventions and policies should therefore be targeted at maternal nutrition for improved birth outcomes, stunting reduction and prevention of excessive weight gain after infancy** (Victoria, C. 2008).

1.4. Determinants of Malnutrition

The term 'malnutrition' is used to describe a number of problems including deficiencies, excesses or imbalances in energy, protein, and/or other nutrient intakes and include both undernutrition and overweight and obesity. All forms of malnutrition have important consequences for global health and survival with long-lasting impacts on development and economic productivity (Black et al., 2013).

The determinants of malnutrition are widely agreed upon and were conceptualised in the UNICEF conceptual framework of undernutrition developed in 1990. This framework illustrates the basic, underlying and immediate causes of undernutrition and is shown in Figure 3.

Figure 3: UNICEF Conceptual Framework of Undernutrition



Immediate level: At the individual level, the factors which determine good nutrition are dietary intake and disease. For infants and children there are well documented guidelines on infant and young child feeding (IYCF), which outline desirable breastfeeding practices and complimentary feeding. The relationship between dietary intake, disease and good nutrition is a cyclical one. Poor diet leads to poor nutrition status, which in turn increases the risk of many infectious diseases, perhaps most notably, diarrhoeal disease. Infections can both increase the requirement for calories and nutrients whilst diarrhoeal disease can also impair gut function, causing a reduction in the absorption of nutrients, which in turn leads to poor nutrition status.

Underlying level: This refers to the elements at the household and community level which influence the immediate causes. Household food security is essential for adequate dietary intake, and care practices influence both the diet of children and the risk of disease. Household environment and access and utilisation of health services also determine the risk of infectious diseases. Underpinning these are factors such as poverty, livelihoods, education, assets and pensions.

Basic level: At this level are the social, economic, political and natural factors of malnutrition. These include natural disasters and environmental and climatic shocks such as droughts or floods, political environment and resources allocated to nutrition and other underlying determinants and cultural aspects and religious norms.

This framework has been used to inform nutrition programming for the last 25 years and more recently has been built upon and expanded to encompass other forms of malnutrition (for example overweight and obesity), consequences of malnutrition, and approaches to address the determinants at each level.

1.5. Best Practices to Address Malnutrition

Global and Regional Frameworks to Address Malnutrition

Community Management of Acute Malnutrition

Treatment of acute malnutrition (wasting) was often facility-based and carried out by medical staff, meaning that if a child was acutely malnourished, s/he would have to be brought to a clinic or hospital for treatment. In recent years this approach has changed to a community based model, using a network of volunteers who are responsible for identifying malnourished children. This has been made easier with the use of coloured bands which measure the mid-upper arm circumference (MUAC) and show green for a healthy child, orange for a moderately malnourished child and red for severe malnutrition. Once identified, most children (with the exception of those with additional complications such as oedema) can be treated at home with ready to use therapeutic foods (RUTF). This model, known as the community management of acute malnutrition (CMAM) has revolutionised the way acute malnutrition is treated and allows many more children to receive treatment than the facility-based model.

UN REACH

REACH was established in 2008 by the Food and Agricultural Organisation (FAO), the United Nations Children's Fund (UNICEF), the World Food Programme (WFP), and the World Health Organization (WHO) to assist governments of countries with a high burden of child and maternal undernutrition to accelerate the scale-up of food and nutrition actions. The International Fund for Agricultural Development (IFAD) later joined REACH, extending an advisory role at the global level. REACH was originally meant to strengthen UN efforts towards ending poverty and hunger by 2015, the first of the eight UN Millennium Development Goals. Yet, its action spans beyond 2015 as hunger remains a problem, and nutrition issues are given an even stronger emphasis since 2015.

At present, REACH operates in 12 countries at varying degrees of intensity, namely: Bangladesh, Burundi, Chad, Ethiopia, Ghana, Mali, Mozambique, Nepal, Niger, Rwanda, Tanzania and Uganda. REACH country engagements are led by neutral facilitators, with some facilitators hosted by government offices, such as the Office of the President, Office of the Prime Minister or one of the sector ministries and others hosted by one of the UN partner agencies.

The SUN Movement

One key international effort, which has served to increase the profile of nutrition globally, was the launch of The Scaling-Up Nutrition (SUN) Movement in 2010. The SUN movement seeks to bring together key stakeholders, including country governments, donors, UN agencies, civil society, and in some countries, business actors to address the challenges of undernutrition. To date, 57 countries have joined the SUN movement including 26 OIC countries. The specific OIC countries that are also members of SUN can be seen in Table 1 below:

Table 1: OIC Member Countries in the SUN Movement

Bangladesh	Guinea-Bissau	Pakistan
Benin	Indonesia	Senegal
Botswana	Ivory Coast	Sierra Leone
Burkina Faso	Kyrgyzstan	Somalia
Burundi	Mali	Sudan
Chad	Mauritania	Tajikistan
Comoros	Mozambique	Togo
Gambia	Niger	Yemen
Guinea	Nigeria	

Although SUN is an international effort, the SUN Movement is driven by its member countries. All stakeholders supporting the SUN Movement are committed to the idea that by transforming individuals' behaviour to align behind national nutrition priorities, they can amplify the reach and impact of every stakeholder's work and scale up nutrition in a faster, more equitable and sustainable way. This requires action across sectors, with people from different stakeholder groups and at all levels – from national, district to the community level to reach the farthest and most vulnerable people.

A key strength of the SUN Movement's efforts so far has been its ability to inspire 57 country level movements that are making nutrition a political priority through social mobilisation, advocacy and communication efforts.

Over the past decade, global and country recognition of the threat that malnutrition poses to the health and future development of children, and therefore societies, has grown exponentially.

The importance of a concerted approach is now widely accepted, involving:

- Multiple stakeholders, led by Governments, supported by the UN, Civil Society, Business, Academia and Donors
- Multiple sectors, including health, agriculture, women's empowerment, planning, social protection, education and more
- At multiple levels, from the highest levels of government to local community leaders.

Multi-sectoral planning

As highlighted in the previous section, it is now widely recognised that nutrition is a multi-sectoral issue and therefore requires the collaboration of multiple sectors to successfully address the nutrition burden.

In South Asia, the World Bank took action against malnutrition through the development of a regional strategy which combined an increase in awareness and funding with multi-sectoral convergence.

To respond to the alarmingly high rates of child malnutrition in South Asia, the potentially severe consequences of the problem, and the multi-sectoral nature of its determinants, the South Asia Regional Management Team (RMT) adopted nutrition as a regional priority. The RMT also identified the need for a framework that would ensure that the region maintains and delivers on the results focus, and hence a Results-Based RAS for Nutrition was developed with extensive consultations at the country and regional levels with staff from different sectors. The strategy outlined the region's vision and approach to improving nutrition. It drew upon collective knowledge, experience and thinking, and distilled concrete actions that the region could take in the immediate to the medium term to translate commitment into results.

To achieve this vision, the strategy outlined some key results and provided a road map to scale up South Asia Region's work program on nutrition. It proposed some strategic approaches to guide the scale up of this work program, with an emphasis on working across sectors, focusing on the Bank's areas of comparative advantages to support client countries implementation of comprehensive programs that integrate critical nutrition-sensitive actions in multiple sectors. The overall objective of the RAS is to expand the scale, scope, and impact of the region's work program, while building staff's and clients' commitment to, and capacity for a multi-sectoral response to the nutrition crisis. The RAS met its objective through four key results:

- Improved awareness and commitment by Bank staff and clients to addressing maternal and child nutrition;
- Increased World Bank lending for operations aimed at improving maternal and child nutrition;
- Increased World Bank funding/management of analytical work to address knowledge gaps in maternal and child nutrition;
- Successful implementation of a multi-sectoral convergence model project aimed at improving child nutrition indicators.

Critical Success Factors and Risks for Achieving Nutritional Targets

Common Results Framework (CRF)

One agreed upon critical success factor is the development of a Common Results Framework (CRF). Developed by the SUN movement, the CRF is as a single and agreed set of expected (or common) results generated through the effective engagement of different sectors of Government and the multiple (non-government) actors who have capacity to influence people's nutrition. This set of results should be based on the national goals and targets for nutrition, and reflect the ways in which different sectors and actors can best contribute to the achievement of these targets through their individual and collective actions. While the "results" referred to in a CRF are guided by the 1000 days window of opportunity to improve nutrition, CRFs may also include targets for obesity or overweight reduction (Walters, Dohan and Shoham 2015).

The Common Results Framework includes a table of expected results: it also consists of a costed implementation plan describing the steps needed for implementation. There may also be compacts, or memoranda of understanding, which set out mutual obligations between different stakeholders. In practice, the implementation plan is often an amalgamation of several plans from different sectors or stakeholders.

SUN countries have identified the CRF in different ways. For example, in Ethiopia the CRF equates to the National Nutrition Programme, in Nepal the Multi-Sectoral Nutrition Plan includes a CRF and in El Salvador sectors are aligning around the Strategic Plan for Food Security and Nutrition. Other countries, such as Pakistan, institutionalised nutrition as a multi-sectoral development issue in their national planning process back in the mid-1970s (Walters, Dohan and Shoham 2015).

Multi-sector Planning

Coherent multi-sectoral action can be challenging but there are three fundamental issues that once fully considered can smooth the path:

1. **Political will and commitment from all levels of government and external actors is required to enable and apply a shared policy framework and action planning.**

   Experience in SUN countries has shown that in many countries there are 1 or 2 key people who are fully engaged and understand the SUN processes, and who generally attend SUN global meetings and gatherings. As such there remains a need for strong high-level advocacy efforts to explain the nutrition challenges of the country to actors from various sectors (especially those outside health); to clarify why it malnutrition should matter to them; and to discuss and identify what the roles of specific stakeholders should or could be. A clear set of advocacy arguments for the country need to be established and economic cost-benefit analyses can play a dual role. First in providing top line, typically highly impressive cost-benefit ratios but also, and arguably more importantly, in bringing the Ministry of Finance to the table.

   The position of the SUN Focal Point and commitment at the highest levels of government are critical factors in ensuring convening of the different sectors, that responsibilities are allocated, and that sectors are accountable.

   External actors, particularly development partners need to be well coordinated and consistent in their technical support to countries, conveying the same messages through their respective points of influence and programmes.

2. **Multi-sector policies and action are highly context specific and any guidance needs to be considered within the local political, cultural and nutritional environment. As nutritional needs vary widely across and between nations appropriate targeting of actions is advisable.**

   The concept of SUN can be quite hard to grasp and the relationships between nutrition and other sectors need to be explained to some stakeholders. A contextual analysis which reviews both the nutrition situation and its enabling environment has proved to be a useful tool. Links between nutrition and other sectors can be made, and resultant multi-sector workshops to disseminate findings can also be used as a platform for dispelling myths, raising awareness of the problem, identifying roles and prioritizing actions within the local context. Experience shows that the process of contextualizing the nutrition problems promotes and develops individual and organizational understanding.

3. **Accountability mechanisms need to be in place to support co-ordination, M&E as well as accountability. The designated secretariat or coordination unit needs to be appropriately staffed and equipped for the assignment.**

The SUN experience has shown that these bodies are more effective when placed above the line ministries. The benefits of doing this are twofold in that they obtain executive powers across the line ministries and it reduces potential policy bias emanating from a given ministry. To be effective the coordinating body needs to represent all relevant ministries. In practice it has been shown that these bodies tend to display a bias toward whichever ministry houses them (Scaling Up Nutrition, 2015).

Political and social mobilisation around nutrition

Global advocacy from the SUN Movement has played an important role in bringing awareness to nutrition and gaining high-level political commitment to move processes forward. Studies on the cost of hunger and economic effects of malnutrition have also proven effective in some countries. However, the role of nutrition champions in high-level positions at national level cannot be underestimated. These include advocates high up in government bodies, such as the Ministry of Planning or a Presidential Office, who have driven nutrition forward as a multi-sectoral issue and positioned it high on the national agenda (Walters, Dohan and Shoham 2015).

Enshrining a common goal for nutrition in legal statutes or in a national development strategy can help increasing the level of engagement of actors. However, the more inclusive the process of discussion and planning in the early stages and the broader the advocacy, creating recognition of nutrition as a priority development issue for the country, the more effective and efficient the implementation.

Engagement of sectors to establish multi-stakeholder platforms

The process of bringing stakeholders together from across Ministries, donors, United Nations (UN) agencies, civil society, academia, the private sector and the broader population requires a high level convenor. Where these convenors are based in a sectoral ministry, such as the Ministry of Health, their ability to convene across sectors is often compromised and plans may be skewed towards activities of their sector. Alignment of different actors requires multiple stakeholders to have a common understanding and a willingness to adapt their traditional ways of working to achieve new collective objectives. It can be a big step for sectors to start thinking about nutrition and how their work might contribute towards nutrition outcomes; and a further step to integrate relevant indicators into their strategies and programming (Walters, Dohan and Shoham 2015).

Madagascar, Niger and Peru are examples of countries where there has been recognition of the need for early consultation with the subnational level stakeholders to inform improved planning. The private sector is not always aligned with the national interest. However, it can contribute beyond the restricted focus of its value chain and business interests if there is a clear strategic approach to its participation from the start; for example, in Guatemala, the private sector's involvement in social auditing (through corporate social responsibility) contributed to identify ways health services could be improved (Walters, Dohan and Shoham 2015).

Implementing plans at the regional and district level

At the implementation stage, the commitment of government sectors and development partners is tested as all actors need to align firmly with what has been agreed upon at the national level. Budgets, plans and monitoring frameworks are often disconnected between

sectors. Strong coordination teams are required at provincial/district level to link budgets, plans, monitoring and accountability frameworks. Funding also needs to be aligned with the action plans. Monitoring and Evaluation systems that can demonstrate achievement of objectives and consolidate results across sectors are required, which include sufficient flexibility to be responsive to different local realities (Walters, Dohan and Shoham 2015).

Whilst much of the best practice and lessons learned are drawn from the experiences of the SUN movement, the principles are still relevant for non-SUN countries.

1.6. Measures of Child Malnutrition

The report focuses on four distinct types of malnutrition. The first type is **acute malnutrition**, which is captured by the prevalence of *wasting*. A child is considered to be wasted if her/his weight-for-height is below 2 standard deviations of that of a reference group. Severe wasting is defined when weight-for-height falls below 3 standard deviations of that of the reference group. Rates of wasting in excess of 15% correspond to a "critical situation" according to the World Health Organization (WHO). Severe acute malnutrition is related to elevated mortality rates, amongst others, and is the subject of humanitarian attention.

The second type of malnutrition is **chronic malnutrition**, measured by *stunting*. A child is stunted when her/his height-for-age is 2 standard deviations below that of the reference population. Stunting is associated with impaired cognitive and non-cognitive development of children with long-term impacts in adulthood. Rates of stunting in excess of 40% indicate a crisis situation.

The third type of malnutrition is **micro-nutrients deficiencies** (or "hidden hunger"). Section 2.3 above discussed additional types of deficiencies, however, data on these are not available for large shares of populations across the world. The report therefore focuses on indicators for iron deficiency, which is associated with anaemia, and vitamin A deficiency, which is associated with growth retardation and infection.

The fourth type of malnutrition is **over-nutrition**, i.e. *obesity and overweight*, which are also associated with non-communicable diseases and heightened mortality and morbidity rates, among other consequences. Overweight among children is defined as weight-for-age being above 2 standard deviations of that of the reference population. In adults, overweight and obesity are measured using the Body Mass Index (BMI).

2. MALNUTRITION IN THE OIC MEMBER COUNTRIES

2.1. Current Level of Malnutrition in the OIC Member Countries

Table 2 summarises the state of the key malnutrition indicators (stunting, wasting, overweight and anaemia) in OIC countries and the rest of the world. Column 1 indicates the mean of malnutrition for all OIC countries together. Column 2 presents the mean of malnutrition for developing countries that are not part of OIC and column 3 presents results for the world. Finally, columns 4-8 breaks down the OIC by sub-region. The figures presented here come from the "State of Children" report published in 2015 by OIC.

It is clear from Table 2 that OIC countries experience high rates of malnutrition across all indicators; and that OIC countries tend to under-perform when compared to the rest of the (developing) world. Stunting rate in OIC is 33%, which is above the high prevalence threshold defined by the WHO (30%). This rate is 13% higher than in the rest of the world. 11.1% of children in OIC countries are wasted (corresponding to a "serious" situation as per WHO guidelines), which is 18% more than in non-OIC developing countries. OIC countries are also particularly likely to suffer from the double burden of nutrition as both under-nutrition and over-nutrition are more acute than in the rest of the world. Overweight affects 7.4% of children in OIC countries, against 4.6% in the rest of developing countries (a gap of 61%). Finally, "hidden hunger" or micronutrient deficiencies, is also particularly prevalent in OIC countries, at 53% versus 42% in the rest of the developing world and 43% in the world (a gap of 26%).

Looking at the regional distribution of malnutrition (columns 4-8), one can see that stunting is most prevalent in South Asia (at 45%), followed by sub-Saharan Africa (36%) and East Asia and Pacific (35%). The same three regions are also most affected by wasting (14% for EAP, 12% for SSA and 12% for SA). Micronutrient deficiencies are acute across the board, but the highest concentration (as measured by the prevalence of anaemia) are found in sub-Saharan Africa (69%) and South Asia (57%). In contrast, overweight is low in sub-Saharan Africa and South Asia (around 4.5%) and is mostly observed in East Asia and Pacific (12%), Europe and Central Asia (12%) and the Middle East and North Africa (13%).

Schematically, Table 2 depicts a situation where acute under-nutrition and hidden hunger are concentrated in sub-Saharan Africa and South Asia (which predominantly concentrate poor countries) and over-nutrition is concentrated in the richer areas of East Asia, Europe, Central Asia, the Middle East and North Africa. In addition, MENA, East Asia and Pacific and Europe and Central Asia are clearly affected by the double burden of malnutrition (the rate of stunting and anaemia are high in all these regions).

Table 2: Malnutrition in OIC and non-OIC Countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OIC	Non-OIC developing	World	OIC EAP	OIC ECA	OIC MENA	OIC SA	OIC SSA
Stunting	33	29	29	35	17	21	45	36
Wasting	11.1	9.4	9.6	14	3	7	12	13
Overweight	7.4	4.6	5.5	12	12	13	4	5
Anaemia	53	42	43	32	33	39	57	69

Source: SESRIC 2015. Notes: Prevalence rates in %, children below the age of 5; years 2009 – 2013. EAP: East Asia and Pacific, ECA: Europe and Central Asia, MENA: Middle East and North Africa, SA: South Asia, SSA: sub-Saharan Africa. The composition of each region is in annex A.

2.2. Trends of Malnutrition in the OIC Member Countries

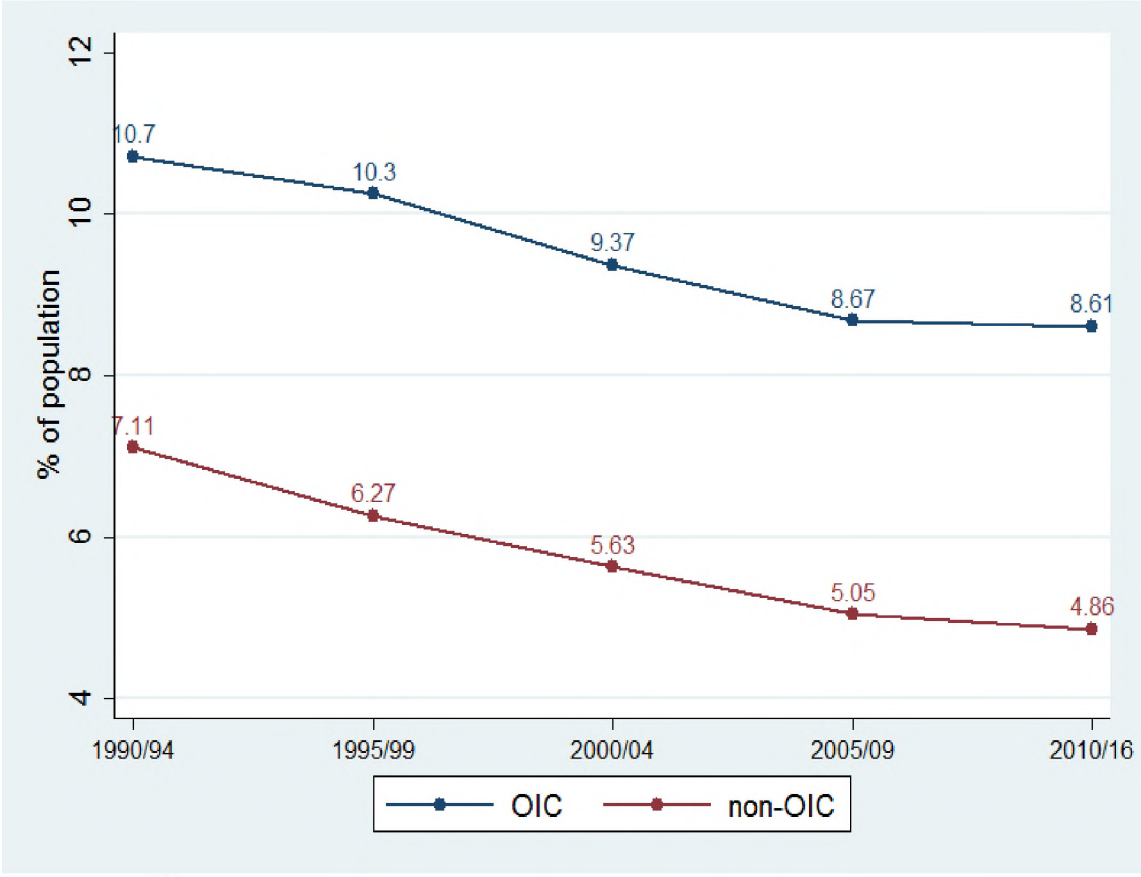
This section presents the trends of malnutrition in and outside of the OIC over the last 20 years. To do that, the Joint Malnutrition Estimates (JME), provided by UNICEF, the World Health Organization and the World Bank, in their updated version of August 2016, is used. This dataset harmonises and gathers malnutrition data for a wide range of countries (150) in the world. It includes all but one of the 57 OIC member countries (there is no data for the United Arab Emirates). However, the dataset mostly focuses on developing countries: Out of the 150 countries in the dataset, 31 are low income (21%), 50 are lower middle income (33%), 48 are upper middle income (32%), and only 20 are high income (13%), according to the World Bank classification. The distribution for OIC countries is not too dissimilar: Out of 56 countries, 16 are low income (29%), 18 are lower middle income (32%), 16 are upper middle income (29%) and 6 are high income (11%). Although the OIC sample comprises a higher share of poor countries, the differences are small enough not to bias a comparison of OIC with non-OIC countries.

Not all countries are surveyed in the same years so that the composition of countries for each given year can vary dramatically. Using yearly averages would thus bias the estimates. Instead, five-year averages of malnutrition indicators are calculated to ensure that comparisons of malnutrition averages over time are made on the same underlying set of countries.

Wasting

Figure 4 depicts the evolution of acute malnutrition, or wasting, since 1990/95. Wasting is more prevalent in the OIC countries than in the rest of the world throughout the period. Although the temporal evolution of wasting over time looks remarkably similar across the two group of countries, a detailed inspection of the underlying number reveals that progress has been slower in OIC countries. Prevalence of wasting went down from 10.7% in 1990/95 to 8.6% in 2010/16 in OIC countries whereas the corresponding figures for non-OIC countries are 7.1% and 4.9%. This corresponds to a decrease of 20% over the period in OIC countries and of almost a third (32%) in the rest of the world; despite lower initial wasting rates there.

Figure 4: Prevalence of Wasting in OIC and non-OIC Countries, 1990/94 - 2010/16

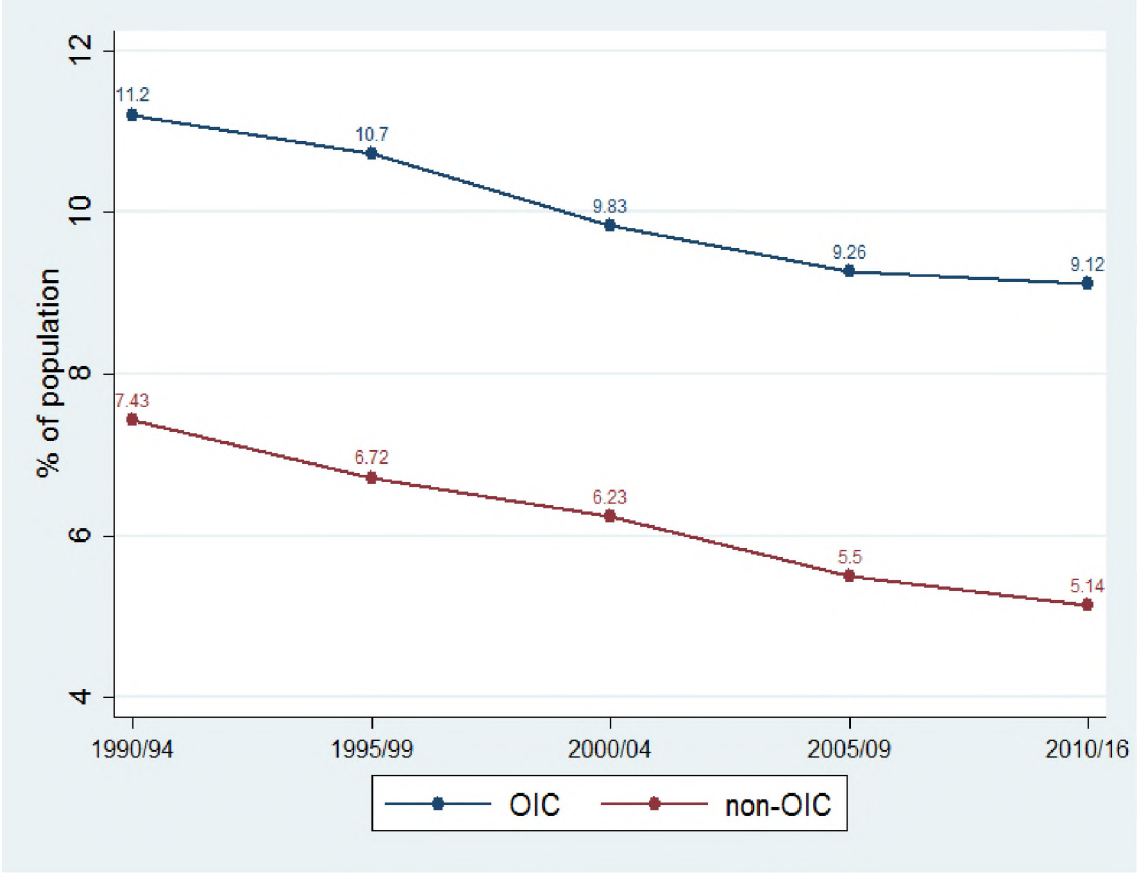


Source: Authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016).

Figure 5 focuses on the evolution of wasting in developing OIC and non-OIC developing countries only (i.e. without high-income countries). One can see that, again, wasting rates are higher in OIC countries than in non-OIC countries. Progress in wasting reduction has also been slower in developing OIC countries (19%) than in non-OIC developing countries (31%).

A worrisome recent trend is the almost complete absence of progress in OIC countries between the last two measurements (i.e. between 2005/10 and 2010/16). Wasting only went down by 0.05 percentage point (pp) in the whole of OIC and by 0.14 pp in developing OIC countries. The trend of reduction in wasting has also been mostly flat in the non-OIC world over this period, but the absolute rate of wasting is also much lower in these countries.

Figure 5: Prevalence of Wasting in OIC and non-OIC Countries, 1990/94 - 2010/16. Developing Countries Only



Source: Authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016).

Zooming into specific countries, 31 OIC countries saw wasting rates go down and 21 OIC countries saw wasting rates go up between 1990/95 and 2010/16.

Overall, Pakistan (-13.5 pp), Afghanistan (-8.7 pp), Benin (-7.8 pp), Mauritania (-7.5 pp), Guyana (-6.9 pp), Niger (-6.6 pp) and Uzbekistan (-6.2 pp) have experienced the biggest absolute drops in wasting prevalence. 9 countries have recorded reduction of wasting prevalence by more than 5 percentage point over the entire time period.

The biggest overall increases in wasting have occurred in Djibouti (+9 pp), Saudi Arabia (+8.9 pp), Egypt (+7.6 pp), Comoros (+5.8 pp), Mali (+4 pp), Lebanon and Iraq (+3 pp), and Libya (+2.9 pp).

In relative terms, the best performers have been Benin (-63%), Uzbekistan (-58%), Pakistan (-56%), Turkey (-55%), Guyana (-52%), Kazakhstan (-52%) and Iran (-51%). The worst performers have been Egypt (+400%), Saudi Arabia (+306%), Comoros (+110%), Lebanon (+83%), Libya (+81%) and Djibouti (+72%).

Table 21 in annex A presents the evolution of wasting for all OIC countries.

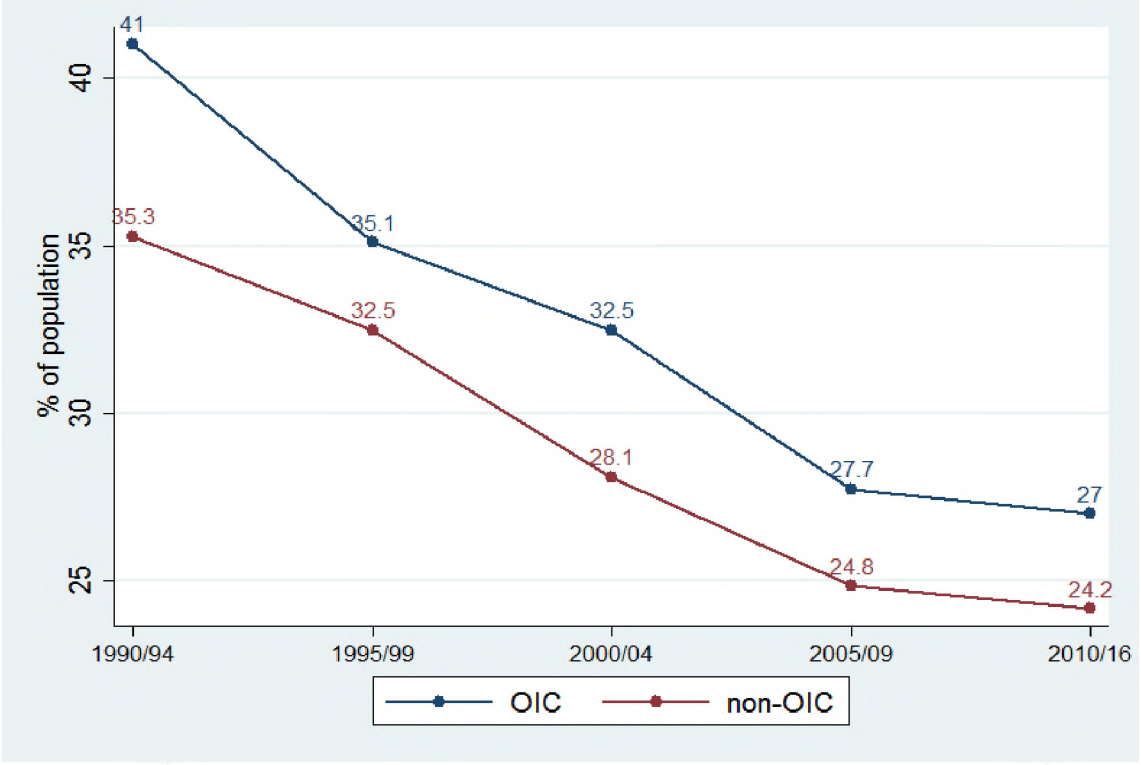
Finally, it is worth noting that many countries have not had a uniform evolution of wasting. Djibouti, Algeria, Mali, Syria, Togo, Azerbaijan, or Nigeria, for instance, have seen several changes in trend. Such discontinuities reflect the sensitivity of the wasting indicator to short term changes, positive or negative. Figure 37 and Figure 38 show the evolution of wasting for all OIC countries.

Stunting

The evolution of stunting in OIC and non-OIC countries is depicted in Figure 6. The prevalence of stunting in OIC countries is consistently higher than in the rest of the world. In absolute terms, stunting prevalence is very high in OIC, and was above the critical threshold of 30% defined by the WHO until 2000/04. Nevertheless, the trend was decreasing over the entire period: stunting decreased from an average rate of 41% in 1990/94 to 27% in 2010/16; a reduction of 34%. However, similarly to what was observed for wasting, OIC countries experienced very little progress over the most recent period (-0.14 pp).

In the meantime, stunting rates have also gone down in non-OIC countries (from 36% in 1990/95 to 24% in 2010/16); and the extent of the decline (31% of the initial value) is similar to the one observed for OIC countries.

Figure 6: Prevalence of Stunting in OIC and non-OIC Countries, 1990/94 - 2010/16



Source: Authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016).

Both the levels and trends of stunting are quite similar in Figure 7, which focuses on developing countries, although stunting is slightly more prominent.

Figure 7: Prevalence of stunting in OIC and non-OIC countries, 1990/94 - 2010/16, Developing Countries Only

Source: Authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016).

No less than 48 OIC countries have recorded a reduction of stunting over the entire period spanning 1990/94 to 2010/16. In absolute terms, the largest decreases have been experienced in Bangladesh (-35 pp), Kirgizstan (- 23.3 pp), Uzbekistan (-20 pp), Morocco (-19.6 pp) and Mauritania (-18.2 pp). In relative terms, Iran (-72%), Kazakhstan (-66%), Kirgizstan (-64%), Jordan (-62%) and Turkey (-61%) have been the best performers. Only 5 OIC countries have seen a secular increase in stunting: Cote d'Ivoire (+7.1 pp), Djibouti (+5.5 pp), Mali (+2.7 pp), Albania (+2.7 pp) and Kuwait (+0.8 pp).

Regionally, average reduction of stunting has been most important in South Asia (-20 pp; corresponding to -36%), ahead of Europe and Central Asia (-13 pp, -42%), East Asia and Pacific (-7.6 pp, -21%), Sub-Saharan Africa (-7 pp, -17%) and the Middle East and North Africa (-6.8 pp, -26%).

Annex A presents further details on the evolution of stunting for all OIC countries.

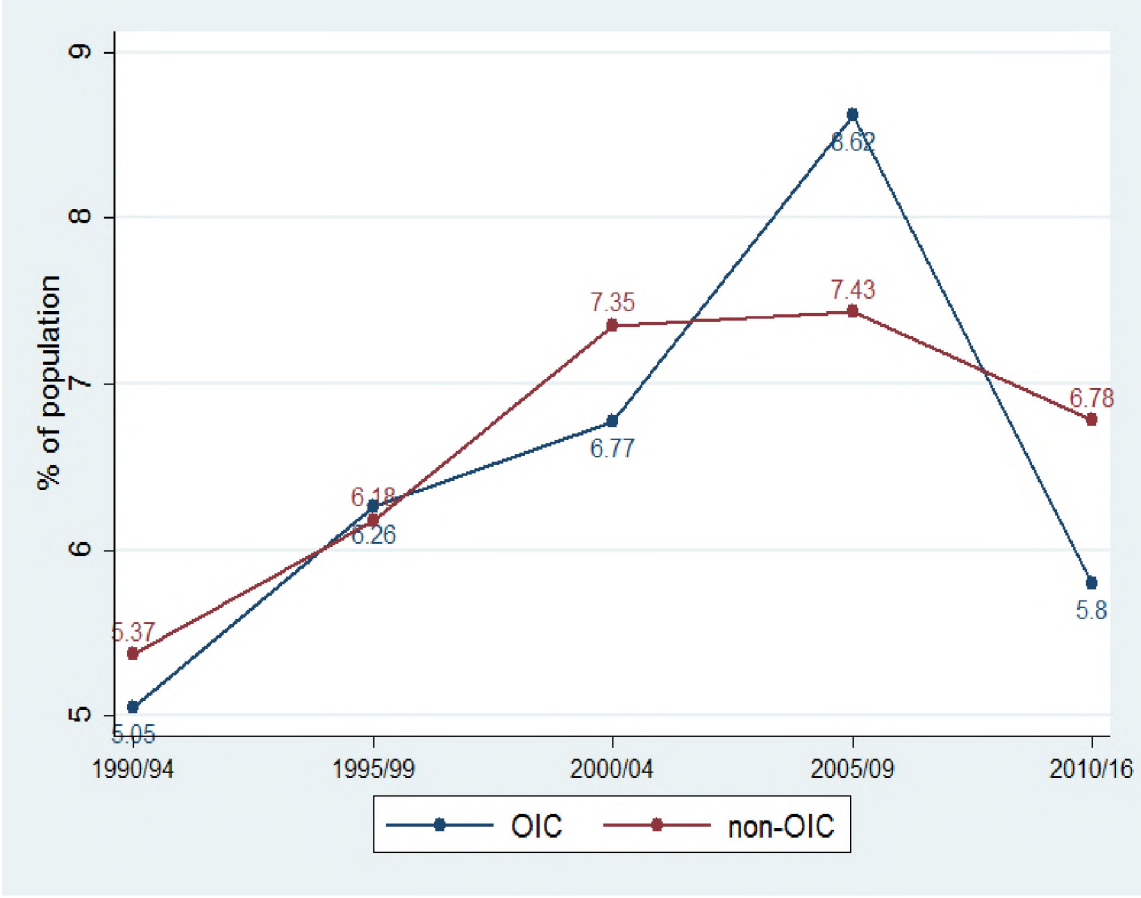
Overweight

Figure 8 presents the evolution of overweight in OIC and non-OIC countries. In OIC countries, overweight have steadily risen between 1990/94 and 2005/09, when it moved from an initial rate of 5.1% to a peak of 8.6%. The rate of overweight has then declined to 5.8% in 2010/16. In non-OIC countries, overweight passed from 5.4% in 1990/94 to a maximum of 7.4% in 2005/09, before to decrease to 6.8% over the latest period.

The situation of overweight in OIC countries has been roughly similar to that of non-OIC countries until 2000/04. Thereafter, OIC countries experienced a sharper increase in overweight until 2005/09; followed by a very pronounced drop over the period 2010/16. The current rate of overweight is currently substantially lower in OIC countries than in the rest of the world.

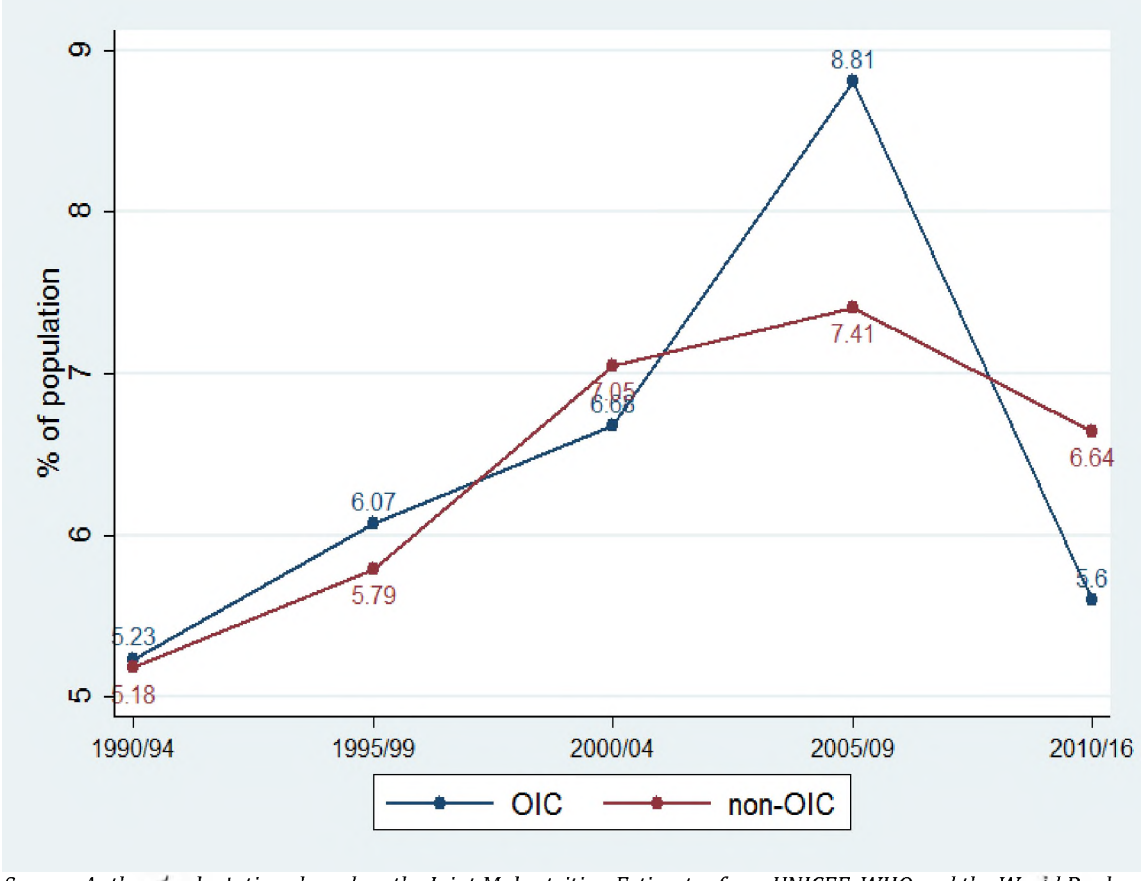
The levels and trends of overweight are very similar in Figure 9 which focuses on developing countries.

Figure 8: Prevalence of Overweight in OIC and non-OIC Countries, 1990/94 - 2010/16



Source: Authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016).

Figure 9: Prevalence of Overweight in OIC and Non-OIC Countries, 1990/94 - 2010/16, Developing Countries Only



Source: Authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016).

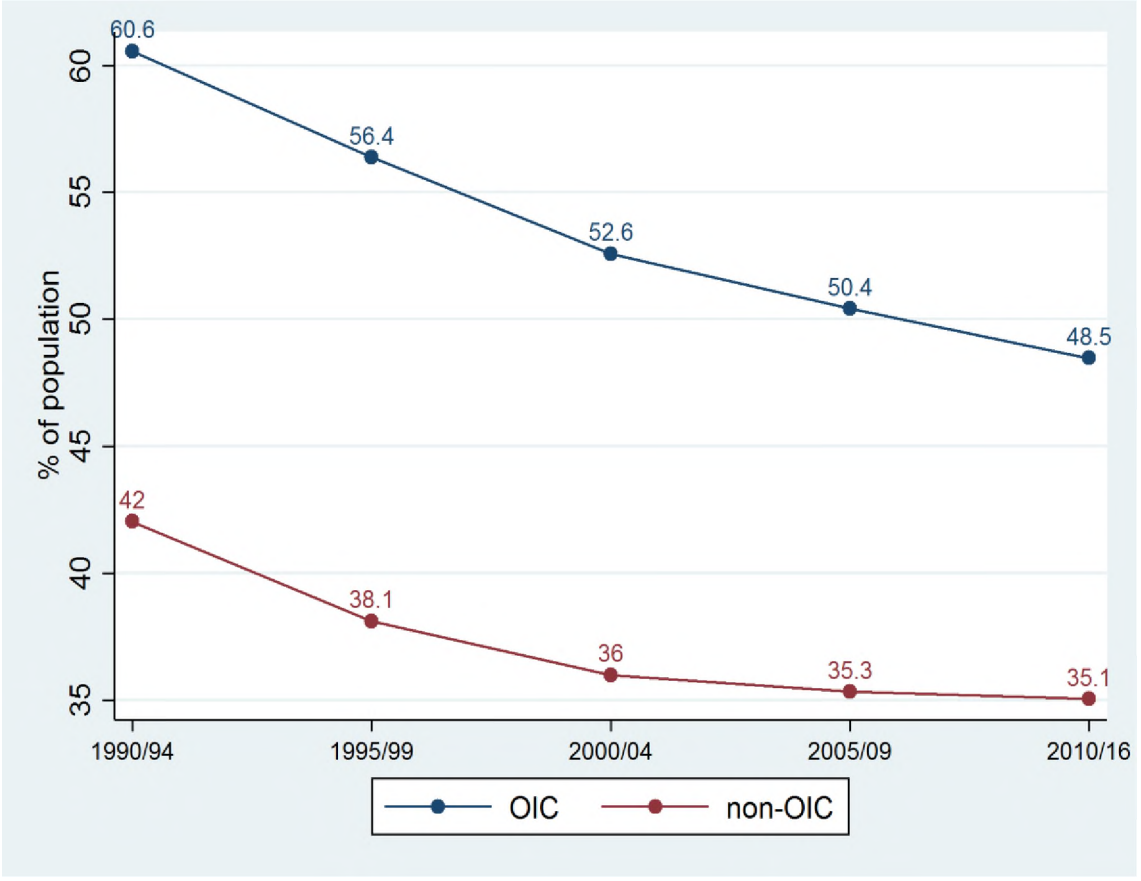
Overweight has fallen over the entire period in 22 OIC countries. Overweight has fallen most substantially in Yemen (-6 pp), Mauritania (-5.6 pp), Lebanon (-4 pp), Oman (-4 pp), Jordan (-3.9 pp), Uzbekistan (-3.1 pp) and Pakistan (-3 pp). In relative terms, the largest decreases have occurred in Mauritania (-82%), Yemen (-75), Guinea-Bissau (-55%), Oman (-48%), Jordan (-45%), Nigeria (-44%) and Senegal (-43%).

Over the same period, overweight has increased in 27 OIC countries. Largest increases in absolute value have been recorded in Albania (+14 pp), Tunisia (+11 pp), Libya (+9 pp), Egypt (+8.8 pp) and Azerbaijan (+7 pp). In relative terms, the worst performers are: Mali (+840%), Bangladesh (+600%), Maldives (+442%), Saudi Arabia (+408%) and Tunisia (+286%). The very high relative increases in these countries must be understood in light of the very low initial value of overweight there (e.g. 0.5% in Mali, 0.2% in Bangladesh, 1.2% in Maldives).

As for wasting and overweight, annex A presents further details on the evolution of overweight among OIC countries.

Anaemia

Figure 10: Prevalence of Anaemia in OIC and Non-OIC Countries, 1990/94 - 2010/16

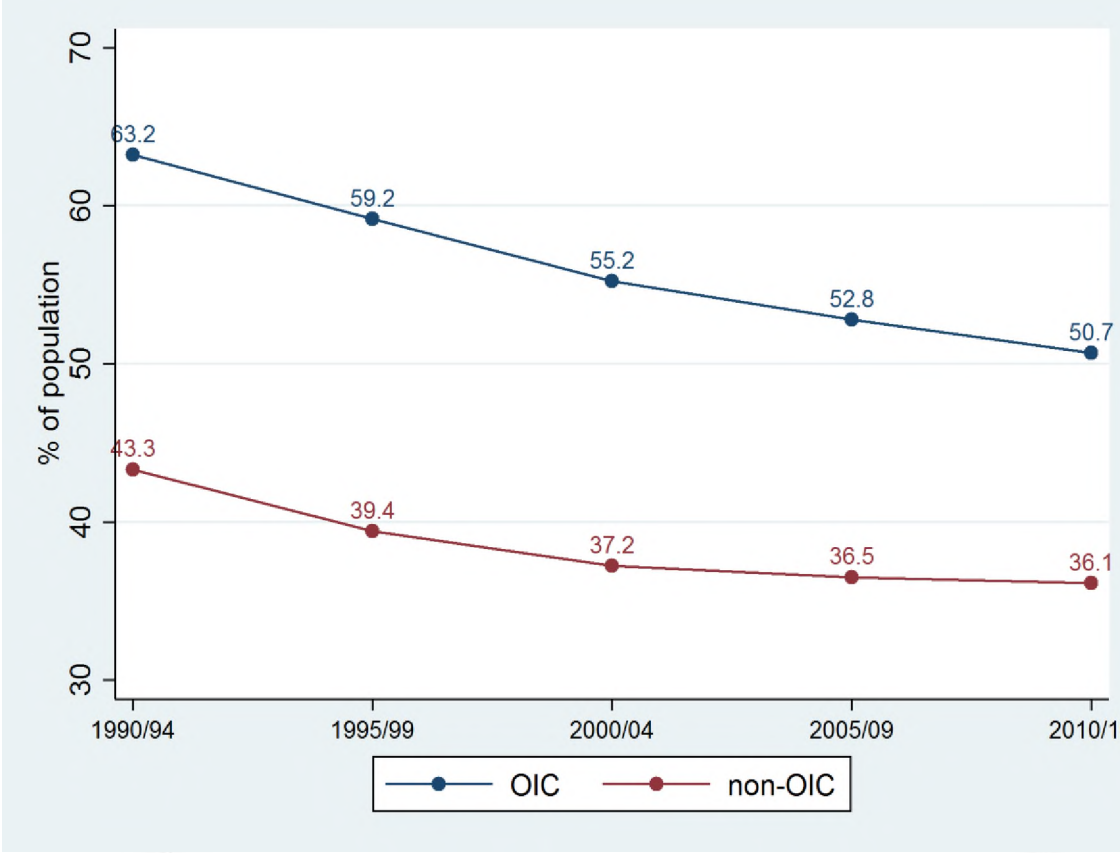


Source: Authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016).

The prevalence of anaemia is substantially higher in OIC countries than in non-OIC countries over the whole period (Figure 10). Starting from an initial rate of 61% of children under the age of five being anaemic, the prevalence rate continually decreased in the last 20 years but still remains very high: close to half of the children (48.5%) in the OIC were anaemic over the period 2010/16. In the non-OIC world, the prevalence of anaemia went down from 42% to 35% over the same period.

The levels and trends of anaemia are very similar when the sample is restricted to developing countries (Figure 11).

Figure 11: Prevalence of Anaemia in OIC and Non-OIC Countries, 1990/94 - 2010/16, Developing Countries Only



Source: Authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016).

54 out 55 OIC countries for which data are available have experienced a drop in anaemia prevalence between 1990/94 and 2010/16. The only country where prevalence of anaemia increased is Egypt (+3.4 pp). The largest drops in anaemia rates have been recorded in the Maldives (-54 pp), Kazakhstan (-35 pp), Sudan (-29 pp), Indonesia (-26 pp), Tajikistan (-22 pp), and Djibouti, Comoros and Uganda (-21 pp). In relative terms, the largest decrease has been experienced in the Maldives (-64%), Kazakhstan (-54%), Indonesia (-45%), Tajikistan (-44%), Albania (-39%), Turkey (-37%), Iran (-36%) and Kirgizstan (-35%).

Overall evolution of child malnutrition

By combining information on wasting, stunting and overweight, it is possible to define a typology of countries' trajectories between 1990/95 and 2010/16. Countries can be classified into the following categories: (I) countries with progress on under-nutrition and over-nutrition; (II) countries with progress on both under-nutrition indicators (wasting and stunting) but worsening situation of over-nutrition; (III) countries with mixed progress in under-nutrition combined with deterioration of over-nutrition; and (IV) countries with deterioration of both under- and over-nutrition.[2]

[2] Mixed progress on under-nutrition is mostly of the form of improvement on stunting and deterioration of wasting.

14 OIC countries have seen progress on all 3 indicators of under- and over-nutrition: Afghanistan, Benin, Chad, Guinea, Guinea-Bissau, Jordan, Kirgizstan, Mauritania, Nigeria, Oman, Pakistan, Somalia, Tajikistan and Uzbekistan. This list includes very different countries. Half are located in Sub-Saharan Africa (overall, one-third of Sub-Saharan African countries have seen progress on all three indicators), 3 in Europe and Central Asia (50% of countries in this region are in category I), 2 in the MENA region (12% are in category I) and 2 in South Asia (50% are in category I). MENA countries are especially under-represented in this list as only 2 countries out 17 made it to this category. Interestingly, this list is dominated by poor countries. Indeed, 6 of them are low-income and 6 others are lower middle-income countries, according to the World Bank classification.

16 OIC countries have recorded progress on under-nutrition but a deterioration of over-nutrition: Azerbaijan, Bahrain, Bangladesh, Burkina-Faso, Gabon, Guyana, Indonesia, Iran, Kazakhstan, Maldives, Morocco, Mozambique, Niger, Suriname, Tunisia and Turkey. These countries are well spread geographically and it is difficult to identify a regional pattern (4 in Sub-Saharan Arica, 4 in MENA, 3 in Europe and Central Asia, 2 in LAC and South Asia and 1 in East Asia). However, 11 out of these 16 countries are high income (3) or upper-middle income countries (8). This is consistent with the notion that economic development reduces under-nutrition but can give rise to an increase in over-nutrition.

19 OIC countries have a mixed record on under-nutrition. 18 of them have seen progress on stunting but a deterioration of wasting and only one (Cote d'Ivoire), the opposite. Out of these 19 countries, 13 have seen a concomitant increase in over-nutrition: Algeria, Cameroon, Comoros, Cote d'Ivoire, Egypt, Iraq, Libya, Malaysia, Saudi Arabia, Sierra Leone, Syria, Turkmenistan and Uganda. Consistent with the finding above on countries with rising over-nutrition, 8 out of these 13 countries are high income or upper middle income. Conversely, 5 of the 6 countries which have experienced declining over-nutrition and a mixed evolution of undernutrition (the Gambia, Lebanon, Senegal, Sudan, Togo, Yemen) are low income or lower middle income countries.

Finally, 2 OIC countries have seen deterioration of both under- and over-nutrition: these are Albania and Mali (one low income and one upper middle income country).

To summarise, OIC followed a broadly similar trend than non-OIC countries on undernutrition, although with higher prevalence levels and slightly slower progress (especially for stunting). OIC countries have experienced a sharper rise in over-nutrition in the period leading up to 2005/09 but a very large decline thereafter, putting prevalence rate of overweight in the OIC significantly below that of non-OIC countries.

Almost 60% of OIC countries (30 out 51) have experienced unambiguous decline in under-nutrition over the last 20 years. Slightly more than half of these (16 out of 30) have concomitantly recorded an increase in over-nutrition. These countries tend to be located at the upper end of the income distribution whereas countries that reduced both under- and over-nutrition tend to be poor. A large minority of OIC countries (37%) have posted a contrasted trend of malnutrition: most of these have reduced stunting but seen wasting and overweight deteriorate. Once again, these tend to be relatively well-off countries. Finally, two countries only have seen malnutrition getting worse across the board (Albania and Mali).

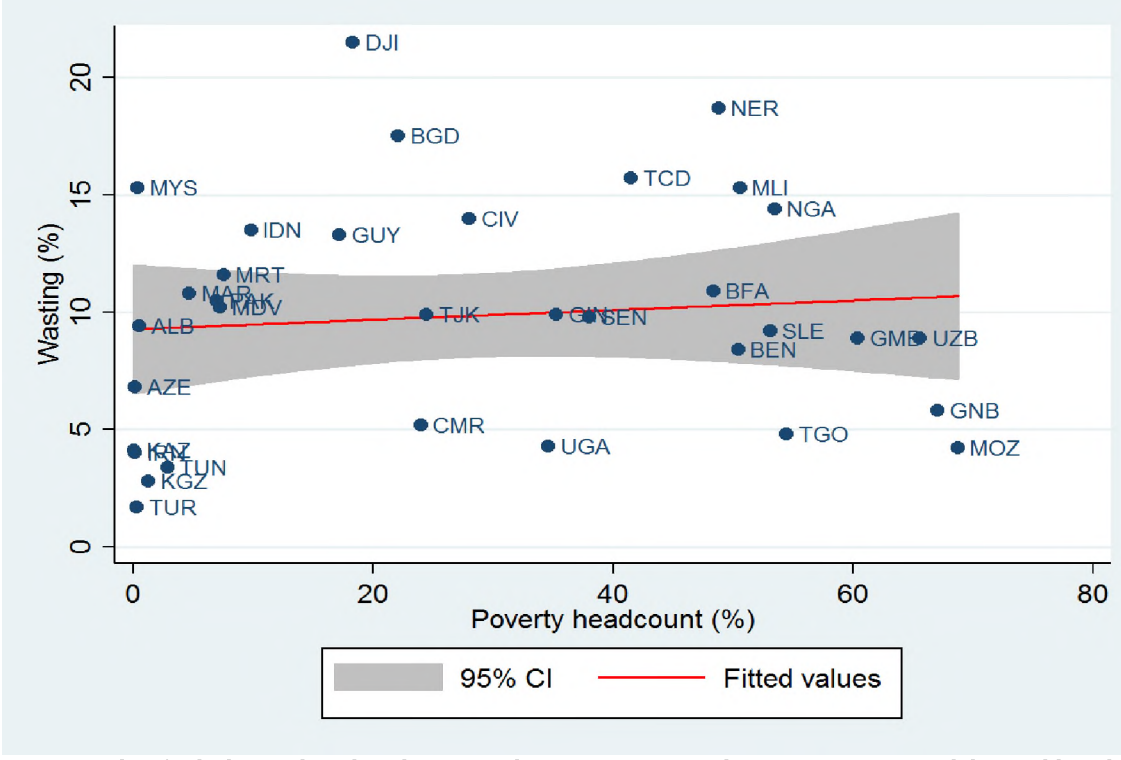
2.3. Malnutrition and Poverty in the OIC Member Countries

To assess the relationship between malnutrition and poverty in OIC countries, the poverty headcount calculated at the $1.9 per day threshold is used. The data come from the World Data Indicators, World Bank. The relationship is assessed using the latest measurement of malnutrition available for each country. Due to data limitations (some countries have patchy poverty data, and it sometimes do not overlap with the period of measurement of malnutrition), only between 34 and 40 OIC countries are included in the analysis.

Wasting

Figure 12 presents the relationship between wasting prevalence and the extent of poverty in OIC countries. There does not seem to be any association between wasting and poverty. A regression of wasting on poverty rate confirms this finding. This means that for every poverty level, one can find countries with very different prevalence rates of wasting. Countries that have a much higher wasting prevalence than others with a similar poverty rate include Djibouti, Niger, Bangladesh, Malaysia, Chad and Mali. Djibouti, for instance, has a wasting rate of more than 20% whereas Comoros, with a slightly higher poverty rate, experiences wasting prevalence of only 5%. A similar contrast exists between Niger and Togo: both have around 50% poverty headcount, but wasting is in excess of 15% in the former and at 5% in the latter. In contrast, Turkey, Kirgizstan, Tunisia, Kazakhstan, Uganda, Cameroon, Togo, Mozambique and Guinea-Bissau have low wasting rates given their level of poverty.

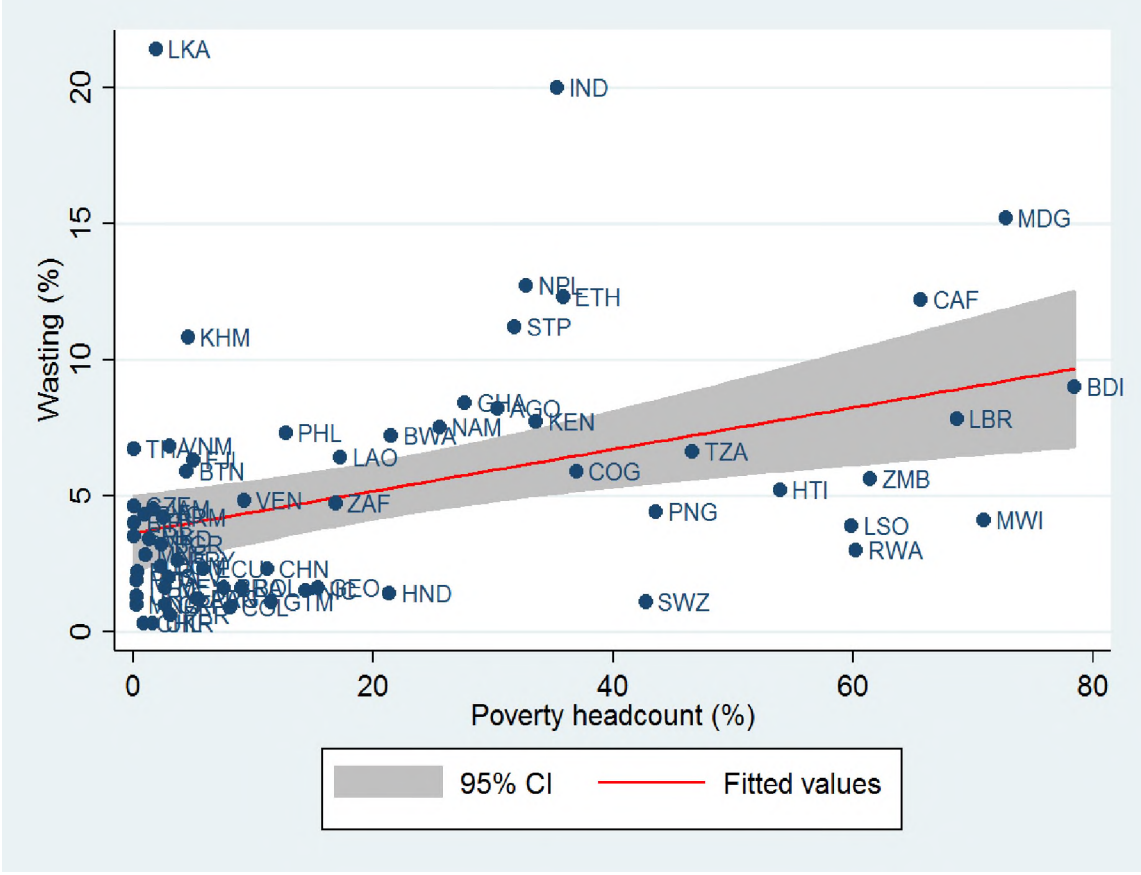
Figure 12: Wasting and Poverty Rate in the OIC Member Countries



Source: Authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016) and the World Bank Indicators (World Bank 2016). For each country, the most recent year for which malnutrition and poverty data exist is used.

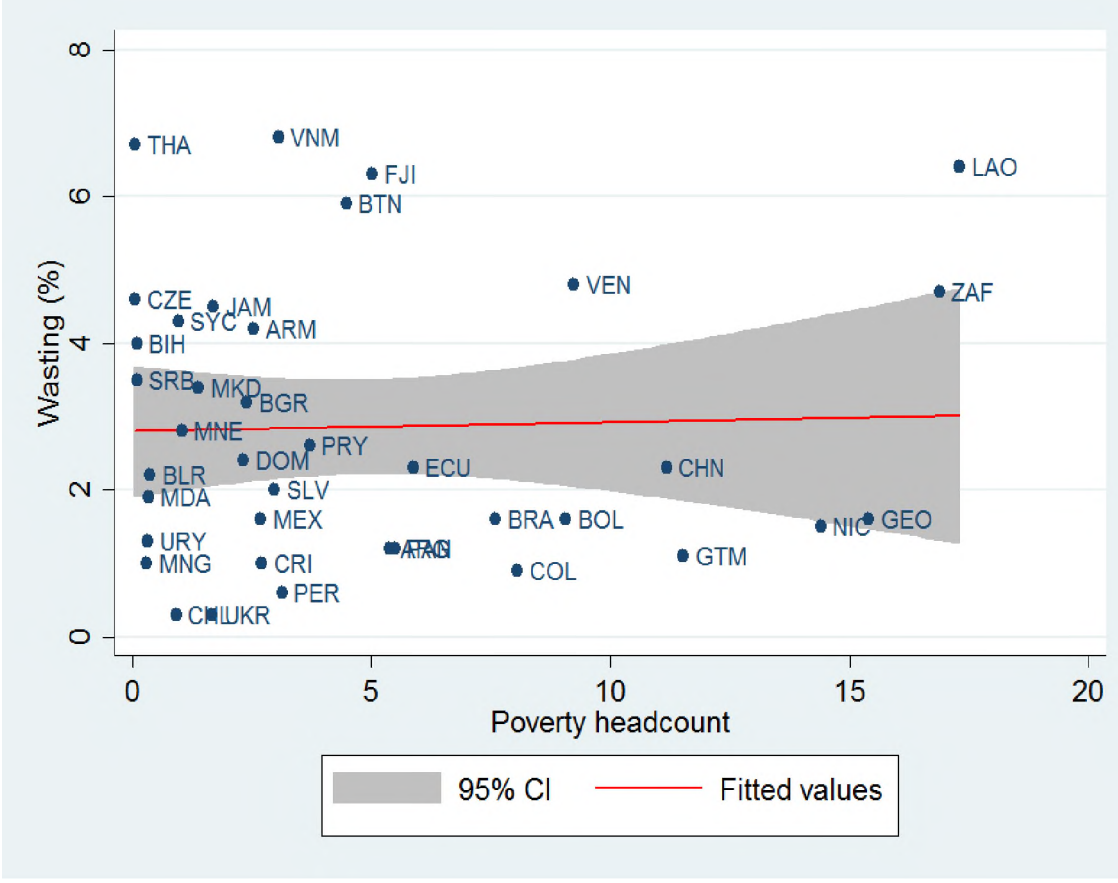
This lack of relationship between wasting and poverty is specific to OIC. In non-OIC countries, there exists a modest positive association between the two variables, as shown in Figure 13. In non-OIC countries, an increase of 10 percentage point of the poverty headcount is associated with a 0.8 percentage point increase in wasting rate. The relationship is statistically significant at the 1% level. When figures Figure 12 and Figure 13 are compared, it seems that the lack of a similar relationship in OIC is driven by the presence of countries with high wasting despite relatively low poverty rates (such as Malaysia, Djibouti or Indonesia).

Figure 13: Wasting and Poverty Headcount, non-OIC countries



Source: Authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016) and the World Bank Indicators (World Bank 2016). For each country, the most recent year for which malnutrition and poverty data exist is used.

Figure 14: Wasting and Poverty Headcount, Non-OIC Countries (zoom on low poverty, low wasting countries)



Source: Authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016) and the World Bank Indicators (World Bank 2016). For each country, the most recent year for which malnutrition and poverty data exist is used.

When the co-evolution of poverty and wasting is explored within countries through the means of a fixed effects regression, however, there is a positive and statistically significant relationship (at the 5% level). Each 10 percentage point decrease in poverty is associated with a decrease of 0.7 percentage point in wasting. In non-OIC countries, the relationship is similar significant statistically, but slightly weaker in absolute value (0.6 percentage point).

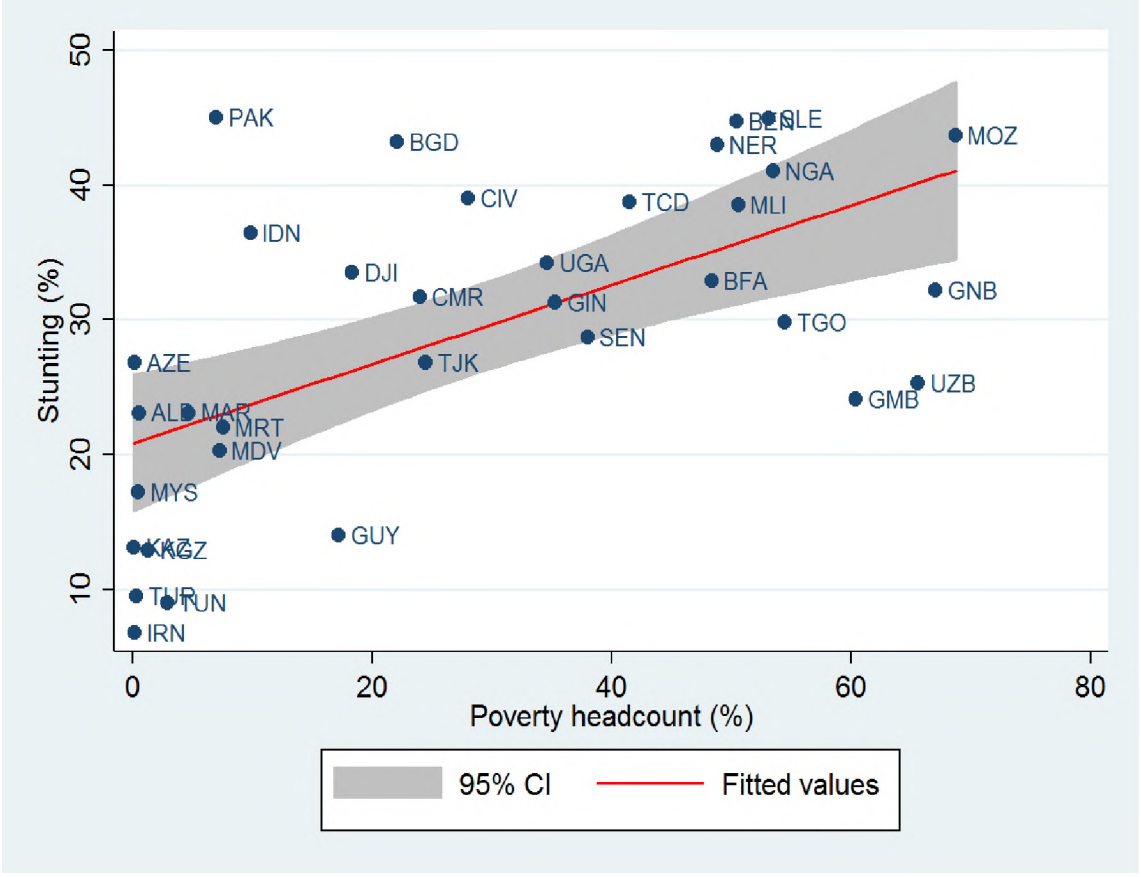
Stunting

A similar investigation with stunting reveals a strong and positive relationship between chronic malnutrition and poverty rate (Figure 15) in OIC. A 10 percentage point increase in the poverty headcount is associated with a 3.2 percentage point in stunting prevalence. The relationship is statistically significant at the 1% level.

Despite this strong relationship, some countries appear to be outliers in Figure 15. Pakistan, Indonesia, Bangladesh and Cote d'Ivoire, for instance, experience much higher rates of stunting than would be expected given their levels of poverty. In contrast, other countries have a lower

than expected stunting prevalence, including Iran, Tunisia, Turkey, Kazakhstan, Kirgizstan, Guyana, the Gambia and Uzbekistan. It is interesting to note the over-representation of Central Asian countries in this list.

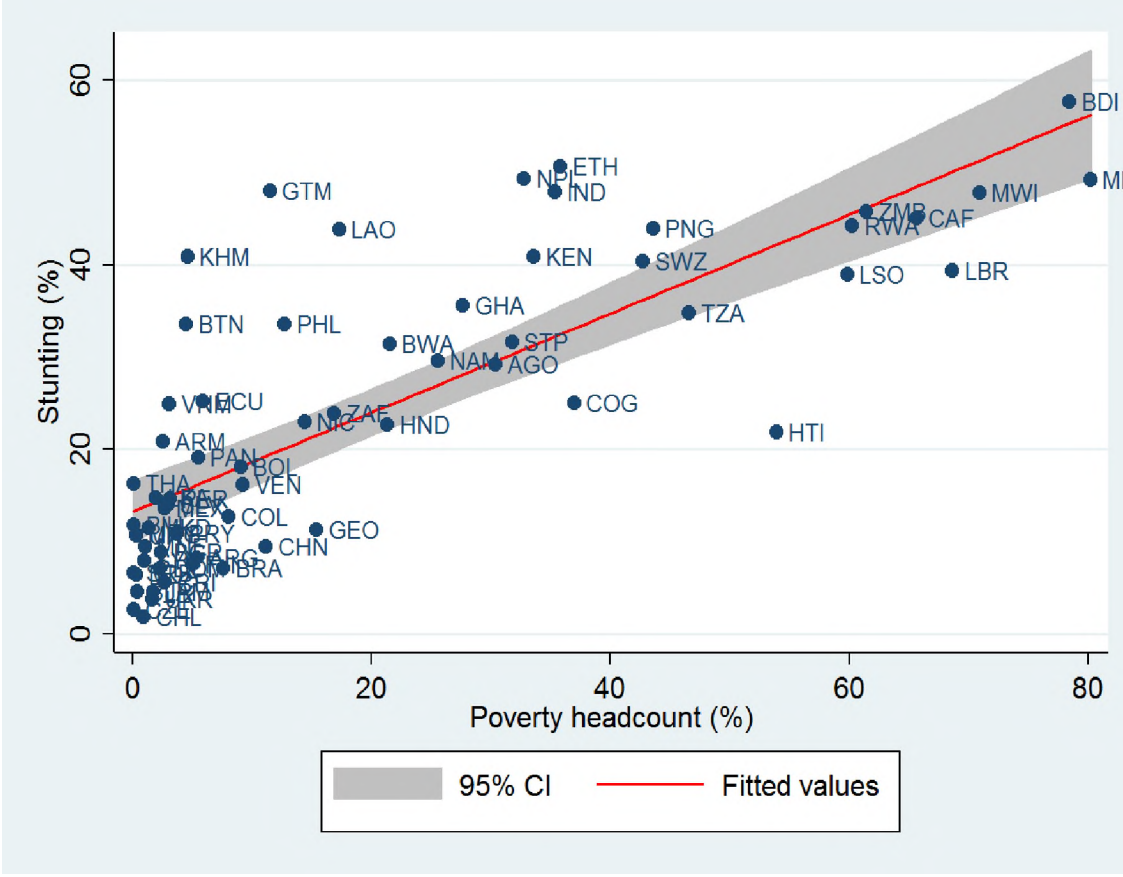
Figure 15: Stunting and Poverty Rate, OIC countries



Source: Authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016) and the World Bank Indicators (World Bank 2016). For each country, the most recent year for which malnutrition and poverty data exist is used.

The correlation between stunting and poverty in OIC, is however just over half as the one that exist in non-OIC countries. Among the latter, a 10 percentage point increase in poverty is associated with a 5.7 percentage point increase in stunting rate. Figure 16 shows this relationship, and it is clear that the slope of the red line (the fitted relationship) is now steeper than it was in Figure 15. It is particularly salient that in the non-OIC world, there are no very poor countries with low stunting rates; contrary to what is seen for OIC (e.g. the Gambia, Uzbekistan).

Figure 16: Stunting and Poverty Rate, Non-OIC countries



Source: Authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016) and the World Bank Indicators (World Bank 2016). For each country, the most recent year for which malnutrition and poverty data exist is used.

When the co-evolution of stunting and poverty is explored within countries, the relationship remains. In OIC countries, a 10 percentage point decrease in poverty rate is associated with a decrease in stunting of 3.7 percentage point (an effect significant at the 1% level). In the non-OIC world, the corresponding effect is 4.9 percentage point.

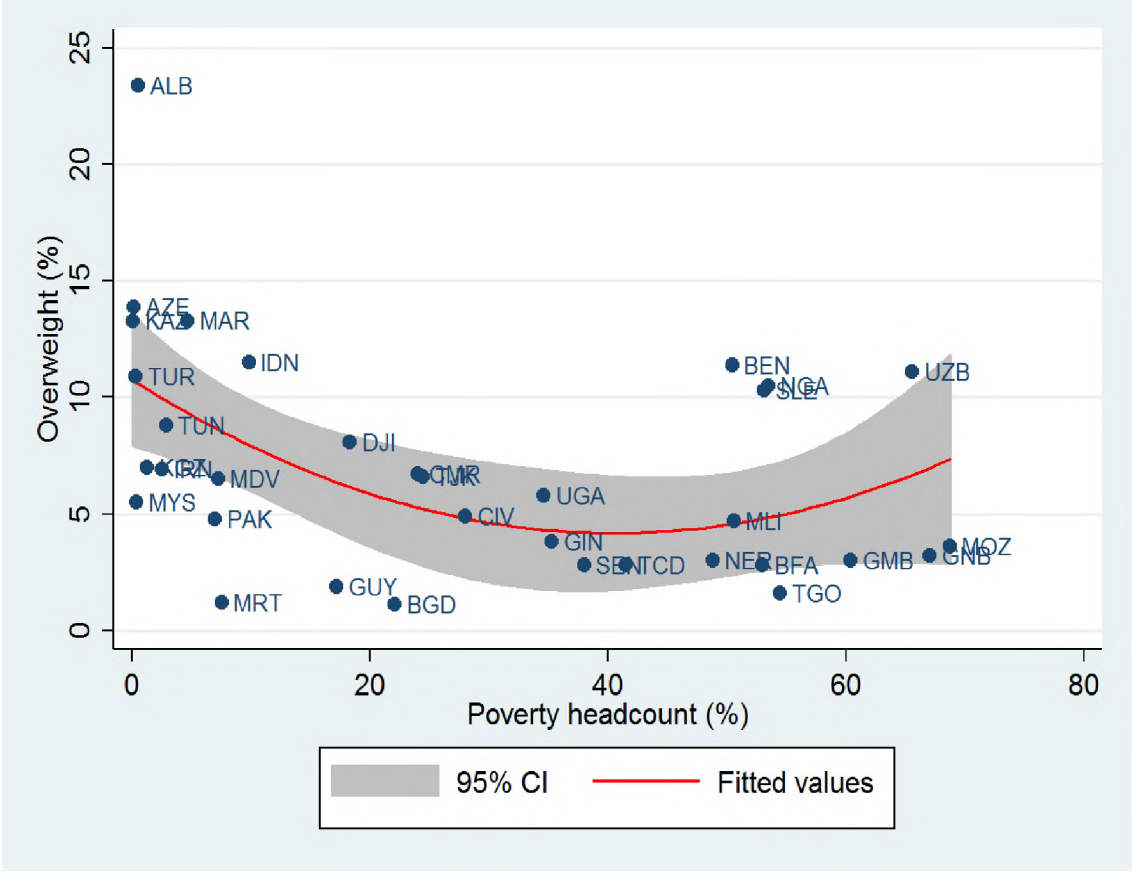
Overweight

The relationship between overweight and poverty in the OIC world is non-monotonic. Figure 17 shows that the relationship is positive at high levels of poverty, meaning that economic development in poor countries is accompanied by a reduction of overweight. However, the relationship turns negative at lower levels of poverty, implying that further economic progress tends to be associated with rising levels of overweight. The relationship changes sign when poverty rate reaches 40.6%. For countries with poverty rates higher than this threshold, poverty reduction and overweight reduction go hand in hand. 12 OIC countries were in that group at the last time of measurement. For countries with poverty rates below than 40.6%, poverty reduction is accompanied with rising overweight prevalence. 22 OIC countries were in that group at the time of last measurement.

It is worth stressing that the negative segment of the curve is much steeper than the positive one. For countries with poverty rates below the threshold, a 10 percentage point decrease in poverty is associated with a 3.2 increase in prevalence of overweight. For countries with poverty rates above the threshold, a similar decrease in poverty is associated with a very small 0.4 percentage point decrease in overweight. Nevertheless, both segments of the curve correspond to statistically significant effects of poverty at the 5% level.

Figure 17 reveals a few outliers. Albania has much higher overweight problem than other countries with low poverty levels whereas Benin, Nigeria and Sierra Leone tend to have more overweight children than countries with similar high levels of poverty. In contrast, Mauritania, Bangladesh, Guyana and Malaysia have lower overweight prevalence than expected based on their poverty rates.

Figure 17: Overweight and Poverty, OIC Countries



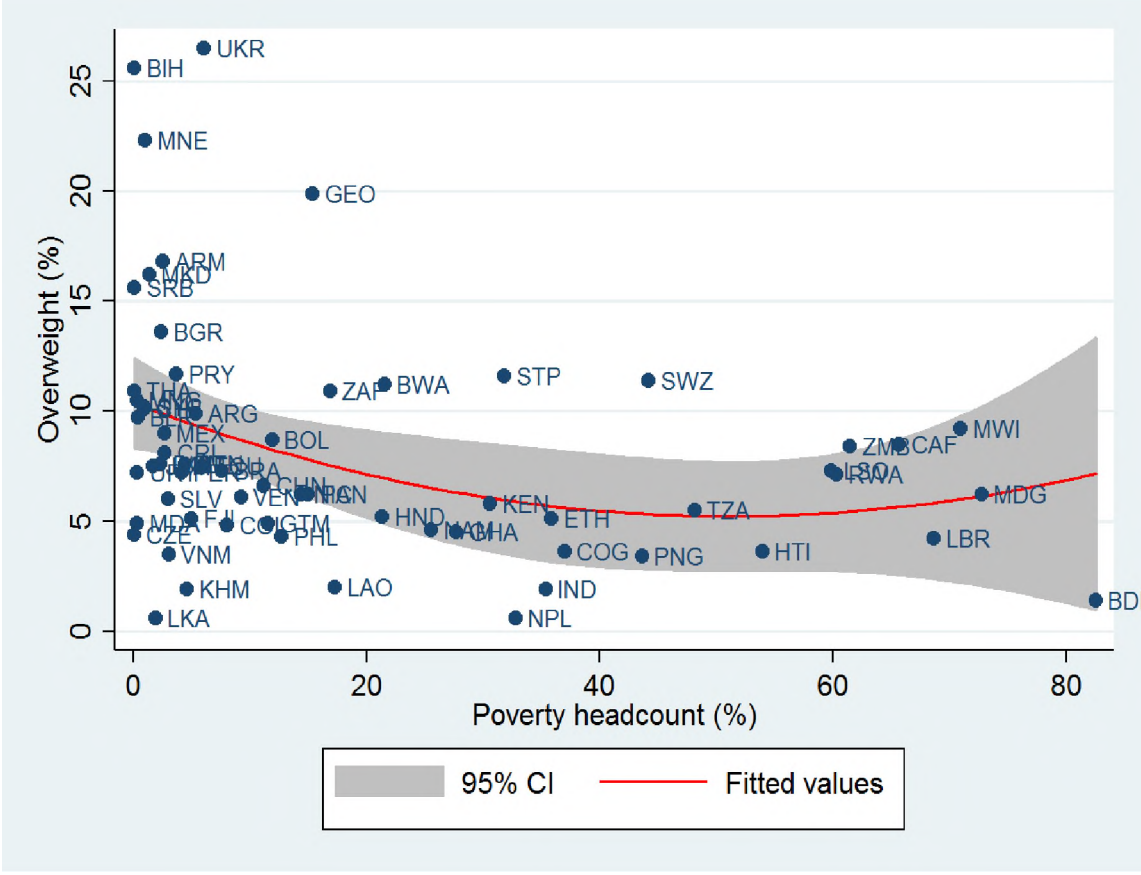
Source: Authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016) and the World Bank Indicators (World Bank 2016). For each country, the most recent year for which malnutrition and poverty data exist is used.

In non-OIC countries, the relationship between poverty and overweight is monotonically negative (Figure 18). Unlike for OIC countries, the positive relationship at high levels of poverty is not statistically significant. The negative portion of the curve is also not as steep as for OIC: a 10 percentage point decrease in poverty is associated with a 2 percentage point

increase in overweight (instead of 3.2 for OIC countries). It is apparent from Figure 18 that there is much wider dispersion of overweight prevalence at low levels of poverty in the non-OIC world than in OIC.

When the co-evolution of overweight and poverty is explored within countries, the relationship is not statistically significant, which is consistent with the contrasted pattern uncovered above based on poverty levels.

Figure 18: Overweight and Poverty Headcount, non-OIC Countries



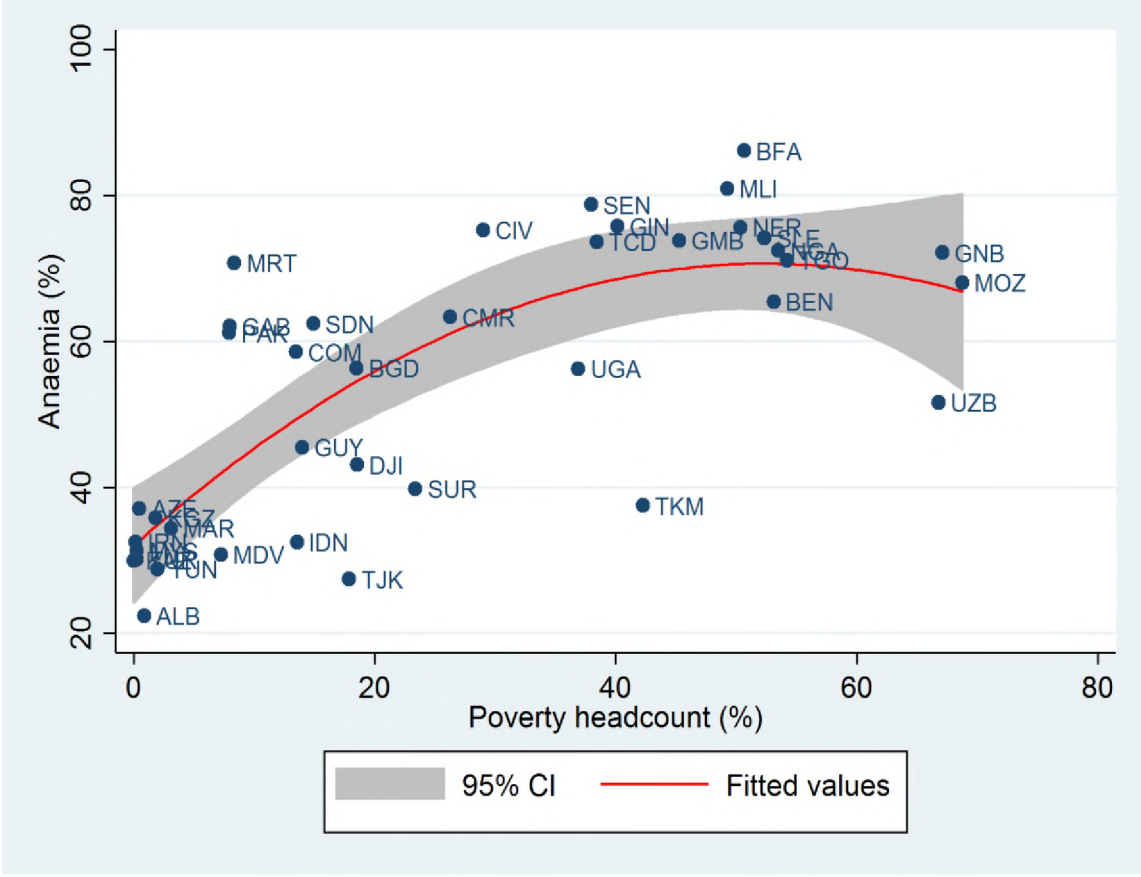
Source: Authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016) and the World Bank Indicators (World Bank 2016). For each country, the most recent year for which malnutrition and poverty data exist is used.

Anaemia

The relationship between anaemia and poverty in OIC countries is depicted in Figure 19. There is a strong positive association between the two variables for poverty rates below 52%. Among countries with poverty rates above this threshold, the relationship turns negative. Both associations are statistically significant at 1%. This implies that OIC countries with extreme levels poverty would experience an increase in anaemia prevalence as poverty goes down to 52%, at which point poverty reduction and anaemia reduction go hand in hand.

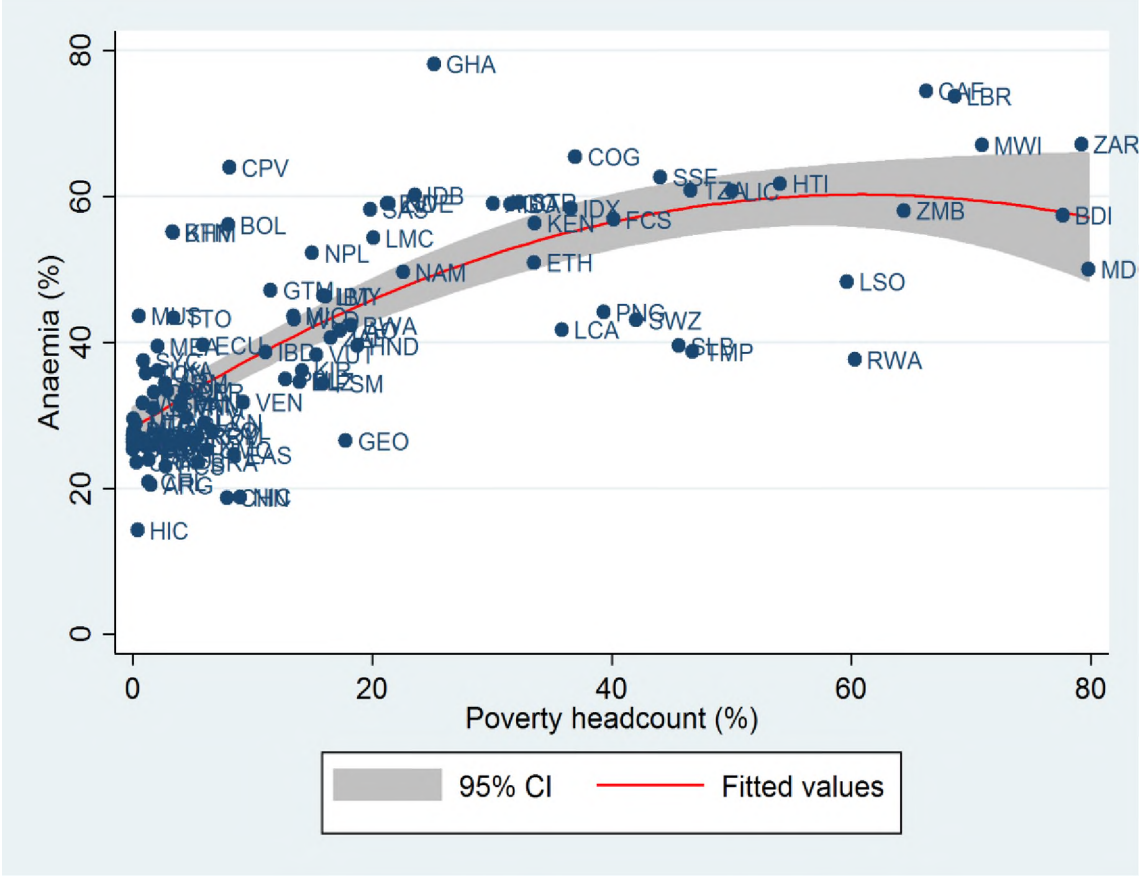
A similar curvilinear relationship exists among non-OIC countries (Figure 20). However, the poverty level at which the relationship turns negative is higher (60%) and concerns a fewer proportion of countries than in the OIC world. In contrast, the positive relationship between poverty and anaemia among countries where poverty rate is below 60% is slightly weaker among non-OIC countries.

Figure 19: Anaemia and Poverty Headcount, OIC Countries



Source: Authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016) and the World Bank Indicators (World Bank 2016). For each country, the most recent year for which malnutrition and poverty data exist is used.

Figure 20: Anaemia and Poverty Headcount, non-OIC Countries



Source: Authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016) and the World Bank Indicators (World Bank 2016). For each country, the most recent year for which malnutrition and poverty data exist is used.

When the co-evolution of poverty and anaemia prevalence among under-fives is explored within countries, the curvilinear relationship depicted in Figure 19 for OIC countries remains, although the positive association becomes weaker. In non-OIC countries, the relationship is positive at all levels of poverty, but the strength of the correlation is still weaker than among OIC countries.

Summary and implications

The state of association between poverty and malnutrition in OIC described above is similar when alternative indicators of poverty (poverty gap, different poverty lines) are used instead. When the analysis is done with economic development, measured by the logarithm of GDP per capita, chronic under-nutrition (stunting and anaemia) and development are found to be inversely related (but even more so in the non-OIC world) and overweight and development are found to be non-linearly associated (with both moving in the same direction at high levels of poverty and in opposite direction at low levels of poverty). However, there is an inverse and significant relationship between wasting and development (in similar proportion across OIC and non-OIC samples).

This analysis then confirms that under-nutrition is a feature of under-development in OIC, as in the rest of the world. The strength of this association is however lower in OIC, as evidenced by the lack of association between wasting and poverty and by the smaller magnitude of the correlation between stunting and poverty in OIC than elsewhere.

Holding other factors constant, a typical OIC country that would reduce its poverty rate from a level corresponding to the 75th percentile (corresponding to a poverty rate of 50%) to that of the 25th percentile (corresponding to a poverty rate of 4.7%) of the poverty distribution would be expected to reduce stunting by 13 percentage point. This is a substantial decline that corresponds to almost half of the average level of stunting in the OIC sample. However, this also shows that stunting cannot be reduced to its poverty dimension, especially in the OIC group. Even by completely eradicating poverty, our calculations show that the typical OIC country would still be expected to have a stunting rate of 21%. In the non-OIC world, the association between poverty and stunting is stronger, and thus an average country that would eradicate poverty would be expected to have a stunting prevalence of 13% only.

A second take-away is that over-nutrition is both a feature of under-development and economic prosperity in OIC. Countries with extreme levels of poverty experience more overweight issues than countries with average levels of poverty, something that is not observed outside of OIC. In addition, once OIC countries reduce poverty levels below 41% (or move above the threshold of 6,900 in 2011 US dollars), economic development is accompanied with rising overweight rates at a pace that is faster than in non-OIC countries.

Finally, it is worth stressing that these associations between malnutrition and poverty are not the result of simple processes. They reflect both the role poverty reduction plays in diminishing malnutrition (especially under-nutrition) and the reverse role malnutrition reduction plays in fostering economic development. In addition, related factors, such as institutional quality or the influence of the health and education sectors are likely to exert an impact on both malnutrition and poverty.

2.4. Risk Factors of Malnutrition in the OIC Member Countries

The previous section established that OIC countries are more affected by malnutrition (in all its forms) than non-OIC countries, even when focusing on developing countries. It also established that whereas malnutrition and poverty are related, the strength of this association is lower in OIC when it comes to under-nutrition (and is higher for over-nutrition) than in non-OIC countries.

In what follows, the levels of key risk factors of malnutrition, as identified by the UNICEF framework, are described and compared between OIC and non-OIC countries. Risk factors include basic causes (GDP per capita, inequality, education, rainfall, gender equality), underlying causes (access to sanitation and water, healthcare availability) and immediate causes (food deficit, disease).

Table 3 presents the pairwise comparisons between the mean of each variable in OIC countries and in non-OIC countries. It also distinguishes between comparisons made on all countries and those made when excluding high income countries. For each comparison, we have retrieved the p-value deriving from a statistical test of equality of means. We summarise this information through the stars that are associated with each difference. One star indicates that the p-value lies between 5% and 10%, two stars that the p-value lies between 1% and 5%, and three stars

that the p-value lies below 1%. It is usually considered that a p-value below 5% indicates that the differences are statistically significant (one star indicates weak significance).

Table 3: Risk Factors of Malnutrition in OIC and non-OIC countries

	All OIC countries	All non-OIC countries	Difference in means	All Developing OIC countries	All Developing Non-OIC countries	Difference in means
Economic Development						
GDP per capita (in 2010 USD)	6712	16760	-10047***	3262	15659	-12397***
Rainfall (mm)	847	1230	-383***	885	1226	-341***
Access to electricity(%)	71.0	80.2	-9.3**	68.1	79.0	-10.8**
Literacy rate of adults (%)	75.1	86.7	-11.7***	72.4	86.2	-13.8***
Education expenses (% of GDP)	3.9	4.8	-0.9***	3.9	4.8	-0.9***
Food deficit (kcal/day)	76.8	105.8	-29.1**	82.0	110.0	-27.9*
Arable land (% of area)	13.4	13.9	-0.6	14.9	14.0	0.9
Growth of food production since 2004-06 (%)	30.0	16.5	13.5***	27.3	17.1	10.2***
Health, water and sanitation						
% Defecate in open	14.0	8.4	5.6**	15.1	9.0	6.1**
Community health workers (per 1,000)	0.32	0.87	-0.54*	0.34	0.92	-0.58*
% consume iodized salt	54.9	68.3	-13.3***	54.7	68.9	-14.2***
% diabetes	8.2	8.7	-0.5	7.0	8.6	-1.6**
% children receiving oral rehydration and continual feeding	44.2	49.5	-5.3**	43.7	49.1	-5.5**
% children receiving ORS packets against diarrhoea	37.7	41.0	-3.3	38.1	40.8	-2.7

	All OIC countries	All non-OIC countries	Difference in means	All Developing OIC countries	All Developing Non-OIC countries	Difference in means
Health expenses (% of GDP)	5.6	7.1	-1.6***	5.8	7.0	-1.2***
Hospital beds (per 1,000 people)	1.8	3.5	-1.7***	1.8	3.4	-1.6***
Lifetime risk of maternal death (%)	1.3	0.6	0.8***	1.5	0.6	0.9***
Improved sanitation (%)	62.1	75.5	-13.4***	58.3	73.9	-15.6***
Improved drinking water (%)	81.8	90.5	-8.7***	80.2	90.0	-9.7***
Low birth weight babies (%)	13.6	9.8	3.7***	14.1	9.9	4.2***
Coverage vitamin A supp. (%)	69.9	58.0	11.9**	69.2	58.0	11.2**
Societal factors						
CPIA Gender Equality Index (max=6)	3.2	3.4	-0.2**	3.2	3.4	-0.2**
Gini Index	39.3	39.5	-0.2	39.3	39.7	-0.3

Source: authors' calculations based on the World Bank Indicators.

One can see that for a wide array of factors, OIC countries fare less well than non-OIC countries. This remains true when high-income countries are excluded from the comparisons. OIC countries are significantly poorer, and display lower levels of education than non-OIC countries. Health indicators are also significantly poorer in OIC countries than in the rest of the world. For instance, the prevalence of open defecation is two-third higher in OIC countries than in developing non-OIC countries. And there are about two-third fewer community health workers in the former than the latter group. The health expenditures as a share of GDP are almost 20% lower in OIC countries, and the number of hospital beds in OIC countries is almost half of that of developing non-OIC countries. And significant differences also exist in terms of e.g. salt iodisation, improved sanitation and drinking water. The diagnostic of comparatively weak heath sectors in OIC countries was already made in a report by SESRIC (2013).

OIC countries also receive less rainfall, have a higher food deficit, and have a higher gender inequality level than non-OIC countries. However, the coverage of vitamin A supplementation is significantly higher, the diabetes prevalence is significantly lower, and the growth in food production has been considerably higher in OIC countries than in the rest of the developing world.

Overall, the areas of structural weaknesses in OIC countries underscored in Table 3 go a long way in explaining the higher levels of malnutrition experienced in OIC countries than in the rest of the world.

2.5. Short and Long Term Political, Social and Economic Consequences of Malnutrition in the OIC Member Countries

Determining the short and long term social, economic and political consequence of malnutrition in early life is fraught with methodological challenges, including the challenge of following up undernourished individuals over long time scales, often 20 to 30 years, as well as potential confounding factors which may influence outcomes over such long timescales.

This section draws on the international evidence base on the social, economic and political consequences of undernutrition. This section presents the evidence from a few large scale, longitudinal studies, which follow individuals for 20-40 years, which much of the literature is drawn from. Studies from OIC countries from several regions are also documented to illustrate how the international evidence base is applicable to various OIC countries.

Economic Consequences

Much of what is known about the long term consequences of stunting in early life (up to 24 months) comes from a longitudinal study of 1338 Guatemalan adults in 2002-2004, then aged 25-42 years, who were studied as children in 1969-1977. This study found that higher height-for-age z scores were associated with more years of completed school, higher test scores in both reading and cognitive skills, and, for women, increased age at first birth and fewer pregnancies and children (Hoddinott et al. 2013). Additionally, increases in height for age z-score reduced the likelihood of a household living in poverty. Another analysis of this same cohort of individuals found a significant impact on wages for men (48% higher) for those who had received nutritional supplements before the age of three suggesting that investing in nutrition, especially for very young children, can support long-term economic growth (Hoddinott et al. 2008). These studies, by showing the range of negative impacts of early growth failure across a number of outcomes (e.g. reduced educational attainment and wages) as well as the positive effects of good nutrition (e.g. smaller families and reductions in the likelihood of living in poverty), illustrate the long-lasting effects of nutritional status during early childhood on individuals' life courses.

To situate these findings within an OIC country, in Egypt in 2009, 41% of the working aged population (15-64) was estimated to have been stunted as children. Stunting is associated with lower educational attainment. Higher educational attainment has a direct correlation to higher incomes (for non-manual jobs). In 2009, it is estimated that 6.3% of the Egypt's labour force was less productive due to reduced educational attainment linked to stunting, which amounts to a 0.3% loss in Egypt's (yearly) GDP. Those engaging in manual labour are also less likely to be productive if they are stunted as children and have less lean body mass (Haddad and Bouis 1991). In Egypt, 13.7 million people who were stunted as children are engaged in manual labour, leading to a potential lost income of 1.03% of the GDP in 2009 (African Union Commission, NEPAD Planning and Coordinating Agency, UN and Economic Commission for Africa, and UN World Food Programme. 2014).

Reduced Educational Attainment

Another longitudinal study by Daniels and Adair (2004) from the Philippines looked at the relationship between childhood malnutrition and adverse educational outcomes. The authors estimated the relationship between schooling outcomes of over 2000 children and their height-for-age z score, while controlling for potential confounding factors such as household assets and income. They found that a change from a stunting to a non-stunting status, holding other factors constant, would decrease the likelihood that boys would enrol late in in school by a factor of three (from 6% to 2%). Additionally, non-stunted boys were 7% less likely to repeat a year of school and non-stunted girls were 9% less likely to repeat a year of school, compared to their stunted counterparts (Daniels and Adair 2004).

In Egypt, using data on enrolment in 2009, as well as the prevalence of grade repetition and the proportion of stunted children, it was estimated that 10% of all repetitions were associated with stunting in 2009. These repetitions have direct cost implications for both the school system, which must supply additional resources, as well as families who must pay for an additional year of school (African Union Commission, NEPAD Planning and Coordinating Agency, UN and Economic Commission for Africa, and UN World Food Programme. 2014).

Increased health care costs

Health risks for the poor are higher than those for the non-poor. But the specific role of undernutrition in these risk patterns must be underscored, such as substandard housing, poor sanitation services and reduced access to health care. There is an emerging body of evidence indicating that individuals who do not receive adequate nutrition in the womb are at increased risk for developing chronic diseases such as coronary heart disease later in life. The evidence comes from a study of a cohort of individuals who were in utero during the Dutch famine. The study found that these individuals suffered from impaired glucose tolerance, high blood pressure, and obesity as a result of the changes their bodies undertook to adopt to poor nutrition in utero. It is worth noting that these changes are not necessarily connected to the size of the baby at birth (Roseboom et al. 2001). Indeed, even in the absence of large shocks, such as a famine, children while in the womb can still be exposed to a number of subtle stressors. These stressors will cause the child's body to adapt, a mechanism known as the predictive adaptive response. This predictive adaptive response is based on the assumption that the nutritional environment that the child will encounter after birth will be similar to that experienced in the womb. However, this is often not the case. For example, in many countries, children who suffered from under-nutrition in utero experience increased calorie consumption in later years, notably because of the rise of processed foods. This discrepancy between the expected and the actual nutritional environment can predispose the child to increased risk of chronic disease (Uauy, Kain, and Corvalan 2011).

Overnutrition, including overweight, obesity and associated non-communicable diseases (NCD), are also leading to increased health care costs and are of increasing concern in low and middle income countries. It is estimated that 80% of worldwide deaths due to NCDs occur in low and middle income countries, a number which is expected to rise in the coming decades (Uauy, Kain, and Corvalan 2011).

Six of the top eleven causes of the global disease burden are related to diet, with dietary risk, high systolic blood pressure and maternal and child malnutrition topping the list (Global Panel on Agriculture and Food Systems for Nutrition. 2016). A recent simulation of a variety of measures to improve diets and increase physical activity in low and middle income contexts

found that several measures including communicating information about the importance of healthy eating and physical activity, fiscal measures that make unhealthy foods more expensive and healthy foods cheaper, and regulatory measures around labelling or limiting the promotion of unhealthy foods (especially to children) are highly cost effective in terms of reductions in future health costs (Cecchini et al. 2010).

The "Cost of Hunger in Africa" study estimated that Egypt spent USD 213 million on costs directly related to childhood undernutrition, both due to increased frequency and duration of disease and the protocols for correct treatment. This number is likely a gross underestimation of what would be required to treat all underweight children in the country as it estimated that only 1 in 5 children is receiving adequate health care, and it is likely this number will increase as health care provision expands more in rural areas (African Union Commission, NEPAD Planning and Coordinating Agency, UN and Economic Commission for Africa, and UN World Food Programme. 2014). This estimate does not take into account the increased healthcare costs, which are likely to be substantial given the rate of overweight for adults is 68% and that of obesity is close to 30% (International Food Policy Research Institute 2016).

2.6. Regional Policies Related to Malnutrition for the OIC Member Countries

This section looks at key policies from regional economic groups which are relevant to the reduction of malnutrition. Policies examined included both nutrition-specific policies and nutrition-sensitive policies. As an example of these are agricultural policies which are relevant to improving nutrition (e.g. The Comprehensive Africa Agricultural Development Programme (CAADP) of the New Partnership for Africa's Development (NEPAD) which aims to enhance food security by promoting interventions designed to increase agricultural production, improve nutritional value of staple foods, and ensure better access to food for vulnerable groups. Policies which apply to large number of OIC countries, and which guide the development of national policies within a large region, such as the African Union, are discussed in more depth. Policies which effect only one or two OIC countries have not been included. First international global targets and policies are presented, followed by policies for Africa, Asia and finally Europe and Central Asia. Because of the paucity of OIC countries in South America, this region has been excluded from this analysis.

International Code of the Marketing of Breastmilk substitutes

The International code on the marketing of Breastmilk substitutes was developed in 1981 by the World Health Organization to ensure that breastmilk substitutes were not marketed or distributed in a way which interferes with protection and promotion of breastfeeding. It asserts that governments have a responsibility for ensuring that breastfeeding is promoted and that where breastmilk substitutes are available, that they contain correct information in local languages about the benefits of breastfeeding, negative effects of formula feeding, and that they do not glamorise and promote the use of breastmilk substitutes in any way (World Health Organization Europe 1981).

The code had been adopted into legislation in 71% of the 136 countries who answered to a 2010 questionnaire issued by the WHO to monitor adoption and compliance of the code. Key areas of the code included prohibiting the marketing of breastmilk substitutes to the general public, prohibition of sale devices (discounts, promotions) to increase sales of breastmilk substitutes to the general public, free or low cost distribution of breastmilk substitutes in health facilities, giving gifts or other materials to health care workers, ensuring correct

labelling of breastmilk substitutes about the superiority of breastfeeding and ensuring monitoring and enforcement of laws and regulations designed to promote and protect breastfeeding (World Health Organization 2010).

Regarding breastfeeding in OIC countries, it is worth noting that the Holy Quran also encourages breastfeeding for two years "Mothers shall breastfeed their children for two whole years, for those who wish to complete the term" (2:233).

The remainder of this section presents the various regional targets and policies related to reducing and preventing various forms of malnutrition within the OIC regions. First policies related to all of Africa are presented, followed by smaller regional economic groupings and their associated policies. This is followed by policies for Asia and then Europe. The OIC countries which are members of the regional community are listed at the start of each section.

African Regional Policies

Africa Union Regional Nutrition Strategy

OIC Member Countries: Algeria; Chad; Egypt; Guinea; Libya; Mali; Mauritania; Niger; Senegal; Somalia (excluding Somaliland); Sudan; Tunisia; Sierra Leone; Gabon; The Gambia, Guinea Bissau; Uganda; Burkina Faso, Cameroon; Comoros; Djibouti; Benin; Nigeria; Mozambique; Togo; Ivory Coast.

The African continent was the first region to develop a nutrition strategy, which was presented at the International Conference on Nutrition in 1992, covering the period from 1993-2003. The strategy informed most member states in Africa when developing national nutrition plans; however, there was little decline in the rates of malnutrition over the time period covered by the plan, despite the efforts of the countries. Reasons for the ineffectiveness of the initial Africa-wide nutrition strategy include a lack of resources, donor dependence, failure to integrate a multisector approach and an excessive focus on curing, rather than preventing malnutrition (Engesveen et al. 2013). The second version, the Africa Union Regional Nutrition Strategy 2005-2015, aimed at integrating current international initiatives, such as the Scaling-Up Nutrition Movement (SUN) and Renewed Efforts Against Child Hunger and Undernutrition (REACH), as well as taking into considerations the reasons for the failure of the previous strategy. This strategy was followed by a large number of African countries to guide the development of new national policies. The current African Union nutrition strategy (2015-2025) was adopted by the AU executive council in June 2015.

The most recent policy builds on the UNICEF conceptual framework (presented in section 2) and recognises that poor nutrition is caused by a range of immediate, underlying and basic causes and that a multi-sectoral approach is necessary. It builds on the evidence which has been generated over the last ten years and recognises that food alone will not effectively address malnutrition in Africa and that other health and psychosocial care practices need to be addressed in order to improve African nutrition security. The new policy represents a “paradigm shift” in which the African Union Commission (AUC) will have a greater role to play: in the implementation of policies and in ensuring that existing initiatives are fully implemented (African Union 2015). The new policy also supports moving away from a narrow focus on nutrition-specific interventions - which had previously been the main focus of nutrition programmes in Africa - towards nutrition-sensitive programmes which address the underlying and basic causes of poor nutrition. Nutrition-sensitive programmes are necessary

to address the root causes of poor nutrition and eventually remove the need for nutrition programmes.

When developing the policy, several countries including Senegal, Ethiopia or Rwanda which have all witnessed a significant decline in rates of stunting over the recent years, were examined to identify key factors in the rapid decrease in stunting rates. Critical factors included having an explicit prioritisation of nutrition at the highest level of political leadership, having a government system of accountability for delivering on nutrition, ensuring that there is primary health care at the community level across the country and making sure all health workers are focusing on nutrition. In terms of nutrition sensitive actions, these three countries also specifically and actively addressed food security, focusing on participatory rural development and developing strong community structures; a strong focus on school enrolment, especially for girls, as well as other programmes to facilitate women's empowerment and a significant investment in social protection programmes were all identified as key factors for these countries' success (African Union 2015).

The African Union 2015-2025 nutrition strategy uses all six World Health Assembly Targets for monitoring progress.

New Partnership for Africa's Development (NEPAD)

NEPAD was developed as many African leaders realised that a new, holistic approach to the way Africa conducted its affairs was needed in order to bring about real change in term of food security on the continent. The NEPAD strategic framework was developed to help Africa move forwards in terms of improved economic management, social stability and improved adoption of new technologies. NEPAD supports trade liberalisation, assuming that there is a level playing field for all (Notenbaert, Massawe, and Herrero 2010).

NEPAD integrates three previous plans: The Millennium Partnership for the African Recovery Programme (MAP), the OMEGA plan for African development and the New African Initiative which endeavoured to bring together the other two. This was then expanded into what is now NEPAD and was ratified by the African Union in 2002 ("New Partnership For Africa's Development (NEPAD) | African Union" 2016). NEPAD's vision for agriculture is to see Africa's largest sector become instrumental in helping achieve a self-sufficient and economically productive Africa that can participate fully in the world economy.

Specific goals in NEPAD's strategy include:

- Improved productivity of agriculture especially focusing on women and small scale holders.
- Ensuring food and nutrition security for all people.
- Promoting environmental protection and preventing natural resource degradation.
- Transforming Africa into a net exporter of agricultural products and improving the poor's access to both national and export markets (Notenbaert, Massawe, and Herrero 2010).

The NEPAD Agency, established in 2010, is the planning and coordinating agency tasked with implementing NEPAD and integrating it into other AU processes, aiming to provide an African

owned development framework to support regional and international partnerships. NEPAD is primarily implemented at the Regional Economic Community (REC) level.

For example, NEPAD is working with the South African Development Community in order to develop a Food and Nutrition Security Knowledge-Sharing and Monitoring Platform. This platform aims to facilitate peer to peer learning, foster capacity development and encourage a multi-sectoral approach to information and knowledge sharing which can be used to support advocacy for increasing investments in Food and Nutrition security. The platform can also be used to improve regional level coordination and foster accountability in implementing the Malabo roadmap and CAADP programme of work (2015-2025) ("Food and Nutrition Security in SADC Boosted by Knowledge-Sharing" 2015).

Comprehensive Africa Agriculture Development Programme (CAADP)

The Comprehensive Africa Agriculture Development Programme (CAADP) is a policy framework aimed at achieving food and nutrition security by focusing on agricultural development in the AU (Lokosang, Osei, and Covic 2015). It is an African owned programme which aims to help meeting the MDGs in terms of food and nutrition security and poverty alleviation through increased incomes and sustainable socio-economic growth, which will be achieved through increased public spending on agriculture (at least 10% by 2008) leading to a 6% annual agricultural growth rate by 2015 (Giyose 2013). NEPAD, the African Union and Regional Economic Communities will help achieve these targets (South African Development Community 2015).

CAADP consists of four pillars. Pillar three specifically aims to "increase food supply and reduce hunger". The nutrition initiative was launched in 2014, and came out of a 2011 review which found most National Agriculture Food Security Investment Plans lacked specific nutrition objectives and actions (FAO 2014). Additionally, CADAAP includes a specific nutrition initiative with the goal of mainstreaming nutrition into national agricultural investment plans. The FAO and NEPAD facilitate the nutrition task force of CAADP. The overall goal of the initiative is to improve nutrition, which a more specific goal of supporting countries to integrate nutrition into their CAADP process. The initiative also includes four sub-goals including strengthening advocacy and nutrition governance at the regional level, supporting monitoring and evaluation at the national and regional level, maximizing regional learning and leveraging resources and coordinating support for agriculture-nutrition capacity development ("CAADP Nutrition Task Force" 2016).

There are currently 40 country compacts, 28 national investment plans and both ECOWAS and COMESA have regional CAADP policies. As of the end of 2014, 12 out of 17 countries in West Africa had developed roadmaps for nutrition integration including the following OIC countries: Benin, Burkina Faso, The Gambia, Mali, Mauritania, Niger, Senegal, Sierra Leone and Togo. In East and Central Africa 15 out of 18 countries are in the process of implementing their nutrition integration roadmap including OIC countries Cameroon, and Djibouti (FAO 2014).

Assessment of the African Union Nutrition and Food Security Polices

As mentioned above, the most recent African Union policy (2015-2020) was developed taking into account failures of the previous plans. Additionally, the new plan also drew on regional cases of success, looking at which factors were in place in countries which have seen significant reductions in malnutrition in the last ten to fifteen years. The AU policy, which is

based on the UNICEF conceptual framework (presented in section 2) and recognises that food alone will not affectively address malnutrition in African and that a multi-sectoral approach is necessary, is strong. However, challenges lie in the implementation of the policy.

CAADP is implemented by NEPAD and considered one of its most successful programmes. CAADP was launched in 2003. In 2013, ten years on, a number of organisations undertook a stock-take to assess if CAADP had been able to achieve its goals. CAADP has been successful on two accounts. First, it successfully supported a comprehensive approach to agricultural development in Africa, one which recognises the critical importance of not only looking at production but also at infrastructure, trade, marketing and environmental sustainability. Second, CAADP has increased government spending on agriculture, although not to the levels promoted in the CAADP agreement (Howell and Curtis 2013). One of the primary objectives of CADAAP is to ensure that African governments are spending at least 10% of their budget on agriculture. However, as of 2011, the Regional Strategic Analysis and Support System, ReSAKSS, the primary measurement agency for CAADP found that only seven countries had met the target and seemed able to maintain the 10% target in the future (Howell and Curtis 2013). CAADP, has also not been able to achieve its overall goal of transforming African agriculture. One of the main challenges has been that CAADP has prioritised Green Revolution technologies focusing on prompting external inputs such as fertilisers and hybrid seeds rather than looking at labour saving technologies which benefit more small-scale farmers, especially women. Such a focus on technology means that wealthier farmers with greater land holdings have benefited the most from the policy, and smallholders are increasingly left behind (Howell and Curtis 2013).

While the CAADP process has been ongoing for 14 years, the mainstreaming nutrition initiative of CAAPD was only launched in 2014 and thus it is too early to see potential impacts. The second phase of the initiative will focus on ensuring that nutrition interventions are not only included but also budgeted for and implemented as part of National Agriculture and Food Security Investment Plans. A meeting of the nutrition task force met in March 2014 and developed recommendations which were fed into the 2014 Malabo declaration which called for ending hunger in Africa by 2025 and reducing poverty through agricultural transformation ("Malabo Declaration on Accelerated Agricultural Growth and Transformation for Share Prosperity and Improved Livelihoods" 2014). At the regional level, two programmes are supporting the integration of nutrition road maps: the Hunger Free Initiative in ECOWAS the Mainstreaming Nutrition in CAADP and Agriculture Policies and Programmes in Sub-Saharan Africa – Phase II (Oct 2014- Sept 2017) (FAO 2014).

An overview of West African Policy Initiatives

In West Africa, the main challenge lies in the abundance of nutrition-related policies and the need for coordination (Crola, de Miguel, and Cortes 2015). Since the 2008-2009 food crisis, there have been new policies and initiatives launched almost every year including L'Aquila Food Security Initiative (2009), The Scaling Up Nutrition Movement (2010), The New Alliance for Food Security and Nutrition, as well as the Global Alliance for Resilience – Sahel and West Africa, and the Zero Hunger Challenge which were all launched in 2012, and finally the Sustainable Development Goals (SDGs) in 2015 (Crola, de Miguel, and Cortes 2015). The following section presents some of the key policy initiatives in the West African region including key accomplishments of various policies as well as some of challenges created by such a complex policy environment.

Economic Community of West African States (ECOWAS)

OIC Member countries: Benin, Burkina Faso, Ivory Coast, Gambia, Guinea Bissau, Mali, Nigeria, Senegal, Sierra Leone, Togo.

ECOWAS is a regional grouping of fifteen countries which aims to promote economic integration across the West African Region. ECOWAS headquarters has a coordinating mechanism for nutrition and food security. Given the wide range of different actors in agriculture, food security and nutrition initiatives in West Africa (discussed in further detail below), ECOWAS is supposed to fulfil a coordinating role. However its efforts are hampered by funding challenges: only a small amount of the planned funding has been disbursed due in part to humanitarian crises (notably Ebola) which have diverted funds for coordination and leading to a situation where some donors find it easier, especially in the short term, to circumvent ECOWAS policies (Crola, de Miguel, and Cortes 2015). An analysis of ECOWAS's efforts to bring together a regional agricultural policy have found that regional efforts are significantly fragmented, and ECOWAS has not been successful in bringing together development partners (Crola, de Miguel, and Cortes 2015).

Hunger-Free Initiative for West Africa was a three-years programme specifically seeking to keep food and nutrition security high on the agenda in meetings of both ECOWAS as well as within member countries. The project had three main objectives, the first was around developing a participatory and multi-stakeholder strategy and process for a hunger-free West Africa. This included increasing ECOWAS's presence and participation in global debates by supporting the compiling of national priorities and developing specific mechanisms that allow for discussions made at the regional and global level to be fed back directly to ECOWAS member states, for example new right to food guidelines. Additionally, it sought to increase the capacity of the ECOWAS parliament around issues of food security and nutrition. The second objective was to combine social protection programmes with agricultural programmes to provide pathways to graduation from these programmes as well as improving regional level food security. The third objective was to ensure that nutrition is mainstreamed in regional and national agricultural plans and budgets (FAO, n.d.)

ECOWAP, which is the ECOWAS Regional Agricultural Policy, was established in 2010 and has a role in defining policy guidelines as well as mobilising and implementing funding from both technical and financial partners in the field of agriculture, food security and nutrition; a role shared with the West African Economic and Monitoring Unit and the Permanent Inter-State Committee for Drought Control in the Sahel (CILSS). Both ECOWAP and WAEMU are promoting regional integration and have aimed to coordinate regulations, strategies and action plans access the 8 countries which are members of both groups.

ECOWAP has been helpful in developing a data base of all the projects and programmes funded in West Africa relating to agriculture, food security and nutrition. However the group faces a number of key challenges including low levels of participation in meetings, especially of key donors (participation in the groups is not institutionalised, meaning its dependant on individuals); and those individuals who attend those meetings often do not have the mandates to make key decisions (Crola, de Miguel, and Cortes 2015).

The West African Health Organization (WAHO) is the specialised health agency of ECOWAS, seeking to harmonise policies. The ECOWAS Nutrition forum, has been meeting since

1995. The aims of the nutrition forum are to bring together all stakeholders working on nutrition issues from the 15 member states of ECOWAS.

The Permanent Inter-State Committee for Drought Control in the Sahel (CILSS) is supposed to be the technical arm of ECOWAP, however because CILSS has two member states (Chad and Mauritania, both OIC countries) who are not members of ECOWAP they have sought to maintain their autonomy so they can also act on behalf of member states who are not part of ECOWAP. CILSS specifically focuses on ensuring collective food security within the region (Notenbaert, Massawe, and Herrero 2010). CILSS is largely dependent on donor funding (in 2015, 94% of its budget came from donor funds) (Crola, de Miguel, and Cortes 2015).

Community of Sahel-Saharan States (CEN-SAD)

OIC Member countries: Benin, Burkina Faso, Chad, Comoros, Djibouti, Egypt. Guinea-Bissau, Ivory Coast, Libya, Mali, Morocco, Niger, Nigeria, Sudan, Senegal, Sierra Leone, Somalia, Togo, Tunisia.

The objective of CEN-SAD is to provide an economic union for its members and to adopt measures to support the economic integration of the region including free movement of people, goods and services. The focus of the community grouping focuses on free trade and harmonisation of sectoral policies security and the environment rather than nutrition or health policies ("CEN-SAD - Harmonisation of Sectoral Policies, United Nations Economic Commission for Africa" 2016).

The West African Economic and Monetary Union (WAEMU) has a 10-years programme of Agricultural Transformation for Food Security and Nutrition (PCD-TASAN). This draws on analysis of previous initiatives and suggests a "change in paradigm". The new programme aims to cluster family farms in order to improve integration within the agricultural sector. This new policy makes almost no mention of ECOWAS's policies even though the projects cover the same areas (Crola, de Miguel, and Cortes 2015).

Assessment of West African Nutrition Policies

A recent (2016) assessment of ECOWAS's implementation of the regional agricultural policy sought to understand the impact of the regional policies on nutrition. The review found that the policy had been effective in reducing levels of food insecurity in the region. More remains to be done, however, as at least 25 million people in the region are still food insecure. Current causes of food insecurity include increased demand for food due to population pressure and increasing urbanisation and a growing middle class, leaving the poor more vulnerable to food insecurity and undernutrition (Seki, Sablah, and Bendech 2016). Poverty is declining, but remains high in the region. There is strong evidence that agricultural development is particularly linked to poverty reduction and increases the incomes of the poorest. Agricultural investment has helped with poverty reduction but more needs to be done.

While ECOWAS, as a region, met MDG1, with a decline in rates of undernourishment from 24% in 1990 to 10% in 2014, only seven out of fifteen countries have met the MDG1. These statistics also hide important variations within countries and at household level, where food insecurity remains a major problem in several OIC/ ECOWAS countries including Burkina Faso and Senegal (Seki, Sablah, and Bendech 2016).

Rates of malnutrition in the region have also remained unacceptably high: rates of wasting have remained stuck at 9% over the last ten years, while stunting has declined very slowly, reducing only by three percentage points between 1990 and 2011. In addition to the unsolved challenge of undernutrition, overnutrition is also becoming a problem among women of reproductive age (and to a lesser extent among children under five). The majority of countries in the region are off course in meeting three out four World Health Assembly 2025 targets (Seki, Sablah, and Bendech 2016).

Why the relative lack of progress? While West Africa includes many different organisations working on issues of food security and nutrition, there is no unique, harmonised multi-sectoral coordinating mechanism for food and nutrition security in the region. While there are a number of different organisations in the regions (CILSS, WAHO, etc), all seem to work on their own without significant alignment to regional objectives, leading to poor coordination and continued weak integration between the nutrition and agriculture sectors (Seki, Sablah, and Bendech 2016).

In 2015 Action Contre la Faim undertook an analysis of nutrition policies in 11 West African countries, which was supplemented by two case studies from Mali and Mauritania to understand the range of nutrition sensitive policies which are included in these country policies as well as potential challenges in implementing these policies. Key findings from this synthesis include:

- The SUN movement has helped many West African countries to develop multi-sectoral nutrition policies and plans.
- Despite the fact that most policies recognise the need for multi-sectoral responses to malnutrition, the health sector tends to support most nutrition specific actions and also is likely to receive requests from other sectors to monitor nutrition sensitive interventions.
- The agricultural sector, overall, has remained uninvolved in nutrition efforts, continuing to focus on increasing productivity over nutrition despite efforts to make agricultural policies more nutrition sensitive.
- While there has been a large increase in the number of multi-sectoral frameworks, the actual implementation of these frameworks has been hampered by weak coordination capacity at national and subnational levels.
- Subnational level government tend to have little awareness of nutrition programmes and receive insufficient resources to improve local efforts (Bichard and Leturque 2015).

West African nutrition policies and frameworks will only work if there is strong and effective coordination among the many actors working in the domain of regional food security and nutrition. Additionally, agricultural programmes in the region must be made more nutrition sensitive.

Middle East and North African Regional Policies

Arab League of States (LAS)

OIC Member Countries: Algeria, Bahrain, Comoros, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, State of Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syrian opposition, Tunisia, UAE, Yemen

Like other regional groupings, the LAS aims to promote coordination and integration among member states. Food security is a significant challenge in the LAS region: in just five countries (Iraq, Mauritania, the Occupied Palestinian territories, Somalia and Sudan) up to 21 million people currently require emergency food relief. Arab countries have been particularly hard hit by the 2007-2008 food price increase, exacerbated by the high rates of inflation in Arab countries making food more expensive, and on the high reliance on imported food stuffs due to a shortage of arable land and water. While Arab countries are home to 5% of the world's population they have only 1% of the world's water reserves (Lampietti et al. 2011; IFAD 2009). Arab countries are also facing an increase in demand for food due high rates of population growth (1.7% compared to 1.1% globally) and high rates of urbanisation. Some Arab countries have developed policies to deal with the increasing food prices such as increasing public sector salaries and bread subsidies to help the poor. However, it is questionable whether these measures are sustainable in the long-run unless the governments manage to increase fiscal revenues. Additionally, there are questions about the effectiveness of these policies to increase nutrition security, and not just food security, for the poor. Non-oil rich countries in the region are likely to suffer the most.

It has been recommended that Arab governments should respond to current price shocks with a combined package of trade policies, wage increases and social safety net programmes. Current safety nets in the region focus on food subsidies in many places, however they are not the most cost effective means of delivering food to the poorest due to inefficiencies in terms of administration, overhead, storage and loss. There is also some evidence that food subsidy policies in some countries are actually increasing malnutrition (obesity) due to the energy-dense and nutrient-poor nature of the subsidised foods which are usually produced, such as bread, sugar and oil. In Egypt, the government's subsidy policy created a wide disparity between the cost of energy-dense foods (sugar, oil, bread) and energy-dilute, nutrient-poor foods (fruits and vegetables), making high energy foods much cheaper than nutrient-dense foods. A study in Egypt found a direct relationship between increased maternal BMI with the reduced price of sugar and bread (Asfaw 2007). Cash transfers which can be targeted to the most vulnerable would be more cost-efficient, but are not widely implemented in the region. For example, in Jordan the National Aid Fund covered less than 20% of the eligible population, and of those who received aid only 14% were actually eligible. Additionally, providing cash in combination with messages about the importance of healthy diets and the danger of obesity maybe more effective than subsidies for improving dietary quality. It would also reduce the price difference between healthy and unhealthy foods, reducing the incentive to purchase high energy, nutrient poor foods. Access to family planning services also need to be increased, as the region has very high rates of population growth which threaten regional food security (Lampietti et al. 2011).

At the same time, obesity is a growing challenge in many Arab countries, especially oil producing countries in the region, with rates of overweight and obesity dramatically increasing in the past three decades. The region now has the second highest mean body mass

index after North America. Consumption of fruit and vegetables has decreased and people are eating more fast food, snacks rich in fats and sugars and are eating more meals outside the home. Rates of physical exercise are also decreasing: in seven Arab countries rates of physical inactivity for adults ranged from 33% to 86% (Musaiger et al. 2011). In some wealthy countries in the region, such as Saudi Arabia, rates of inactivity among adults are as high as 96%. In certain countries, cultural factors inhibit women's access to and participation in sports and other physical activity (Musaiger et al. 2011). To combat these challenges, the Arab Taskforce for Obesity and Physical Activity developed a strategy to combat obesity which included:

1. Reducing the incidence of obesity and overweight in Arab countries by encouraging healthy diets and increased physical activity.
2. Reduced risk factor for chronic diseases.
3. Increased awareness of the importance of physical activity, healthy diets, good nutrition and maintaining a healthy weight.
4. Explore new partnerships between government, civil society and the private sector to promote health diets in Arab society.
5. To establish better way of monitoring and assessing obesity levels.
6. Conduct research on the how to improve health, nutrition and physical activity levels.
7. To provide effective services to obese people (Musaiger et al. 2011).

Draft Nutrition Strategy and Plan for Action for Countries of the Eastern Mediterranean Region 2010-2019

OIC Countries: Afghanistan, Bahrain, Djibouti, Egypt, Iraq, Iran, Jordan, Kuwait, Lebanon, Libya, Morocco, Occupied Palestinian Territory, Oman, Pakistan, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab Emirates and Yemen.

This action plan was developed based on the outcomes of two meetings held in 2009 in Egypt and Jordan; recognising that malnutrition rates remain unacceptably high and nutrition has not been adequately prioritised in national planning agendas. There has actually been an increase in rate of underweight in the region, from 14% in 1990 to 17% in 2004. In addition to the high burden of undernutrition, over nutrition is becoming an increasing problem in the region: in 2005 non-communicable diseases accounted for 52% of all deaths in the region; a figure that is expected to rise to 60% by 2020 (WHO 2010c). Overweight is not only a problem for adults in the region, but also increasingly for school-aged and preschool-aged children. The number of school-aged children who are obese in the region have doubled in the last 20 years, from 23.5 million in 1992-2001 to 41.7 million in 2010 (Musaiger 2011). Overweight and obesity in children is more common in wealthy countries in the region, and presents a major public health problem, with many countries in the region having higher prevalence of overweight than in many developed countries (Musaiger 2011). Obesity is more common in urban areas throughout the region, which presents additional challenge as the region is increasingly urban. The significant increase in obesity has led to a diabetes epidemic. The Middle East and North Africa region has the highest rates of diabetes in the world: one in ten people. Health care expenditure on diabetes has not been able to keep up with the increasing prevalence, and many people are diagnosed late leading to more costly health complications (Yahia 2014).

While there is an alarming increase in the rates of obesity, there has been little research investigating the most likely causes. Economic improvements in the region have contributed to a nutrition transition with high intakes of saturated fats, cholesterol, and refined carbohydrates and a decrease intake of fibre and healthy fats. This has been accompanied by a decline in physical activity. A systematic review of the causes of malnutrition in the Eastern Mediterranean region found that sugar is a large element of daily energy supply, responsible for 9 to 15% of people's energy intakes. Sugar sweetened beverages are of particular concern and their consumption is linked not just to obesity but also to metabolic syndrome and increased rates of type two diabetes. Another contributing factor may be the nutrition transition: in Jordan 40% of obese children's diets came from fat, compared to 28% of non-obese children. High intakes of fruits and vegetables were found to be protective against obesity in studies carried out in Syria, Iran and Kuwait. While western fast foods are often blamed for increasing obesity, a study of both local and western fast foods consumed in Bahrain found that the local fast foods often had higher levels of fat, salt and calories than the western fast foods (Musaiger 2011).

Another key trend globally, and which can be seen particularly well in the region given the diversity of countries at various income levels, is that obesity is no longer something which only affects the wealthy in developing countries. A 2004 review found that as a country's GDP increases, the obesity burden shifts to groups from lower socioeconomic status, and that this shift seems to come at a lower level of development for women than men (Monteiro et al. 2004). This suggests that as countries become wealthier, malnutrition remains a problem for the poor.

Assessment of the East Mediterranean/ Arab region nutrition policies

Nutrition will only be improved through an integrated, multi-sectoral, and holistic policy. The region still has a high burden of undernutrition, especially in the poorest countries, with stunting rates as high as 58% in Yemen. One the other hand, obesity and associated non-communicable diseases also present a great challenge, and are actually increasing the fastest in the middle income countries within the region. While many countries in the region have benefited from increased incomes and development, and went through the accompanying dietary transition, ongoing political and economic problems remain acute in the region.[3]

As can be seen with the case of food subsidies in Egypt, tacking one challenge, food insecurity, without thinking about the implications, may also be responsible for increasing rates of obesity.

Given the scale of the obesity and non-communicable disease problems in the region, the policy response has been weak. Despite the fact that there is strong evidence for a number of cost effective policies to reduce the burden on non-communicable diseases, countries in the region have been slow to take action. This is due to a number of factors including weak public health systems, and complex social, economic and political contexts such including poverty, sex inequality and corruption (Rahim et al. 2014).

[3] Exposure to food insecurity may cause even higher rates of associated non-communicable diseases in the future, when the transition nutrition occurs, as people living in food insecure environments during childhood are more likely to develop non-communicable diseases later in life (Rahim et al. 2014).

Asian Regional Policies

The **South Asian Association for Regional Cooperation (SAARC)** has a regional action framework for nutrition. This framework contains four pillars, or overarching strategic approaches, to guide nutrition actions in the region. These are:

1. Building high level political commitment to nutrition governance with the aim of strengthening multi-sectoral policies, plans and programmes in order to effectively address basic and underlying causes of undernutrition.

   The SAARC framework specifically supports placing the coordinating body for nutrition at the highest level of government and not within a specific ministry to enhance effective multi-sectoral coordination. It is also key that governments continuously monitor those groups who are most vulnerable to undernutrition, and ensure that continual analysis of the situation allows governments to course correct policies, should they see a shifting pattern of malnutrition (for example, an increase in overweight and obesity). The plan also specifies that high level political commitment must be matched by commensurate budget allocation to enable investment in nutrition programmes.

2. Investing in the scale-up of proven, cost-effective nutrition specific and nutrition sensitive interventions, focusing on women and children.

   Scale-up needs to be done in a way which is sensitive to local needs and done in a way which ensures equity and targeting of the poorest and most vulnerable. Proven nutrition actions should include those highlighted by the Lancet series for addressing undernutrition in the first 1000 days, as well as focusing in improving nutrition for adolescent girls to prevent low birthweight children. Nutrition interventions should not be limited to those actions which address undernutrition but should also target overweight and obesity in areas where those are a problem. Nutrition sensitive interventions need to be implemented along-side nutrition specific programmes in order to address the underlying and basic causes of poor nutritional.

3. Investing in human and institutional capacity to manage nutrition programmes at the national and subnational level.

   Periodic capacity needs assessment should be carried regularly, looking at the capacity of everyone from decision makers to service delivery personal to identify capacity needs and develop plans for strengthening capacity.

4. Development of a coherent monitoring framework for reporting and knowledge management to improve accountability of stakeholders implementing nutrition actions.

   Results based management systems to track progress against indicators needs to be developed along with effective nutrition information systems which allow for tracking data disaggregated by gender, urban/ rural and socioeconomic groupings (South Asian Association for Regional Cooperation, n.d.).

European Regional Policy: The WHO Regional Nutrition Plan for Europe 2015-2020

OIC Countries: Azerbaijan, Tajikistan, Turkey, Turkmenistan, Uzbekistan, Kazakhstan, Kyrgyzstan.

Unlike the African Regional strategy, which is still largely focused on reducing undernutrition and promoting food security, with a mention of preventing increases in over nutrition, the

WHO Regional Nutrition Plan for Europe is strongly focused on overnutrition and associated non-communicable diseases with only a passing mention on preventing undernutrition.

The strategy's main aim is to "avoid premature deaths and significantly reduce the burden of non-communicable diseases, obesity and all other forms of malnutrition prevalent in the WHO European region." The European region has the highest rates of non-communicable diseases of the six WHO regions; accounting for 77% of the disease burden and almost 80% of all premature deaths. Some countries within the region (including Tajikistan, see case study) are affected by the double burden of under and over nutrition. In the region, 57% of all adults over 20 are overweight or obese and rates of obesity are increasing very quickly especially in Eastern Europe where rates of obesity have tripled since 1980. Overweight and obesity in children is also increasing, especially in Southern Europe, affecting those from lower socioeconomic groups. Micronutrient deficiencies, particularly iodine and iron, remain a challenge for some in the region, especially among vulnerable populations.

The WHO Regional Action Plan for Europe aims to provide countries with a comprehensive and coordinated plan for countries to adopt their own action plans and policies to improve food systems, reduce nutritional risks and improve people's nutrition throughout the life course with a specific focus on the burden of NCDs.

The guiding principles of the strategy include:

1. Reducing inequalities in access to healthy foods. Policies need to focus on improving the key elements of availability, affordability and acceptability of healthy diets for the most vulnerable groups and populations, specifically focusing on equity.
2. Ensuring human rights and the right to food. In order to achieve the right to food, a right which has been institutionalised in the constitutions of many countries, requires a sustainable, equitable and resilient food system which tackles both supply and demand side of the food system.
3. Empowering people and communities through a health-enhancing environment. People should be empowered to promote policies that create healthy food environments and encouraged to take action around these issues.
4. Promotes a life course approach to nutrition, starting from maternal nutrition considering the nutrition needs of pregnant women, encouraging healthy diets for children and young people and ensuring the elderly are able to meet their nutritional needs.

These guiding priorities are used to define specific objectives which include: creating healthy food and drink environments, promoting a healthy diet for the most vulnerable throughout their life course; strengthening health systems to ensure they are able to promote healthy eating and nutrition and that people are able to access health care for non-communicable diseases; improving surveillance, monitoring, evaluation and research and adjusting existing monitoring systems to ensure that they are fit-for-purpose; and finally strengthening governance for nutrition at all levels of government and engaging with networks such as the European salt action network and the European network to reduce marketing pressures on children (World Health Organization Europe 2014).

2.7. Effects of Climate Change and Natural Disasters in the OIC Member Countries

Conceptual Discussion

Climate change threatens to exacerbate existing threats to food security and livelihoods due to a combination of factors that include the increasing frequency and intensity of climate hazards, diminishing agricultural yields and reduced production in vulnerable regions, rising health and sanitation risks and increasing water scarcity (IPCC, 2007). An assessment of the likely impact of climate change of agricultural production in Africa found that some regions would experience severe reductions or total loss of agricultural productivity whereas other areas may benefit from increased rainfall (Müller et al. 2011). However, negative trends are more common than positive ones (Parry et al. 2014).

Climate change is thought to impact human nutritional status but it is also established that nutrition patterns (mostly the type of foods people choose to consume) has an impact on climate change (usually meat heavy diets have a great impact on climate change) (International Food Policy Research Institute 2016). The causal pathways through which climate change affects nutrition are complex, as climate change can lead to a variety environmental changes including drought and water scarcity, but also increased salinization of agricultural lands, logistical challenges caused by increased frequency of climate disasters and increased burden of tropical disease and pest infestations which impact agricultural outputs (Parry et al. 2014).

Using the UNICEF conceptual framework, and starting with the basic causes of malnutrition, climate change make the environment less enabling for nutrition because of e.g. less frequent and predicable rainfall. Climate change influences political priorities, adversely impact economic growth, and exacerbate inequalities, as the poorest tend to live in areas which are most affected by climate change (International Food Policy Research Institute 2016). Globally, more than 70% of agriculture is rain-fed, which is especially vulnerable to climate change. Drought, leading to loss of livelihoods has been shown to reduce overall food consumption as well as dietary diversity, leaving to both acute and chronic malnutrition. Studies of populations affected by droughts have found increased mortality rates for those with chronic disease such as HIV as well as an increased likelihood of contracting, and dying from communicable disease such as diarrhoeal disease (Parry et al. 2014). Additionally, climate change is linked with increased rates of population displacement especially from rural areas to urban centres as people seek employment. This can lead to overcrowding and lack of access to safe water and shelter, thereby promoting disease transmission and making the nutritional status of the population poorer (Parry et al. 2014).

Climate change is impacting key pillars of food security including access and utilisation of food and food price stability (Parry et al. 2014). Climate change is expected to cause increases in the prices of the most common staples (including rice, wheat and maize) of 5-25% by 2050. Additionally, the actual nutritional content of these staples will decrease, including in terms of zinc, iron and protein as a result of increased CO2 emissions (International Food Policy Research Institute 2016). The Intergovernmental Panel on Climate Change (IPCC) established with a high degree of confidence that global temperature increases as well as increasing population leading to increased demand for food will pose threats to global food security (Parry et al. 2014).

Between 2030 and 2050, climate change will be expected to cause approximately 250 000 additional deaths per year, from malnutrition, malaria, diarrhoea and heat stress (WHO n.d). Humanitarian emergencies caused by famine and disasters can (and often do) lead to acute food shortages, water and sanitation crises and destruction of livelihoods. This can cause an increase in acute malnutrition, which has a high impact on morbidity and mortality. Famine and nutritional emergencies can also happen quite suddenly. In terms of nutritional implications, a modelling of the impact of climate change on nutritional status of children under five found that, without any mitigation measure, the number of stunted children would increase by 20 to 25 million (or a 17 to 22% increase), compared to a future without climate change. South Asia is likely to have the greatest increase in stunting, with up to a 62% increase in severe stunting in the region (Parry et al. 2014).

Effects of Climate Change in the OIC Member Countries

Two regions which are particularly hard hit by climate change are the fertile crescent of north Africa, which includes the countries of Iraq, Syria, Lebanon, Jordan, Palestine and Egypt (International Food Policy Research Institute 2016) and the Sahelian band (which includes e.g. Mauritania, Algeria, Niger, Mali, Chad, Sudan).

Seasonality and climate change

Seasonality is a key factor when considering the impact of climate change on people's nutritional status, and is most likely to impact those living in regions which rely on rain-fed agriculture and where the rains are seasonal. Seasonality has been shown to have a significant impact on people's nutritional status. In India, children born during the summer and heavy rains period have lower height for their age than children born in December (International Food Policy Research Institute 2016).

Famine

While it is recognised that climate change may exacerbate levels of undernutrition through changing rainfall patterns and drought, famine is a much more complicated issue that is caused by multiple factors including poverty, food insecurity, overcrowding, lack of jobs and lack of transportation (Devereux, n.d.). The development of transportation and communications infrastructure has significantly reduced vulnerability to droughts, even when droughts continue.

If one defines famine as "a shortage of food or purchasing power that leads directly to excess mortality from starvation or hunger-induced disease", some argue that while malnutrition remains a global problem, famine is becoming less of a global challenge. However, global warming is threatening to undo recent progress (HEART 2015).

Policies to Mitigate Effects of Climate Change in the OIC Member Countries

Many of the regional nutrition and food security policies discussed in the previous section have elements which specifically aim to address famine and other disasters. The next section presents additional bodies, policies, agencies or groups actively monitoring global levels of food security to enable an effective response to famine and disaster, especially in Asia and Europe.

Integrated Food Security Phase Classification (IPC)

The IPC is a set of protocols (tools and procedures) that are used to classify the severity of the level of food insecurity and provide actionable recommendations. The classification system is widely recognised and seeks to answer key questions including the severity of the situation, which areas are food insecure, the number of people who are insecure, what is the socio-economic background of those facing food insecurity and finally, why people are food insecure (IPC Global Partners 2012). The classification system includes five phases, from phase 1- minimal, where more than four in five households can meet basic food and non-food needs to phase 5- famine, which is defined as a situation when "even with humanitarian assistance one in five households in an area have an extreme lack of food and other basic needs and where starvation, death and destitution are evident" (IPC Global Partners 2012).

An IPC survey in Yemen, an OIC country, undertaken in 2015 found that 41% of the population (10.6 million people) were food insecure and 5 million of those were severely food insecure (HEART 2015). Additionally, the rates of child malnutrition are among the highest in the world, with critical levels of acute malnutrition in three regions and poor or serious levels in the rest of the country.

The Sahel, which also includes a number of OIC countries faces regular famine- with drought in the region leading to hunger for millions of people for the third time in seven years (HEART 2015). Nigeria is currently facing famine conditions in Borno state. Recent evidence found that 55,000 people are classified as phase 5 according to the IPC classification and another 1.8 million are classified as phase 4, an emergency situation (Boseley 2016).

Famine Early Warning Systems (FEWS NET)

FEWS NET was established in 1985 following devastating famines in the Sahel and horn of Africa. It is a network which provides early warning and analysis about acute level of food insecurity providing an evidence based analysis to enable governments and others to plan for and respond appropriately to humanitarian crises. The network has partners actively monitoring the situation in terms of weather, climate, markets and trade, agricultural production, livelihoods, nutritional status and food assistance in 36 of the world's most food insecure countries and producing monthly maps and reports on projected levels of food insecurity (USAID 2016).

3. CASE STUDIES

Methodological Approach

To understand better how malnutrition and poverty are related, and how policy can tackle these potential links, the analysis now turns to five detailed case studies. The selected countries are Senegal, Egypt, Indonesia, Tajikistan and Bangladesh. Each case study features a brief account of the state and trend of malnutrition; a quantitative analysis of poverty and malnutrition, a quantitative analysis of the relationships between maternal and child malnutrition; and a qualitative analysis of these relationships as well as of the policy landscape to fight malnutrition based on stakeholders' interviews and examination of secondary data and literature.

Inclusion Criteria

The case studies have been chosen to reflect (i) the geographic distribution of OIC countries in the world, (ii) the various patterns of malnutrition found in OIC countries (especially in terms of under- and over-nutrition) and (iii) different trends in malnutrition rates (with some countries more successful than others in recent years). Additionally, countries with good malnutrition data (i.e. countries for which multiple recent surveys with anthropometric data are available), and which are members of the Scale-Up Nutrition (to facilitate contacts with local stakeholders), were prioritised. By doing so, selected countries are likely to have at least nominally expressed a political will to tackle malnutrition, allowing the subsequent analysis to focus on the means to do so most effectively. The only country which is not a SUN member is Egypt, which was nevertheless chosen due to its importance within the OIC and to the paucity of Arab countries with both SUN membership and good malnutrition data.

Hata! Başvuru kaynağı bulunamadı. below summarises the key selection criteria in matrix orm. It shows that all countries, bar Bangladesh, have significant under- and over-nutrition problems, and that the recent records in terms of under- and over-nutrition are mixed across the sample.

Table 4: Selection Criteria Matrix

Countries	**Senegal**	**Bangladesh**	**Egypt**	**Indonesia**	**Tajikistan**
Criteria					
Child Over- and undernutrition	X		X	X	x
Lack of progress on undernutrition	X			X	
Lack of progress on overnutrition	X		X	X	
SUN member	X	X		X	X
Good data	X	X	X	X	X

Brief Description of Over- and Undernutrition Profiles of the Selected Countries

For this briefing, the most recent Global Nutrition Scorecard was used for each country.

Senegal: Some evidence of progress. Prevalence of under-five stunting went from 29% in 2011 to 19% in 2014. Some evidence of growing over-nutrition: in 2008, 28% of people were overweight and 8% were obese. The country is off-course for all under-nutrition targets of the WHA (World Health Assembly Indicators).

Indonesia: Very high prevalence of under-nutrition and limited signs of progress: prevalence of under-five stunting only went down from 40% in 2007 to 36% in 2013. Prevalence of over-nutrition: 21% were overweight and 5% were obese in 2008. The country is off-course for all WHA targets (World Health Assembly Indicators).

Egypt: Signs of progress: prevalence of under-five stunting went down from 31% in 2008 to 22% in 2014. The country is on course to meet the WHA indicator of under-five stunting. High prevalence of over-nutrition: proportion of adolescent overweight is 33% in 2011; 62% of the population was overweight and 29% was obese in 2014. The country is off-course on under-five wasting and general overweight indicators.

Bangladesh: High rates of under-nutrition but signs of progress (the country is on course for meeting the WHA under-five stunting target). Prevalence of under-five stunting went down from 42% in 2012 to 36% in 2014. Limited prevalence of overweight (with compared to the countries in the sample): 18% of the population was overweight and 4% was obese in 2014. The country is on-course for meeting the under-five overweight target.

Taiikistan: High prevalence of under-five stunting but some signs of progress (it went down from 39% in 2007 to 27% in 2012), but the country is off-course for meeting this under-five stunting target. Very high prevalence of overweight: 45% of the population was overweight and 14% was obese in 2014; however, the country is on-course to meet the under-five overweight target.

Quantitative Analysis

For each selected country, two sets of quantitative data analysis were undertaken. The first one intends to shed light on the relationships between poverty and malnutrition. The second one relates to the intergenerational transmission of malnutrition.

Poverty and malnutrition

DHS reports routinely feature cross-tabulations of malnutrition against meaningful categories such as age, rural-urban residence, wealth groups or education levels. While these are suggestive of the relationships between poverty and malnutrition, such an approach does not inform us on the most significant factors of malnutrition. The reason is that many of these categories are correlated, such as education and wealth. If both turn out to be significantly associated with malnutrition in cross-tabulations, it does not guarantee that the same is true when one accounts for this correlation. It may be, for instance, that education matters, but not wealth (or the other way around). To account for these correlations, multivariate regressions of malnutrition are estimated. These multivariate regressions will rely on the latest available cross-section from DHS (this is true for all countries bar Indonesia for which DHS does not have anthropometry data; the Indonesia Family Life Survey is used instead) and will focus on the last-born child in each household (to enable the inclusion in the analysis of detailed breastfeeding practices).

The variables of interest were selected based on the UNICEF and LANCET frameworks described in the earlier section. These variables are described now.

Poverty: to describe poverty, the wealth quintiles generated either by the DHS or by the authors (in the case of Indonesia) are used.

Water and sanitation: two variables were created taking the value 1 if households have access to improved sources of drinking water and sanitation, respectively and 0 otherwise.[4]

Education: the regressions include the education level of the mother/caregiver and of the household head.

Infant and young child feeding practices (IYCF): two variables describing breastfeeding practices were created. The first one, immediate breastfeeding, takes the value 1 if the last-born child has been immediately put to breast after birth and the second one, exclusive breastfeeding, takes the value 1 if the last-born child has been exclusively breastfed until the age of 6 months. Both correspond to the WHO recommendations.[5] Access to healthcare: three variables were creating (access to antenatal and postnatal healthcare, and micronutrient supplementation). The variables are antenatal visit to a doctor (1 if yes, 0 if no), baby postnatal check within 2 months of delivery (1 if yes, 0 if no), vitamin A supplementation given within 2 months of delivery (1 if yes, 0 if no).[6]

Food security: the DHS dataset is not very detailed on food security. The regressions include a dietary diversity index, which is simply the sum of food groups consumed by the household. Finally, the following control variables are included: the age and sex of the child, urban-rural residence, age and sex of the household head, and whether the caregiver/mother is working.

Intergenerational Transmission of Malnutrition

To estimate how much malnutrition is passed from mother to child, a second set of multivariate regressions is conducted. In these regressions, the malnutrition status of the child is predicted based on two variables indicting maternal malnutrition (and the same set of controls used in the previous set of estimations). The first variable of maternal malnutrition is low stature of mother, defined as length for age below two standard deviations, and whether the child had a low weight at birth (LBW). Both variables stem from the DHS dataset or were created using the WHO growth reference tables and software.[7]

The correlation between maternal and child stature reflect both the role of genetic growth potential (Tanner et al. 1970) and that of environmental factors (Kramer, 1987). Environmental factors may cause mothers not to express their growth potential, which will be reflected in short stature. Short stature women are more likely to give birth to children with a low weight at birth. Low birth weight children, in turn, are often impaired in their growth

[4] The DHS's wealth index is a combination of assets ownership, housing quality and access to improved sanitation and drinking water sources. As the regressions will directly estimate the effect of access to water and sanitation, the wealth index should be interpreted as an index of assets ownership and housing quality.

5 For children currently below 6 months of age, the variable of exclusive breastfeeding takes the value 1 if the child is currently exclusively breastfed. A third aspect of recommended breastfeeding practice, i.e. breastfeeding until the age of 24 months, could not be analysed. To use this variable, one would need to restrict the sample to children below 24 month of age, which would lead to a very small sample size.

6 It is worth noting that these variables are bound to suffer from reverse causality as these types of healthcare are specifically linked to malnutrition. Their access may therefore be targeted to most vulnerable households. And most vulnerable households may also be most likely to demand these types of healthcare.

[7] The growth table for children under five can be found at: http://www.who.int/growthref/tools/en/.

potential and at risk of becoming short adults (e.g. WHO, 1992). Not all the intergenerational transmission of malnutrition is channelled through the effect of low birth weight. Provision of nutritious food and control of infections (Golden 1998, Martorell et al. 1994), as well as improvements in socio-economic status across generations (Hauspie et al, 1996) would allow the child to partially catch-up the effect of LBW. In contrast, insofar as the short stature of mothers stem from lack of access to healthcare or nutritious food, or the implementation of harmful feeding practices, then the causes behind maternal malnutrition will also exert their impact on child growth, beyond the independent effect of LBW.

Remarkably, very little differences were found when both measures of maternal malnutrition are introduced together in the regressions, which suggests that LBW is far from channelling all causes of intergenerational of malnutrition. The regression results when both variables are included together were thus be the ones reported.

Logit regressions and odds ratios

Each of the three malnutrition variables that will be used as dependent variables in the regressions are of a binary nature (they take the values 0 or 1). To estimate this type of binary variables, the logit estimator is used. The logit estimator constraints the predicted value of the dependent variable to be comprised between 0 and 1.

Logit regressions yield coefficients that are non-linear with the value of other regressors and which are hard to interpret. The estimated coefficients will therefore be presented in the odds ratios form (which corresponds to the exponentiated value of the coefficients). Odds ratios are constant with the value of all covariates and have a simple interpretation: they indicate by how much the odds of the dependent variable to take the value 1 change when the covariates increase by one unit (or switch to positive status if the covariate is a binary variable). An odd ratio of 1 indicates that the likelihood of malnutrition does not change with the covariate, i.e. that there is no relationship between the two variables. An odd ratio greater (lower) than 1 indicates that the covariate is positively (negatively) associated with malnutrition.

Stakeholders' interviews and review of secondary literature

To complement the quantitative analysis, a number of stakeholders' interviews have been carried out in each country (usually around 8-10). These interviews followed a semi-structured pattern, with the core of the interview focusing on the areas of intervention and expertise of the respondent. The same interview protocols were used in each country, although some questions were tweaked to better reflect local realities. The interviews were especially meant to shed light on the challenges and successes of policies aimed at addressing malnutrition. The existing literature (reports, books and peer-reviewed articles) was also reviewed to provide further context and insights to the analysis.

Integration of quantitative and qualitative research

Each case study follows the same template. They start by presenting data on levels and trends of malnutrition before turning to the analysis of the links between malnutrition and poverty. To that end, results of the quantitative analysis are shown, and discussed in the light of key findings of the review of secondary literature and the stakeholders' interviews. To achieve a consistent structure throughout, the analysis of poverty and malnutrition is always broken down into (i) the overall role of poverty, (ii) food security, (iii) health, water and sanitation and (iv) IYCF practices and breastfeeding. These do not exhaust all the potential pathways through which poverty and malnutrition are related but they proved extremely relevant in all case

studies. We then present the quantitative findings on intergenerational transmission of malnutrition before analysing the policies addressing malnutrition, based on the interviews, secondary review and quantitative findings.

3.1. Senegal

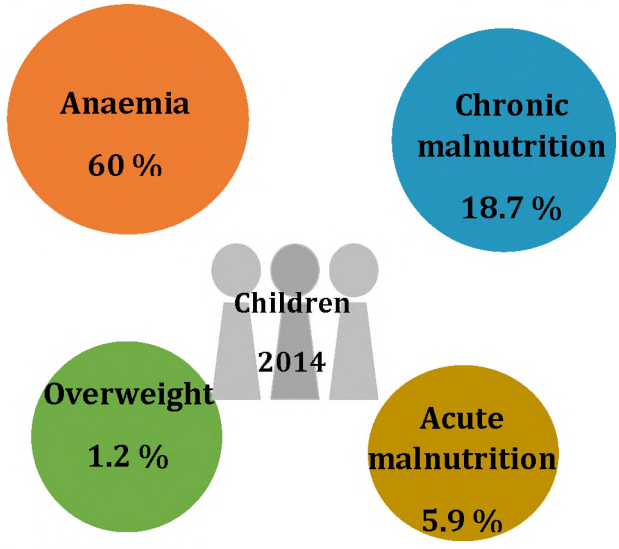
Senegal is located in West Africa and has a population of 15.3 million. The population is predominantly young (60% of people are below the age of 25). Whereas the northern part of the country is in the Sahel region, the southern part has a tropical climate. Multidimensional poverty is high (59.6% of the population are in multidimensional poverty and a further 16% are vulnerable to poverty, which puts Senegal at the 89th rank out of 112 countries according to Alkire et al. 2016). More than 40% of the population is illiterate, and the poverty headcount reaches 47% (at $1.9 per day threshold). Senegal ranks 170th out of 188 countries on the Human Development Index (UNDP 2015).

The economy remains very dependent on agriculture, fishing and exploitation of raw commodities (phosphate) and is supported by remittances, foreign direct investment and donor assistance. The country achieved an economic growth rate of 3.5% in 2015 but average performance over the last 20 years was disappointing: real GDP per capita grew by 0.7% per year between 2005 and 2014 and by 1.6% between 1995 and 2014 (WDI 2016). Senegal is, however, a politically stable country, having managed several political transitions peacefully.

With a prevalence of stunting of 19.4% and a prevalence of wasting of 5.8% in 2014, Senegal ranks 69th and 82nd in the world, respectively. These are relatively good rankings given that Senegal was the 40th poorest country in the world based on GDP per capita at the same time. However, Senegal has a very dire problem of micronutrient deficiency, as evidenced by the extremely high rate of children under the age of five who have anaemia: 60%, a rate that puts Senegal among the 15% most affected countries in the world.

State of Malnutrition in Senegal

Figure 21: Malnutrition in Senegal at a Glance



Source: SDHS (2014)

Table 5 presents the breakdown of stunting and wasting across sex, residence, region, education and wealth groups. According to SDHS (2014) data, 6% of children were wasted. This is classified as a "poor" situation, as per the WHO classification ("acceptable", "poor", "serious" and "critical"). The national average hides important regional variations as acute malnutrition is strongly concentrated in the northern and eastern regions of Senegal. Prevalence of wasting almost reaches 10% in the DHS northern region (9.6%), which comprises Louga, Matam and Saint-Louis administrative regions, while it is 2.8% in the West region (essentially the Dakar area). Wasting also tends to be lower in the south of the country (the rate is currently 6%). Wasting is otherwise more common in boys (6.2% against 5.5% for girls) and among households of low socio-economic status (8.2% among households of the poorest group, against 3.3% among those of the richest group). Children whose mothers have low levels of education are also more likely to be wasted (6.2% against 3.8%).

Chronic malnutrition, or stunting, affected 19% of children in 2014 (SDHS 2014), which is just below the threshold for the situation being considered "poor". Nevertheless, like for acute malnutrition, chronic malnutrition is strongly regionally concentrated. Whereas regions in the north and east are most affected by acute malnutrition, it is the south of the country, which is most affected by chronic malnutrition. The DHS southern region[8] is characterised by a prevalence of stunting of 30% in 2014; a situation considered serious by the WHO. In the North, in contrast, stunting was about half as prevalent (14%). Stunting is twice as prevalent in rural areas (23.2%) as it is in urban areas (12.4%). Stunting is also more common in boys than girls (20.3% against 17%) and twice as common among children whose mothers have low levels of education as others (20% against 10%). Finally, there is a very strong negative relationship between socio-economic status and stunting: the rate of the latter is of 29% among poorest households and of 8.4% among richest households.

According to SDHS (2014), 1.2% of children under 5 were overweight. This rate is much higher for children below 9 months of age (4.7%) than for older children and is higher for boys (1.7%) than for girls (0.8%). Overweight is also more common in the South region (2%) and it tends to be more prevalent among households of higher socio-economic status.

Micronutrient deficiencies constitute an acute public health problem in Senegal. 60% of children aged 6-59 months old suffered from anaemia in 2014. Anaemia is slightly more prevalent in boys than girls (62% against 59%); in rural areas (64% against 55% in cities) and among households with low socio-economic status (69% for children living in households at the bottom wealth quintile against 59% for children living in households at the top wealth quintile). The problem extends to adult women: 54% of women in reproductive age and 61% of pregnant women were anaemic (SDHS 2010, 2013). 40% of children between 6 and 59-month old suffer from vitamin A deficiency (Stevens et al. 2015).

[8] It is made up of Casamance (Ziguinchor, Sedhiou, Kolda) as well as the Kedougou and Tambacounda regions.

Table 5: Breakdown of Child Malnutrition in Senegal by Key Characteristics, 2014

	Stunting	Wasting	Overweight	Anaemia
Sex: Male	20.3	6.2	1.7	61.8
Sex: Female	17	5.5	0.8	58.7
Residence: Urban	12.4	4.5	1.2	55.3
Residence: Rural	23.2	6.8	1.3	63.8
Education: No education or primary	19.9	6.2	1.2	60.2
Education: Secondary or higher	9.8	3.8	1.8	62.2
Wealth quintile: Lowest	28.8	8.2	0.9	68.8
Wealth quintile: Second	21.7	6.7	0.9	63.9
Wealth quintile: Middle	15.5	6.3	1.9	55
Wealth quintile: Fourth	13.4	3.4	1.5	50.6
Wealth quintile: Highest	8.4	3.3	1	59
Region: West	12.7	2.8	1	60.2
Region: Center (> 2010)	21.7	6.4	1.1	67.8
Region: North (> 2010)	14	9.6	1.1	46.6
Region: South (> 2010)	30.1	6	2.1	63.3
Mean	18.7	5.9	1.2	60.3

Note: The table refers to proportion on children under 5 years of age. Source: ICF International, 2015. The DHS Program STATcompiler. Funded by USAID. http://www.statcompiler.com. October 19 2016

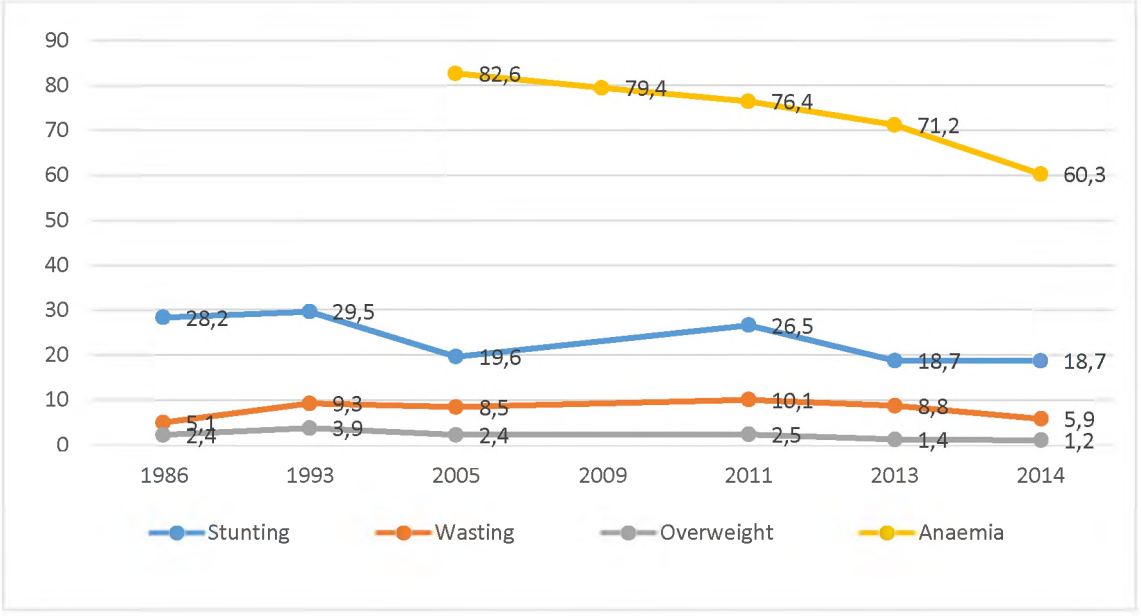
Trends in Malnutrition

Figure 22 displays the evolution of stunting and wasting over the last 20 years. The prevalence of wasting has significantly declined between 2013 and 2014, when it moved from 8.8% to 5.9%. Prior to that, between 1993 and 2013, wasting rate had remained quite constant at around 9%. According to several stakeholders, on the period leading to 2013 the caseload of people in need of humanitarian action for malnutrition remained fairly constant: while the rate of wasting had reduced in some regions, the number of *departements* reaching critical or serious levels had increased.

The stunting rate in 2013-14 (18.7%) was similar to the one observed in 2005 (19.6%). Over this period, stunting first sharply went up between 2005 and 2011, to reach 26.5%, before to drop between 2011 and 2013. Prior to 2005, the prevalence of stunting hovered just below the 30% mark. The drop in stunting between 2011 and 2013 was not uniformly felt. Worryingly, some of the most affected southern regions did not experience much decrease in stunting over this period.[9] If the trend continues, one can expect stunting to decline to acceptable levels for most of Senegal but to have a cluster of (mostly) southern regions where stunting remains at stubbornly high levels. Nevertheless, according to the Global Nutrition Report, Senegal is among the countries most likely to move from off-course to on-course in terms of stunting target (IFPRI 2016).

[9] Examples of regions for which stunting has gone down substantially are Kédougou (from 33% to 19%), Kaffrine (from 32% to 24%), Louga (from 21% to 12%), Matam (from 19% to 11%) or Diourbel (from 22% to 13%). Some of the initially most affected regions, however, have not seen much progress: prevalence of stunting has moved from 35% to 31% in Kolda, from 33% to 28% in Sédhiou, from 24% to 23% in Tambacounda and from 17% to 16% in Ziguinchor.

Figure 22: Evolution of Child Malnutrition in Senegal between 1986 and 2014



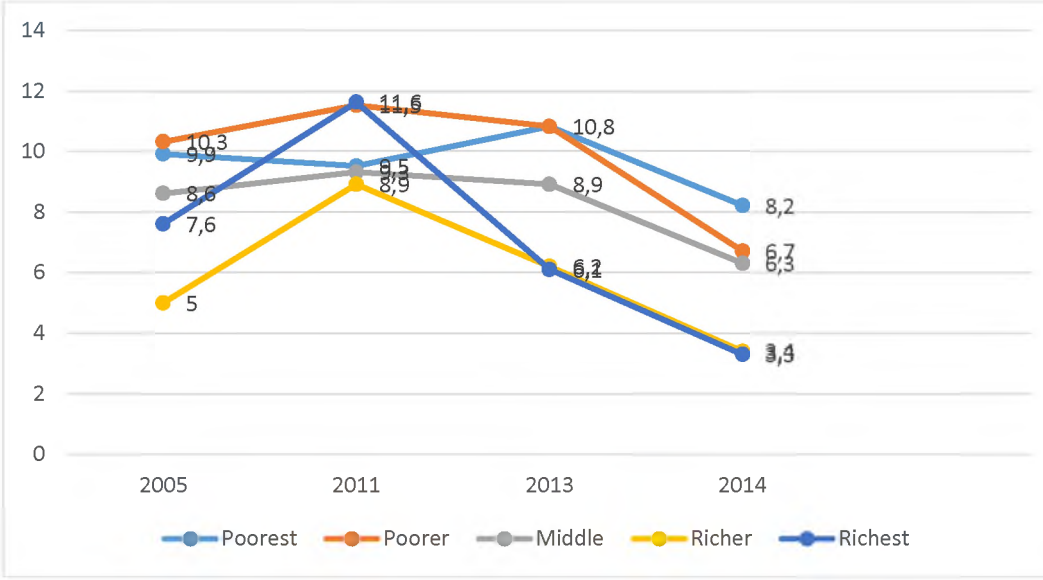
Source: ICF International, 2015. The DHS Program STATcompiler. Funded by USAID. http://www.statcompiler.com. October 19 2016

Overweight remained fairly constant between 1986 and 2011 (at around 2.4%, with a peak at 3.9% in 1993) and steadily declined thereafter. The prevalence of overweight is now half (at 1.2% in 2014) of the level observed in 2011.

Finally, prevalence of anaemia steadily declined since 1986, albeit from an extremely high level (82.6%). The prevalence of anaemia has decreased at a rate of 0.83 percentage point per year. Between 2013 and 2014, the prevalence rate suddenly dropped by almost 11 percentage point, which warrants confirmation from subsequent surveys. Figure 23 and Figure 24 depict the evolution of malnutrition by wealth groups. Whereas wasting has considerably diminished among children of the highest quintile over the last 10 years: from 7.6% in 2005 to 3.3% in 2014; the decrease has been much more modest among children of the lowest wealth group (from 10.3% in 2005 to 8.2% in 2014).

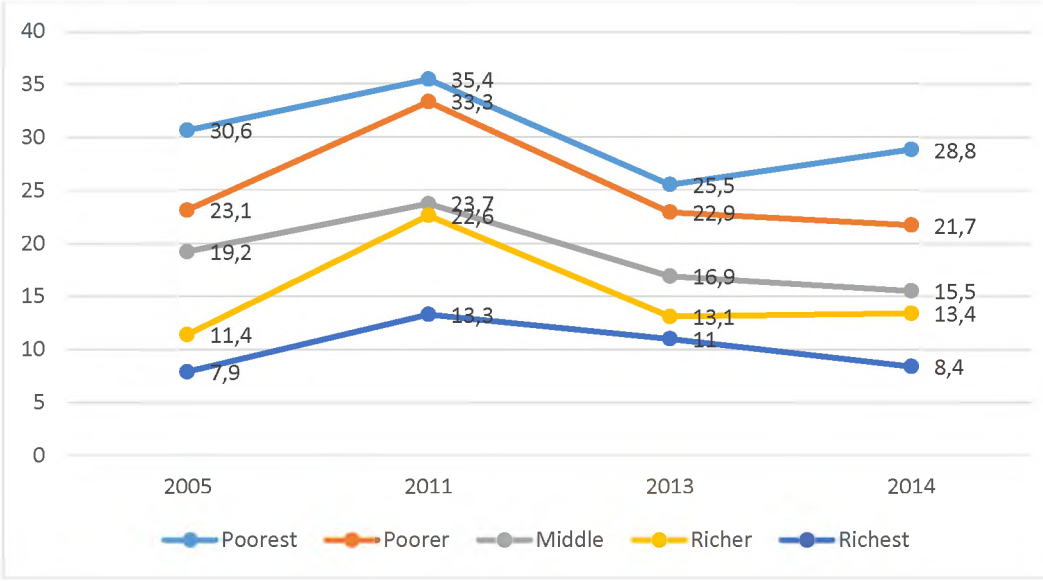
The temporal evolution of stunting between 2005 and 2014 is fairly similar across all wealth groups. All groups saw a rise in stunting between 2005 and 2011, and a decline thereafter, leaving prevalence in 2014 to a similar level than it was in 2005. The group that experienced the most significant decline is the second poorest group for which stunting prevalence went down from 19.2% in 2005 to 15.5% in 2014.

Figure 23: Evolution of Wasting in Senegal between 2005 and 2011, by Wealth Group



Source: ICF International, 2015. The DHS Program STATcompiler. Funded by USAID. http://www.statcompiler.com. October 19 2016

Figure 24: Evolution of Stunting in Senegal between 2005 and 2011, by Wealth Group



Source: ICF International, 2015. The DHS Program STATcompiler. Funded by USAID. http://www.statcompiler.com. October 19 2016

Relationships between Poverty and Malnutrition

Multivariate regressions

To disentangle the specific roles played by poverty from other causes of malnutrition, the results of multivariate regressions of malnutrition are shown in Table 6.

Table 6: Correlates of Malnutrition among Children Below 5 Years of Age, Senegal 2014

	(1)	(2)	(3)
	Wasting	**Stunting**	**Overweight**
Girl	0.72***	0.66***	1.16
	(0.09)	(0.07)	(0.30)
Age in months	1.03***	1.03***	0.93***
	(0.00)	(0.00)	(0.02)
Wealth index (r: poorest quintile)			
Poorer	0.98	0.81	0.51*
	(0.16)	(0.11)	(0.20)
Middle	0.76	0.51***	0.75
	(0.16)	(0.09)	(0.34)
Richer	0.78	0.44***	0.79
	(0.20)	(0.10)	(0.40)
Richest	0.49**	0.33***	0.85
	(0.17)	(0.10)	(0.50)
Improved drinking water source	0.90	0.87	1.21
	(0.14)	(0.10)	(0.39)
Sanitation (r: unimproved sanitation)			
Improved sanitation	0.88	1.01	1.14
	(0.12)	(0.12)	(0.34)
Mother's age	0.99	0.99*	1.01
	(0.01)	(0.01)	(0.02)
Mother is working	0.84	1.13	0.72
	(0.11)	(0.13)	(0.22)
Rural	1.22	0.93	0.84
	(0.22)	(0.14)	(0.33)
Mother's education (r: no education)			
Primary education	0.76	0.81	0.78
	(0.13)	(0.12)	(0.28)
Secondary education	0.59	0.42***	0.33
	(0.20)	(0.12)	(0.25)
Number of children below 5 years of age	1.03	1.07	0.96
	(0.02)	(0.06)	(0.06)
Female-headed household	0.96	1.12	1.36
	(0.17)	(0.17)	(0.44)
Age head of household	0.99	0.99	0.99
	(0.00)	(0.00)	(0.01)
Education head of household (r: no education)			

	(1)	(2)	(3)
	Wasting	**Stunting**	**Overweight**
Primary education	0.54** (0.13)	0.53*** (0.11)	1.63 (0.72)
Secondary education	0.65 (0.20)	0.64* (0.17)	1.76 (0.83)
Higher education	0.73 (0.37)	0.67 (0.28)	1.25 (1.34)
Breastfed immediately	0.94 (0.12)	1.16* (0.09)	0.82 (0.21)
Exclusive breastfeeding	1.13 (0.18)	1.37** (0.20)	1.03 (0.36)
Prenatal doctor visit	1.01 (0.39)	1.52 (0.49)	0.82 (0.60)
Baby postnatal check after 2 months	0.87 (0.12)	1.07 (0.13)	0.85 (0.28)
Vitamin A dose within 2 months of delivery	1.02 (0.07)	0.91 (0.06)	1.09 (0.16)
Dietary diversity index	1.05* (0.03)	1.11*** (0.03)	1.02 (0.07)
Observations	1942	1942	1942

*Note: Authors' calculations based on the SDHS (2014) data. Coefficients are odds ratios and figures in parentheses refer to standard errors. *: p<0.1, **: p<0.05, ***: p<0.001.*

Only a few variables turn out to be significantly associated with odds of wasting. Odds of wasting are twice higher for children of the bottom wealth quintile than for children of the richest group. And odds of wasting are half as low for children whose mothers have a primary education than for those without. Surprisingly, none of the sanitation or health variables are significantly associated with prevalence of wasting. Similarly, food security and good breastfeeding practices do not seem to explain lower prevalence rates (food diversity is even positively related to wasting, at 10%).

There is a very clear association between poverty and stunting. Odds of stunting are between 66% and 50% lower for children in the five top wealth quintiles than for children of the bottom group. These effects are strongly significant in a statistical sense. Odds of stunting are also about half of those for children whose mothers have secondary education and who live in household whose heads have primary education than others. Surprisingly, exclusive breastfeeding and food dietary diversity are associated with higher rates of stunting. This may reflect that breastfeeding messages are primarily addressed to disenfranchised households and that increased food diversity manifests itself by moving away from least preferred, but most nutritious foods.

Results for overweight are remarkable in that virtually none of the included variables are significantly associated with this form of over-nutrition. We only see that children from the second poorest quintile are least affected and children with access to latrine are much more

affected. It is not obvious to make sense of these findings; which overall point to the fact that overweight is mostly unrelated to basic poverty factors.

Analysis

Evolution of Income, Poverty and Inequality

Senegal experienced a slow but steady increase of its real GDP per capita between 2000 and 2015, at a pace of 1.25% per year. This evolution stands in sharp contrast to the post-independence period when living standards continually declined between 1960 and 1994. The country is now about to catch-up to its 1960 level of living standards. In 2015, the level of GDP per capita was similar to that of 1963 in real terms.

To the contemporaneous period of slow, steady economic progress, corresponds a slow, steady decline of poverty. The poverty headcount (calculated at the line of $1.9 per day) fell from 68% in 1991 to 38% in 2011. However, the country stopped making progress on poverty reduction since 2004. The highest poverty rates are seen in the southern regions: Kolda (77%), Kédougou (71%), Sédhiou (68%), Fatick (68%) and Ziguinchor (67%). Poverty is more prevalent in rural areas and in regions where access to basic infrastructures such as sanitation, drinking water, transport, electricity, food storage is limited (GoS 2014, p.10).

Are the areas with most poverty also those with the most malnutrition? On the one hand, chronic malnutrition is concentrated in the South, which are among the poorest regions of Senegal. On the other hand, regions where acute malnutrition is most present are not among the poorest ones in Senegal. This suggests that the relationships between poverty and malnutrition in Senegal are not simple nor uniform across different types of malnutrition.

Finally, inequality declined between 1991 and 1994 but the very large magnitude of the drop (from 54% to 41%) warrants suspicion of the data. Ever since 1994, the Gini index has remained stable at around 40%.

Food Security

Qualitative evidence and stakeholder interviews confirm that the links between poverty and acute malnutrition are not as straightforward as common wisdom suggests. The aid community relies on the Household Economy Approach (HEA) to identify "extreme-poor" households, which will receive aid (food supplementation, seasonal cash transfer, screening and treatment of malnourished children). The criteria to identify these households critically revolve on the household size, land and cattle owned and access to markets. Despite its name, such a methodology thus identifies food-insecure households, not extreme poor households. And it is possible that extreme poor households are not the most food-insecure. This matters a great deal as the government aims to establish a unified social protection system through which eligible poor people would receive a range of interventions, including cash transfers. The targeting criteria for the social protection system will be different, and include more welfare indicators. Research is underway to compare the types of households selected by each method.

Nevertheless, there is a strong connection between the index of food production and the evolution of wasting. While between 2004 and 2010, food production increased by 60%, in the year leading up to 2011, food production collapsed by 29% (own calculations based on FAO data). This coincides with the marked increase in malnutrition recorded in the 2011 DHS

survey and apparent in Figure 23 and Figure 24. Between 2011 and 2013, food production index rose by 16% (8% per year), which again coincides with a decline in child malnutrition measures. Similarly, the lack of progress on wasting over the entire period of study can be related to the corresponding absence of progress on food availability and security. The proportion of undernourished population calculated by the FAO was indeed the same in 2014/16 as it was in 1990/92 (at 24.5%).

There is also a strong presumption among stakeholders that food security matters for stunting. The poor southern regions of Sédhiou, Kolda, Ziguinchor and Kédougou are among the most food insecure in the country (WFP 2014). Whereas 16% of Senegal households are moderately or severely food insecure, the figure reaches 33% in Kédougou, 42% in Kolda, 58% in Sédhiou and 39% in Ziguinchor. Matam, in the east of the country, is also heavily affected (38%). Similarly, the WFP (2014)'s assessment reveals that while 19% of households overall have an inadequate food consumption[10], in Ziguinchor (68%), Sédhiou (63%), Kolda (45%) and Kédougou (42%), the proportion of households with inadequate food consumption is considerably higher. Once again, the only non-southern region with similar prevalence of inadequate food consumption is Matam (47%). This strongly suggests that poverty and food insecurity go hand in hand, and that the latter is a major explanatory factor of stunting rates.

In terms of micronutrients deficiencies, there is a clear and direct link between food security and poverty. The main source of iron, vitamin A and other critical nutrients is from animal-protein; which poor people consume little of. The main area of intervention against deficiencies is through the fortification of cooking oil and flour. A committee for food fortification has been set up by the Government of Senegal in 2006 (The Comite Senegalais pour la Fortification des Aliments en Micronutrients, COSFAM) and in 2009 fortification became mandatory for the producers. The downside of this policy, as several stakeholders noted, is that poor people do not consume much flour or oil (fortified or not) in the first place, thereby limiting the effectiveness of food fortification on poor people.

Health, Water and Sanitation

Beyond food availability, stakeholders underscored the availability of healthcare as an important factor. Both maternal and child health (MCH), and sexual and reproductive health (SRH) are critical underlying factors of malnutrition in the UNICEF and Lancet frameworks, although the regressions do not support this finding for Senegal. In the remote agro-pastoral communities in Matam or Tambacounda region, access to both MCH and SRH is very difficult. ACF noted that there are only two paediatricians in all of Matam region[11], including one from ACF itself. Without a developed private health sector, people (of all wealth levels) have to rely on the patchy, understaffed, and critically insufficient public health centres. This might explain why young mothers of all social classes cannot exclusively breastfeed their children for 6 months. The prevalence of illness and infections resulting from lack of care is also directly reinforcing malnutrition (as nutrients are not fully absorbed) and makes children less resilient to malnutrition.

The data confirm that the Senegalese people have a very poor access to safe drinking water and improved sanitation. Only 78.5% of households have access to the former and 48% to the latter, both of which corresponds to the bottom 25% of the world distribution. The country has

[10] Almost 60% of households do not consume iron-rich food, 27% do not consume protein-rich food, 21% do not consume vitamin A -rich food, and 52% do not consume fruits (WFP 2014).
[11] Matam has a population of about 500,000.

also made limited progress over time; access to improved water and sanitation have increased by 16% and 18% since 2000, respectively, although starting from a low base.

Unsurprisingly for such a poor country, Senegal has a limited supply of healthcare. There were only 0.3 hospitals per 1,000 people in 2008, four times as less than the global median. Worryingly, the density of hospital beds was comparable to that in 1996 (0.45). The number of nurses and doctors is also concerning: the country only had 0.4 nurses and 0.06 doctors per 1,000 people in 2010. This places Senegal in the bottom 10% globally. Like for hospital beds, there are no signs of improvements over the last decade on these two measures.

Senegal has one of the highest coverage of antenatal care in the world (96.2% of pregnant women) but maternal health remains poor, as the lifetime risk of maternal death (1.63%) shows, which corresponds to the bottom 25% in the world. Senegal has, however, made impressive progress on this front, as risk of maternal death decreased by more than two-third (69%) since 2000.

Senegal is in the global median when it comes to roll out oral rehydration and ORS treatments for children suffering from diarrhoea (48% and 36%, respectively). But once more, progresses are very limited over the last decade.

IYCF Practices and Breastfeeding

Stakeholders noted that the stagnating levels of acute malnutrition despite intense aid over the years point to the role of neglected structural factors, among which a crucial one is nutrition good practices. Behavioural change communication has been quite insufficient in the past, and the prevalence of harmful practices in pastoral areas is high. These practices are largely common in all social classes and may explain the weak apparent link between poverty and acute malnutrition.

According to DHS (2014), while 97% of children are breastfed, the proportion of children who have been immediately put to the breast after birth is much lower. It ranges from 15% in Diourbel region to 52% in Matam. The average length of exclusive breastfeeding is also much lower than the recommended 6 months. It ranges from less than 1 month in Matam and Kaolack to 2.8 months in Ziguinchor. Food diversity among children aged 6 ot 23 months is also much lower than the WHO recommendations: only 3.6% of children in Diourbel are fed at least four food groups whereas the maximum is reached in Ziguinchor with 23.5%.

Yet, we do not find any association between better breastfeeding practices and lower malnutrition in the data.

Relationships between Maternal and Child Malnutrition

The latest DHS data are used to estimate the impact of (i) mothers' malnutrition status and (ii) low birth weight on current malnutrition status of children. Columns (1), (3) and (5) of Table 7 report the results when the regressions only control for age and sex of the child and columns (2), (4) and (6) report the results the same full array of control than for the multivariate analysis of malnutrition is used.

Table 7: Estimations of the Effects on Children Malnutrition of Low Birth Weight and Malnutrition of their Mothers, Senegal 2014

	(1)	(2)	(3)	(4)	(5)	(6)
	Wasting	Wasting	Stunting	Stunting	Overweight	Overweight
Mother is stunted	2.69*** (0.93)	3.09*** (1.26)	3.07*** (1.00)	3.22*** (1.31)	1.73 (1.07)	1.31 (1.00)
Low birth weight	2.64*** (0.51)	2.43*** (0.56)	2.55*** (0.43)	2.94*** (0.63)	0.93 (0.39)	1.30 (0.58)
Age child	1.02*** (0.00)	1.03*** (0.01)	1.02*** (0.00)	1.04*** (0.01)	0.93*** (0.02)	0.95*** (0.02)
Girl	0.76* (0.12)	0.76 (0.14)	0.71*** (0.09)	0.69** (0.11)	1.05 (0.30)	1.16 (0.40)
Controls	No	Yes	No	Yes	No	Yes
Observations	1377	1094	1377	1094	1377	1050

*Note: Authors' calculations based on the SDHS (2014) data. Coefficients are odds ratios and figures in parentheses refer to standard errors. *: p<0.1, **: p<0.05, ***: p<0.001. Controls refer to the controls used in the regressions to identify the correlates of malnutrition.*

There is a very strong intergenerational transmission of undernutrition in Senegal. Children whose mothers are stunted are about 2.7 times more likely to be wasted than other children. This is a very strong effect that only marginally increases when all controls are included (OR=3.1). The effect on stunting is very similar as children from stunted mothers are 3.2 times more likely to be stunted themselves than other children once all controls are included (column 4). In addition to this effect, children who were of low weight at birth (indicating malnutrition of their mothers while in the womb) are 2.4 times more likely to be wasted and 2.9 times more likely to be stunted than children who had a normal weight at birth. Once again, these results are remarkable as regressions are already including for the general effect of height of mothers. For stunting, the effect of low birth weight increases with the full controls specifications.

Over-nutrition, on the other hand, is unrelated to either mothers' height or low birth weight. The effect of the latter is positive and close to being statistically significant in column (6), however.

A particularly important channel of transmission across generations in Senegal is through iron deficiency and anaemia. Since anaemia is very prevalent in Senegal (54% of women in reproductive age and 61% of pregnant women are anaemic) iron deficiency constitutes a very strong factor in the intergenerational transmission of malnutrition. 71% of children between 6 and 59 months old were anaemic – a condition that in children has been related to poor mother-child interactions and impaired learning capacity.

Malnutrition and Poverty in the National Development Strategy

Senegal ranks 8th out of 45 countries in terms of commitment for reducing undernutrition according to the Hunger and Nutrition Commitment Index (HANCI) (te Lintelo and Lakshman 2015). HANCI compares and ranks the performance of 45 developing countries based on 22 indicators of political commitment to hunger reduction and to addressing undernutrition. On the latter, Senegal is highly rated thanks to the presence of a budget line for nutrition; a near universal coverage of vitamin A supplementation; the government's promotion of

complementary feeding; the existence of a national nutrition plan (soon to become a multi-sectorial strategy); a multi-sectorial and multi-stakeholder coordination mechanism (the CLM, "Cellule de Lutte contre la Malnutrition"); time-bound nutrition targets and national nutritional surveys. Areas of weaknesses are the poor access to sanitation, a moderate access to drinking water and the weak extent of nutrition in national development strategy. Indeed, the latest national development strategic plan, the "Plan Senegal Emergent", released in 2015, does feature nutrition as part of the human capital pillar, but does not dwell long on the topic and does not recognise the specific catalyst role that tacking under-nutrition can have in fostering development.

Another indicator of the commitment to fight malnutrition is the share of expenditures a country spends on healthcare. This share is 4.7% in Senegal (in 2014), which places Senegal in the bottom quarter of the world distribution. Worryingly, this share has continually decreased since 2004 when it reached 5.7%.

Interviewed stakeholders echoed the feeling that political commitment in Senegal is satisfactory and has increased over the years. This is reflected by the status the fight against malnutrition has taken: from a simple policy, it evolved to a full-fledged plan with wider remit ("The Plan de Renforcement de la Nutrition (PRN)"), and will now become a multi-sectoral, inclusive strategy to which all sectors related to nutrition (i.e. not only health or agriculture) contribute to. The creation of a coordinating agency (CLM) under the authority of the Prime minister, as early as 2001, was also hailed as a very good sign.

Areas of fragility and rooms for improvements exist, however. Most stakeholders recognised that the CLM did not fully succeed in its coordinating role, partly because it also operates as an implementing agency (it manages the PRN) and because of the dilution of the coordinating role between the CLM, the MNSCA (the agency in charge of food security, also under the authority of the Prime minister) and even the social protection agency (the DGPS), which is to take a more significant role in the fight against malnutrition. The lack of discernible progress on the fight against acute malnutrition also reveals structural failings in the current strategy, with possible neglect of the role of knowledge and practices, and lack of progress on the health provision front.

Stakeholders mentioned that inadequate breastfeeding contributes to intergenerational transmission of malnutrition. Malnourished adolescent girls are not able to exclusively breastfeed their child as the quantity of milk they produce is insufficient. Indeed, only 33% of mothers exclusively breastfeed their baby until the age of 6 months, well below the WHO target of 50%. Worryingly, there has even been a decline since 2011 when the proportion was 39% (UNICEF 2015). The results from the previous section did not confirm the link between breastfeeding practices and malnutrition, however.

Anaemia and nutrients deficiencies did not benefit from a coordinated strategy and remained at critical high levels. Finally, with decentralisation of health and nutrition activities, the role of local governments is determinant. Stakeholders who work extensively with local governments noted that these often lack the capacities and knowledge to coordinate nutrition activities. Interventions to promote nutrition towards local policymakers are currently underway and needed to sustain the fight against malnutrition.

The issue of stunting has also until recently been in the shadow of policymaking in Senegal as prevalence appeared acceptable and the focus was firmly on the issue of acute malnutrition,

which is associated with heightened mortality and calls for urgent action every lean seasons. However, chronic malnutrition exerts a substantial adverse impact on Senegal's development, which has now come into the attention of the nutrition community. Chronic malnutrition is a priority in the new multi-sectoral plan against malnutrition and is present in the national development strategy (GoS 2014).

The priority given to stunting needs to translate into a priority to reduce rural poverty. Among the regions most affected by stunting, Kolda and Sédhiou are also among the regions with least access to a market in their village (less than 27% of rural households have access to a market in their village, against 50% overall, (WFP 2014)); and are characterised by a high prevalence of pit latrines. In Sedhiou and Kolda, only 29.5% and 51% of households, respectively, have access to drinking water. The national figure for rural households is 82.5%. This critical lack of access to markets and essential amenities is recognised in the "Plan Emergent Senegal", the main national development strategy for the period 2015-2035 (GoS 2014). The plan mentions that 3000 villages in Kaffrine, Kédougou, Tambacounda, Kolda and Sedhiou regions have very poor access to shops, schools, healthcare, water and roads (p. 19).

Finally, interviewed stakeholders were very aware of the intergenerational transmission of malnutrition; and many mentioned a shift in recent years from a focus on the treatment of malnutrition (concentrated efforts during the first 1000 days of the life of children) to a dual focus on treatment and prevention. Prevention is done through interventions targeted at adolescent girls who are soon to become mothers ("the second window of opportunity"). One aspect of this prevention effort is related to best nutrition practices. This concern features in the multi-sectorial strategic plan against malnutrition that is currently being drafted. Many agencies and NGOs have developed a policy to communicate best practices. WFP and ACF specifically mentioned their behavioural change communication (BCC) to adolescent girls through education.

3.2. Egypt

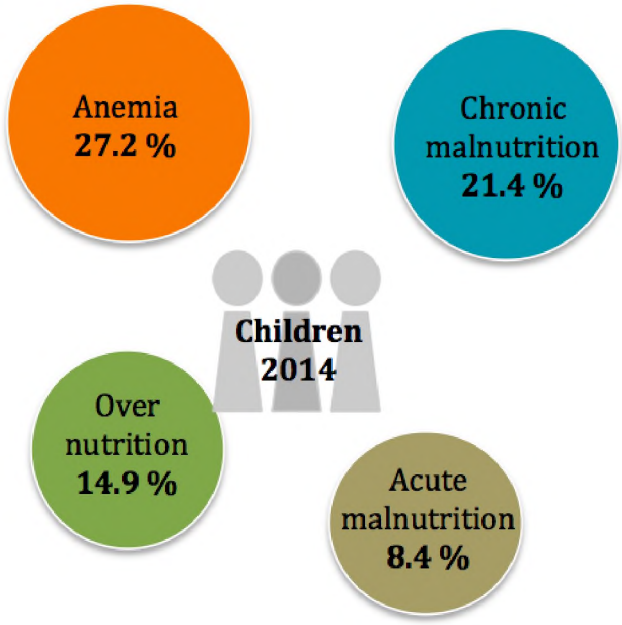
Egypt is the most populous Arab country, and the third most populous country in Africa, with about 92 million inhabitants. The climate is mostly that of a desert and 95% of the population live within 20 km of the Nile river (the arable land only constitutes 3.6% of the country's area). Egypt still experiences a rapid population growth (46% between 1994 and 2014) despite falling fertility rates.

Egypt's economy (measured by real GDP per capita) grew at 1.8% per year between 2000 and 2015. However, between 2011 and 2015, real GDP per capita has not increased much in real terms. Egypt ranks 108th out of 188 on the Human Development Index (HDI). 3.6% people are in multidimensional poverty and 5.4% are vulnerable to it, according to Alkire et al. (2016), which places Egypt at the 35th spot worldwide (out of 112 countries).

Egypt is characterised by very high rates of acute malnutrition, especially with respect to its level of development. 9.5% of children under the age of 5 were wasted in 2014, which places Egypt at the 119th spot in the world. Chronic malnutrition is also a problem - 22% of children under the age of five are stunted - which puts Egypt at the 79th rank in the world. As many other Arab countries, Egypt has a severe problem of over-nutrition: it is the 13th most affected country in the world in terms of under-five overweight.

State of Malnutrition

Figure 25: Malnutrition in Egypt at a Glance



Source: EDHS (2014

In 2014, 8.4% of children surveyed by DHS were wasted (a "poor" situation according to WHO thresholds). The prevalence of wasting was particularly high amongst infants up to the age of 6 months (14.4%) and in the Frontier Governorates (14.1%). Surprisingly, the prevalence of wasting is lowest among children from the poorest group (7.4%), and highest among children of the second richest group (9.3%).

21.4% of children under the age of 5 were stunted, which corresponds to a medium prevalence according to WHO. Stunting rates peaked around the ages of 18-23 months (at 24.6%). Whereas there is no meaningful gender difference in wasting, boys are particularly prone to stunting: 22.8% of boys compared to 19.9% of girls are stunted. Unlike for wasting, there is also a large difference between urban and rural settings, with children in urban areas more likely to be stunted. Stunting rates are also higher than average in Upper Egypt, particularly in urban Upper Egypt (15% compared to 10.9% in rural Upper Egypt).

27.2% of children below 5 years old suffer from anaemia, according to the EDHS (2014). Rural children are more affected (29.2%) than urban ones (23.1%), as are children in the Frontier governorates (44.5%) and Upper Egypt (30.2%) than other regions. Prevalence of anaemia also steadily goes down with the wealth index.

15% of children below 5 years of age are overweight. Overweight is particularly pronounced among children below 6 month of age (19.5%) but is otherwise very similar across wealth groups, rural/urban, and education levels of the mothers. Only in frontier governorates is overweight well below national average (8.3%).

Table 8: Breakdown of Malnutrition by Key Characteristics, Egypt 2014

	Stunting	Wasting	Overweight	Anaemia
Sex: Male	22.8	8.4	15.3	27.2
Sex: Female	19.9	8.5	14.3	27.3
Residence: Urban	23	8.8	16.1	23.1
Residence: Rural	20.7	8.2	14.3	29.2
Education: No education or primary	25.3	8.6	13.9	27.8
Education: Secondary or higher	20.1	8.4	15.2	27.1
Region: Urban Governorates	19	8.6	14.7	21.4
Region: Lower Egypt	17.9	8.4	16.5	27.5
Region: Lower Egypt – urban	19.3	8.9	17.3	25.1
Region: Lower Egypt – rural	17.6	8.3	16.3	28.1
Region: Upper Egypt	26.2	8.3	13.2	27.9
Region: Upper Egypt – urban	29.8	9	16.8	22
Region: Upper Egypt – rural	24.8	8	11.9	30.2
Region: Frontier governorates excluding North and South Sinai	15.1	14.1	8.3	44.5
Wealth quintile: Lowest	24.1	7.4	15.6	34
Wealth quintile: Second	23.1	8.1	12.8	32.9
Wealth quintile: Middle	18.1	8.8	13.9	23.8
Wealth quintile: Fourth	20	9.3	15	25.3
Wealth quintile: Highest	23.4	8.2	17.7	21.3
Mean	21.4	8.4	14.9	27.2

Note: The table refers to proportion on children under 5 years of age. Source: ICF International, 2015. The DHS Program STATcompiler. Funded by USAID. http://www.statcompiler.com. October 19 2016

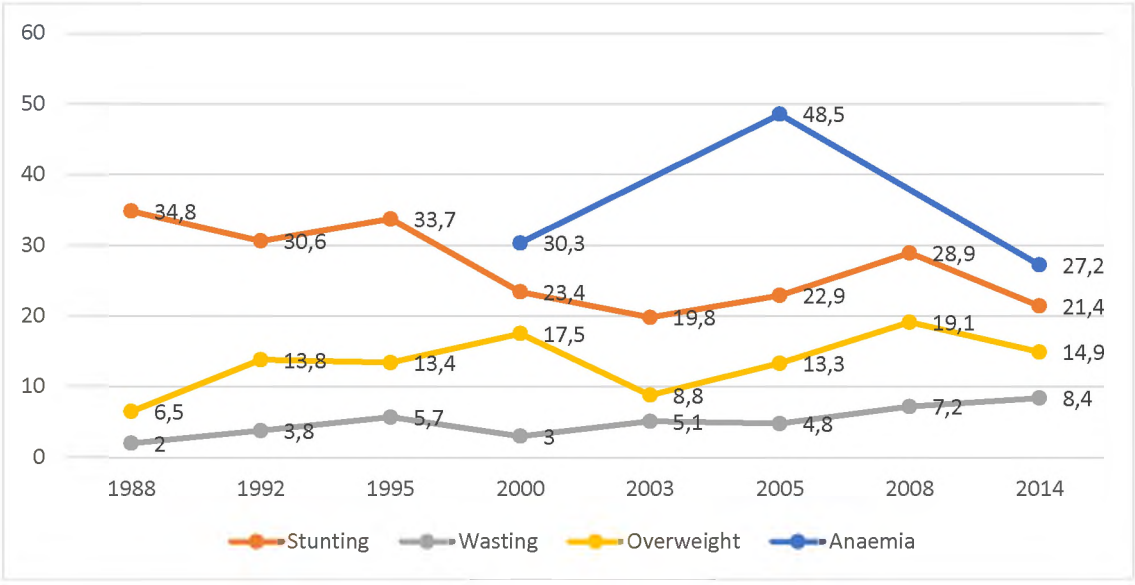
Trends in Malnutrition

Figure 26: Evolution of child Malnutrition between 1988 and 2014 in Egypt below shows the trend of the four indices of malnutrition over several rounds of DHS data collection between 1988 and 2014. Whereas the prevalence of chronic malnutrition (stunting and anaemia) has decreased over time (albeit with some intermittent increases), the share of children with acute malnutrition, i.e. wasting, and overweight have increased. Stunting has decreased from 35% in 1988 to 21% in 2014, which corresponds to a pace of reduction of 0.52 percentage point per year. This secular reduction has been considerably undermined by the sharp increase witnessed between 2003 and 2008. The prevalence of anaemia has likewise increased between 2000 and 2005 (from 30% to 48.5%) before to sharply decrease between 2005 and 2014 (to reach 27.2%).

In contrast, wasting has steadily increased between 1988 and 2014. Between 2005 and 2014, the prevalence of wasting almost doubled (from 4.8% to 8.4%). Since 1988, overweight among

children under the age of 5 has increased from 6.5% in 1988 to 14.9% in 2014. Over the latest period (2008-2014), however, the rate of overweight declined from 19.1% to 14.9%.

Figure 26: Evolution of child Malnutrition between 1988 and 2014 in Egypt



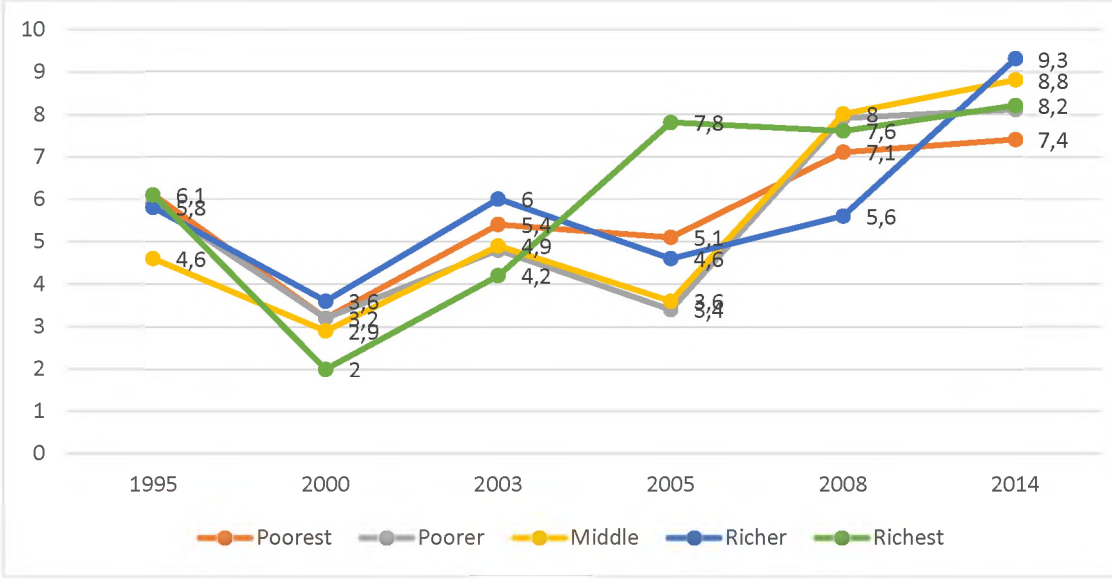
Source: ICF International, 2015. The DHS Program STATcompiler. Funded by USAID. http://www.statcompiler.com. October 19 2016

Figure 27 and Figure 28 look at the evolution of wasting and stunting by wealth groups. One can see that the evolution of stunting between 1995 and 2014 has followed three sub-periods: first, a decrease between 1995 and 2003. This was largely parallel across wealth groups until 2000, but between 2000 and 2003, stunting actually went up in the richest group. Second, an increase between 2003 and 2008, that has hit the poorest group first and the two richest groups later. Third, a decrease between 2008 and 2014, that has been most marked for the middle and richer groups.

The prevalence of wasting has also followed a non-monotonic path since 1995. It first strongly decreased until 2000, then sharply increased until 2003 (where it reverted to levels close to those of 1995), and finally went down between 2003 and 2014. The later decline has been most pronounced for the richer, middle and poorer groups, and to a lower extent for the poorest group. For the richest group, in contrast, wasting continued to increase after 2003, which explains why prevalence of wasting is currently highest among children of this group.

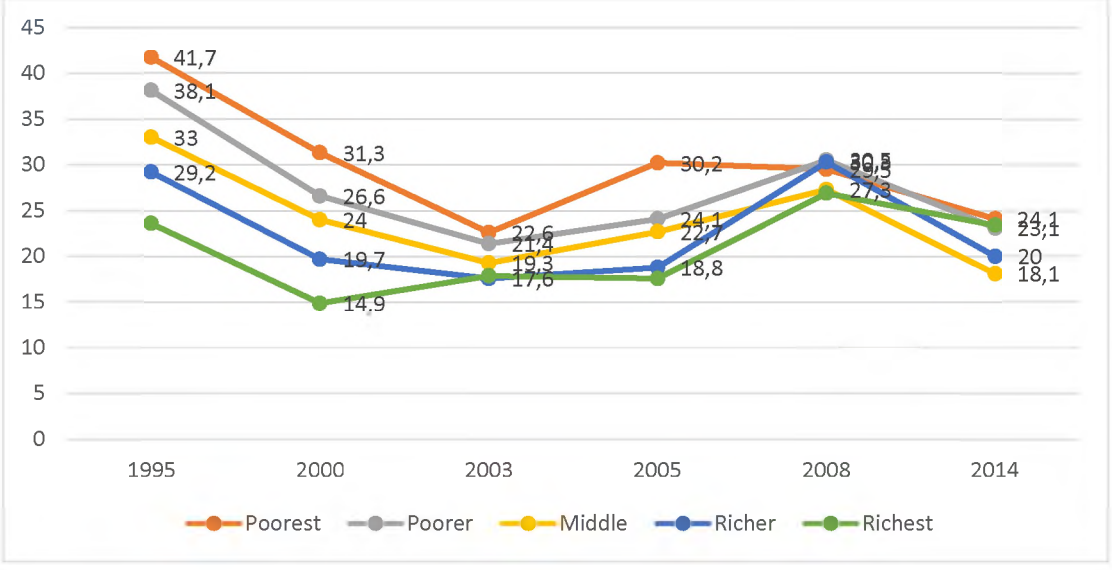
Overweight has followed a similar temporal pattern than stunting for all groups except the poorest one (i.e. overweight increased in the first period and decreased in the second one). Overweight in the poorest group, by contrast, has first gone down before to increase over the recent period.

Figure 27: Evolution of Wasting in Egypt between 1995 and 2014, by Wealth Groups



Source: ICF International, 2015. The DHS Program STATcompiler. Funded by USAID. http://www.statcompiler.com. October 19 2016

Figure 28: Evolution of Stunting in Egypt between 1995 and 2014, by Wealth Group



Source: ICF International, 2015. The DHS Program STATcompiler. Funded by USAID. http://www.statcompiler.com. October 19 2016

Relationships between Poverty and Malnutrition

Multivariate Regressions

Table 9 below presents the results of multivariate regressions of child malnutrition in Egypt in 2014.

Table 9: Correlates of Malnutrition among Children below 5 Years of Age, Egypt 2014

	(1)	(2)	(3)
	Wasting	**Stunting**	**Overweight**
Girl	0.82**	0.82***	0.98
	(0.07)	(0.04)	(0.06)
Age in months	0.99*	1.00**	0.99***
	(0.00)	(0.00)	(0.00)
Wealth index (r: poorest quintile)			
Poorer	0.93	1.02	0.83*
	(0.14)	(0.09)	(0.09)
Middle	1.15	0.86	0.89
	(0.17)	(0.80)	(0.10)
Richer	1.39*	0.85	0.84
	(0.23)	(0.09)	(0.11)
Richest	1.40*	0.78*	0.89
	(0.28)	(0.10)	(0.14)
Improved drinking water source	0.84	0.75**	0.82
	(0.15)	(0.08)	(0.11)
Sanitation (r: unimproved sanitation)			
Improved sanitation	0.82*	1.15**	1.40***
	(0.09)	(0.08)	(0.11)
Mother's age	1.00	0.98***	0.99*
	(0.07)	(0.01)	(0.01)
Mother is working	0.92	1.07	1.06
	(0.12)	(0.09)	(0.10)
Rural	0.92	0.86*	0.94
	(0.12)	(0.07)	(0.10)
Mother's education (r: no education)			
Primary education	1.23	0.98	0.92
	(0.20)	(0.10)	(0.12)
Secondary education	0.98	0.74***	0.90
	(0.12)	(0.06)	(0.09)
Higher education	1.19	0.82*	0.96
	(0.22)	(0.10)	(0.14)
Number of children below 5 years of age	0.99	1.04	0.97
	(0.06)	(0.04)	(0.04)
Female-headed household	0.97	0.98	0.86
	(0.24)	(0.15)	(0.17)
Age head of household	1.00	1.00	1.00
	(0.04)	(0.00)	(0.00)
Education head of household (r: no education)			

	(1)	(2)	(3)
	Wasting	**Stunting**	**Overweight**
Primary education	0.95	1.02	1.12
	(0.14)	(0.10)	(0.14)
Secondary education	0.70***	0.89	0.85
	(0.09)	(0.08)	(0.09)
Higher education	0.61***	0.91	0.98
	(0.11)	(0.11)	(0.14)
Breastfed immediately	1.08	0.94	0.83**
	(0.10)	(0.06)	(0.06)
Exclusive breastfeeding	1.05	0.94	0.90*
	(0.09)	(0.06)	(0.06)
Prenatal doctor visit	0.79*	0.77***	0.98
	(0.11)	(0.06)	(0.11)
Baby postnatal check after 2 months	1.03	1.10*	1.22***
	(0.09)	(0.06)	(0.08)
Vitamin A dose within 2 months of delivery	1.02	1.03	1.01
	(0.04)	(0.02)	(0.03)
Dietary diversity index	1.00	1.00	1.00
	(0.01)	(0.01)	(0.01)
Observations	9437	9437	9437

*Note: Authors' calculations based on the DHS (2014) data. Coefficients are odds ratios and figures in parentheses refer to standard errors. *: p<0.1, **: p<0.05, ***: p<0.001.*

The bivariate associations from the EDHS report suggested that wasting did not vary much across subgroups. This is confirmed in the multivariate analysis as many variables fail to exert a statistically significant effect on wasting. But odds of wasting reduce with age, access to improved sanitation (by 18%, but the effect is only significant at 10%), and with education of the household head (secondary education reduces wasting by 30%). The multivariate regressions also confirm that, even when other factors of malnutrition are controlled for, wealth tends to increase odds of wasting. The effect is strong: children living in the t2o-top quintiles of wealth are around 40% more likely to be wasted than children of the lower quintiles. These effects are however, significant only at the 10% level. It is also found that prenatal doctor visit reduces odds of wasting by 20% (effect is significant at 10%).

The relationship between poverty and stunting is clearly established in the multivariate regressions. Children living in the 4 top quintiles of wealth are between 14% and 22% less likely to be stunted than children in the bottom two quintiles. These effects are however not very strong in magnitude, and mostly just fail to reach usual levels of statistical confidence (except for the top quintile for which the effect is statistically significant at 10%). Other facets of poverty and welfare are more strongly associated with chronic malnutrition, however. Access to improved drinking water reduces odds of stunting by 25%. Education of mothers, either secondary or higher education, reduces chances of stunting by 26% and 18% with respect to children whose mothers have no education or a primary education, respectively. The presence of antenatal visits by a doctor likewise reduces chance of stunting by 23%. All these effects are highly significant, statistically. A surprising finding is, however, that access to improved sanitation increases odds of stunting by 15%. Postnatal baby check is also positively associated with stunting, but this may stem from the fact that mothers of malnourished babies

are more likely to seek assistance of a doctor. Breastfeeding and food dietary diversity are unrelated to stunting. Finally, the regressions show that stunting is more common among male, older and urban children.

Prevalence of overweight is not strongly related to poverty in Table 9. Children who are in households of the poorer quintile (the second bottom quintile) are 17% less likely to be overweight than others, but that is the only effect of wealth in the data. This relative lack of association between overweight and socio-economic status is confirmed by Mowafi et al. (2014). Education (of mothers or household heads) is unrelated to overweight, as is access to improved drinking water source, food dietary or access to antenatal checks. On the contrary, access to improved sanitation is strongly associated with overweight as is postnatal baby check. In terms of policy, the most striking results is the role of breastfeeding. Both immediate and exclusive breastfeeding (until the age of 6 month) are significantly associated with lower odds of overweight, by 16% and 10%, respectively.

Analysis

Evolution of Income, Poverty and Inequality

Real GDP per capita has increased by an average of 1.8% per year between 2000 and 2015. The increase has been steady but tapered off after 2011, which coincides with growing political instability in the region. The reduction of the rate of economic growth since 2011 has amplified an increase in poverty rates that started in 1999. About 27.8% of the population lived below the national poverty line in 2015, a figure on the rise since 1999/2000. The poverty rate was 17% in 1999, 20% in 2004, 22% in 2008, 25% in 2011 and 26% in 2013.

Wealth status of individuals is considered to be a key determinant of malnutrition as it is linked with the ability to purchase nutritious foods and to afford healthcare. Rashad and Sharaf (2015) found that child and household-level characteristics – including wealth status – matter more than economic growth and inequality to explain malnutrition levels in Egypt. However, we do not find such a strong relationship in the previous estimation of Table 9: Correlates of Malnutrition among Children below 5 Years of Age, Egypt 2014 And Sharaf and Rashad (2016) found that the relationship between household wealth and child malnutrition status is not constant across wealth levels, with most malnutrition problems concentrating at the bottom end of the wealth distribution.

Food Security

A likely explanation for the role of poverty on stunting is food security. Prevalence of food insecurity increased from 14% in 2009 to 17.2% in 2011, affecting 13.7 million people (WFP, 2013). Since the Avian flu crisis in 2006, Egypt was witness to several other crises that affected poverty and food security levels, such as the global food, fuel and financial crisis of 2007-2009, further global food price increases from 2010 onwards, and the economic challenges of the 2011 revolution (ibid). As net food importer, Egypt is vulnerable to international food price volatility; where poor households, whose food expenditure represents around 49% (Ramadan 2015a), are particularly at risk. Despite rural Upper Egypt remaining the poorest governorate, WFP (2013) show that "significant pockets of poverty and food insecurity are emerging in urban areas, where poverty increased by nearly 40% between 2009 and 2011" (which we confirm in our regressions).

Poor households are more likely than others to use negative coping strategies in times of crisis, such as a reduction of the daily intake of meat, poultry and fish and dietary diversity in general – insufficient dietary diversity is prevalent across 58% of poor households, compared to 23% of the non-poor (Ramadan 2015). Furthermore, particularly the poor rely on subsidized bread; and whereas Egypt's share of dietary energy from cereals, roots and tubers, and average protein supply are above world average, protein supply from animal origin is well below world average.

FAO data confirm that Egypt has not increased much its food production since 2004/06: it went up by 18% over the period 2006-2013. However, the average food deficit is low, at 12 kilocalories per days, and the proportion of undernourished people always remained below 5% since 1990/92 (FAO 2015).

Health, Water and Sanitation

The health, water and sanitation picture of Egypt is very contrasted. On the one hand, there is a near universal access to improved sanitation and drinking water source (95% and 99%, respectively) and a complete absence of open defecation since 2008. On the other hand, Egypt does badly on treatment of diarrhoea (only 22% of children are given oral rehydration and continuous feeding, which is in the bottom 10% of the world distribution). Healthcare supply is also particularly deficient: in 2012 there were only 0.5 beds per 1,000 people in Egypt, which is in the bottom 5% worldwide (it is the joint 13th lowest). And things are getting worse as there were still 2.2 beds per 1,000 people in 2005. Maternal mortality, is however, slightly lower than the world median (the lifetime risk of maternal mortality was 0.12% in 2015, against a median of 0.17%).

Egypt has also made good progress on the coverage of antenatal care: in 2014, 90% of pregnant women received antenatal care (which corresponds to the world average), against only 74% in 2008. In the EDHS 2014, women who had given birth during the 5 years preceding the survey, were asked a battery of questions about pre-natal care, including the intake of iron supplements, intestinal worms precautions, whether they were weighed, had blood pressure measured, urine and blood samples taken, and whether they were informed about potential complications to their pregnancies. 31.3% of women giving birth in the five years preceding the EDHS 2014 data collection, received vitamin A in the first two months after the delivery of the last-born child; 64.6% of women took iron tablets or syrup at least for parts of the pregnancy; and 90.2% of women lived in households with iodized salt during the last pregnancy. However, only 3.3% of pregnant mothers took deworming medication. The quality of antenatal care was highly dependent on whether mothers had regular and frequent antenatal visits: for example, 72% of mothers with regular care (four antenatal visits or more) prior to the last birth, received or bought iron supplements opposed to 26% of mothers who had none.

The quality of the care also varied with demographic and socioeconomic characteristics. For example, urban, higher educated and wealthier mothers and mothers who earned cash were more likely to have received the recommended antenatal care than rural, lesser educated, poorer mothers and mothers who did not get paid or got paid in-kind. Of particular concern is if the quality of pregnancy care decreased with higher birth orders because with increasing numbers of birth children, women and babies are at higher risks of complications.

Breastfeeding and IYCF Practices

The regression results further underscore the importance of breastfeeding. The EDHS 2014 shows that 95.7% of last born children within the two years preceding the survey were breastfed with a median duration of 17 months – indicating that breastfeeding is almost universal in Egypt now. However, the data also showed that only 40% of children under the age of 6 months were exclusively breastfed, and about 30% were bottle-fed.

WHO and UNICEF recommend starting to feed complementary food by the age of six months. The majority of Egyptian children aged 6 months and older receive other foods or milk in addition to breast milk (EDHS 2014). However, 23% of children aged 6-8 months are not being given solid or semi-solid food in addition to the breast milk and 8% of children aged 9-11 months are not being fed solid or semi-solid food. This is a risk factor, because after the age of 6 months, mothers' breast milk no longer produces adequate nutrition for the child.

With increasing age, infants and young children should rely less and less on breastfeeding alone, and the number of food groups consumed and the frequency of other food and liquids should be increased. Looking at the data, 79.7% of youngest children aged 6-23 months, received breast milk or breast milk substitutes during the 24 hours before the survey; 43.2% had been fed foods from at least 4 different food groups depending on their age and breastfeeding status; and 60.2% had been fed the minimum standard number of times, according to what is considered appropriate for their age. Taking all three criteria together, only 23.3% of children were fed according to IYCF guidelines. According to EDHS report there are no consistent patterns across socio-economic characteristics. Additionally, only 23% of children aged 6-23 months were fed according to the minimum IYCF standards for diet diversity and meal frequency (see Figure 4 above).

Relationships between Maternal and Child Malnutrition

For all children born since January 2009, information on the child's birth weight was obtained - either from a written record or the mother's recall (EDHS 2014). 15.5% of children whose birth weights were recorded, weight less than 2.5 kilograms at birth, which is classified as low birth weight; and 4.7% of mothers recalled that their child was very small, and 11.8% thought it smaller than average. In general, the shares of low weight or small new-borns are larger in rural areas and in the frontier governorates. Furthermore, children from better-off households - indicated by the wealth quintile and/or the working status of the mother as 'working for cash' - have higher birth weights and sizes.

To investigate how much low birth weight and maternal malnutrition impact later nutritional status, Table 10 presents the results of the quantitative analysis of intergenerational transmission of malnutrition described earlier in the chapter.

Table 10: Estimations of the Effects on Children Malnutrition of Low Birth Weight and Malnutrition of their Mothers, Egypt

	(1)	(2)	(3)	(4)	(5)	(6)
	Wasting	**Wasting**	**Stunting**	**Stunting**	**Overweight**	**Overweight**
Mother is stunted	1.00 (0.19)	0.98 (0.20)	1.62*** (0.18)	1.56*** (0.18)	0.75* (0.12)	0.78 (0.13)
Low birth weight	1.42*** (0.19)	1.47*** (0.20)	1.64*** (0.14)	1.57*** (0.14)	1.26** (0.13)	1.22* (0.13)
Age child	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	0.99*** (0.00)	0.99** (0.00)
Girl	0.81** (0.08)	0.83* (0.09)	0.78*** (0.05)	0.80*** (0.05)	0.91 (0.07)	0.92 (0.07)
Controls	No	Yes	No	Yes	No	Yes
Observations	6106	5757	6106	5757	6106	5757

*Note: authors' calculations based on the EDHS (2014) data. Coefficients are odds ratios and figures in parentheses refer to standard errors. *: p<0.1, **: p<0.05, ***: p<0.001.*

One can see that children are not more likely to be wasted when their mothers are short. However, low birth weight is positively associated with wasting (children who were small at birth are almost 50% more likely to be wasted at the time of survey, column 2). The pattern of intergenerational transmission is even stronger for stunting. Children whose mothers are short are about 60% more likely to be stunted; and children who were small at birth are 57% more likely to be stunted than other children. Like for wasting, the results remain remarkably consistent with and without controls. The pattern of transmission of malnutrition when one looks at over-nutrition is more complex. On the one hand, children whose mothers are short tend to be less likely to be overweight than others (but the effect is imprecisely estimated). On the other hand, children who were small at birth are more likely to be overweight (by 22-26%) than children who were not small.

Malnutrition and Poverty in the National Development Strategy

Egypt has a 10-year Food and Nutrition Policy and Strategy (2007 – 2017) with 12 policy areas, which are considered to be comprehensive. These 12 policy areas are (based on Landscape Analysis 2013):

1. Promotion of inter-sectoral collaboration that lead to Universal Access to adequate food and nutrition
2. Incorporation of Nutrition Objectives (which fall under the policy areas) into National Development Policies, Plans, Strategies, Programmes, or activities to achieve Millennium Development Goals
3. Improving Household Food Security
4. Monitoring the food and nutrition situation
5. Improving the Quality and Safety of Food related Services to protect consumer health
6. Prevention and Control of Nutrition infectious diseases
7. Caring for the socio-economically deprived and nutritionally vulnerable

8. Capacity building and development at community, institutional and authority levels
9. Prevention and Control of non-communicable/chronic diet-related diseases (NCDs)
10. Promotion of infant and young child feeding and protection of breastfeeding
11. Prevention and control of micronutrients deficiency
12. Promotion of healthy dietary practices and life styles focusing on school aged children and adolescents

Egypt ranks 12th out of 45 African countries in the latest HANCI Africa Index, and its commitment is considered moderate (http://africa.hancindex.org/countries/egypt/). The country score is held back by the lack of a separate budget line for nutrition (but nutrition appears in sectoral budgets), a low coverage in vitamin A supplementation, weak presence of nutrition in the national development policy documents, and the absence of time-bound nutrition targets.

Given the importance of food security as an aspect of nutrition and the costs of malnutrition in Egypt, the National Implementation Team (NIT) proposed to consider the role of the Food Security Advisory Board in the implementation and evaluation of a "National Social, Economic and Health Plan" which would mobilize will across private and public institutions in a multi-sectoral effort that builds on the National Nutrition Strategy (COHE 2013).

UNICEF Egypt Country Office, together with the Ministry of Health and Population (MOHP), commissioned a landscape analysis (LA 2012) – the first of its kind in the MENA region – in 2010. The aim of this landscape analysis was to review gaps and constraints, and to identify opportunities "for integrating new and existing effective nutrition actions in order to create and accelerate inter-sectoral action for improving nutrition." This aim lays within the wider target of implementing sustainable action in the 36 high-burden countries (where 90% of malnourished children live), which Egypt belonged to in 2008.

Much of the landscape analysis in 2012 mirrors findings from the EDHS 2014. With respect to maternal and infant malnutrition, the analysis found sub-optimal levels of exclusive breastfeeding; declining consumption levels of vitamin A-rich foods amongst children; only half of children and women taking vitamin A supplements; and even a decrease of iron supplementation for infants from 49% in 2005 to 33% in 2008. It notes that wasting, stunting and underweight measures of malnutrition had increased between 2005 and 2008; as was shown in Figure 27 and Figure 28 of this report.

Several underlying causes of the widespread malnutrition were mentioned in the landscape analysis: food insecurity (due to low incomes, high food prices, low agricultural production outputs), poor dietary practices, inadequate health care provision, environmental pollution and food safety issues. These issues were also mentioned and discussed in stakeholder interviews. Poverty, food security and poor dietary practices in particular were perceived to be the most important drivers of malnutrition.

As we described earlier, reliance on energy-dense foods (high in fat, low in nutrients) and limited diet diversity is a strong factor contributing to malnutrition in Egypt. The policy of food subsidy by the government may also unwittingly worsen the reliance on energy-dense foods as opposed to nutrient-rich foods. Worryingly, a diet rich in energy contributed both to excess calorie intake, leading to overweight, and to micronutrient deficiencies, leading to stunting. Asfaw (2007) demonstrated through a rigorous statistical analysis that women's body mass index is directly associated – negatively – with the price of subsidised energy-rich food. The double burden of malnutrition is thus a critical area of concern. Programmes aimed at improving Infant and young children feeding practices are thus especially important. Kavle and

al. (2015) underscore that educational materials – tailored to the audience – need to be given to mothers and their families to improve the quality, quantity and frequency of meals. Messages related to the detrimental role of "junk food" on young children development need to be given to a wide range of local actors as part of community-level strategies.

A readiness analysis – conducted as part of the above mentioned landscape analysis - showed a "general willingness to participate in any activities that will see nutrition actions scaled up" across different stakeholders. The analysis mapped a wide range of nutrition actions that were already undertaken, proving a lot of wide ranging commitment. However, the analysis also found that none of these activities were operating at scale to reach the wider population, which is largely based on to the predominantly curative approach to nutrition problems, at the expense of preventive activities. This issue was also noted by the COHE in 2013. One of the clear recommendations of the study was to refrain from viewing chronic child undernutrition as a sectoral concern, and to make stunting prevalence rates a "key outcome indicator for social and economic development policies" which is tackled across numerous sectors (COHE 2013, p. 50).

The issue of the high number of scattered programs across the country was also confirmed in the expert interviews that were conducted for the present report. Experts firmly believe that key issues of malnutrition in Egypt relate to poverty as well as to the awareness about what constitutes nutritious food. Poor households are more likely to rely on subsidised food, often bread, but even where food budgets are low, better choices could be made. In order to achieve change in people's awareness of and perception of nutritious food, a WFP programme currently piloted in one of the poorest governorate, Sohag, take these issues into account. WFP works together with ministries in a cash transfer program based on antenatal care attendance. Female participants receive food basket vouchers and recommendations for healthy food during their pregnancy and the first two years of the child. This will be complemented by awareness and education campaigns with educational videos in primary health care centres in the communities and in public spaces. In addition to nutritional issues, these messages will talk about the role of mental health, the role of fathers, and also target adolescents. Another project aimed at changing people's attitude towards 'good food' and to move families away from cheaper fast food is the recipe series for Egyptian dishes that are both nutritional and to the taste of the population.[12] This type of programme is directly related to the sentiments also related by stakeholders in the landscape analysis, in that lifestyle and dietary habits need to change across people of all walks of life. It also speaks to one of the key recommendations of COHE (2013), which was focused on communicating nutritious low budget foods for behaviour change.

By providing financial resources to mothers, cash transfer programmes can increase food security and access to nutritious foods. However, in the context of readily available energy-dense foods, cash transfers may in fact reinforce obesity and overweight in Egypt. Aitsi-Selmi (2009) suggests that increased income and adult health knowledge caused by the design of Egypt's conditional cash transfer programme may offset the latter's negative impact through poor diets. It follows that combining such conditional cash transfer programmes with wide-ranging behavioural change communication (BCC) actions, and possibly the reorientation of the current food subsidy towards ensuring access to healthy foods (through e.g. vouchers) could maximise the beneficial role of social protection on malnutrition (Asfaw 2007).

[12] World Food Programme's (WFP) recipe series, FamilyChef; e.g. https://www.wfp.org/stories/familychef-egyptian-bean-dip-foul

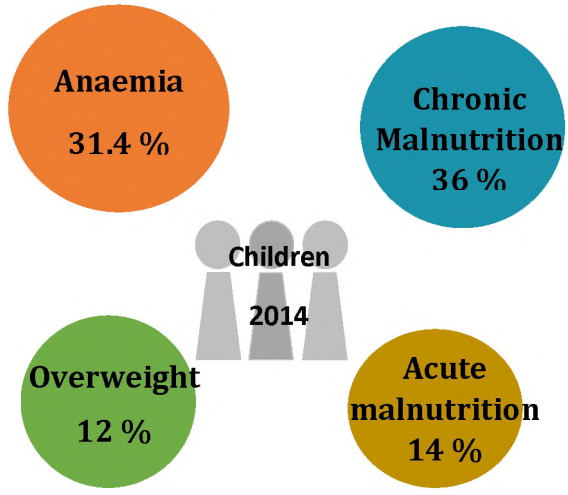
Another sentiment voiced in stakeholder interviews was the need to tackle malnutrition at various stages of life. The cash transfer programme conditional on prenatal care mentioned above speaks to this, and so does the school-feeding programme. The current national school-feeding programme covers 13.5 million students.[13] As mentioned above, early years are critical for the development of the double burden of malnutrition, which justifies actions targeted at early childhood, but this should not be done at the expense of a continuum of care throughout the life-cycle.

3.3. Indonesia

Indonesia has the largest economy in Southeast Asia, with a GDP of US$ 1 trillion in 2012. It is a G20 member, a stable democracy and the fourth most populated country in the world, with 251 million people, 50% of whom are below the age of 30. However, it faces persistent public health problems, and the large population amplifies the numbers. The infant mortality rates were 29 per 1,000, live births in 2013 (IFPRI, 2015). Food insecurity and undernutrition are persistent challenges in Indonesia, particularly in the eastern provinces, where stunting is alarmingly prevalent. Hunger and malnutrition reportedly have been halved two years before the 2015 Millennium Development Goal deadline, but pockets of the country remain a serious concern with stunting in certain districts reaching levels as high as 58%.

Despite recent global economic crises, Indonesia has witnessed steady economic growth in recent years. The country rose to lower middle income status in 2009 and has experienced a gradual reduction in overall poverty, from 17% in 2004 to 13% in early 2010. Indonesia's economic growth has reached 5% in 2014 and 4.8% in 2015 (World Development Indicators, 2016). 15.5% of people live in multidimensional poverty (55th rank in the world), and 7% are vulnerable to multidimensional poverty (Alkire et. Al 2016). Indonesia ranks at the 110th place on the Human Development Index (UNDP 2015), which corresponds to a medium level of development.

Figure 29: Malnutrition in Indonesia at a Glance



Source: IFLS (2014)

[13] https://www.wfp.org/news/news-release/egyptian-government-expand-national-school-feeding-programme-reach-all-public-scho

State of Malnutrition in Indonesia

Traditionally, Indonesia has prioritized undernutrition, paying special attention to "*Gizi Buruk*" or severe underweight as a way to judge the national nutritional situation (likely driven by the MDG indicator of measuring underweight). However, by this measure alone, nutritional issues appear largely resolved, as the prevalence of severe underweight is just 5.4% in children under-five.

Levels of wasting however remain high with 14% of children under 5 wasted and 7% severely wasted in 2015 (UNICEF,WHO,WB, 2015) and the national prevalence of stunting and anaemia stand at 37.2% and 31%, respectively (Basic Health Survey or *Riskesdas*, 2013).

Table 11 presents the breakdown of stunting, wasting, overweight and anaemia prevalence by key characteristics, based on data from the Indonesia Family Life Survey (2014). Stunting is more prevalent in rural than urban areas (40.2% against 31.6%), among children with uneducated mothers (41.4% against 33.9% for mothers with a level of education), and among children from lower socio-economic status (prevalence of stunting is 39.7% in the poorest group and 29.1% in the richest group). One can also see that stunting is very acute in the regions of Tenggara and South Kalimantan, where it is close to 50%.

Wasting does not vary much across sexes or residence. And while children with uneducated mothers are more likely to be wasted (10% against 8.9% for children with educated mothers), the relationship with wealth is not clear. The regional variations are also less pronounced than for stunting. Nevertheless, Bali (3.9%) and West Sumatra (6%) seem to be spared the brunt of acute malnutrition.

Prevalence of anaemia is highest among boys (33.3% against 30% among girls) but does not vary much with education or wealth groups (although children of the richest group are significantly less likely to be anaemic, at 27%). Regional variations are, however, very wide. While West Sumatra (13.5%) is well below the national average, Tenggara (53.7%) and South Sulawesi (41.6%) are well above it.

Overweight among under-five children is not very high (1.7%) in Indonesia. Urban areas are more affected (2.4% against 1.1% in rural areas); and overweight is more common among children with educated mothers (2%) and who belong to the richest group (2.4%). Yogyakarta (3.8) and East Java (2.8%) are most affected by overweight.

Table 11: Breakdown of Child Malnutrition (under-five) by Key Characteristics, Indonesia 2014

	Stunting	Wasting	Overweight	Anaemia
Sex: Male	36.4	9	1.7	33.3
Sex: Female	34.0	8.1	2.0	29.8
Residence: Urban	31.6	8.3	2.4	30.6
Residence: Rural	40.2	8.9	1.1	31.7
Education: Below 1st grade	41.4	10	1.2	31.4
Education: Above 1st grade	33.9	8.2	2	31.0
Wealth quintile: Lowest	39.7	9.4	1.7	33.7
Wealth quintile: Second	37.0	8.2	1.5	31.8

	Stunting	Wasting	Overweight	Anaemia
Wealth quintile: Middle	35.2	7.8	1.9	32.4
Wealth quintile: Fourth	34.5	8.1	1.8	30.2
Wealth quintile: Highest	29.1	9	2.4	26.7
Region: North Sumatra	39.7	9.2	1.8	21.6
Region: West Sumatra	31.6	6	1.2	13.5
Region: South Sumatra	36.1	10.2	0.4	35.6
Region: Lampung	31.1	11.9	2.2	24.2
Region: DKI Jakarta	31.7	7.7	1.9	33.3
Region: West Java	32.9	6.2	1.5	30.8
Region: Central Java	30.7	10.5	2.5	33.9
Region: DI Yogyakarta	26.7	8.1	3.8	34.8
Region: East Java	33.0	7	2.8	26.7
Region: Bali West Nusa	29.9	3.9	1.4	30.3
Region: Tenggara	48.8	10.5	1.0	53.7
Region: South Kalimantan	45.6	7.8	1.9	34.4
Region: South Sulawesi	38.2	10.1	1.5	41.6
Mean	35.3	8.5	1.9	31.1

Source: authors' calculations based on the IFLS (2014). Wealth index created by the authors with a factors analysis.

Trends in Malnutrition

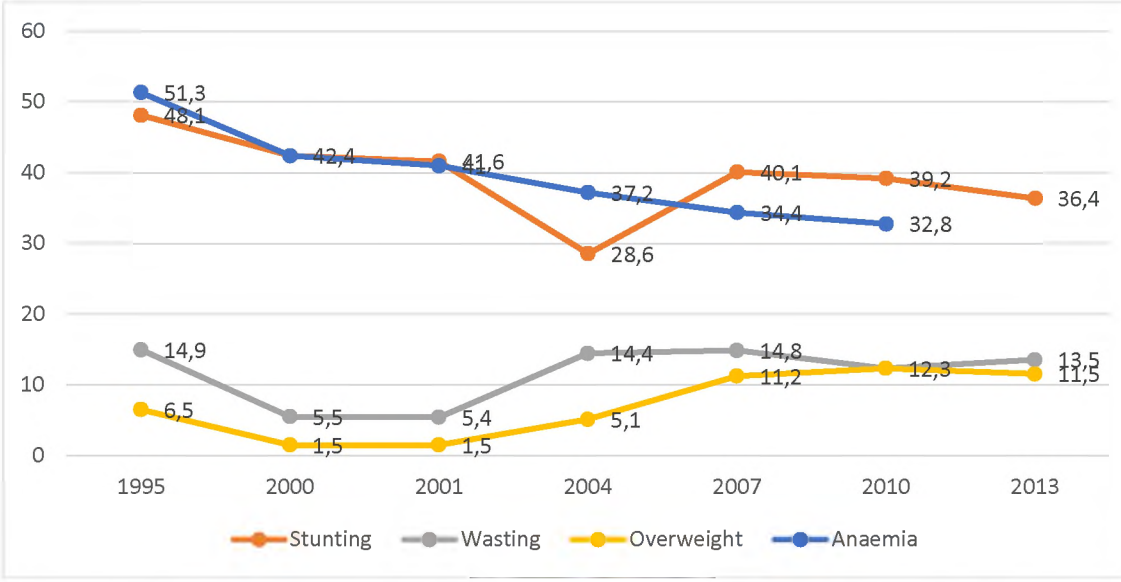
Figure 30 shows that trends in malnutrition are very different between types of malnutrition. Indonesia has managed to reduce chronic malnutrition in a steady manner since 1995. The prevalence of stunting has decreased from 48.1% in 1995 to 36.4% in 2013, which corresponds to a decline of 0.65 percentage point per year. The pace of stunting reduction has been remarkably constant over the entire period if we ignore the year 2004 which displays a much lower, and hardly credible, stunting rate of 28.6%.[14] Anaemia prevalence has likewise decreased steadily over the period, from 51.3% in 1995 to 32.8% in 2010 (and 31% in 2014). The pace of anaemia prevalence reduction has been sustained, at 1.2 percentage point per year.

In contrast, acute malnutrition (wasting) has not gone down much from its 1995 level. Prevalence of wasting had initially decreased from 14.9% in 1995 to 5.4% in 2001, but has since then increased until 2013 to reach the level of 13.5%. Overweight has followed a similar pattern: prevalence first decreased between 1995 and 2001 (from 6.5% to 1.5%) but has since steadily increased to reach 12.3% in 2010 and 11.2% in 2013.

[14] The dataset used in that particular year is different the ones used in the other years, and has a much lower sample size.

The evolution of acute malnutrition is surprising in light of the secular progress of GDP per capita. The increase of acute malnutrition between 1995 and 2001 coincides with the period of recession linked to the Asian debt crisis of the end of the 1990s. But the deterioration of acute malnutrition between 2001 and 2013 coincides with a period of robust economic growth in the post-debt crisis era (GDP per capita increased by 69% over this period).

Figure 30: Evolution of Child Malnutrition between 1995 and 2013, Indonesia



Source: ICF International, 2015. The DHS Program STATcompiler. Funded by USAID. http://www.statcompiler.com. October 19 2016

Relationships between Poverty and Malnutrition

Multivariate Regressions

Table 12 presents the results of the multivariate regressions aimed at identifying correlates of child malnutrition in Indonesia. Most variables included in the regressions are not related to the likelihood of wasting. The most important exception is food diversity: consuming one additional food group is associated with a reduction of the odds of wasting by 8% (the effect is significant at the 1% level). Education of the household head is surprisingly positively associated with wasting, but the effect is small and imprecisely estimated. Finally, wasting is more common in households headed by older individuals, but the effect is not very precisely estimated (at 10%).

Stunting is strongly associated with some poverty-related variables. Children of the richest group are 27% less likely to be stunted than others (significant at 1%), but it is interesting to note that there is no systematic difference in the odds of stunting across the other 4 wealth groups. Children having access to improved sanitation are also 27% less likely to be stunted than others, and the effect is significant at the 1% level. Odds of stunting are also considerably higher in large households: each additional child under the age of 5 increases the chance that other children are stunted by 17%. Rural areas are also much more affected by stunting than urban areas (by 27%). Finally, education of heads of households protect from stunting but the effect is very modest. However, we do not find an impact of food diversity or breastfeeding on

stunting. Breastfeeding over a long period is even positively associated with stunting, possibly because mothers of thin children are more likely to receive messages about breastfeeding and IYCF practices.

Overweight is largely unrelated to the variables included in Table 12. However, most cases of overweight occur in households with improved sanitation, hence the strong coefficient associated with this variable.

Table 12: Correlates of Malnutrition among Children below 5 Years of Age, Indonesia 2014

	(1)	(2)	(3)
	Wasting	**Stunting**	**Overweight**
Girl	0.85 (0.11)	0.89 (0.07)	1.36 (0.35)
Age in months	1.00 (0.001)	1.00 (0.002)	0.95*** (0.01)
Wealth index (r: poorest quintile)			
Poorer	0.90 (0.18)	0.95 (0.11)	0.74 (0.36)
Middle	0.80 (0.16)	0.94 (0.11)	1.08 (0.45)
Richer	0.95 (0.19)	0.97 (0.11)	1.01 (0.44)
Richest	1.32 (0.25)	0.73*** (0.09)	1.21 (0.52)
Improved sanitation	0.80 (0.13)	0.73*** (0.07)	4.59** (3.50)
Mother's age	1.00 (0.01)	0.99* (0.01)	0.97 (0.02)
Mother is working	0.79 (0.12)	0.88 (0.07)	1.71** (0.47)
Rural	0.94 (0.13)	1.27*** (0.01)	0.60* (0.18)
Mother's education (r: no education)			
Education	0.81 (0.14)	0.87 (0.09)	1.52 (0.68)
Number of children below 5 years of age	0.90 (0.11)	1.17** (0.09)	0.92 (0.24)
Female-headed household	1.15 (0.23)	1.17 (0.14)	0.55 (0.28)
Age head of household	1.01* (0.01)	0.99 (0.003)	1.02 (0.01)
Education head of household (r: no education)			

	(1)	(2)	(3)
	Wasting	**Stunting**	**Overweight**
Education	1.06* (0.03)	0.96** (0.02)	1.11 (0.09)
Breastfed for 24 months	1.00 (0.13)	1.21** (0.09)	0.83 (0.23)
Exclusive breastfeeding	0.79 (0.23)	0.96 (0.14)	0.88 (0.53)
Prenatal doctor visit	0.50 (0.21)	0.77 (0.24)	.
Dietary diversity index	0.92*** (0.02)	1.01 (0.01)	0.94 (0.04)
Observations	3377	3377	3267

*Note: authors' calculations based on the IFLS (2014) data. Coefficients are odds ratios and figures in parentheses refer to standard errors. *: p<0.1, **: p<0.05, ***: p<0.001.*

Analysis

Evolution of Income, Poverty and Inequality

As was mentioned above, despite recent global economic crises, Indonesia has witnessed a steady and robust economic growth in recent years. Between 2000 and 2015, real GDP per capita increased by 5.3% per year (including the period of recession of the late 1990s due to the Asian debt crisis). As a result, the country rose to lower middle income status in 2009 and has experienced a gradual reduction in overall poverty. Poverty headcount (calculated at the $1.9 per day line) went from 49.6% in 1995 to 24% in 2004 and 8.2% in 2014.

Yet, while chronic malnutrition has steadily declined over the same period, acute malnutrition and overweight have increased.

Food Security

Indonesia's increase in national wealth has been accompanied by significant improvement in food security. Yet, challenges remain for the future stability of the Indonesian food system. According to the 2015 Global Hunger Index (GHI 2015), Indonesia reduced its GHI score by up to 25% since 2000. While it has not reduced hunger at the same rate as other South-East Asian countries, such as Thailand and Vietnam, it has made considerable efforts to combat food insecurity. The proportion of undernourished people likewise went down from 18.8% in 2005/07 to 7.6% in 2014/16 (FAO 2015). Largely due to the fear of supply disruptions, Indonesia announced its intention to meet 90% of its food needs from domestic sources by 2014. This highly ambitious goal has not been achieved. Most food-crop farmers are smallholders and face problems of economies of scale. It will be difficult for the industry to increase production to meet self-sufficiency targets, particularly when climatic conditions become increasingly variable as a consequence of climate change (Piesse, 2016).

Improvement in food security also manifests itself in the increase in food availability, measured by energy per capita. The increase mostly came from doubling the amount of fat consumed. Rice availability remained mostly stable while energy coming from meat and fish doubled, from milk tripled, and from wheat increased six-fold. Simultaneously, the increased global trading of foods has led to increasing amounts of processed food imports in LMICs, which are distributed mainly through growing supermarket chains and multinational fast-food

companies. Urban areas are particularly affected by these new commercial outlets (World Bank 2013).

A stakeholder from University of Indonesia argued that the relationship between economic growth and stunting prevalence in Indonesia is not linear, and stressed that stunting does not just hit the poor households but also wealthy households. This is consistent with the finding that wealth and stunting are not related except for the richest group. Yet a project to address stunting led by UNICEF in three districts between 2011 and 2014 found that the most significant improvement came from the lowest wealth quintile: a 6% stunting reduction was found in the general population but 9% in the lowest quintile. These results hint at the complexity of the malnutrition problem, and the need to look beyond poverty and lack of food.

Health, water and sanitation

Health and rural infrastructures of sanitation and water are particularly key. A stakeholder from an international NGO explains how the GoI has currently intensified infrastructure development which is necessary for access to health care. He further elaborates that without roads, doctors, midwives and nurses are unwilling to serve in rural areas. With 0.6 hospital beds per 1,000 people, Indonesia fares poorly in that sector, as it ranks in the bottom 10% in the world. Likewise, with 1.4 nurses and 0.2 doctors per 1,000 people in 2012 (when the global medians are 2.5 ad 1.3, respectively), access to quality healthcare in Indonesia is well below expectations of a middle income country. Access to improved sanitation and water source is also limited: only 61% of Indonesians had access to the former and 87% to the latter, when the global medians are 83% and 95%, respectively. 20% of people still had to resort to open defecation in 2015, which places Indonesia in the bottom 25% worldwide in that respect.

The recent trends are positive but although the rate of progress is relatively slow: open defecation was reduced by 33% and access to improved sanitation and water increased by 30% and 12%, respectively, since 2000. The number of doctors per 1,000 people increased by 25% between 1990 and 2015 and that of nurses increased by 69% between 2003 and 2012.

IYCF practices and breastfeeding

Beyond material means, caregivers' knowledge of feeding best practices were deemed critical by interviewed stakeholders. Many caregivers in Indonesia hold harmful beliefs about feeding of infants and young adults that need to be challenged by behavioural change communication (BCC). In general, urban areas have lower levels stunting among children under-five than rural areas, although urban areas host more obesity cases than rural areas. Regarding the feeding practices, urban households are considered more worrisome than rural ones, since they ostensibly consume more processed food and calorie-dense foods which may provide sufficient (or too much) energy, but are often lacking in essential micronutrients. The caregivers' knowledge of nutrition matters in this context, as caregivers may not be aware of appropriate feeding practices and are often unwilling to cook due to the lack of time. Thus, the tendency is to buy convenience foods but there is little regard given to the ingredients and ensuring the foods meet children's need. This often leads to micronutrient deficiencies and increasingly, overweight.

Stakeholders from the University of Indonesia and GKIA believe that people from poor urban families are more at risk of malnutrition compared to those who come from poor rural families. The urban poor bear more burdens than the rural poor, since they do not have any natural resources to be utilised, unlike in the rural areas where most of the poor people have access to land to grow their own food. An assessment of Indonesia's physical environment reveals an urban environment that is fairly unfriendly to pedestrian physical activity with

limited access to healthy foods seen in many urban environments, so that those travelling to and from school and work have few options other than ready-made foods outside of the home. At present and particularly given a low public awareness of the double burden problem, schools are not yet a venue for preventing child obesity.

Relationships between Maternal and Child Malnutrition

Anaemia among pregnant women is a persistent issue at 37% and was highlighted by six out of the eight interview respondents. Maternal anaemia can lead to babies being born low birth weight (LBW). The rate of LBW babies in Indonesia is between 8-11% which is likely due to energy deficiency during pregnancy and maternal anaemia. Based on the Indonesian Demographic and Health Survey (IDHS), only 17% of pregnant women consume at least 90 iron tables during pregnancy. There are two possible causes that can be drawn from the interviews; first, the availability of such iron tablets, under a national programme, is still somewhat varied from one district to another. Therefore, the Government of Indonesia (GoI) must ensure supply. Secondly, caregivers or mothers might accept the iron tablets but they do not consume them according to the right procedures.

In addition to supplementation with iron tablets at the individual level, other programmes aimed at improving maternal and child nutrition such as family planning, antenatal care, immunisation, vaccine, provision of Iron Folic Acid supplements are available.

Table 13 presents the results of the regression of current children's nutritional outcomes on their mother's stature and whether the child had low birth weight. One can see that the intergenerational transmission of malnutrition is relatively modest when wasting is concerned. There is no relationship between mothers' height and children's wasting status; but children who were of low weight at birth are between 44% and 55% more likely to be wasted than children who were born with a normal weight. The intergenerational transmission of stunting is stronger: children whose mothers are short are 2.3 times more likely to be stunted than other children, and children who had low weight at birth are 73% more likely to be stunted than children of normal weight at birth. Finally, there is an inverse relationship between maternal malnutrition and child overweight: children whose mothers are short are half as likely to be overweight than children from mothers of normal stature.

Table 13: Estimations of the Effects on Children Malnutrition of Low Birth Weight and Malnutrition of their Mothers, Indonesia

	(1)	(2)	(3)	(4)	(5)	(6)
	Wasting	**Wasting**	**Stunting**	**Stunting**	**Overweight**	**Overweight**
Mother is stunted	0.85 (0.11)	0.83 (0.11)	2.33*** (0.17)	2.32*** (0.18)	0.47*** (0.14)	0.51** (0.16)
Low birth weight	1.55*** (0.24)	1.44** (0.24)	1.72*** (0.17)	1.73*** (0.18)	0.74 (0.30)	0.66 (0.29)
Age child	1.001 (0.005)	0.99** (0.004)	1.00 (0.002)	1.00 (0.003)	0.95*** (0.01)	0.95*** (0.01)
Girl	0.80* (0.10)	0.81** (0.10)	0.85** (0.06)	0.85** (0.06)	1.36 (0.34)	1.39 (0.36)
Controls	No	Yes	No	Yes	No	Yes
Observations	3377	3377	3377	3377	3267	3267

*Note: authors' calculations based on the IFLS (2014) data. Coefficients are odds ratios and figures in parentheses refer to standard errors. *: p<0.1, **: p<0.05, ***: p<0.001.*

Malnutrition and Poverty in the National Development Strategy

Indonesia ranks 10th out of 45 countries for its commitment to reduce hunger and malnutrition (te Lintelo and Lakshman 2015). On the specific fight against malnutrition, Indonesia ranks 10th as well. Positive elements are the existence of a nutrition budget, government's promotion of complementary feeding, high skilled birth attendance, and the existence of a national nutrition programme, good multi-stakeholders and multi-sectors coordination mechanism, time-bound nutritional targets and a national nutritional survey. Weaknesses include the weak place of nutrition in the national development strategy, moderately high coverage in vitamin A supplementation, moderate access to drinking water, and poor access to sanitation.

Looking at the share of health expenditures in GDP as an additional measure of commitment yields a less positive picture. Indonesia's heath expenditures only represented 2.8% of its GDP in 2014, which puts it in the bottom 5% in the world (it is the 10th country starting from the end). After an increase between 2000 and 2007 (from 2% to 3.1%), the share of health expenditures in the economy has been going down until 2011 (to 2.7%) before picking up a bit ever since.

The National Mid-Term Development Plan (RPJMN) 2015-2019 is the overarching five-year national framework for development policies and programmes since the President Joko Widodo took office. Indonesia's commitment to nutrition was felt by stakeholders to have increased in the last 5-6 years. It became a member of the Scaling-Up Nutrition Movement in 2011 and, as explained by a representative from the Ministry of Health (MoH), it was at the beginning of 2013 that nutrition-specific measures to address stunting were carefully being considered and several stakeholders mentioned that the current government is putting a special emphasis on stunting. Indeed, stunting has been listed as one of Indonesia's national development indicators, which means it is prioritised and aligned with the wider development vision.

Indonesia's commitment for nutrition is also reflected in the order of Laws (Number 18, 2012) that orders both the national and the local governments to formulate an Action Plan for Food and Nutrition at their respective administration levels: national, provincial and district. At the national level, the awareness of nutrition among government sectors and across multiple stakeholders is rising, and the political commitment is there, as seen in the completion of National Action Plan for Food and Nutrition that adopts multi-sectoral approach for nutrition policies and programmes.

The country has a high level coordinating body, The Secretariat of National Movement for Nutrition Improvement Acceleration (previously called Secretariat for the First 1000 Days of Life), which sits within The Ministry of National Development Planning (or Bappenas). Bappenas is now able to identify both nutrition sensitive and nutrition specific interventions, which ministries need to be involved, and to cost the activities. This has resulted in a growing number of government sectors included in the nutrition efforts, up to 18 Ministries including 3 Coordinating Ministries. Bappenas is currently in the midst of determining the coordination and monitoring mechanisms with other ministries. Evaluations are undertaken every 6 months.

Another representative from Bappenas argued that the multi-sectoral approach for nutrition policy and programme is still relatively new. Bappenas is currently advocating for nutrition to other sectors, stressing that 70% of nutrition intervention rely on sectors other than health.

Stakeholders reported enthusiasm from other ministries and agencies; as the current system critically lacks integration of the many nutrition-related programmes in existence.

Challenges on the Ground

Two independent stakeholders from CSO and Academia felt that the SUN Movement is not making progress as the nutrition problems of maternal and child nutrition are stagnant. Stunting and wasting rates remain very high, and overweight is on the rise.

The stakeholder interviews highlighted several challenges perceived to ultimately hamper the progress of malnutrition reduction in Indonesia. The upmost challenge is the need to foster accountability to nutrition in Indonesia. Almost half of all stakeholders agree that the existence of regulation or an Action Plan on nutrition is often deemed a great outcome on its own, overlooking the gap between regulation and implementation.

The above-mentioned challenge to implement nutrition policy and programmes is mostly rooted in the suboptimal inter-sector collaboration among government agencies and multi-stakeholder coordination between government, CSOs, International Organisations, NGOs, private sector and academics. Although the awareness of nutrition among different sectors and stakeholders is considered to be rising at the national level and the political commitment for nutrition is available, several stakeholders perceive that the only highly engaged government sectors are the Ministry of Health and Bappenas. This means that an active role from other ministries is not yet fully seen. According to two stakeholders from government sectors, commitment for nutrition will only be seen when the relevant sectors have pin-pointed funding allocations and programme planning.

The third challenge is the suboptimal vertical coordination between national government at the national level and the local governments at provincial and district levels as the actual implementers on the ground, resulting in varied compliance between them. Ever since decentralisation was effectively implemented in Indonesia in 2000, 34 provinces and 512 districts throughout the country have been given wide-ranging authorities. As a result, the role of the central government is mostly a steering one, through providing guidelines, norms, and standards. It can only reach the local government at the provincial level, and cannot directly reach the district-level government unless the district is extremely troubled. It is the responsibility of the provincial governments to manage and reach the district-level governments that fall under their purview. Thus, variation in nutrition progress is inevitable. With regard to the National Action Plan for Food and Nutrition, the big challenge is its implementation which takes place at the sub-national level: province and district. Not all local governments comply with the national direction to formulate the Regional Action Plan for Food and Nutrition (RADPG) and the central government seems to be aware of the issue of low compliance. As a stakeholder from Bappenas states, the actual challenge lays in setting-up an effective monitoring system.

An incentive-based scheme seems required to increase compliance of local governments with the national guidelines or directions. Six out of eight stakeholders imply the need to trigger motivation and/or pressure for the local government to demonstrate results and impacts from the state budget transferred by the central government. Incentive mechanisms can be initiated through the inclusion of nutrition outcome as one of the Key Performance Indicators (KPIs) of both Governor (at the province level) and Mayor (at the district level).

3.4. Bangladesh

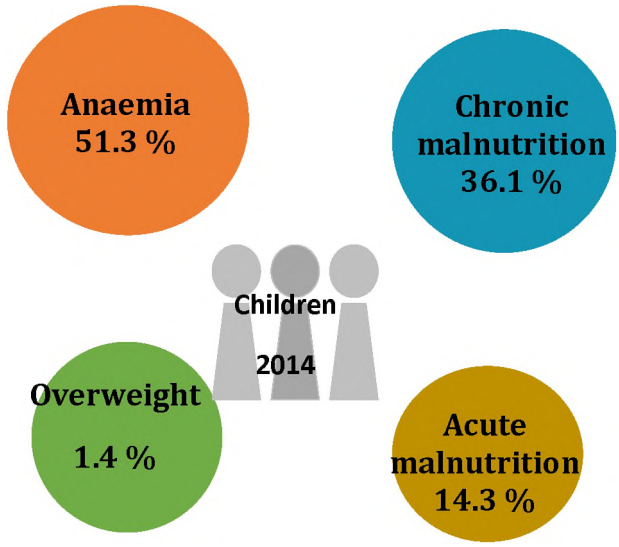
Bangladesh is located in South Asia and came into existence as the result of the split between Western and Eastern Pakistan in 1971. Bangladesh has an estimated population of 156 million, the ninth largest in the world. Despite this large population, Bangladesh is a very homogenous country: 90% of the population is Muslim, 99% speak the Bangla official language and 98% is ethnically Bengali (CIA 2016).

The country has witnessed impressive economic growth and poverty reduction: the proportion of people living in extreme poverty has been halved since the 1970s and the country grew at an average of 6% over the last two decades. Since 2015, Bangladesh has become a lower middle income country. This economic record has translated into nutritional progress: stunting rates went down from 55% in 1997 to 36% in 2014.

Nevertheless, stunting remains very high (the 24th worst rate in the world), and almost reaches 50% in regions of Syhet and Chittagong. The standards of living remain low despite the growth record and the economy is hampered by poor infrastructures, insufficient power supply, a high reliance on garment exports, and political instability. As a result, 41.3% of people in Bangladesh live in multidimensional poverty and 22.4% are vulnerable to it (76th out of 112 countries) and Bangladesh ranks 142nd out of 188 countries (corresponding to low levels of development).

State of Malnutrition in Bangladesh

Figure 31: Malnutrition in Bangladesh at a Glance



Source: BDHS (2014)

Bangladesh has a mean rate of wasting of 14.3%, the 14th highest in the world. This is close to the emergency threshold of 15%. However, other South Asian have similarly high levels of wasting (15% in India, 21% in Sri Lanka). Wasting rates do not vary much by sex, residence or education but are higher among households of the poorest quintile (17%) than the richest one (11%). Regional variations are also relatively limited although Dhaka is less affected than the rest of the country.

Bangladesh has the 24th highest stunting rate in the world, at 36.1%. This rate exceeds the critical threshold defined by the WHO. As can be seen in Table 14, prevalence of stunting is alarmingly high in a number of regions, where it is close to 50%. Stunting is more common in rural areas (38% against 31%), among households whose heads have with low or primary education (45% against 30% otherwise) and among poorer households (49% for households of lowest wealth quintile against 19% for households of the highest one).

With 1.4%, Bangladesh has one of the lowest rate of child overweight in the world (the fifth lowest). Overweight peaks among households with middle levels of wealth and in urban areas (especially Dhaka). Finally, with 51% of prevalence of anaemia among children in 2011, Bangladesh has a severe problem of micronutrient deficiency (the 38th largest rate in the world, in line with other South Asian countries). The problem is more severe in rural areas, among households of middle wealth levels and outside Dhaka.

Table 14: Breakdown of Child Malnutrition Prevalence by Characteristics, Bangladesh 2014

	Stunting	Wasting	Overweight	Anaemia
Survey	2014 DHS	2014 DHS	2014 DHS	2011 DHS
Sex: Male	36.7	15	1.5	52.8
Sex: Female	35.4	13.6	1.4	49.8
Residence: Urban	30.8	12.2	1.8	46.3
Residence: Rural	37.9	15.1	1.3	52.7
Education: No education or primary	45.2	15.2	0.7	53.3
Education: Secondary or higher	29.1	13.7	2	50.4
Wealth quintile: Lowest	49.2	17.1	0.5	56.1
Wealth quintile: Second	42.2	16.5	0.9	58.7
Wealth quintile: Middle	35.9	12.8	2.2	51.1
Wealth quintile: Fourth	31	13.1	0.7	44.2
Wealth quintile: Highest	19.4	11.7	3	43.5
Region: Barisal	39.9	17.7	1.4	59.6
Region: Chittagong/Sylhet	41.7	14.5	1.2	51
Region: Chittagong	38	15.6	1.4	51.6
Region: Sylhet	49.6	12.1	0.8	49.5

	Stunting	Wasting	Overweight	Anaemia
Survey	2014 DHS	2014 DHS	2014 DHS	2011 DHS
Region: Dhaka	33.9	11.9	2.1	47.7
Region: Khulna	28.1	13.5	0.4	54.2
Region: Rajshahi/Rangpur	33.5	17.5	1.1	53.3
Region: Rangpur	36	17.7	1.3	57.7
Region: Rajshahi	31.1	17.3	0.9	49.3
Mean	36.1	14.3	1.4	51.3

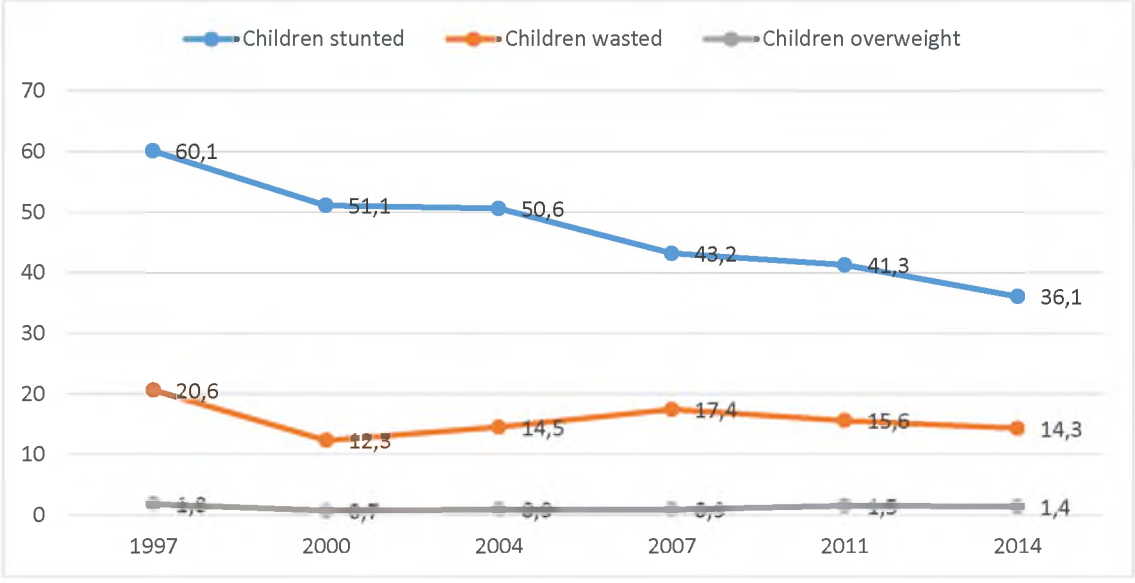
Source: Authors' calculations based on BDHS (2011, 2014).

Trends in Malnutrition

Bangladesh has made impressive progress in reducing stunting, from 60% in 1997 to 36% in 2014. Figure 32 further shows that these progresses have been mostly parallel across wealth groups. Heady et al. (2015) point out that Bangladesh has one of the best record of stunting reduction in the world.

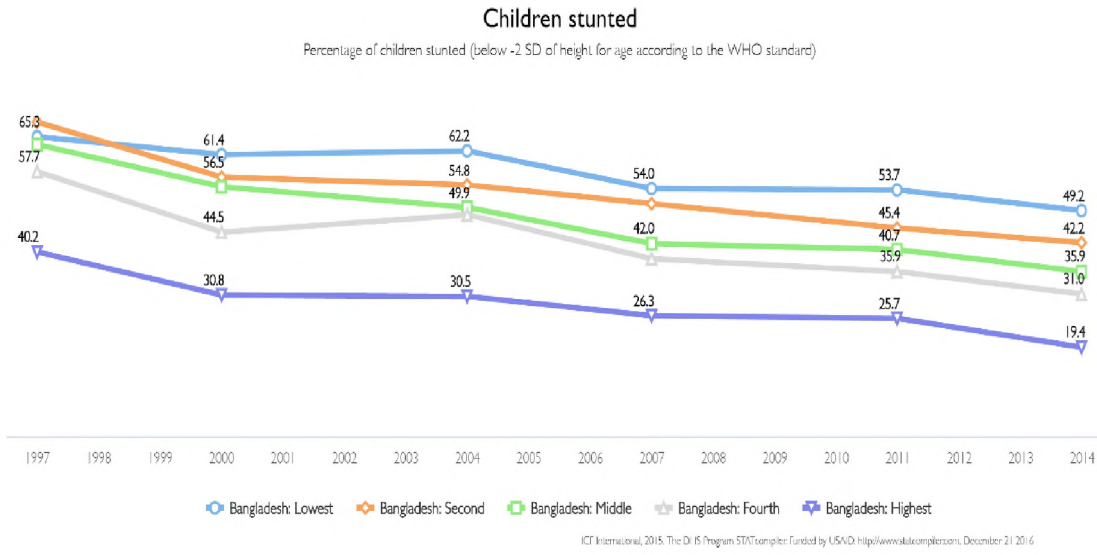
Over the same period, however, the prevalence of wasting has remained stubbornly high. After a large decrease between 1997 and 2000 (from 21% to 12.3%), the proportion of wasted children has hovered between 12 and 17%, stabilising at 14.3% in 2014. Figure 34 shows that this lack of progress has been shared by all wealth groups, except the middle one which experienced a substantial drop between 2011 and 2014 (from 17.7% to 12.8%).

Figure 32: Evolution of Child Malnutrition between 1997 and 2014, Bangladesh



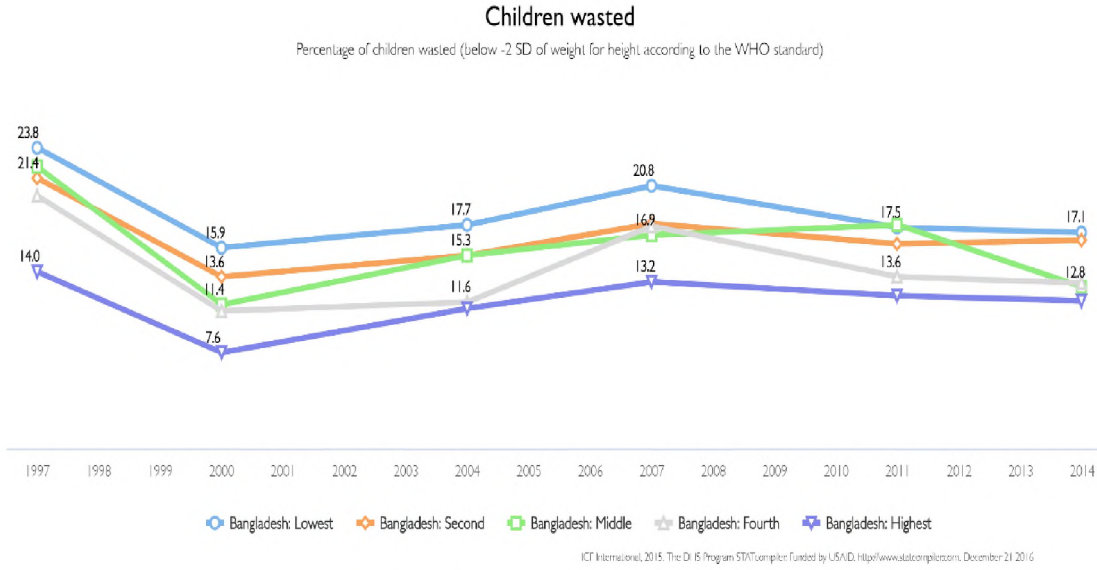
Source: ICF International, 2015. The DHS Program STATcompiler. Funded by USAID. http://www.statcompiler.com. October 19 2016

Figure 33: Evolution of Stunting in Bangladesh, by Wealth Groups



Source: ICF International, 2015. The DHS Program STATcompiler. Funded by USAID. http://www.statcompiler.com. October 19 2016

Figure 34: Evolution of Wasting in Bangladesh, by Wealth Groups



Source: ICF International, 2015. The DHS Program STATcompiler. Funded by USAID. http://www.statcompiler.com. October 19 2016

Relationships between Poverty and Malnutrition

Multivariate Regressions

Table 15 presents the correlates of malnutrition. It shows that girls are 16% and 27% less likely to be wasted and stunted that boys, respectively. Risks of wasting decrease with age for both sexes; in contrast to risks of stunting which rise with age.

The odds of wasting are significantly lower among households of the three-top quintiles of wealth. The correlation between wealth and wasting appears stronger while we control for other factors than it did with the simple bivariate association of Table 14. Indeed, children are 38% less likely to be wasted if they belong to a household of the richest class than if they belong to a household of the poorest class. Similarly, when mothers have experience of higher education, the odds of wasting go down by 40% (but there are no statistically significant effects for primary or secondary education). Other welfare-related indicators are not meaningfully related to wasting, such as access to water and sanitation, education of household head, or food diversity index. The fact that children are more likely to be wasted when the mother/caregiver works can, however, be interpreted as a consequence of poverty (which pushes women to work outside the household). Finally, immediate breastfeeding is associated with reduced odds of wasting but the results do not suggest a role for the health-related variables.

The association between stunting and poverty is very strong. Children belonging to the poorest group are exactly twice as likely to be stunted as children of the richest group. A similar effect (albeit smaller in magnitude) also apply in comparison with children of the second poorest and second richest group. In addition, education levels of both the mother/caregiver and the head of household strongly protect against stunting. Children whose mother/caregiver have a secondary education experience are 42% less likely to be stunted than children whose mother/caregiver has no education. The effect rises to 60% when the comparison is done with mothers with higher education. However, access to safe drinking water or improved sanitation do not reduce odds of stunting, and rural children turn out to be significantly less affected by stunting than their urban counterparts (by 20%), despite the higher prevalence of poverty in the countryside.

Health-related variables are also important correlates of stunting: risks of stunting are significantly lower when prenatal visit to a doctor has taken place (by 24%) and when vitamin A dose has been given within two months of delivery (by 8%). Surprisingly, immediate breastfeeding is associated with higher chance of stunting as is higher dietary diversity. It is possible that both effects partly reflect causality if breastfeeding and messages about IYCF best practices are primarily directed at vulnerable mothers.

Overweight appears as mostly unrelated to the determinants of malnutrition included in Table 15. Overweight is much more likely when the mother/caregiver has any experience of education, but the estimates are quite imprecise.

Table 15: Correlates of Malnutrition among Children below 5 Years of Age, Bangladesh 2014

	(1)	(2)	(3)
	Wasting	**Stunting**	**Overweight**
Girl	0.84**	0.73***	1.48
	(0.06)	(0.06)	(0.41)
Age in months	1.04	1.06***	0.99
	(0.00)	(0.00)	(0.02)
Wealth index (r: poorest quintile)			
Poorer	0.76**	0.74***	0.63
	(0.09)	(0.09)	(0.44)
Middle	0.67***	0.92	1.75
	(0.34)	(0.11)	(1.04)
Richer	0.55***	0.68***	0.69
	(0.47)	(0.09)	(0.48)
Richest	0.44***	0.50***	2.76
	(0.07)	(0.08)	(1.89)
Improved drinking water source	1.07	1.06	0.96
	(0.26)	(0.26)	(0.99)
Sanitation (r: unimproved sanitation)			
Improved sanitation	0.89	0.91	0.95
	(0.08)	(0.08)	(0.35)
Mother's age	0.98**	1.08	1.01
	(0.08)	(0.10)	(0.02)
Mother is working	1.19*	1.08	1.42
	(0.11)	(0.10)	(0.47)
Rural	0.99	0.81**	1.13
	(0.09)	(0.08)	(0.36)
Mother's education (r: no education)			
Primary education	0.84	0.77**	6.08*
	(0.10)	(0.09)	(6.07)
Secondary education	0.70***	0.58***	4.59
	(0.09)	(0.08)	(4.51)
Higher education	0.45***	0.40***	5.42
	(0.10)	(0.09)	(5.73)
Number of children below 5 years of age	1.03	1.07	1.29
	(0.06)	(0.06)	(0.27)
Female-headed household	1.12	1.02	1.52
	(0.15)	(0.13)	(0.65)
Age head of household	1.01**	0.99*	0.99
	(0.00)	(0.00)	(0.001)
Education head of household (r: no education)			
Primary education	0.87	0.86	0.95
	(0.09)	(0.09)	(0.51)
Secondary education	0.71***	0.77**	1.56
	(0.09)	(0.09)	(0.84)

	(1)	(2)	(3)
	Wasting	**Stunting**	**Overweight**
Higher education	0.84 (0.15)	0.64** (0.12)	1.86 (1.22)
Breastfed immediately	1.07 (0.16)	1.16* (0.09)	1.58 (0.48)
Exclusive breastfeeding	1.09 (0.12)	0.93 (0.10)	1.21 (0.50)
Prenatal doctor visit	0.77*** (0.07)	0.76*** (0.06)	1.63 (0.57)
Baby postnatal check after 2 months	1.01 (0.08)	1.07 (0.09)	0.80 (0.15)
Vitamin A dose within 2 months of delivery	0.89** (0.05)	0.92* (0.05)	0.80 (0.15)
Dietary diversity index	1.05*** (0.02)	1.10*** (0.02)	0.99 (0.06)
Observations	3638	3638	3638

*Note: authors' calculations based on the BDHS (2014) data. Coefficients are odds ratios and figures in parentheses refer to standard errors. *: p<0.1, **: p<0.05, ***: p<0.001.*

Analysis

Evolution of income, poverty and inequality

Table 15 showed that income and poverty were strong predictors of both stunting and wasting. The economic progress made by Bangladesh is therefore a likely cause of the decline in stunting rates that have been experienced over the last 20 years. Real GDP per capita has indeed more than doubled between 1995 and 2015 (corresponding to an increase of 5.9% per year on average). The pace of economic growth has remained strong in the recent years (the economy grew by 6% between 2005/06 and 2013/14), and the incidence of poverty (defined as people below a $1.9 per day line) has thus declined from 35% in 1995 to 19% in 2015. Over the same period, economic inequalities remained relatively stable, with a Gini index between 32% and 33.4%.

The case of wasting is puzzling, however: wasting rates have remained very high despite economic growth; and despite to the finding that well-off households are less likely to be wasted than poorer one.

Food security

The high rates of wasting and stunting (even if the latter are diminishing) can be partly linked to food insecurity. According to the FAO (2015), Bangladesh has made little progress since the early 2000s on their undernourishment indicator. This indicator measures the proportion of people who fall below a minimum calorie diet based on national estimates of per capita food availability. Whereas the proportion of undernourished people went down from 33% to 21% between 1990/92 and 2000/02; the trend has since then considerably flattened. The

proportion of undernourished people has remained at around 17% between 2005/07 and 2014/16 (16.4% in 2014/16).

The high reliance of households on rice on their diet and the preferences given by authorities to rice production (Naher et al. 2014) have caused food prices to steadily rise in Bangladesh, despite global prices being low and stable over the recent period. It has also been emphasised during key informant interviews that feeding practices hold back malnutrition decline. The strong household preference for rice consumption means that food diversity is lower than optimal.

FAO data show that food production has increased by 36% between 2004/06 and 2013. The average food deficit is constant at around 120 kilocalories since 2005.

Health, water and sanitation

The multivariate regressions showed that prenatal visits mattered to reduce stunting. Bangladesh has one of the lowest coverage of antenatal care in the world, as only 64% of women received prenatal care at the last time of measurement (WDI 2016). Only 8 countries did worse; however, significant progress has been made. The proportion of pregnant women receiving prenatal care rose from 26% in 1994 to 49% in 2004, for instance. Similarly, birth attendance by a skilled provider almost tripled between 2004 and 2014 (from 16% to 42%; Nipport et al. 2014).

Bangladesh has also made progress on access to improved water source and sanitation. It has been established before that those variables did not directly relate to malnutrition, but this may be due to the high coverage achieved by country. Indeed, 87% of households accessed improved water sources in 2015, against only 68% in 1990. Access to improved sanitation has also considerably improved: 61% in 2015 of households accessed it, against 51% in 2005 (although the proportion is still low in absolute value). By the same token, whereas in 2015 only 1.2% of households resorted to open defecation, this proportion was still 11.9% a decade ago, in 2005, and 26.5% in 1995. The near-elimination of open defecation features as a likely cause of the secular decline in stunting, according to Heady et al. (2015). And access to clean water has important indirect consequences on nutrition, by reducing childhood illnesses (Lim, Flaxman et al. 2010).

IYCF practices and breastfeeding

Stakeholders pointed out the importance of feeding practices. Knowledge about best practices was still considered problematic in many communities while in others the translation of knowledge into actual behaviour was not automatic. Behavioural change communication has been quite insufficient in the past, and almost entirely the result of NGOs efforts.

According to BDHS (2014), while 98% of children are breastfed, the proportion of children who have been immediately put to the breast after birth is much lower, at 51%. It ranges from 39% in Khulna region to 60% in Rangpur. The average length of exclusive breastfeeding is also much lower than the recommended 6 months as 55% of infants up to 6 months of age were exclusively breastfed. However, 87% of infants up to 24 months were still breastfed, consistent with recommendations. Food diversity among children aged 6 to 23 months is also much lower than the WHO recommendations: 26% of them are fed at least four food groups, 55% consume iron-rich food and 62% received vitamin A supplementation.

Relationships between Child and Maternal Malnutrition

With a prevalence of low birth weight of 22% in 2014 (the tenth highest rate in the world), Bangladesh face a serious issue of intergenerational transmission of malnutrition. It is worth noting that this is not specific to Bangladesh but extends to the whole region (the proportion of low birth weight is 32% in Pakistan and 28% in India, for instance).

Table 16 presents the results of multivariate regressions predicting child current malnutrition on the long-term nutritional status of their mother. For Bangladesh, the information on children' weight at birth is not known, so the analysis relies instead on the subjective assessment of their mother. A child is considered to be of low weight at birth if their mother describes them as "smaller than average" or "very small" at birth. 18% of children were of low birth according to this definition.

Both mothers' stature and low birth weight strongly affect children malnutrition status. Children whose mother is stunted are close to twice as likely to be wasted, and about 2.3 times more likely to be stunted than others. Similarly, children who were of low weight at birth are about 2.2 more likely to be wasted and at least 85% more likely to be stunted than others. All these effects are strongly significant statistically.

Overweight is not significantly related to mother's stature or low birth weight status.

Table 16: Estimations of the Effects on Children Malnutrition of Low Birth Weight and Malnutrition of their Mothers, Bangladesh

	(1)	(2)	(3)	(4)	(5)	(6)
	Wasting	**Wasting**	**Stunting**	**Stunting**	**Overweight**	**Overweight**
Mother is stunted	1.90*** (0.14)	1.84*** (0.15)	2.34*** (0.17)	2.18*** (0.18)	1.01 (0.26)	1.13 (0.31)
Low birth weight*	2.51*** (0.22)	2.25*** (0.21)	2.01*** (0.17)	1.85*** (0.18)	0.77 (0.28)	0.87 (0.34)
Age child	1.04*** (0.00)	1.04*** (0.00)	1.05*** (0.00)	1.07*** (0.00)	0.98 (0.01)	0.99 (0.02)
Girl	0.84** (0.06)	0.83** (0.07)	0.74*** (0.05)	0.73*** (0.06)	1.33 (0.35)	1.48 (0.41)
Controls	No	Yes	No	Yes	No	Yes
Observations	4037	3628	4037	3628	4037	3628

*Note: authors' calculations based on the BDHS (2014) data. Coefficients are odds ratios and figures in parentheses refer to standard errors. *: p<0.1, **: p<0.05, ***: p<0.001.*

Malnutrition and Poverty in the National Development Strategy

The government ranks 14th out of 45 countries for its commitment to reduce hunger and malnutrition (te Lintelo and Lakshman 2015). This corresponds to a "moderate" level of commitment, and puts Bangladesh in the same group as e.g. Indonesia, the Gambia or Mali. It turns out that Bangladesh has a much stronger commitment to reducing malnutrition (for which it ranks 9th) than hunger (for which it only ranks 20th). Positive elements attesting to the commitment to reduce malnutrition include the existence of a nutrition budget, a very high coverage of vitamin A supplementation (97%), government's promotion of complementary feeding, the existence of a national nutrition plan which is multi-sectoral and entails a

coordination mechanism to bring together stakeholders and sectors; and time-bound nutrition targets. The weaknesses mostly relate to the low access to improved water and sanitation sources, low levels of maternal health and the limited place of nutrition in the national development plan.

Looking at health expenditure as another indicator of government commitment reveals a less positive situation. With health expenditures representing only 2.8% of GDP in 2014, only 7 countries did worse than Bangladesh. Worryingly, the recent trend is downward looking as the country spent more (3.2% of its GDP) on health in 2011.

The first large-scale dedicated nutrition programme in Bangladesh was the Bangladesh Integrated Nutrition Programme (BINP), in 1995, which was part of the wider National Plan of Action for Nutrition. The programme focused on behavioural change communication, food supplementation and deworming, and targeted underweight as the indicator of malnutrition. Lack of results of the BINP (according to a Save the Children report of 2003), driven in part by insufficient budgetary commitment from the government, led to replacement of the programme by the National Nutrition Programme (NNP) in 2002 and then the National Nutrition Services (NNS) in 2011. The NNS aims to mainstream nutrition activities that were previously coordinated by the Ministry of Health and Family Welfare. The goal of the NNS, which sits within the Ministry of Health and Family Planning, is to both roll out comprehensive package of nutrition services and to enhance coordination of nutrition actors.

Nevertheless, coordination was often referred to as being insufficient, in part due to the lack of incentives from donors. An interim report on the implementation of the NNS commissioned by the World Bank identified a number of limitations and gaps (Saha et al. 2015). Internal government coordination needs to be strengthened and the NNS should be given a more prominent role. The NNS activities also appear as too numerous and ambitious to be adequately implemented by frontline workers in the communities. The capacity of training these workers is also likely too limited.

Nutrition has been mainstreamed in the food security and agriculture policies of Bangladesh, at least since 2006. The National Food Policy in 2006 mentioned nutrition as a core objective of the food policy. In addition, the country's poverty reduction strategy drafted in 2011 names food security as a key activity for achieving social protection of vulnerable households and commits to provide nutritious food to at least 85% of the population by 2021. Yet, while food production indeed increased, and the country achieved self-sufficiency status, Naher al al. (2014) argue that the agricultural sector is too reliant on rice and not very nutrition sensitive.

Rapid progress in health, which we have documented above, has been the subject of a special series of the Lancet in 2013. Reasons for these progresses include the vitality of the NGOs, a pluralistic system of healthcare provision combining state, NGO and private actors; successful specific programmes such as immunization, family planning; and rising number of community health workers. Despite these advancements, the state of health in Bangladesh remains weak and the financial commitment of the government is cause for concern.

Stakeholders did not mention national policies as the core reason behind the reduction in stunting rates. The NNS was deemed too recent to have a clear impact yet, and problems with leadership of the programme were mentioned. However, a clear change in commitment at high policy level was noted. Whereas 15 years ago, most of the impetus behind nutrition action was due to NGOs and international agencies, the government is now fully on board in the fight

against malnutrition. The relative contribution of the government was also felt to be under-estimated by a number of stakeholders, especially in terms of its achievements on food security.

The issue of implementation in communities was commonly advanced. Doubts were raised as to the capacity of the NNS to train frontline workers and mobilise communities. Remaining challenges relate to the health environment, women's empowerment and reproductive health, and IYCF practices. Whereas the programme "Alive and Thrive" demonstrated positive results, an impact evaluation of three livelihood programmes entailing direct nutrition interventions did not find the same results (Nisbett et al. 2016). To date, behavioural change communication has mostly been the area of NGOs (cf. the programmes included in the two aforementioned studies) and the NNS/government remained absent. This is an area where stakeholders consider the government should do more in the future.

3.5. Tajikistan

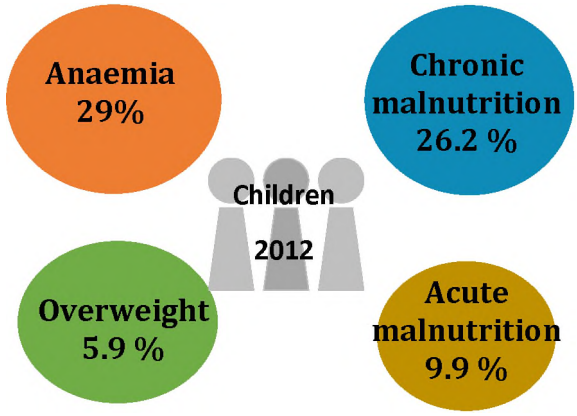
Tajikistan is a country of central Asia with a population of approximately 8.5 million people. The country is classified as lower middle-income according to the World Bank, with a GDP per capita of $928 (World Bank 2016). Poverty has declined substantially in the last 12 years- from 72% of the population in 2003 to 31% of the population in 2015 (Rabie et al. 2012; World Bank 2016). According to the UN multidimensional poverty index, 13.2% of the population live in multidimensional poverty, and a fifth of the population (20.8%) are vulnerable to multidimensional poverty (United Nations Development Reports 2016). Poverty is much more common in rural areas (where 70% of the population live) and correlates with low levels of education, employment in agriculture and those living in unfavourable geographic locations, such as at a very high altitude (Rabie et al. 2012).

The economy of Tajikistan is heavily dependent on remittances (which represented 43% of the country's GDP in 2015, one of the highest in the world) from migrants who leave to work in Russia, largely in the construction sector; which leaves the economy highly vulnerable to global downturns (Rabie et al. 2012; World Bank 2016). Recent changes in regulations for migrants working in the Russian Federation are effecting the income and food security of many households (Kim and Huseinov 2016). The most recent analysis by the World Bank suggests that while Tajikistan has done very well in reducing monetary poverty, non-monetary poverty including access to education, heat and sanitation remain problematic (World Bank 2016). Tajikistan ranks 129 out of 188 countries on the Human Development Index.

Table 17 presents prevalence of key child malnutrition indicators, and its breakdown along several characteristics. At the national level, 26% of children under five are stunted. There is significant regional variation, with stunting ranging from 19% in Dushanbe to 27% in Sughd and Khatlon regions. Stunting is also more prevalent in rural areas (27.4% against 21.4%), many of which are in mountainous regions with poor infrastructure and transportation facilities. Stunting prevalence goes down with wealth levels (32.1% among the poorest group and 20.9% among the richest group). There is a significant increase in rates of stunting in children after six months of age.

State of Malnutrition in Tajikistan

Figure 35: Malnutrition in Tajikistan at a Glance



Source: TjDHS (2012), MOH and UNICEF (2010) for anaemia.

Iodine deficiency, anaemia and vitamin A deficiency remain major public health challenges. In 2011, 27.4% of children under five were anaemic (Stevens et al. 2013). The DHS, however, does not provide figures for anaemia. According to data from a 2009 micronutrient survey, approximately 59% of women of reproductive age and 53% of children under five are iodine deficient, the highest rates in the Central and Eastern European region. Iodine deficiency is much more common in landlocked, mountainous countries, as iodine is most commonly found in ocean water and is often washed out of soil in mountainous areas. Tajikistan, a landlocked country where 93% of the surface area is mountainous must rely on salt iodisation. The national salt iodisation programme has not been able to guarantee that salt is iodised effectively. The 2012 DHS found that while 83% of children live in households with iodised salt, testing of the salt showed that only 38% was fortified with iodine at recommended levels (Chaparro and Sethuraman 2014).

Anaemia affected 24% of women of reproductive age and 29% of children below 5 according to the most recent micronutrient survey (2009), a decrease from 42% in 2003. Anaemia remains a major problem for children under two, half or whom are anaemic (Chaparro and Sethuraman 2014). The presence of both iron and iodine deficiency in the same children is of particular concern due to the potential implications on cognitive development (Rabie et al. 2012).

Wasting remains a challenge in Tajikistan, with wasting rates of 10% for children under five in 2012. Wasting rates are especially high for very young infants: the most recent DHS found that nationally rates of wasting for infants under 6 months was 23% and 18% for infants aged 6 to 8 months, suggesting sub-optimal infant and young child feeding practices. This level of wasting is considered "serious" by the World Health Organization Classification. Wasting is more common among children whose mothers have low levels of education (13.5% against 9.5%), but does not vary in an obvious way with wealth. Regional variations are also quite limited.

Overweight affects 5.9% of children in Tajikistan. More generally, obesity affects 30% of women of reproductive age (38% in urban areas), with rates increasing in recent years. Cardiovascular diseases are responsible for 39% of all deaths in Tajikistan. Overweight among children is more common when their mothers are educated (6.1% against 3.6%) and when they belong to the third and fourth richest groups. Regional variations are extremely pronounced, with overweight being very low in GBAO (1.1%) and very high in Sughd (11.8%).

Table 17: Breakdown of Malnutrition Indicators by Key Characteristics, Tajikistan 2012

	Stunting	Wasting	Overweight
Sex: Male	25.5	9.9	6.1
Sex: Female	26.8	10	5.6
Residence: Urban	21.4	9.9	5.5
Residence: Rural	27.4	9.9	6
Education (2 groups): No education or primary	27.6	13.5	3.6
Education (2 groups): Secondary or higher	25.9	9.5	6.1
Wealth quintile: Lowest	32.1	9.5	4.3
Wealth quintile: Second	29	10.9	3.3
Wealth quintile: Middle	23.4	9.6	7.4
Wealth quintile: Fourth	24.9	10.5	8.1
Wealth quintile: Highest	20.9	9	6.4
Region: Dushanbe	18.9	10.3	5.4
Region: GBAO	24.3	8.1	1.1
Region: Sughd	27.2	8.4	11.8
Region: DRS	26.3	9.8	4.3
Region: Khatlon	26.9	11.1	3
Mean	26.2	9.9	5.9

Source: ICF International, 2015. The DHS Program STATcompiler. Funded by USAID. http://www.statcompiler.com. October 19 2016

Trends in Malnutrition

Figure 36 displays the evolution of child malnutrition between 1999 and 2012, based on the Joint Malnutrition Estimates. One can see that while chronic malnutrition (stunting, anaemia) have gone down over the entire period, acute malnutrition and overweight are roughly at the same level of prevalence at the end of the period than they were at the beginning.

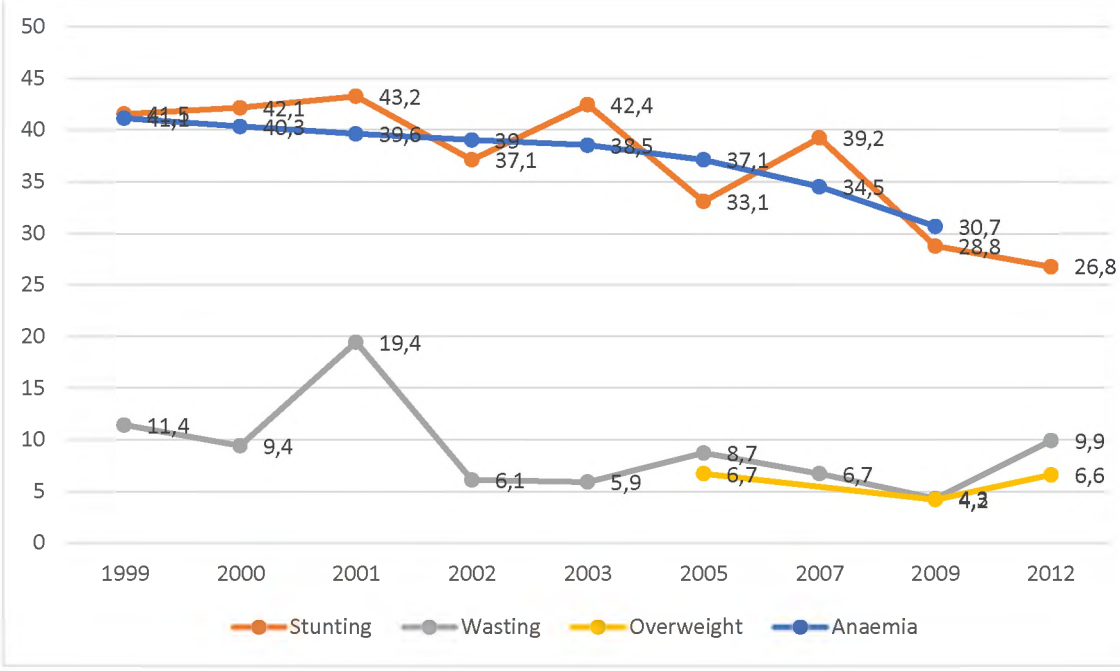
The rate of stunting has gone down from 41.5% in 1999 to 26.8% in 2012, which corresponds to a decline of 55%; or 1.13 percentage point per year. The evolution has not been steady, however, with stunting alternating periods of increase and decrease. A local health expert described the trends in malnutrition reduction as a "sinusoidal" function, which was attributed to dependence on migration and remittances. The reduction in malnutrition rates were seen in

years when up to one million people migrated to Russia, thus increasing household income and reducing levels of food insecurity. However, downturns in the Russian economy, which led to over 200,000 Tajik young people being banned from working there, has severely reduced remittances and contributed to increased rates of food insecurity and malnutrition (Interview, local expert on health and social issues). The fact that malnutrition rates have recently started to increase again is a worrying development, especially in the context of increasing levels of food insecurity.

The prevalence of anaemia has steadily diminished over the whole period. It decreased by a third (from 41.1% in 1999 to 30.7% in 2009), corresponding to a decline of roughly 1 percentage point per year.

The rate of wasting peaked in 2001, at 19.4%. It then stabilised between 6.1% in 2002 and 4.3% in 2009 before to rise again to 9.9% in 2012. Finally, the proportion of overweight children in 2012 is the same to that of 2005 (6.7%), whereas it went down to 4.3% in between (in 2009).

Figure 36: Evolution of Child Malnutrition between 1999 and 2012, Tajikistan



Source: ICF International, 2015. The DHS Program STATcompiler. Funded by USAID. http://www.statcompiler.com. October 19 2016

Relationships between Poverty and Malnutrition

Multivariate Regressions

Table 18 looks at the correlates of child malnutrition to assess the relationships between poverty-related variables and malnutrition.

Table 18: Correlates of malnutrition among children below 5 years of age, Tajikistan

	(1)	(2)	(3)
	Wasting	**Stunting**	**Overweight**
Girl	0.89 (0.10)	0.96 (0.08)	0.98 (0.16)
Age in months	0.99** (0.00)	1.01*** (0.00)	1.00 (0.01)
Wealth index (r: poorest quintile)			
Poorer	0.78 (0.13)	0.89 (0.12)	0.70 (0.26)
Middle	0.51*** (0.09)	0.63*** (0.09)	1.94** (0.57)
Richer	0.60*** (0.11)	0.73** (0.11)	2.23*** (0.67)
Richest	0.51*** (0.11)	0.58*** (0.10)	1.96** (0.66)
Improved drinking water source	0.81 (0.11)	1.15 (0.12)	2.19*** (0.56)
Sanitation (r: unimproved sanitation)			
Improved sanitation	0.77 (0.16)	0.80 (0.13)	3.45** (1.81)
Mother's age	1.02 (0.01)	1.06 (0.04)	1.00 (0.02)
Mother is working	1.03 (0.15)	1.07 (0.12)	1.07 (0.22)
Rural	0.75* (0.12)	1.08 (0.14)	2.05*** (0.48)
Mother's education (r: no education) Primary education	0.34*** (0.13)	0.95 (0.38)	0.97 (0.82)
Secondary education	0.28*** (0.09)	1.22 (0.43)	0.86 (0.64)
Higher education	0.25*** (0.09)	0.93 (0.35)	1.24 (0.95)
Number of children below 5 years of age	1.08* (0.05)	1.06* (0.04)	1.00 (0.06)
Female-headed household	0.89 (0.14)	0.94 (0.11)	1.09 (0.22)
Age head of household	1.00 (0.00)	1.00 (0.00)	0.99 (0.01)
Education head of household (r: no education)			

	(1)	(2)	(3)
	Wasting	**Stunting**	**Overweight**
Primary education	1.13 (0.69)	0.47 (0.26)	0.58 (0.59)
Secondary education	0.63 (0.32)	0.55 (0.24)	1.26 (0.22)
Higher education	0.54 (0.28)	0.46* (0.21)	. .
Breastfed immediately	0.95 (0.11)	0.94 (0.08)	1.02 (0.17)
Exclusive breastfeeding	1.01 (0.03)	0.84 (0.11)	0.97 (0.23)
Prenatal doctor visit	0.89 (0.15)	1.30** (0.15)	1.64*** (0.30)
Baby postnatal check after 2 months	0.89 (0.12)	1.03 (0.11)	2.50*** (0.63)
Vitamin A dose within 2 months of delivery	1.01 (0.03)	1.04* (0.02)	1.11*** (0.03)
Dietary diversity index	0.98 (0.02)	1.00 (0.02)	0.97 (0.03)
Observations	3048	3048	3026

*Note: authors' calculations based on the TjDHS (2012) data. Coefficients are odds ratios and figures in parentheses refer to standard errors. *: p<0.1, **: p<0.05, ***: p<0.001. Households whose heads have higher education are dropped in column 3 because of collinearity.*

Wasting appears to be systematically related to poverty. Children of the three-top wealth groups are between 40% and 50% less likely to be wasted, and the effect is highly significant, statistically. Education of the caregiver is also of critical importance: caregivers with primary, secondary or tertiary education are between two-third and three-quarter less likely to have their children wasted than caregivers with no education (there is no significant between primary and other levels of education). Other potential factors of malnutrition are not systematically associated with wasting in Tajikistan, however. In particular, sanitation, health and breastfeeding variables are not significantly associated with wasting.

Stunting is very strongly associated with poverty. Children of the three top wealth groups are considerably less at risk of stunting than children of the bottom two (by 37% for members of the middle group, 27% for members of the richer group and 42% for members of the richest group). These effects are significant at the 1% or 5% levels. Stunting is also half as likely when the household heads have a higher education level than when they do not. In contrast, none of the sanitation, water and food security variables are significantly associated with stunting. Finally, antenatal visits to doctors and supplementation in vitamin A are positively related to stunting, suggesting that access to such health practices is targeted to vulnerable households.

The relationship between overweight and poverty is the mirror image of the one found for stunting. The likelihood of overweight is about twice higher for children of the three top wealth groups than for children of the bottom two ones. These effects are significant at the 1% and 5% levels. Other evidence that overweight is concentrated among the wealthier

households is the finding that access to improved drinking water and sanitation strongly increases odds of overweight, by a factor of 2.2 and 3.5, respectively. Education, breastfeeding and food security are unrelated to overweight. Surprisingly, there is a positive association between all variables of health (antenatal visits, postnatal visits and supplementation in vitamin A) and overweight. This runs contrary to the previous assumption that these health practices were targeted to vulnerable households. Finally, rural children are about twice as likely to be overweight as urban children.

Analysis

Evolution of Income, Poverty and Inequality

Tajikistan experienced a catastrophic economic collapse following the end of the USSR. Between 1989 and 1999, real GDP per capita was reduced by 70% and even in 2015 the country had not recovered its level of economic development of 1989 (it is still 30% lower). The period over which the above trend analysis was conducted coincides thus to the period of economic catch-up after the country hit a low point in 1999. This contextualises the very strong growth of the real GDP per capita of this period (8.7% per year between 1990 and 2015).

This episode of economic growth was accompanied by a strong decline of poverty. The poverty headcount (calculated at the $1.9 per day threshold) fell from 54% in 1999 to 19.5% in 2015. However, Tajikistan has been very strongly impacted by the global financial crisis of 2008. It is important then to distinguish between the period 1999-2007, at the end of which poverty rate was only 4.7%, and the period 2008-2015, at the end of which poverty rose to 19.5%.

Tajikistan's extremely high reliance on international remittances means that the country is heavily impacted by global recessions, as can be seen with the increase in poverty since 2008. Stakeholders highlighted the underdeveloped economy, and shortage of jobs as being key underlying causes of poor nutrition which must also be addressed in order to see real progress on nutritional outcomes (Interviews, Local Expert on Health and Social Issues and UNICEF). Almost every single stakeholder interviewed as part of this research identified the global financial crisis (2008) and changes in rules around migration to Russia as key factors which were likely to have a major impact on child malnutrition (Interviews, UN, NGO and Government Experts).

Inequality rose between 1999, when the Gini index was 29.5%, and 2004, when it reached 33.6%. It has since decreased to 30.8% in 2015. While interviewed stakeholders in Tajikistan felt that in theory government policies covered everyone, geographical remoteness limits access to key services some regions (Interview, local expert on health and social services).

Food Security

Food security, is a necessary but not sufficient condition for reducing undernutrition. The Food and Agricultural Organization identifies four pillars necessary for food security: availability, access, utilisation and stability of the other three factors. At least three of these conditions remain a challenge in Tajikistan: i) availability of food products, especially in the winter in mountainous regions, ii) access to food (a very high percentage of people's income is spent on food), and iii) the lack of stability due to the reliance on remittances and imported food.

Tajikistan is the most food insecure county in Central Asia, with up to 40% of the rural population suffering from seasonal food insecurity, a situation considered "serious" ("2016 Global Hunger Index" 2016; UNDA 2013). The country is food deficient, given that only 7% of the country is arable. Tajikistan relies heavily on imported food (about 50% of is imported), making the country vulnerable to climatic, political and economic in other countries (UNDA 2013). The global price hikes of 2008 affected Tajikistan particularly harshly and led the government to implement a number of policies relating to food security including the "Agrarian Policy Concept, Food Security and Agriculture Investment Plan", which is part of the National Development Strategy for 2006-2015, the National Food Security Strategy of 2008, and the Law on Food Security in 2010. The Government also established the Food Security Council of the Republic of Tajikistan.

Food represents a very large proportion of people's budgets: 70-80% of household income is spent on food; and around one fifth of the population is food insecure. The most recent round of monitoring by the World Food Programme carried out in June 2016 found that food insecurity is increasing in rural Tajikistan. The number of households facing food insecurity has increased by 5% in six months, likely due to the economic contraction of the Russian federation and a decline in remittances, on which a large majority of the population rely (Kim and Huseinov 2016). Levels of food insecurity are much higher for female headed householders (37%) compared to male headed households (24%) (Kim and Huseinov 2016). In mountainous areas, access to food markets in inhibited by poor infrastructure, lack of transport and extreme weather conditions (UNDA 2013). (UNDA 2013). Poverty and the increasing costs of foods were also mentioned by several interviewees, who highlight financial accessibility of food, especially expensive foods such as animal source foods, as being a key challenge for many families (Interviews, local NGO representative, local public health expert). This leads to low levels of dietary diversity and a high reliance on nutrient-poor staples foods. One expert also highlighted social pressures and customs to ensure that a family is able to show wealth during times of celebration, even if this is at the cost of feeding their family a more diverse diet at other times (Interview, local expert on health and social issues).

Food production has increased by 55% between 2004/06 and 2015 and the proportion of undernourished population has decreased from 40.5% in 2005/07 to 33.2% in 2014/16 (FAO 2015). But food deficit has not decreased accordingly. Using data from the FAO, one can see that the average daily food deficit in Tajikistan ranged between 250 and 300 calories between 2000 and 2015, with no signs of long-term progress. This may explain why rates of wasting in 2012 DHS were higher than in 2005 (Chaparro and Sethuraman 2014), despite the significant decline in poverty described above.

Despite the presence of food insecurity, Tajikistan is facing a double burden of malnutrition, with both under and over-nutrition very present. Many of those interviewed mentioned overweight among women as a particular challenge, which many felt was a result of a diet high in carbohydrates (over 70%of people's diet comes from wheat flour, one of the highest rate in the world) and low in fruits and vegetables. Overweight, obesity and associated non-communicable diseases are on the increase, and cardiovascular diseases are responsible for 39% of all deaths. The likely causes for the high rates of obesity and associated non-communicable diseases are likely two-fold. One maybe related to the increased risk of obesity and related conditions caused by poor nutrition in utero (discussed in the previous section), especially given that women who are becoming mothers now were likely born when the poverty rate was over 70% following the collapse of the Soviet Union. There is also some evidence that micronutrient deficiencies in adults may increase the risk of obesity and related

diseases. It is hypothesised that in adults, deficiencies of folate may increase the risk of heart disease and existing zinc deficiency may increase the severity of diabetes (Eckhardt 2006). Fruit and vegetable consumption in particular, are considered especially important given the variety of micronutrients and other essential dietary components they contain. The World Health Organization lists low fruit and vegetable intake as the 6th greatest risk factor for global mortality (Eckhardt 2006). Within the context of high food prices, low levels of dietary diversity, and a high reliance on refined wheat in the diet, it is likely that micronutrient deficiencies may also be contributing to obesity.

Stunting and micronutrient deficiencies remain major nutritional challenges in Tajikistan, due to low dietary diversity, a high reliance on nutrient-poor food (such as wheat) and high levels of food insecurity.

Health, Water and Sanitation

Tajikistan has a good coverage of improved sanitation (95%; and open defecation is negligible) but access to improved drinking water sources remains a challenge (74% in 2015). This increases only slowly, as it was 70% in 2010 and 65% in 2005. Many stakeholders interviewed highlighted sanitation and prevalence of waterborne diseases, and resulting gastrointestinal tack damage, as a key major cause of poor nutrition in the country (Interview USAID, WHO, Medical Science Academy).

The country has a better than average presence of skilled health professionals: the country had 1.9 doctors per 1,000 people in 2015 (the average in the world was 1.6), but this figure was down from 2.7 per 1,000 in 1989. The country also had 5 nurses per 1,000 people in 2015, which is twice as high as the global median. In terms of availability of hospital beds, Tajikistan is on a downward trend. Whereas the country had about 10 beds per 1,000 in 1989 (in the top 5% in the world), it only had 5.5 in 2011 (which is still twice as high as the global median).

Tajikistan is also close to the global median in terms of maternal health: the lifetime risk of maternal death was 0.12% in 2015, slightly better than the global median of 0.17% and significantly better than the global average of 0.8%. Antenatal care coverage is, however, limited. Only 79% of pregnant women received such care in 2015, whereas the global median is 95%. And little progress has been made since the early 2000s (75% in 2001).

There is a marked gap in terms of health outcomes between the rich and poor, with the poor experiencing much worse health outcomes, and higher rate of morbidity and mortality compared to rich households. The majority of healthcare funding come from out-of-pocket spending, adding an addition layer of challenge for the poor in accessing health care (European Union 2014). Geography also presents a challenge in terms of health care provision, with 10% of health care facilities located in rural areas, despite the majority of the population (about 70%) living in rural areas. There are few distribution channels to supply health facilities in rural areas, meaning that facilities often lack basic medicine and supplies. The country has a better than average presence of skilled health professionals: the country had 1.9 doctors per 1,000 people in 2015 (the average in the world was 1.6), but this figure was down from 2.7 per 1,000 in 1989. However, low wages mean that health facilities have trouble attracting and retaining health workers, who often migrate to countries with higher wages. (European Union 2014). There are also broader quality concerns about the health system which related to insufficient training, a lack of evidence based guidelines and an underinvestment in primary care (Khodjamurodov et al. 2016).

Infant and Young Child Feeding Practices

The lack of relationship between breastfeeding and dietary diversity (except on wasting) and all forms of malnutrition (except stunting) that is found in regressions (Table 18) is surprising. The 2012 DHS found that while breastfeeding is almost universal, only one third of children are exclusively breastfed for the first six months. Additionally, only 20% of children aged 6 to 24 months are fed appropriately according to recommended infant and young child feeding practices (Statistical Agency under the President of the Republic of Tajikistan- and MEASURE DHS 2013). A local expert on health said that duration of breastfeeding is a particular challenge, with 65% of women stopping when the child is only five months old (interview, local expert on health and social issues). Very few children receive an adequately diverse diet, which is defined as food from four or more food groups. Only 12% of breastfed children and 33% of children aged 6-23 months consume a diverse diet and only 14% of non-breastfed and 19% of breasted children were fed the recommended four or more times a day (Kim and Huseinov 2016).

While several stakeholders highlighted the law on exclusive breastfeeding as one of the most successful nutrition policies, they have also highlighted the challenges of implementation and enforcement of the law (interviews, UN Representatives, NGOs, and Republican Nutrition Centre). A nutrition officer from a UN agency highlighted cultural myths and practices as one of the key reasons for low levels of dietary diversity; for example, a cultural belief that feeding eggs to a child will negatively impact their cognitive development. Additionally, medical staff do not have the training to adequacy council mothers on correct infant and young child feeding practices. UNICEF has planned formative research to start later this year to better understand barrier and constrains to adequate infant and young child feeding which will inform a national strategy which is being developed (Interview, UN representative). Economic access was also highlighted as a challenge for some types of food, especially meat and animal source foods which many cannot afford (Interview, Republican Nutritional Centre). A studied carried out in developing the nutrition strategy for 2015-2024 found that only one in four families could afford to feed children beans and eggs, and 95 percent of the population rely on a diet that is predominantly bread (interview, local expert on health and social issues and UN representatives).

Relationships between Maternal and Child Malnutrition

Table 19: Estimations of the Effects on Children Malnutrition of Low Birth Weight and Malnutrition of their Mothers, Tajikistan

	(1)	(2)	(3)	(4)	(5)	(6)
	Wasting	**Wasting**	**Stunting**	**Stunting**	**Overweight**	**Overweight**
Mother is stunted	1.54**	1.47**	1.76***	1.60***	0.71	0.79
	(0.27)	(0.28)	(0.25)	(0.24)	(0.23)	(0.26)
Low birth weight	3.37***	3.11***	2.22***	2.13***	0.33**	0.39*
	(0.59)	(0.57)	(0.35)	(0.36)	(0.17)	(0.20)
Age child	0.99***	0.99	1.01***	1.01***	1.00	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
Girl	0.85	0.86	0.97	0.98	1.06	1.05
	(0.10)	(0.11)	(0.09)	(0.09)	(0.17)	(0.18)
Controls	No	Yes	No	Yes	No	Yes
Observations	2729	2617	2729	2617	2729	2600

*Note: authors' calculations based on the TjDHS (2012) data. Coefficients are odds ratios and figures in parentheses refer to standard errors. *: p<0.1, **: p<0.05, ***: p<0.001.*

Table 19 shows that there is a strong intergenerational transmission of undernutrition in Tajikistan. Children whose mothers are short are 54% more likely to be wasted than others (column 1). When the full array of controls is introduced, the effect goes down to 47% but remains significant at the 5% level. The corresponding impact of short mothers is even stronger for stunting: children whose mothers are short are 76% more likely to be stunted than others. When all controls are used, the effect is reduced to 60% (and significant at the 1% level). The legacy of low birth weight is also very strong. Children who were small at birth are 3 times more likely to be wasted (column 2) and 2.1 times to be stunted than children with a normal weight at birth.

The opposite holds for over-nutrition. As was seen in the preceding subsection, overweight in Tajikistan is associated with affluence. It is therefore not surprising that children whose mothers are short tend to be less likely to be overweight, although the effect is not statistically significant. Furthermore, low birth weight is associated with a considerably lower likelihood of overweight (by 60%, column 6), the effect being statistically significant at 10%.

Malnutrition and Poverty in the National Development Strategy

The year 2013 marked the start of a period of heightened commitment from the Government of Tajikistan to fight against malnutrition. The country joined the Scale-Up Nutrition (SUN) movement, it established the Food Security Council (FSCT) to coordinate decision-makings related to food security, and it developed a number of strategic documents on nutrition including the "Nutrition and Food Security Strategy 2013-2020". The strategy stresses the double burden of malnutrition and prevention of food-borne diseases and nutrition-related NCDs.

In July 2016, the first national nutrition forum was convened in the country by government and development actors under the aegis of the Ministry of Health and Social Protection. In the previous year, the Ministry of Health and Social Protection, which acts as the coordinator of nutrition policies in Tajikistan, hosted an inter-sectoral training with WHO/Europe on physical activity and overweight. In 2014, Tajikistan approved the Nutrition and Physical Activity Strategy.

The SUN 2016's assessment noted a growing and satisfactory commitment from the government of Tajikistan, notably from the Ministry of Health and Social Protection but also from the Ministry of Finance and the Ministry of Economic Development and Trade. The current president has been a champion of nutrition and has highlighted food safety as a particular concern in the country (Interview, Medical Science Academy). Over half of Interviewees also highlighted Ministry of Health and Social protection as the lead agency for nutrition programming, but the Ministry of Agriculture, Economic Development and the Prime Minister's office were also listed as important. The strong interest in nutrition can be traced back to an influential study by the World Bank in 2012 (Rabie et al. 2012) which calculated that malnutrition costed m$40 annually to the country in loss lives and productivity (Interviews, UN representative and USAID). The Global Alliance for Improved Nutrition (GAIN) also used the financial argument in their case for investing in flour fortification, arguing that one dollar invested in fortification efforts will yield up to nine dollars in terms of reduction of birth defects and improved health outcomes (McKee and Garret 2014). This is an interesting example of how awareness of the economic consequences of malnutrition can help spurring action from actors not directly related to nutrition.

Tajikistan is also working on the development of a Common Results Framework (CRF) and multi-sectoral plan for nutrition, two critical tools recognised as best practices by the international community to fight against malnutrition. The country's involvement in SUN helps to sustain momentum towards meeting these goals. Food security and nutrition have also been included, to some extent, in the new National Development Strategy (NDS 2030) and Mid-Term Development Strategy (2020). This notably followed an undernutrition gap analysis conducted in 2015 to identify gaps in current programming and areas of actions for government to prioritise (which led to a high level workshop). Prior to that, nutrition was barely mentioned in development goals. The common results framework should help bring together the work of multiple actors, as one stakeholder highlighted that until recently the landscape for nutrition interventions had been highly fragmented, with a number of programmes being delivered by different NGOs but a lack of systematic nutrition programming implemented by the government (Interview, local public health expert). The role that the Donor Coordination Council played in advocating for nutrition to be included in the National Development Strategy can been seen an early example of this improved coordination. The National Health Strategy (2010-2020) entails nutrition activities and the Food Security Programme (2009-2015) stresses nutrition needs but the development of a CRF and multi-sectoral plan would mark a significant progress in the institutional fight against malnutrition. The eventual establishment of the CRF is planned for 2017 whereas the president's annual speech is envisaged to include nutrition, making 2017 the "year of nutrition". Several other experts echoed the feeling that nutrition is gaining increased visibility and importance in national strategy documents (interview, local expert on health and social issues). However, despite national level policies, one stakeholder highlighted the challenge of ensuring that nutrition is included in the plans for the jamoats (local authorities), where awareness of nutritional issues remains weak.

Nutrition-specific policies include a focus on promotion of good nutritional practices (and physical activity), universal salt iodisation (less than 50% of households consume iodised salt), vitamin A supplementation, improved intake of other micronutrients, and the implementation of the WHO recommendations for management of severe acute malnutrition (i.e. community-based). Rabie et al. (2012) identified the above areas as the most strategic and cost-effective ones for Tajikistan. Critical nutrition-sensitive policies revolved around improving food security and health.

The relatively low proportion of adherence to best nutritional practices as well as the high rates of micronutrients deficiencies means there are very strong potential gains for the above policies. However, the implementation of these polices is a challenge. For instance, while there is a law mandating Universal Salt iodisation, its enforcement is widely considered lacking. Some efforts are being made to understand the challenges and bottlenecks of implementing the law, including the organisation of a workshop in 2015. Many stakeholders agreed that implementing policies is one of the key challenges to improving nutrition. Insufficient funding for nutrition programmes, and social issues more broadly, was felt to be one of the main reasons for weak policy implementation. For example, several stakeholders highlighted the need for increased investment in large scale nutrition education and behaviour change communication strategies, however they highlighted that there was insufficient funding for such programmes (Interviews, UN representative, Local Expert on Health and Social Issues). The SUN score card, which reviewed progress in 2016, found remaining challenges were lack of financial tracking and the need for enhanced mobilisation of resources for nutrition. A budgeting exercise, carried out in 2015-2016 increased collaboration between the Ministry of Health and Social Protection but identified key financing gaps. The Ministry of Health and

Social Protection is now undertaking an exercise to help them define, and cost, a package of maternal, neonatal, child and adolescent health and nutrition services (SUN 2016).

The Ministry of Health and Social Protection convenes a Multi-Sectoral Coordination Council (MSCC) to bring together nutrition actors. However, the structure is not formally bound by clear terms of references. The same is true for the technical working group that supports the MSCC and include a wide number of ministries and the president's office. There remains scope to improve the coordination mechanism by further merging existing bodies, and by formalising the mechanism. Key stakeholder interviewed also felt the Ministry of Health and Social Protection could do more to provide leadership for nutrition actions and take more initiative. They felt that while the Ministry had the responsibility for coordinating nutrition actions, it did not generate key new initiatives and was not perceived by the public as being a leader in nutrition (Interviews). As in other countries, a key challenge that the Ministry of Health and Social Protection faces is being ill-placed to play a convening role for other ministries. While stakeholders mentioned that there are occasional round tables and multi-sectoral working group meetings, these are not frequent enough and often lack participation by key groups, especially those working at the community level. However, exploring how to improve coordination of all stakeholders, including international stakeholders, was highlighted as a key area which could improve the nutrition situation in the country moving forward. Identifying an appropriate, high level coordinating body for nutrition, and ensuring adequate buy-in from all sectors moving forward, will be essential (Interview, Local Expert on Health and Social Issues).

Opinions of key stakeholders about existing policies were divided. Some thought that while the country has policy documents which contain broad nutrition targets, these are not specific enough nor are the interventions being implemented in a systematic way to achieve these goals (Interview, local public health expert). Others felt that both the government and UN agencies such as the World Food Programme are actively involved in developing policies and programmes with specific short and long term nutrition goals (Interviews, Republican Nutrition Centre and UN representative). Like in other contexts, nutrition programming in Tajikistan, at least until recently, seemed to be dominated by donor organisations including the Asian Development Bank, The World Bank, and the Japanese government, among others (Interviews, UN agencies and local health expert).

While there is increasing buy-in from some ministries and government departments, some stakeholders feel that nutrition is still not well understood by some officials, and that greater advocacy on the part of the SUN movement, is still necessary (Interview, UN Representatives). One stakeholder suggested adding nutrition to the curriculum for those studying to become bureaucrats at the post-graduate level (UN Representative). Another stakeholder felt that while results of nutrition surveys and reports are shared with the government, nutrition is not a priority (Interview, USAID). While nutrition can be found in the official policies of many sectors, including water and sanitation, overall it is still felt that nutrition policies and programmes were the responsibility of the Ministry of Health and Social Protection (Interviews, local public health experts).

Several stakeholders also highlighted that that there is limited demand from citizens for improved nutrition at the community level due to a lack of educational programming about the importance of nutrition carried out in communities. This is attributed to both low levels of education and a lack of funding to carry out large scale nutrition awareness campaigns at the community level (Interviews, Local Public Health Expert, UN Representatives, Republican Nutrition Centre).

The health sector, which is key for implementing many of the critical nutrition-specific and nutrition-sensitive policies, is struggling with structural weaknesses. The health system considerably suffered after the demise of the Soviet Union. Basic health infrastructures suffered and the system is geared towards centralised, curative, facility-based healthcare. A shift towards community-based care (especially of severe acute malnutrition), preventive care and community mobilisation is necessary (Rabie et al. 2012). For further progress on malnutrition to happen, it will also be required to reduce the high diarrhoea prevalence among children and the high malaria prevalence that still prevails, especially in the border regions with Afghanistan. Increasing access to quality healthcare will also help in fostering nutrition-specific interventions, notably promotion and improvement of breastfeeding practices and complementary feeding practices.

4. CONCLUSION AND RECOMMENDATIONS

4.1. Key Messages

Chronic malnutrition (prevalence of stunting and anaemia) has diminished in all 5 countries over the last 30 years. The rate of stunting reduction has however been widely different across countries. It has been very strong in Tajikistan (-1.3% /year) and Bangladesh (-1.24%/ year), quite strong in Indonesia (-0.65%/year) and Egypt (-0.45%/year) and fairly weak in Senegal (-0.25%/year). In Senegal, stunting has also stopped declining over the recent period. This echoes the general decline of stunting and anaemia observed among OIC countries as a whole.

The record on economic growth does not perfectly match the record on stunting reduction. Since 1990, real GDP per capita has declined by 27% in Tajikistan (-1.8%/year) while it has increased by 130% in Indonesia (+8.8%/year), yet the former reduced stunting at a faster rate than the latter. Among the remaining three countries, Bangladesh, which experienced a very impressive growth rate of real GDP per capita of 9.5% over the period has achieved considerably more progress on stunting reduction than Senegal (with a growth rate of GDP per capita of +1.5%/year) and Egypt (+0.5%/year). OIC-wide, stunting and poverty are negatively related, but in a weaker way than outside OIC.

Only 3 out 5 countries - Bangladesh, Tajikistan and Indonesia - managed to reduce the prevalence of wasting over the last 30 years. Two of these countries registered a fast economic growth over this period (Bangladesh and Indonesia) but Tajikistan posted a negative economic growth. This echoes the finding about the lack of relationship between poverty rates and wasting among OIC countries. The decline in wasting has been most pronounced in Bangladesh (by 17% overall, -6.2%/year) followed by Tajikistan (by 13% overall, -1%/year) and Indonesia (by 9.4% overall, -0.5%/year). In Egypt, the prevalence of wasting has been multiplied by 4 over 26 years (15.4%/year) and it increased by 13% overall in Senegal (+0.5%/year).

Prevalence of child overweight is currently lower in OIC countries than in non-OIC countries. However, the data show that economic growth (or poverty reduction) beyond a certain development level is accompanied by a strong rise of child overweight in OIC countries. The development threshold where this association arises is lower and the strength of the association is stronger than in non-OIC countries. This suggests that lest decisive action is taken, child overweight within the OIC is poised to substantially increase in the future.

In all 5 countries, the relationship between various dimensions of poverty appears to be stronger with stunting than it is with wasting. In all countries, the proportion of stunting is lower among richest households (in terms of assets ownership) than among the poorest ones. In Senegal, Egypt, Bangladesh and Tajikistan, the top two wealth groups have lower prevalence of stunting than the poorest group. Regarding wasting, prevalence is highest among the second poorest group in Senegal and is lowest among the three richest groups in Bangladesh and Tajikistan. However, there are no relations between asset poverty and wasting in Indonesia. In Egypt, the relationship is even inverted. The strong connection between asset poverty and wasting in Bangladesh is consistent with the strong decline of the latter in this country. In contrast, the absence of a negative relationship between asset ownership and wasting in Egypt and Senegal is consistent with the failure of these countries to reduce wasting over time.

Better education is a factor of malnutrition (mostly stunting) reduction in all 5 countries. In Indonesia, Bangladesh and Tajikistan, education reduces both stunting and wasting. In Senegal, wasting is unrelated to education and in Egypt the relationship is positive.

Poor access to improved water and sanitation infrastructures are holding back progress in malnutrition reduction in Senegal, Indonesia and Bangladesh. In all three countries, access is low and not improving fast enough. In Egypt and Tajikistan, the situation is better and open defecation, for instance, is virtually non-existent. In the quantitative analysis, these factors are associated with lower stunting rates in Egypt and Indonesia and with lower wasting rates in Tajikistan. The lack of similar associations in Senegal and Bangladesh can be attributed to the very low access to these infrastructures throughout these countries (the opposite holds for Tajikistan).

Access to maternal and reproductive healthcare is a significant obstacle to malnutrition reduction in all 5 countries. While availability of healthcare is most acutely insufficient in Senegal, all countries in the sample have critical areas of weakness that contribute to a disabling environment for malnutrition reduction. The quantitative analyses do not find a very prominent role for health variables: access to antenatal or postnatal healthcare is associated with more chances of malnutrition in Egypt (postnatal only) and Tajikistan and with less chances in Bangladesh and Egypt (antenatal only). This is likely caused by (i) demand for healthcare is higher for vulnerable mothers (thus blurring the true effect), (ii) the need to account for availability of healthcare at aggregate levels.

Inadequate Infant and Young Children Feeding (IYCF) practices – including breastfeeding – is a significant factor maintaining malnutrition at high levels. All 5 countries display gaps in the implementation of best practices and stakeholders were in agreement across all contexts about the critical importance of this factor going forward. The quantitative analysis finds mixed results, however. In Senegal, Indonesia and Bangladesh, correct breastfeeding practices are associated with either higher chances of stunting or wasting. In Egypt and Bangladesh (for wasting), the relationship is negative, as expected. The likely explanation is that of selection bias: mothers most vulnerable are targeted for messages related to IYCF practices.

Improvement in food security has been a significant driver of malnutrition reduction in Tajikistan and Indonesia. Sustained high levels of food security hindered progress in Senegal, Bangladesh, and potentially Egypt. Tajikistan and Indonesia have seen long term improvement in food security but both countries have also been affected by the food price crisis. Economic growth does not always translate into better food security, and the persistence of acute malnutrition in the OIC countries in general shows that food security is not the only answer to malnutrition. In the quantitative analysis, food diversity is often not a strong predictor of malnutrition. It is associated with lower wasting rates in Indonesia and Tajikistan but with higher stunting rates in Senegal and Bangladesh. However, the data that were available did not allow us to measure food diversity precisely nor to test the effect of food intake, which would have been a better variable.

In all 5 countries, there is a very strong intergenerational transmission of undernutrition. Children whose mothers are very short are routinely about twice as likely to be stunted themselves. This is likely driven by the same conditions leading to maternal malnutrition to unfold for children as well. In addition, children who were born with a low weight (<2.5kg) are also about twice as likely to be malnourished as others, holding maternal malnutrition constant. Given that low birth weight is a direct consequence of maternal malnutrition; our

results show an overall intergenerational transmission of undernutrition that is very high in all 5 contexts. The proportion of low birth weights is highest in Bangladesh (22%) and Senegal (19%) and quite lower in the remaining 3 countries (where the proportion is between 10 and 13%).

All countries felt the need to put in place a coordination mechanism to address malnutrition. This is consistent with the SUN's recommendations based on the multi-sectoral nature of malnutrition. However, in all countries concerns and doubts were raised about the effectiveness of coordination. Even when many years have passed since the policy change, as in Senegal, the problems seem to persist. Progresses have been made, however, to mainstream nutrition within all sectors and to design comprehensive policy plans.

Commitment of central governments have been rising, and is now considered acceptable or good in all countries. Such commitment has often taken time, however, to materialize in acts. Mounting global awareness of nutrition (bolstered by e.g. the publication of the Global Nutrition Report' scorecards for each country), global movements such as the SUN, and regional policies have all contributed to place nutrition higher up in the agenda of ministries. Such commitment is however often mostly found in the health ministry, and more rarely in the agriculture (or even finance) ministries. Whereas the HANCI index considers commitment to be moderately satisfactory in Senegal, Indonesia and Bangladesh, when one looks at health spending as a fraction of GDP, the picture becomes much less positive.

The implementation of nutrition plans and policies remains a challenge. It is especially the case in decentralised settings as local governments may lack the commitment, knowledge and capacity of central governments and agencies. Although initiatives exist to address this problem, it is rarely the focus of official plans. The dual challenge of managing horizontal coordination (across actors) and vertical coordination (across levels of government) is daunting and contribute to a wide gap between ambitious goals and actual results. It also leads to disparities in implementation of nutrition policies and nutritional outcomes.

In the poorest countries of the sample (Senegal, Bangladesh) as well as in Indonesia, the double- burden of malnutrition is insufficiently integrated within nutrition policy and efforts. Although overweight and obesity feature in government documents, the relevant policies and targets are often overlooked by nutrition practitioners (who tend to focus on the pressing issue of under-nutrition) and it is difficult to integrate actors that are concerned by over-nutrition but not under-nutrition (such as the Ministry of Sports).

4.2. Key Recommendations

1. Adopt the internationally recognised framework for nutrition policy

It is now widely recognised that nutrition is a multi-sectoral issue and therefore requires the collaboration of multiple sectors to successfully address the nutrition burden. Reviews of the failure of previous regional nutrition strategies, for example the first African Union nutrition strategy which ran from 1993-2003, found that one of the major problems with the strategy was that it failed to integrate a multi-sectoral approach. As a result, despite the fact that the African region has had a nutrition policy for longer than other regions, rate of malnutrition on the continent remain unacceptably high.

Moving to a multi-sectoral response requires a switch from focusing only on nutrition specific, often curative interventions to address nutrition more holistically and bring in more nutrition sensitive policies which address the underlying and basic causes of malnutrition and focus on preventing the root causes of malnutrition rather than treating malnutrition To engage multiple sectors to align around improved nutrition, the SUN movement has developed a single and agreed set of expected (or common) results generated through the effective engagement of different sectors of Government and the multiple (non-government) actors who have capacity to influence people's nutrition. This is known as a Common Results Framework (CRF). This set of results should be based on the national goals and targets for nutrition, and reflect the ways in which different sectors and actors can best contribute to the achievement of these targets through their individual and collective actions. While the "results" referred to in a CRF are guided by the 1000 days window of opportunity to improve nutrition, CRFs may also include targets for obesity or overweight reduction (Walters, Dohan and Shoham 2015).

However, despite the recognized need for a multi-sectoral response, the health sector remains responsible for most nutrition interventions and the agriculture sector, in many countries, still remains uninvolved in nutrition interventions and focused largely on productivity. In order to see effective implementation of the CRFs and other multi-sectoral responses, efforts must be made to improve coordination at the national and subnational level.

2. Integrate the double-burden of malnutrition within all nutrition policies

The root causes of malnutrition should be addressed in an integrated way. There is increasing evidence that overnutrition and undernutrition are caused by many of the same factors, and often reinforce each other. For instance, poor nutrition in utero can pre-dispose individuals to obesity and non-communicable disease in later life. Indeed, in an increasing number of households, child stunting and maternal obesity can be found together. An attempt to try to understand this phenomena, and the particular drivers using data from 18 countries, found very similar factors drivers as those factors which are linked to poor nutrition more broadly, including low levels of maternal education, higher numbers of children living in the household, working in subsistence agriculture and relative household poverty (Jehn and Brewis 2009). Additionally, given the effects of poor nutrition during pregnancy on later adverse health; nutrition must be tackled holistically.

Countries must consider policies which aim to address poor nutrition from multiple angles, taking into account both intended and unintended consequences. For example, a policy of food subsidies intended to reduce food insecurity may be a contributing factor to obesity by making calorie-dense, nutrient-poor foods, much cheaper than nutritious foods like fruits and vegetables. The notion that undernutrition concerns the poor and overnutrition concerns the

affluent is a poor guide for policy. An integrated agenda which aims to provide healthy food to all people and encourage them to physically exercise is necessary (Uauy, Garmendia, and Corvalán 2014).

3. Ensuring a strong integration of global, regional and national policies

In many regions within the OIC, there are strong policies, but the challenge in many places is successfully translating those policies from global policies (WHA targets), to regional policies, to national policies which can be effectively implemented at the community level. The 2016 Global Nutrition report highlighted the need for national governments and regional bodies make SMART (Specific, Measurable, Achievable, Relevant and Time-bound) nutrition commitments (International Food Policy Research Institute 2016). If nutrition goals and targets are not SMART, measuring progress towards implementation, and ensuring government accountability, will remain a challenge. A review of the 122 national nutrition plans found that just under half had targets which linked to the World Health Assembly targets; if there plan contained targets, only two thirds of these were SMART (International Food Policy Research Institute 2016). The OIC should ensure that all countries within the region have integrated the WHA targets into national policies and that the targets are SMART.

The Regional Economic communities also represent a potential ally in developing strong nutrition policies, and ensuring accountability for countries in their regions. Yet, they are not as effective as they could be. Regional economic communities within the OIC, many of which have nutrition and agricultural policies, can foster stronger vertical policy coordination by encouraging mutual learning accountability at the regional level. However, competing mandates between regional bodies (especially in West Africa), and a lack of strong communication between countries and regional bodies are hampering this effort.

4. Enacting policies is not enough, a critical focus on implementation is necessary

In many of the country case studies, the design of policies was sound but the implementation of these policies was challenging. The case studies highlighted the challenge of both horizontal coordination between ministries involved in nutrition and of ensuring that national level policies were implemented effectively at the subnational level. Improving vertical coordination is a critical avenue for improving implementation of nutrition programmes. Building on existing decentralised structures contributes to greater local ownership and the kind of inter-sectoral cooperation happening at the central level must be replicated in local governments (Institute of Development Studies 2013).

5. Increased spending on nutrition and health is needed

Effective implementation of nutrition-specific and nutrition-sensitive policies will not be possible without adequate financing and budgeting for nutrition and health. In all five case studies, low levels of health spending by the government were cited as a key challenge. Genuine political commitment to reducing malnutrition only manifests when adequate and reliable funding is made available. Sustainable financing for nutrition is also likely to improve coordination in order to prevent corruption and overlap (Institute of Development Studies 2013). Harnessing global knowledge on the long-term costs of malnutrition for nutrition advocacy should be a key avenue for mobilising funds and commitment of Ministry of Finance.

6. Tackle food security and seasonality…

Many countries face the issue of seasonal variations which contribute to high levels of undernutrition in the 'lean' season. However, with high level political leadership, seasonal hunger can be addressed. Governments need to build a seasonal perspective into poverty reduction strategies and resilience building programmes; programmes must be tailored to the local seasonal context. Governments need to scale up seasonal social protection programmes such as cash for work, warrantage, destocking/restocking and health gardens (Kahmann 2013).

Health and nutrition stocks should be pre-positioned in risk prone areas well before the onset of the lean season. Support needs to be given to income diversification for poor households, including support to rural–urban linkages. Off-farm income earning work is one of the best buffers against seasonal stress. Investment in training schemes to build peoples' skill sets is needed. This will boost their income generating potential. Governments must also ensure that appropriate indicators are developed to enable seasonal analysis to inform existing early warning systems. In particular, market price indicators must be able to detect seasonal household level fluctuations in purchasing power. Donors, national governments and regional bodies must ensure that early warning is translated into early action (Kahmann, 2013).

7. …But aim for a broader focus on nutrition security

In many of the country case studies (Egypt, Bangladesh, Tajikistan), food security efforts have focused on ensuring that the population can meet their caloric requirements but have failed to address how to make the food system more nutrition-sensitive. In some cases, such as Egypt, food subsidy programmes which make high energy, nutrient poor foods cheap may also be contributing to obesity. In Tajikistan, where levels of food insecurity are high, few people can afford nutritious foods (only one in four children is able to regularly consume lentils or eggs) and meat is beyond the reach of most families. Countries need to be investing in research to understand how to make their food systems more nutrition sensitive, moving beyond simply a focus on production.

Rethinking how to support household level food security may be key in developing a more nutrition sensitive approach. Traditional approaches, such as (untargeted) food subsidies are expensive for governments to implement and do not guarantee that the poorest are being preferentially supported. Social protection mechanisms such as cash transfers, which can be targeted to the poorest and most nutritionally vulnerable households, should be a critical tool in nutrition policies. Other ways that social protection strategies can be made more nutrition sensitive include i) focusing on women as recipients of the social protection, based on evidence they are more likely to spend the money on health related costs, ii) defining explicit nutrition indicators in the monitoring system of social protection programmes and iii) integrating programmes aiming at increased dietary diversity (FAO 2015).

8. Design, develop and deliver behaviour change communication (BCC) policies which target IYCF knowledge, attitudes and practice

It is well recognised that an underlying cause of poor nutrition is inappropriate feeding practices. Changes in behaviours related to feeding practices are possible through well-designed and implemented nutrition education and behaviour change communication programs (USAID 2011). Approaches which have been shown to be effective include individual

counselling for primary caregivers. While one-on-one nutritional counselling has been shown to be a more effective approach to changing behaviours, some group counselling/group education can have a positive impact (USAID 2011).

9. In conclusion

Nutrition is complex and multi-sectoral. Implementing one of these recommendations in isolation is unlikely to have a significant impact on nutrition. However, work on nutrition governance carried out by Mejía Acosta and Fanzo (2012) found that having all three elements in place: functioning multi-sectoral coordination at the national, strong vertical coordination and accountability, and adequate and sustainable funding were all necessary to achieve real, lasting impacts on nutrition. Sustainability, of commitment and financial resources over time, so that nutritional gains are maintained through electoral cycles and global financial turndowns.

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ANNEXES

Annex A: Detailed Evolution of child Malnutrition in OIC countries

Table 20: Correspondence between Country Code and Country Name

Country code	Country name
AFG	Afghanistan
ALB	Albania
AZE	Azerbaijan
BEN	Benin
BFA	Burkina Faso
BGD	Bangladesh
BHR	Bahrain
BRN	Brunei Darussalam
CIV	Cote d'Ivoire
CMR	Cameroon
COM	Comoros
DJI	Djibouti
DZA	Algeria
EGY	Egypt, Arab Rep.
GAB	Gabon
GIN	Guinea
GMB	Gambia, The
GNB	Guinea-Bissau
GUY	Guyana
IDN	Indonesia
IRN	Iran, Islamic Rep.
IRQ	Iraq
JOR	Jordan
KAZ	Kazakhstan
KGZ	Kyrgyz Republic
KWT	Kuwait
LBN	Lebanon
LBY	Libya
MAR	Morocco
MDV	Maldives
MLI	Mali
MOZ	Mozambique
MRT	Mauritania
MYS	Malaysia

NER	Niger
NGA	Nigeria
OMN	Oman
PAK	Pakistan
QAT	Qatar
SAU	Saudi Arabia
SDN	Sudan
SEN	Senegal
SLE	Sierra Leone
SOM	Somalia
SUR	Suriname
SYR	Syrian Arab Republic
TCD	Chad
TGO	Togo
TJK	Tajikistan
TKM	Turkmenistan
TUN	Tunisia
TUR	Turkey
UGA	Uganda
UZB	Uzbekistan
YEM	Yemen, Rep.

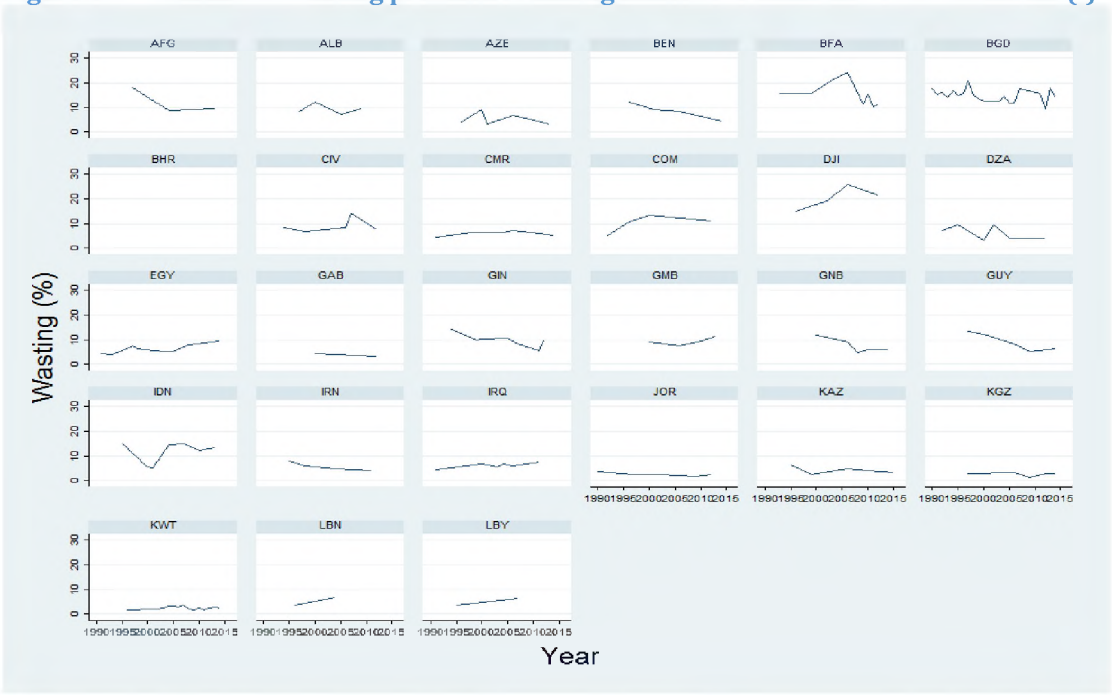
Table 21: Evolution of Wasting Prevalence among Under-five Children between 1990/94 and 2010/16 in OIC Countries

	Absolute change		Relative change
Country	(Percentage point)	Country	(Percentage)
Pakistan	-13.5	Benin	-63.4%
Afghanistan	-8.7	Uzbekistan	-57.9%
Benin	-7.8	Pakistan	-56.3%
Mauritania	-7.5	Turkey	-55.3%
Guyana	-6.9	Guyana	-51.9%
Niger	-6.6	Kazakhstan	-51.6%
Uzbekistan	-6.2	Iran, Islamic Rep.	-50.6%
Maldives	-5.9	Guinea-Bissau	-49.2%
Guinea-Bissau	-5.8	Afghanistan	-47.8%
Burkina Faso	-4.6	Morocco	-41.0%
Somalia	-4.4	Mauritania	-39.3%
Guinea	-4.1	Jordan	-36.8%
Iran, Islamic Rep.	-4.1	Maldives	-36.6%
Nigeria	-3.9	Mozambique	-36.5%
Mozambique	-3.5	Nigeria	-33.1%
Chad	-3.4	Burkina Faso	-29.7%
Kazakhstan	-3.3	Guinea	-29.3%
Bangladesh	-3	Suriname	-28.6%
Cote d'Ivoire	-2.7	Cote d'Ivoire	-26.2%
Turkey	-2.1	Niger	-26.1%
Suriname	-2	Somalia	-22.8%
Morocco	-1.6	Gabon	-20.9%
Tajikistan	-1.5	Chad	-20.7%
Jordan	-1.4	Azerbaijan	-18.4%
Indonesia	-1.4	Bangladesh	-17.3%
Gabon	-0.9	Tajikistan	-13.2%
Azerbaijan	-0.7	Tunisia	-9.7%
Oman	-0.3	Indonesia	-9.4%
Tunisia	-0.3	Oman	-3.8%
Bahrain	-0.2	Kyrgyz Republic	-3.4%
Kyrgyz Republic	-0.1	Bahrain	-2.9%
Algeria	0.1	Turkmenistan	1.4%
Turkmenistan	0.1	Algeria	2.5%
Cameroon	0.7	Sierra Leone	11.9%
Kuwait	0.7	Sudan	12.4%

Senegal	0.7	Togo	13.6%
	Absolute change		Relative change
Country	(Percentage point)	Country	(Percentage)
Togo	0.8	Senegal	13.7%
Sierra Leone	1	Yemen, Rep.	14.0%
Uganda	1.2	Syrian Arab Republic	15.0%
Albania	1.3	Cameroon	15.6%
Syrian Arab Republic	1.5	Albania	16.0%
Sudan	1.8	Gambia, The	29.2%
Yemen, Rep.	2	Mali	35.4%
Gambia, The	2.6	Uganda	38.7%
Libya	2.9	Kuwait	41.2%
Lebanon	3	Iraq	68.2%
Iraq	3	Djibouti	72.0%
Mali	4	Libya	80.6%
Comoros	5.8	Lebanon	83.3%
Egypt, Arab Rep.	7.6	Comoros	109.4%
Saudi Arabia	8.9	Saudi Arabia	306.9%
Djibouti	9	Egypt, Arab Rep.	400.0%
Qatar		Qatar	
Brunei Darussalam		Brunei Darussalam	
Malaysia		Malaysia	

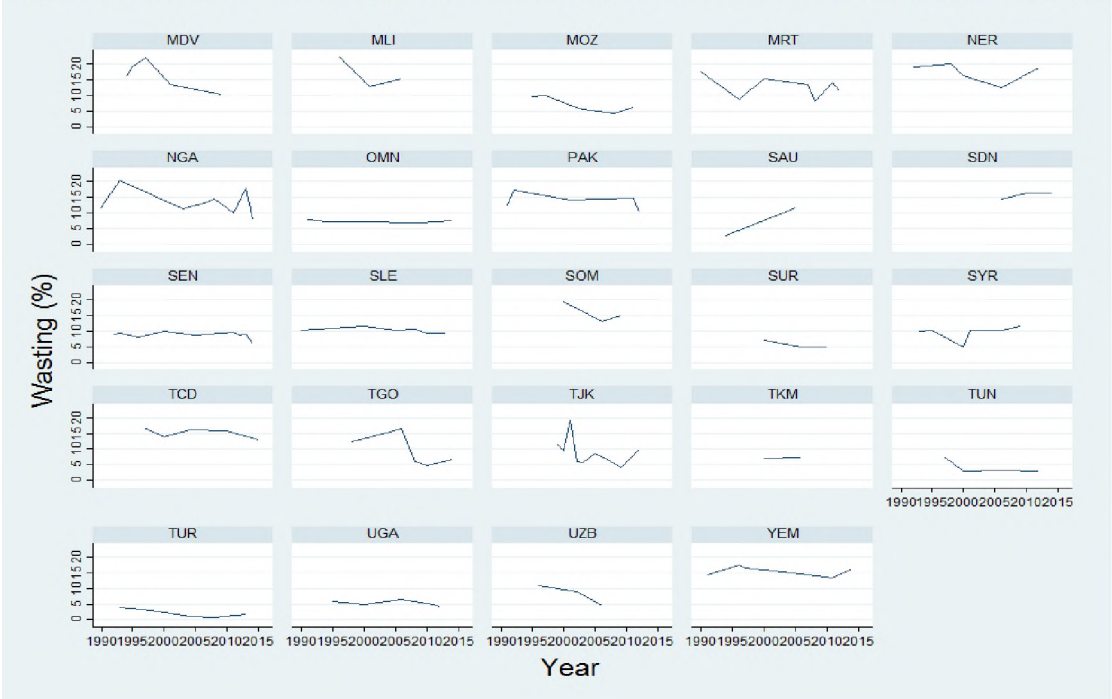
Source: authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016).

Figure 37: Evolution of wasting prevalence among under-five children in OIC countries (I)



Source: authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016).

Figure 38: Evolution of wasting prevalence among under-five children in OIC countries (II)



Source: authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016).

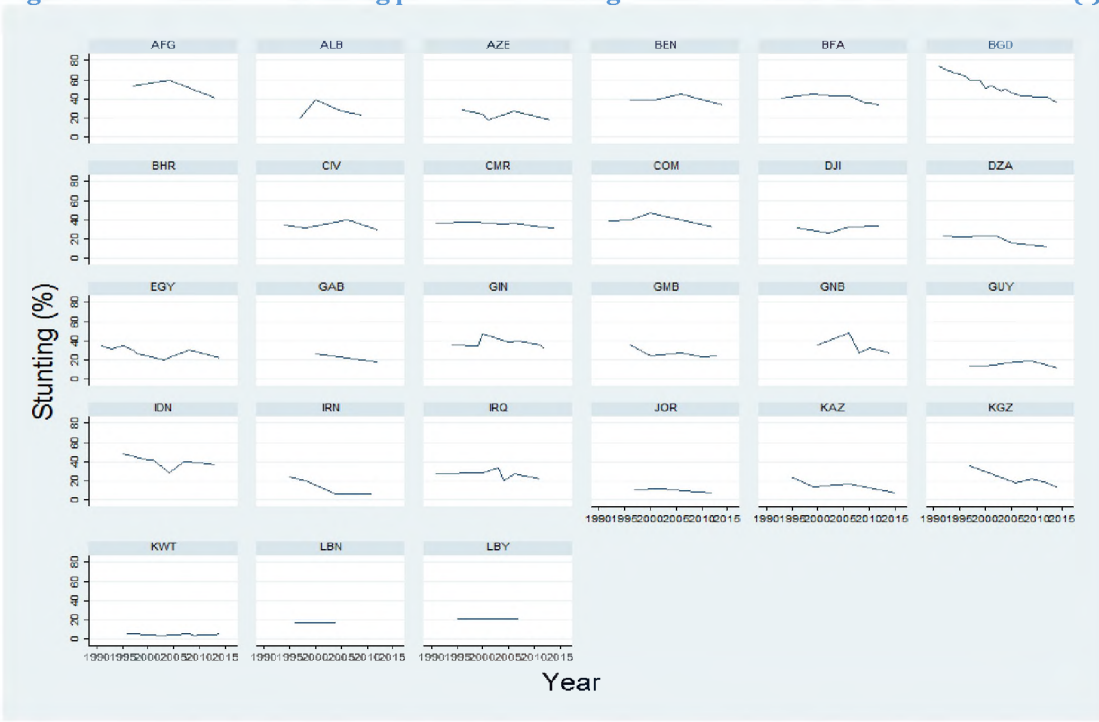
Table 22: Evolution of stunting prevalence among under-five children between 1990/94 and 2010/16 in OIC countries

	Absolute change		Relative change
Country	**(Percentage point)**	**Country**	**(Percentage)**
Bangladesh	-34.8	Iran, Islamic Rep.	-72.1%
Kyrgyz Republic	-23.3	Kazakhstan	-65.7%
Uzbekistan	-19.9	Kyrgyz Republic	-64.4%
Morocco	-19.6	Jordan	-62.0%
Mauritania	-18.2	Turkey	-60.6%
Iran, Islamic Rep.	-17.6	Morocco	-56.8%
Nigeria	-17.6	Saudi Arabia	-56.5%
Pakistan	-17.5	Uzbekistan	-50.4%
Mozambique	-16.8	Bangladesh	-49.1%
Maldives	-15.8	Tunisia	-45.4%
Kazakhstan	-15.3	Mauritania	-45.3%
Tajikistan	-14.7	Maldives	-43.8%
Turkey	-14.6	Oman	-41.7%
Uganda	-13.4	Suriname	-39.3%
Togo	-13.2	Azerbaijan	-35.7%
Jordan	-12.7	Tajikistan	-35.4%
Afghanistan	-12.3	Nigeria	-34.9%
Saudi Arabia	-12.1	Egypt, Arab Rep.	-34.4%
Egypt, Arab Rep.	-11.7	Gabon	-33.5%
Indonesia	-11.7	Turkmenistan	-32.7%
Gambia, The	-11.6	Togo	-32.4%
Oman	-10.1	Gambia, The	-32.1%
Azerbaijan	-10.0	Algeria	-30.8%
Turkmenistan	-9.2	Uganda	-28.2%
Gabon	-8.8	Mozambique	-28.0%
Guinea-Bissau	-8.5	Pakistan	-28.0%
Tunisia	-8.4	Senegal	-26.8%
Burkina Faso	-7.8	Indonesia	-24.3%
Senegal	-7.1	Guinea-Bissau	-23.5%
Comoros	-6.4	Afghanistan	-23.1%
Yemen, Rep.	-5.9	Burkina Faso	-19.2%
Suriname	-5.7	Iraq	-18.1%
Syrian Arab Republic	-5.4	Malaysia	-16.9%
Algeria	-5.2	Comoros	-16.6%
Benin	-5.1	Syrian Arab Republic	-16.4%

	Absolute change		Relative change
Country	**(Percentage point)**	**Country**	**(Percentage)**
Chad	-5.1	Guyana	-14.3%
Iraq	-5.0	Benin	-13.0%
Cameroon	-4.6	Cameroon	-12.7%
Guinea	-4.0	Chad	-11.3%
Malaysia	-3.5	Guinea	-11.3%
Sierra Leone	-3.5	Somalia	-11.3%
Somalia	-3.3	Yemen, Rep.	-11.3%
Guyana	-2.0	Sierra Leone	-8.5%
Niger	-0.8	Lebanon	-4.1%
Lebanon	-0.7	Bahrain	-2.2%
Bahrain	-0.3	Niger	-1.8%
Libya	-0.1	Libya	-0.5%
Sudan	-0.1	Sudan	-0.3%
Kuwait	0.8	Mali	7.5%
Albania	2.7	Albania	13.2%
Mali	2.7	Kuwait	16.0%
Djibouti	5.5	Djibouti	19.6%
Cote d'Ivoire	7.1	Cote d'Ivoire	31.6%

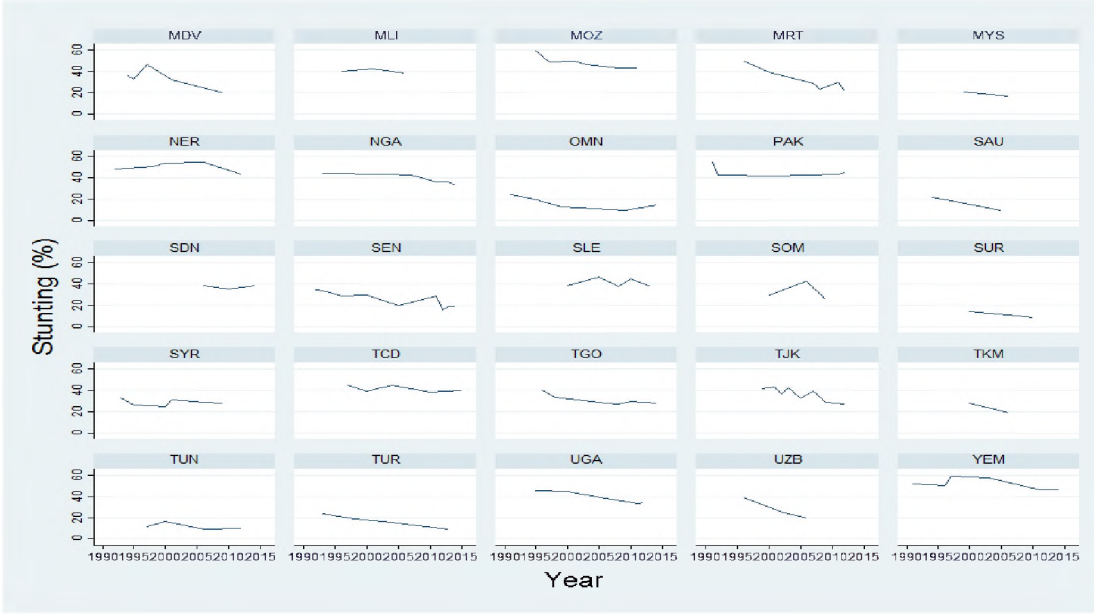
Source: authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016).

Figure 39: Evolution of stunting prevalence among under-five children in OIC countries (I)



Source: authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016).

Figure 40: Evolution of stunting prevalence among under-five children in OIC countries (II)



Source: authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016).

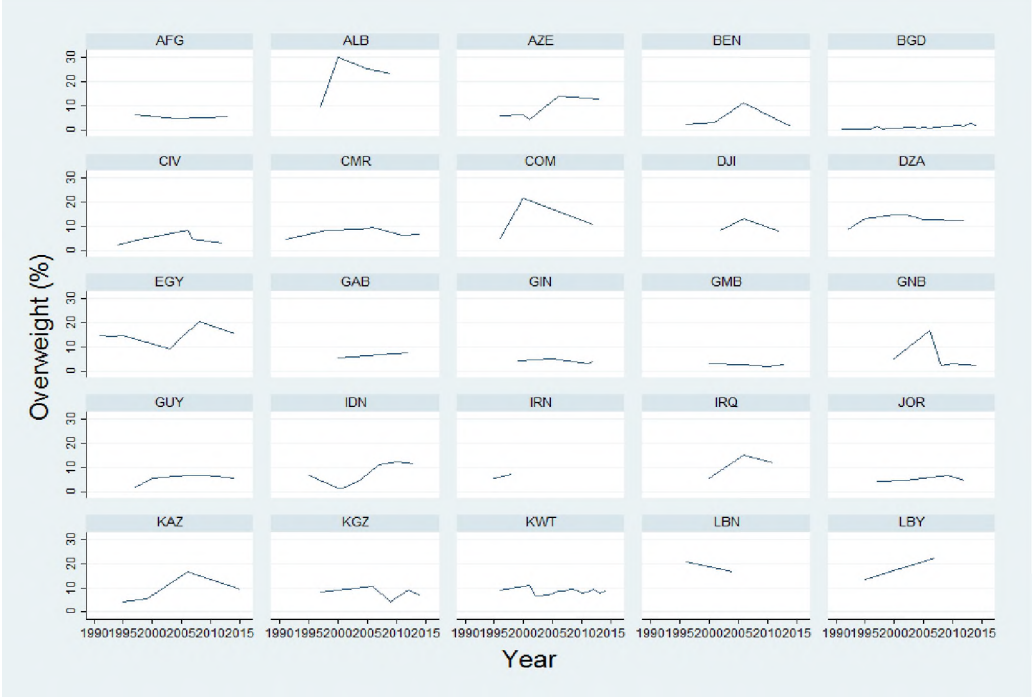
Table 23: Evolution of overweight prevalence among under-five children between 1990/94 and 2010/16 in OIC countries

	Absolute change		Relative change
Country	**(Percentage point)**	**Country**	**(Percentage)**
Yemen, Rep.	-6.1	Mauritania	-82.4%
Mauritania	-5.6	Yemen, Rep.	-75.3%
Lebanon	-4.1	Guinea-Bissau	-54.9%
Oman	-4.0	Oman	-47.6%
Jordan	-3.9	Jordan	-45.3%
Uzbekistan	-3.1	Nigeria	-43.8%
Pakistan	-3.0	Senegal	-43.5%
Guinea-Bissau	-2.8	Pakistan	-38.5%
Somalia	-1.8	Somalia	-38.3%
Nigeria	-1.4	Togo	-31.0%
Sudan	-1.2	Benin	-29.2%
Kyrgyz Republic	-1.1	Sudan	-28.6%
Afghanistan	-1.1	Lebanon	-19.7%
Senegal	-1.0	Uzbekistan	-19.5%
Togo	-0.9	Afghanistan	-16.9%
Benin	-0.7	Kyrgyz Republic	-13.6%
Guinea	-0.5	Guinea	-11.6%
Gambia, The	-0.3	Gambia, The	-10.0%
Djibouti	-0.3	Chad	-7.4%
Chad	-0.2	Djibouti	-3.6%
Kuwait	-0.2	Kuwait	-2.2%
Tajikistan	-0.1	Tajikistan	-1.5%
Cote d'Ivoire	0.7	Syrian Arab Republic	19.3%
Niger	1.0	Iran, Islamic Rep.	25.5%
Suriname	1.1	Cote d'Ivoire	28.0%
Bangladesh	1.2	Mozambique	33.9%
Iran, Islamic Rep.	1.4	Gabon	37.5%
Mozambique	2.0	Suriname	37.9%
Cameroon	2.0	Algeria	42.5%
Gabon	2.1	Cameroon	42.6%
Uganda	2.2	Niger	50.0%
Syrian Arab Republic	2.9	Uganda	61.1%
Guyana	3.4	Libya	67.2%
Algeria	3.7	Indonesia	76.9%
Sierra Leone	4.2	Sierra Leone	89.4%

	Absolute change		Relative change
Country	(Percentage point)	Country	(Percentage)
Mali	4.2	Morocco	94.5%
Saudi Arabia	4.9	Comoros	105.7%
Indonesia	5.0	Azerbaijan	113.1%
Morocco	5.2	Iraq	114.5%
Kazakhstan	5.2	Turkey	118.0%
Maldives	5.3	Kazakhstan	126.8%
Comoros	5.6	Egypt, Arab Rep.	127.5%
Turkey	5.9	Albania	146.3%
Iraq	6.3	Guyana	178.9%
Azerbaijan	6.9	Tunisia	286.5%
Egypt, Arab Rep.	8.8	Saudi Arabia	408.3%
Libya	9.0	Maldives	441.7%
Tunisia	10.6	Bangladesh	600.0%
Albania	13.9	Mali	840.0%

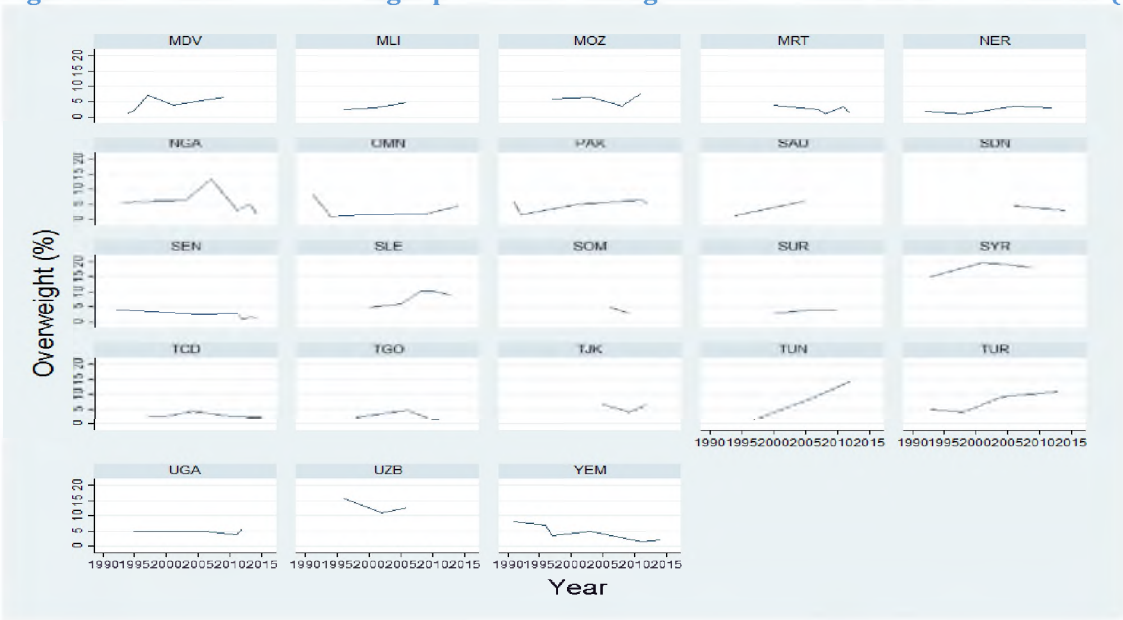
Source: authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016).

Figure 41: Evolution of overweight prevalence among under-five children in OIC countries (I)



Source: authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016).

Figure 42: Evolution of overweight prevalence among under-five children in OIC countries (II)



Source: authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016).

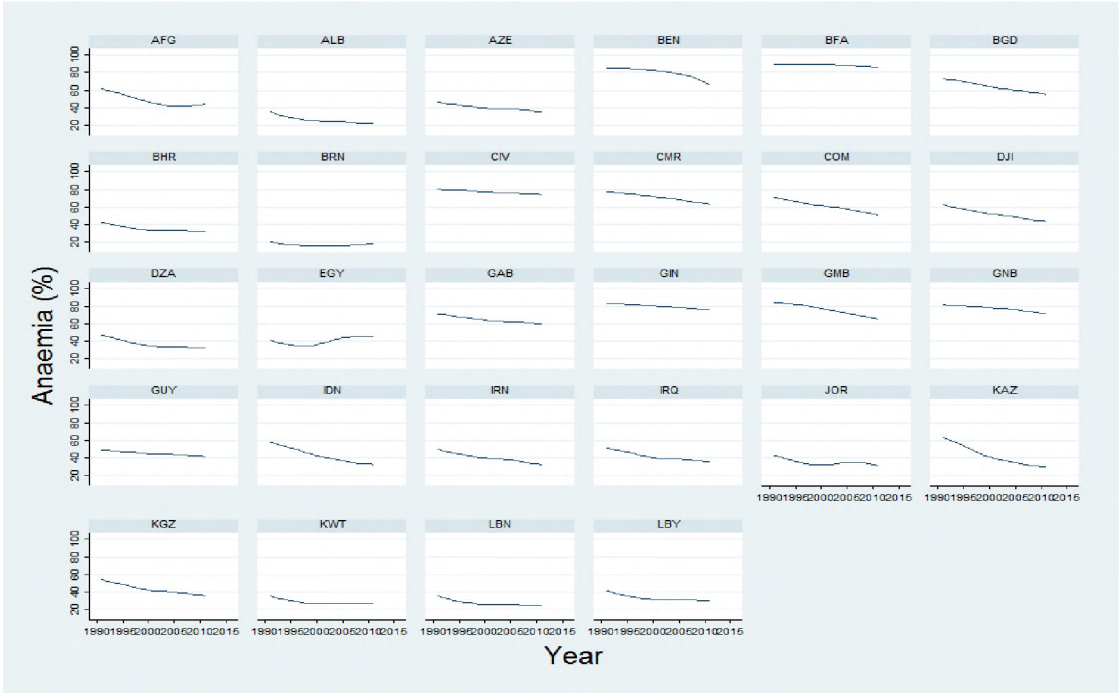
Table 24: Evolution of anaemia prevalence among under-five children between 1990/94 and 2010/16 in OIC countries

	Absolute change		Relative change
Country	**(Percentage point)**	**Country**	**(Percentage)**
Maldives	-53.9	Maldives	-64.3%
Kazakhstan	-35.1	Kazakhstan	-53.9%
Sudan	-29.3	Indonesia	-44.5%
Indonesia	-26.1	Tajikistan	-44.2%
Tajikistan	-21.7	Albania	-39.5%
Djibouti	-20.7	Turkey	-36.9%
Comoros	-20.6	Iran, Islamic Rep.	-36.0%
Uganda	-20.5	Kyrgyz Republic	-35.0%
Benin	-19.5	Lebanon	-34.2%
Kyrgyz Republic	-19.3	Algeria	-34.2%
Gambia, The	-19.0	Sudan	-33.3%
Afghanistan	-18.6	Djibouti	-32.4%
Iran, Islamic Rep.	-18.3	Iraq	-31.1%
Bangladesh	-17.9	Turkmenistan	-30.4%
Turkey	-17.6	Syrian Arab Republic	-30.4%
Oman	-17.6	Malaysia	-30.3%
Uzbekistan	-17.5	Oman	-30.2%
Somalia	-17.5	Libya	-29.7%

Algeria	-16.6	Afghanistan	-29.6%
Iraq	-16.2	Jordan	-29.3%
Syrian Arab Republic	-16.0	Uzbekistan	-28.8%
Saudi Arabia	-15.3	Comoros	-28.7%
Albania	-14.6	Kuwait	-28.3%
Cameroon	-14.1	Saudi Arabia	-28.1%
Turkmenistan	-13.9	Morocco	-27.1%
Malaysia	-13.8	Qatar	-26.8%
Mozambique	-13.5	Bahrain	-26.7%
Morocco	-13.2	Uganda	-26.7%
Jordan	-12.9	Azerbaijan	-26.4%
Libya	-12.8	Tunisia	-24.4%
Azerbaijan	-12.6	Bangladesh	-24.4%
Lebanon	-12.6	Somalia	-23.6%
Gabon	-12.0	Benin	-23.0%
Mauritania	-11.6	Gambia, The	-22.5%
Bahrain	-11.6	Cameroon	-18.2%
Niger	-11.6	Mozambique	-16.9%
Kuwait	-10.4	Gabon	-16.7%
Togo	-10.3	Guyana	-16.6%
Guinea-Bissau	-10.1	Mauritania	-14.1%
Chad	-9.9	Niger	-13.3%
Tunisia	-9.5	Togo	-12.7%
Qatar	-9.4	Guinea-Bissau	-12.4%
Sierra Leone	-8.2	Brunei Darussalam	-12.0%
Guyana	-8.2	Chad	-11.9%
Guinea	-7.2	Suriname	-10.6%
Senegal	-6.2	Sierra Leone	-10.0%
Nigeria	-5.7	Guinea	-8.7%
Cote d'Ivoire	-5.7	Yemen, Rep.	-8.3%
Yemen, Rep.	-5.4	Nigeria	-7.4%
Mali	-5.1	Senegal	-7.3%
Suriname	-4.6	Cote d'Ivoire	-7.1%
Pakistan	-4.1	Pakistan	-6.3%
Burkina Faso	-3.0	Mali	-6.0%
Brunei Darussalam	-2.5	Burkina Faso	-3.4%
Egypt, Arab Rep.	3.4	Egypt, Arab Rep.	8.1%

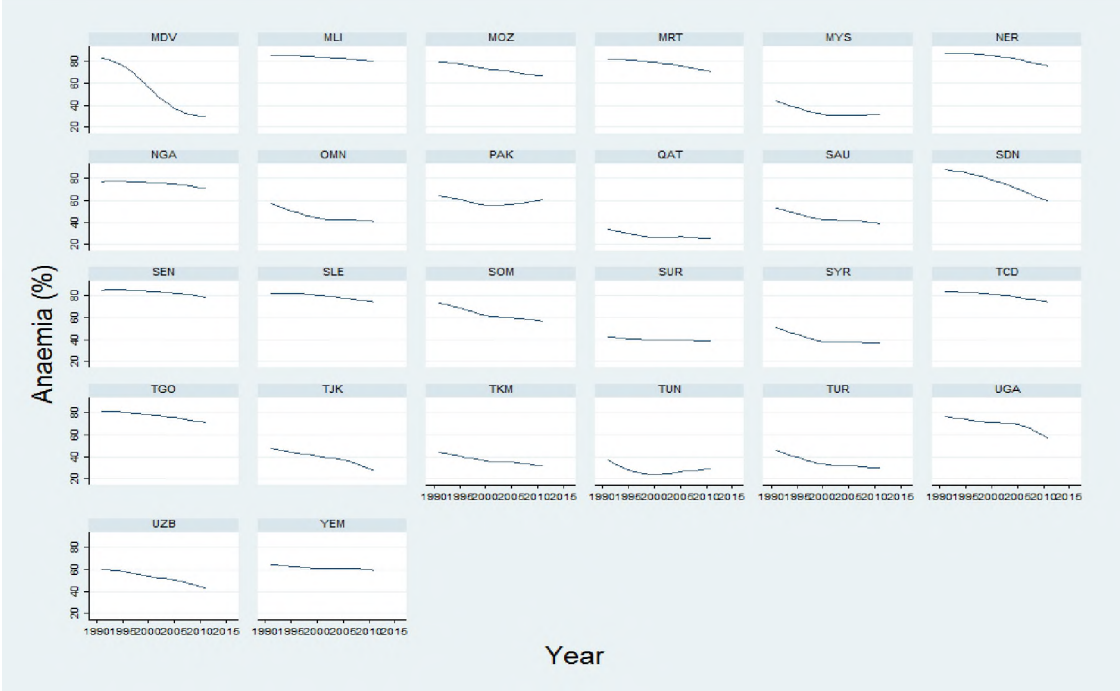
Source: authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016).

Figure 43: Evolution of anaemia prevalence among under-five children in OIC countries (I)



Source: authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016).

Figure 44: Evolution of anaemia prevalence among under-five children in OIC countries (II)



Source: authors' calculations based on the Joint Malnutrition Estimates from UNICEF, WHO and the World Bank (2016).