



**Malnutrition,
non-communicable
diseases
and associated
double duty initiatives**

Report research

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Abbreviations

NCDs	Non-communicable diseases
N-NCDs	Nutrition-related non-communicable diseases
DBM	Double Burden of Malnutrition
LMICs	Low and middle-income countries
DALYs	Disability Adjusted Life Years
EASO	European Association for the Study of Obesity
TB	Tuberculosis
WHO	World Health Organization
WHA	World Health Assembly
FAO	Food and Agriculture Organization of the United Nations
IFAD	International Fund for Agriculture Development
WFP	World Food Programme
UNICEF	United Nations Children's Fund
SDGs	Sustainable Development Goals
BMI	Body Mass Index
EU	European Union
CVD	Cardiovascular Disease

Table of contents

ABBREVIATIONS	
CONTENTS	5
EXECUTIVE SUMMARY	6
1.0 BACKGROUND	8
1.1 Current status of global malnutrition	8
1.2 Current status of NCDs	9
1.3 Global agenda on nutrition and the prevention and control of NCDs	11
1.4 NCD risk factors	12
1.5 NCDs and Infectious disease	16
1.5.1 Links between Infectious disease and NCDs	17
1.6 Shared drivers of the double burden of malnutrition	20
1.7 Potential conflicts from addressing over and under nutrition in silos	22
2.0 DOUBLE DUTY ACTIONS	23
2.1 Methodology	24
2.2 Results	25
3.0 DOUBLE DUTY ACTIONS - EXPANDED CASE STUDIES	33
4.0 FINANCING NUTRITION	37
4.1 Domestic nutrition budget allocation	38
4.2 Donor spending	38
5.0 FINANCING NCDs	41
5.1 Government allocation/ out of pocket spending on NCDs	41
5.2 Donor spending	42
6.0 CONCLUSION	45
7.0 ANNEX A	48
8.0 REFERENCE LIST	49

Executive Summary

Background

Over the past 25 years, the proportion of hungry and undernourished people living in developing regions as a whole has halved. After steadily declining for over a decade, global hunger is on the rise again, affecting 815 million people in 2016, or 11 per cent of the global population, says a new edition of the annual United Nations report on world food security and nutrition released in September 2017. At the same time, multiple forms of malnutrition are threatening the health of millions worldwide.

The increase – 38 million more people than the previous year – is largely due to the proliferation of violent conflicts and climate-related shocks, according to The State of Food Security and Nutrition in the World 2017. The epidemiological transition has seen a shift from predominantly what were acute infections of childhood to chronic non-infectious diseases of adults. Non-communicable diseases are now the leading cause of mortality and morbidity globally. Increasingly, countries are being faced with the “double burden of malnutrition” – the coexistence of undernutrition and overweight, obesity and NCDs. The World Health Organization has recommended the implementation of “double duty actions” that can offer integrated solutions to both.

Methods

This report briefly examines the nutrition and NCD landscape globally. It identifies past and present double duty actions in order to get a better understanding of what case studies are currently available. For the purpose of this report double duty actions were defined as initiatives in which the authors / implementers themselves explicitly stated the aims of the initiative to be “double duty” or as tackling undernutrition and N-NCDs / one of its risk factors. Initiatives that did not initially aim to tackle the double burden of malnutrition but upon evaluation have reported impacts on both undernutrition and N-NCDs / one of its risk factors was also included. The list is not exhaustive. Key search terms used to look for case studies are included in Annex A. The report also presents two expanded case studies of double duty actions – one in which the general approach of a development agency towards tackling the double burden of malnutrition is examined and the second, a clear program of how a double duty approach can be incorporated into a non-health agro-value chain initiative.

Results

Based on the inclusion and exclusion criteria, case studies were found in Mexico, Brazil, Malaysia, Japan, Mauritius, Vietnam, South Africa, Lebanon, India, Kenya, the Western Pacific Region, West Africa and the WHO. Such case studies are still few and far between and could be indicative that the intentional planning, implementation and outcome measurement of collaborative interventions to tackle the double burden of malnutrition is yet at an immature stage.

Conclusions

Business as usual addressing undernutrition and overnutrition in silos can no longer continue if we are to meet the global targets for nutrition and NCDs. Coordinated actions across sectors are needed for successful implementation of initiatives. The evidence base to test the hypothesis that double duty actions can indeed reduce the prevalence of NCDs is yet lacking and hence the intentional implementation and evaluation of such activities is needed. Adopting the three-level strategy put forth by the WHO can increase the efficiency of actions through a double duty approach. In-depth analysis of the two case studies showed that development agencies have a key role to play in tackling the double burden of malnutrition. Nutrition-sensitive interventions need to incorporate nutrition-related SMART indicators to measure impact on the double burden of malnutrition. Commitments need to be followed by the investment of resources.

Background

1.1

Current status of global malnutrition

—

‘Malnutrition’ is a broad term encompassing “deficiencies, excesses or imbalances in a person intake of energy and/or nutrients”(1). Broadly speaking malnutrition can be divided into two categories: undernutrition (which includes stunting, wasting, underweight and micronutrient deficiencies or insufficiencies) and overweight, obesity and nutrition-related non-communicable diseases (1). Malnutrition is a serious public health problem affecting nearly every country in the world. Worldwide, one in three people suffer from some form of malnutrition (2). Women, children and adolescents are at particular risk (3). It is estimated that around 45% of deaths in children under the age of 5 is linked to undernutrition (3). Malnutrition and diet are the biggest risk factors for the global burden of disease. In 2014, 462 million adults worldwide were underweight while 1.9 billion were overweight or obese (4). In 2016, 155 million children under 5 were stunted and 52 million children under 5 wasted while 41 million children under 5 were overweight (5). 56% of all stunted children under 5, 48% of all overweight children and 69% of all wasted children lived in Asia (5). 38% of all stunted children, 24% of all overweight children and 27% of all wasted children under 5 lived in Africa (5). The number of overweight children is increasingly most rapidly in Asia and the number of stunted children is declining in every region except Africa and Oceania (2).

Asia and Africa bear the greatest share of all forms of malnutrition.

The epidemiological transition has seen a shift from predominantly what were acute infections of childhood to chronic non-infectious diseases of adults. Non-communicable diseases are now the leading cause of mortality and morbidity globally. While low and middle-income countries continue to fight undernutrition and infectious disease, they now have to combat the rising tide of overweight, obesity and N-NCDs too. If business as usual is to continue, global nutrition and NCD targets will not be met. Whilst many countries are on course to meet targets related to stunting, wasting and overweight in children under 5 and exclusive breastfeeding, nearly all countries are off course in meeting targets related to adult overweight, obesity, diabetes and anemia in women (2). Obesity and overweight is increasing in nearly every country in the world (2).

Increasingly, we are being faced with the ‘double burden of malnutrition’: when undernutrition and/or overweight, obesity and nutrition-related non-communicable diseases occur in the same household, community and population across a life course (4). As an example, at the individual level, an overweight person can simultaneously be deficient in one or more vitamin/mineral. At the household level, an overweight or anemic mother may coexist with an underweight grandparent or child (3). At the population level, communities, nations or regions may simultaneously experience both under and overnutrition. Increasing evidence indicates that

there are shared drivers – biological, environmental and socioeconomic factors – contributing to the prevalence and risk of both, undernutrition and overweight, obesity and nutrition-related non-communicable diseases (6,7). These are discussed in further detail in Section 1.6 of the report.

The economic consequences of malnutrition are significant: in Asia and Africa economic losses amount to 11% of GDP every year (2). Furthermore, according to the Global Nutrition Report 2016, a diagnosis of diabetes in China, amounts to a loss in income of 16.3% annually (2). In the USA, when one individual in a household is obese, the household faces a loss of 8% of its annual income (2). On the other hand, investing in nutrition promises a \$16 return on investment for every \$1 spent (2).

1.2

Current status of NCDs

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NCDs refer to chronic diseases that “tend to be of long duration and are the result of a combination of genetic, physiological, environmental and behavioural factors” (8). According to the WHO Global Status Report 2014, NCDs are the leading cause of mortality and morbidity worldwide. NCDs were responsible for 38 million or 68% of the 56 million deaths that occurred in 2012 (9). Forty two percent of these deaths were ‘premature’, occurring in people under the age of 70 (9). LMICs were disproportionately affected; nearly three quarters of all NCD deaths and 82% of all premature deaths occurred in low and middle-income countries (9). In LMICs, 48% of all NCD deaths were in individuals under the age of 70 compared to just 28% of NCD deaths in high-income countries (9). Deaths by NCDs have increased in all regions of the world since 2000. The highest number of deaths in 2012 was in the Western Pacific Region (10.9million) followed by the South East Asian Region (8.5 million) (9). In 2012, four NCDs were responsible for 82% of all NCD deaths (10). Cardiovascular disease was responsible for 17.5million deaths or 46.2% of all NCD deaths, cancers were responsible for 8.2 million or 21.7% of all NCD deaths, respiratory diseases, including asthma and chronic obstructive pulmonary disease were responsible for 4.0 million or 10.7% of NCD deaths and diabetes was responsible for 1.5 million or 4% of NCD deaths (9). Total DALYs due to NCDs increased from 1.1

billion to 1.5 billion between 1990 and 2015 although age-standardised DALY rates due to NCDs declined (10). The total annual number of deaths by NCDs is projected to increase to 52 million by 2030 (9).

Absolute numbers of premature deaths is often used to describe the burden and distribution of NCDs. These statistics help convey that efforts need to be concentrated on developing countries where most of the deaths occur (11). In their new study Allen et al (2017) show however that the proportion of premature deaths in low and middle-income countries is actually directly proportional to population size in these countries – leading us to question whether the burden of NCDs borne by LMIC's is in fact actually disproportionate (11). They argue that the “82% of all premature deaths occurred in low and middle-income countries” statistic doesn't control for demographic differences such as population age distribution or global distribution of those under the age of 70 and “therefore does not constitute an individual risk of premature NCD deaths, which would be a more meaningful statistic when comparing those living in countries of different income levels” (11). Hence they quantify the “relative risk” of premature NCD mortality in each World Bank region through the use of age-standardized rates of premature mortality (11). They show that the probability of a 30-year-old dying from an NCD before the age of 70 is 1.5 times higher in developing countries than an individual in a high-income country (11). The study argues that relative risk may constitute a more appropriate way of

quantifying the unequal global distribution of premature mortality from NCDs than absolute numbers of deaths in LMICs (11).

1.3

Global agenda on nutrition and the prevention and control of NCDs

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Momentum around Nutrition has been building over the past few years. At least 12 of the 17 Sustainable Development Goals contain indicators that are highly relevant to nutrition (2). In 2012, the World Health Assembly adopted a set of six 2025 Global Targets for Maternal, Infant and Young Child Nutrition. In 2013, the governments of the United Kingdom, Brazil and the Children's Investment Fund Foundation held the first Nutrition for Growth Summit which yielded a US\$ 23 billion donor commitment for actions to improve nutrition (2). 2014 saw the second International Conference on Nutrition (ICN2) with governments agreeing on a set of ten commitments in the Rome Declaration on Nutrition and an accompanying Framework for Action. In 2015, the new UN Sustainable Development Goal to "end all forms of malnutrition" for all people by 2030 was adopted at the United Nations and the 'United Nations Decade of Action on Nutrition from 2016-2025' was declared to translate ICN2 commitments to a set of coordinated initiatives. The Decade of Action on Nutrition is a united global effort among governments and other players to set, track, coordinate and increase the efficiency and effectiveness of nutrition actions at all levels (12). Implementation of the Decade is co-convened by FAO, WHO, WFP, IFAD and UNICEF. The Decade calls for Member States to act

on six pillars for nutrition; sustainable food systems for healthy diets, aligned health systems providing universal coverage of essential nutrition actions, social protection and nutrition education, trade and investment for improved nutrition, enabling food and breastfeeding environments and review, strengthen and promote nutrition governance and accountability (13). A high-level event on 'Nutrition and Food for Healthier Futures' organized by the Nutrition for Growth Stakeholder Group will take place on the 4th of November in Milan, on the eve of the G7 Health Ministers' Meeting. It aims to take stock of global progress towards the nutrition-related SDGs and World Health Assembly targets, celebrate new commitment to global nutrition, discuss further actions needed and see the launch of the 2017 Global Nutrition Report. (14). The Sun Movement Global gathering will also take place in November 2017 in Côte d'Ivoire to share progress and encourage collaboration on malnutrition actions.

The Moscow Declaration on NCDs in May 2011 and the Political Declaration of the High-level meeting of the General Assembly on the Prevention and Control of NCDs in September 2011 put NCDs on the development agenda and garnered international commitment for action against the epidemic. This commitment was operationalized by the adoption of the 'Global Action Plan for the Prevention and Control of Non-Communicable Diseases 2013 – 2020', better known as GAP NCD by the 66th World Health Assembly in May 2013. GAP NCD built around 6 major objectives, provided

a roadmap and a plethora of policy options to Member States by which to attain the nine global voluntary NCD targets by 2025 (15). Included among these targets was a 25% relative reduction in the risk of premature mortality from cardiovascular diseases, cancer, diabetes or chronic respiratory diseases (15). The WHO Global Monitoring Framework for the prevention and control of NCDs comprised of the 9 targets and 25 indicators was set in place to track progress against a baseline in 2010. The year 2013 also saw the establishment of the United Nations Interagency Task Force for the provision of technical assistance to countries. In July 2014, members of the United Nations committed themselves to four priority areas – governance, prevention, healthcare and surveillance and monitoring (9). The WHO Global Coordination Mechanism on prevention and control of NCDs was established in September 2014 to enhance coordination of activities across sectors and stakeholders and assist the implementation of GAP NCD. NCDs were not included in the Millennium Development Goals (MDGs) but for the first time included in the Sustainable Development Goals, with a target (3.4) to reduce premature mortality by one third by 2030 compared to 2010. A third high-level UN meeting on NCDs is to be held in 2018 to monitor the progress made by individual countries.

1.4 **NCD risk factors**

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Most NCD's have been strongly associated and causally linked with four modifiable behavioural risk factors: tobacco use, physical inactivity, unhealthy diets and the harmful use of alcohol (16). These behaviours lead to a variety of metabolic and physiological effects including raised blood pressure, overweight and obesity, hyperglycaemia and hyperlipidaemia, which serve to further elevate risk.

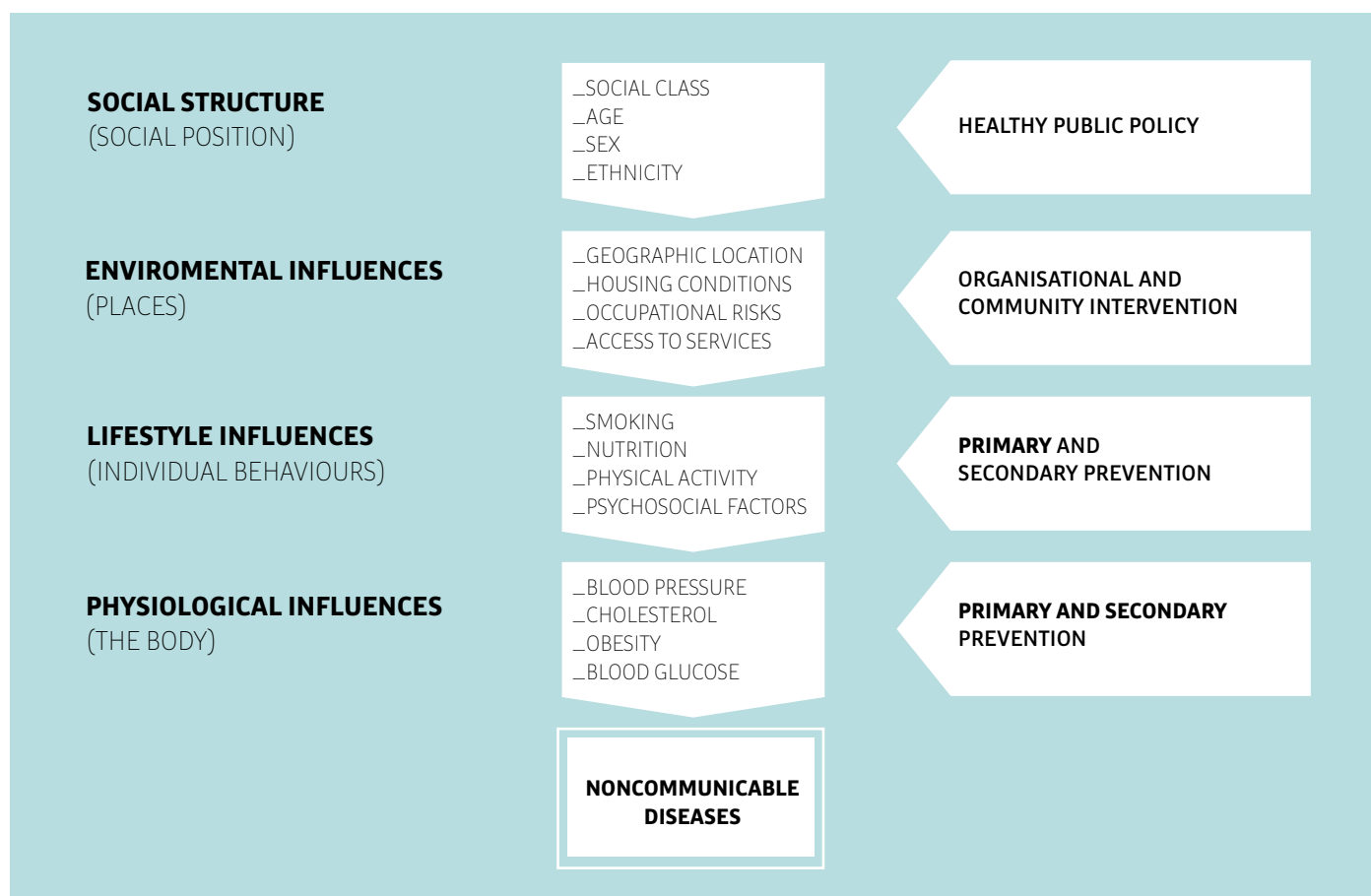


Diagram 1

Diagram 1 taken from the WHO STEP wise approach to surveillance of non-communicable diseases shows the multi-dimensional nature of NCD determinants. Risk factors are grouped according to cause and arranged along a causal scale from more distant to those that are closer to the actual disease / condition in question (17).

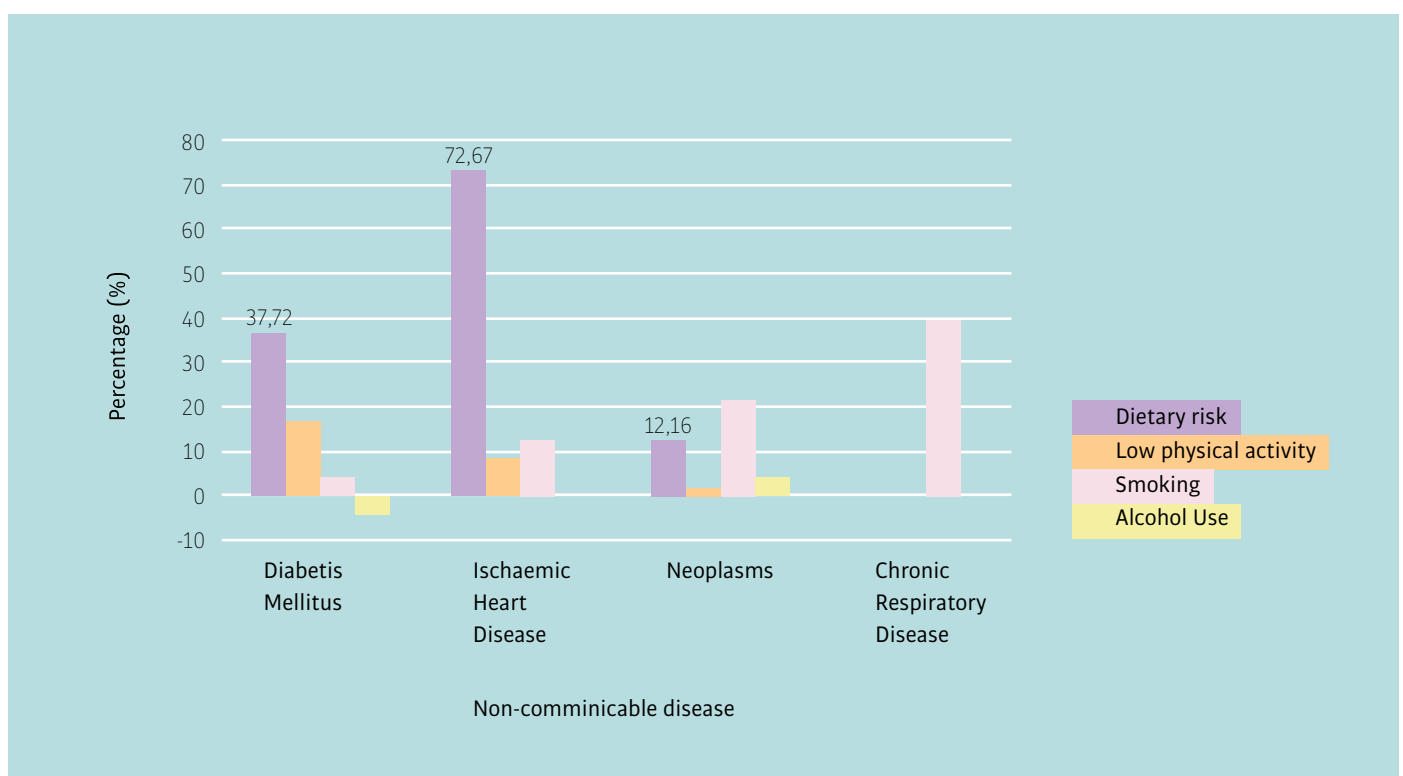
Malnutrition and diet are the largest risk factors for the global burden of disease. Epidemiological studies have shown associations between the consumption of specific food and nutrients and overall dietary patterns with cancers, cardiovascular diseases and diabetes (9). For example, excess sodium intake is associated with increased hypertension and cardiovascular disease and was responsible for 1.7million deaths globally through cardiovascular causes in 2010 (9). Low intake of fruits and vegetables was responsible for 2.7 million deaths worldwide and is estimated to cause 19% of gastrointestinal cancer, 31% of coronary heart disease

and 11% of stroke (18). The consumption of saturated fats and trans fats is directly associated with type 2 diabetes (16). Conversely, systematic reviews and meta-analysis of randomised controlled trials have provided evidence that the replacement of saturated fats in the diet with polyunsaturated fats reduces coronary heart disease events and that reducing intake of sodium reduces blood pressure in both hypotensive and normotensive individuals (19,20). Maternal malnutrition, alteration of in utero environments and the foetal origin of disease has been described for a number of conditions including non insulin dependent diabetes further highlighting the importance of diet and nutrition as risk factors for the global burden of disease.

Graph 1 shows the percentage contribution of the four main risk factors to deaths caused by the four main NCDs. Worldwide, across all ages and both sexes, diet was by far the most important risk factor for deaths caused by three of the four main NCDs in 2015.

Graph 1

Percentage contribution of the four main shared modifiable behavioural risk factors to deaths caused by the four main NCDs. 'Ischaemic Heart Disease' was used as a proxy for 'Cardiovascular Disease', 'Neoplasms' for 'Cancers' and 'Chronic Respiratory Disease' for 'respiratory diseases, including asthma and chronic obstructive pulmonary disease'. Data for the graph was obtained from the Institute of Health Metrics GBDx Results Tool (21).



The importance of nutrition and diet is further highlighted by the obesity epidemic. Obesity has more than doubled globally since 1980 (22). In 2014, 38% of men and 40% of women over the age of 18, representing >1.9 billion adults were overweight (22). Of these, 600 million were obese (22). The number of overweight children under 5 is fast approaching the number wasted, with 41 million children found to be overweight in 2016 – representing an increase of about 10 million in the last 15 years alone (4). Overweight and obesity have traditionally been thought of as a high-income country problem. However, low and middle-income countries are seeing a rapid rise in overweight and obesity, particularly in urban settings. In 2014, nearly half of all overweight and obese children lived in Asia (22). The number of overweight and obese children in Africa doubled between 1990 and 2014 to 10.6million (22). In most developing countries, the prevalence of overweight and obesity is much higher among women than men (23). According to the European Association for the Study of Obesity (EASO), “65% of the world’s population lives in a country where overweight and obesity kill more people than underweight” (24). Overweight children are more likely to be obese as adults and suffer from diabetes and cardiovascular disease at a younger age than their non-overweight counterparts (25). Obese children are at higher risk of developing asthma, bone and joint problems, type 2 diabetes and early signs of risk factors for heart disease (26). EASO also reported that “44% of the diabetes burden, 23% of the ischaemic heart disease burden and between 7% and 41% of certain

cancers are attributable to overweight and obesity” (24). Raised BMI is estimated to be responsible for 2.8million deaths per year (24).

Economic development has resulted in increased disposable incomes, urbanisation, mechanisation, demographic changes and globalisation of the food trade (27). These social determinants and drivers have resulted in changes in lifestyle, behaviour and diet that have had an adverse impact on human health. People have gained increased access to low cost energy dense foods that are high in sugars, salts and fats and are often micronutrient poor. Strong evidence exists to show that adults and children living in urban areas are more likely to be overweight and obese than their rural counterparts. Studies have also shown that rural-to-urban migrants show a higher risk of obesity relative to rural subjects (28, 29). Furthermore, several studies have also shown that urbanisation is strongly associated with increased blood pressure, cholesterol and a higher prevalence of type 2 diabetes (30). 54% of the world’s population lived in urban areas in 2014 with this projected to increase to 70% by 2050 (30). 90% of this growth is set to occur in Africa and Asia where most low and middle-income countries are located (30). 828 million people are currently living in slums with this number to be around 2 billion by 2030 (30). While low and middle-income countries continue to fight undernutrition and infectious disease, they now have to combat the rising tide of overweight, obesity and nutrition-related non-communicable diseases.

1.5

NCDs and Infectious disease

—

The epidemiological transition has seen a shift from predominantly what were acute infections of childhood to chronic non-infectious diseases of adults. Yet infectious diseases were responsible for 8.8 million deaths in 2015 with a majority of these in low and middle-income countries and in children under the age of 5 (31). The table below displays the number of deaths by infectious diseases for each World Bank income category: 78.5% of deaths from infectious disease in 2015 occurred in low and lower-middle income countries.

Table 1

Number of deaths from infectious disease by World Bank income category. Causes of death aggregated to calculate number of deaths by Infectious disease included the following: 'HIV/AIDS and Tuberculosis', 'Diarrhoea, lower respiratory and other common infectious disease', 'neglected tropical disease and malaria', 'nutritional deficiencies' and 'other communicable, maternal, neonatal, and nutritional diseases'. Data for the table was obtained from the Institute of Health Metrics GBDx Results Tool (31).

WORLD BANK INCOME CATEGORY	NUMBER OF DEATHS BY INFECTIOUS DISEASE	PERCENTAGE OF TOTAL DEATHS BY INFECTIOUS DISEASE (%)
TOTAL	8,825,139.14	-
HIGH-INCOME	630,911.57	7.1
LOW-INCOME	2,254,786.86	25.5
LOWER-MIDDLE INCOME	4,675,756.9	52.9
UPPER-MIDDLE INCOME	1,257,820.71	14.2

Infectious disease has historically been linked with malnutrition. Malnutrition can lead to weight loss and specific micronutrient deficiencies resulting in impaired immune function and greater susceptibility to disease and infections. This can lead to a vicious cycle of repeated infection and deteriorating nutritional status. A malnourished person is more likely to have severe disease episodes and longer recovery periods. Infectious diseases and non-communicable diseases are also not separate challenges. They have many common features including overlapping high-risk populations, long-term care needs and social, economic and environmental determinants (32). In addition, some infectious diseases and NCDs interact biologically to increase susceptibility to disease and lead to poorer health outcomes. This interaction is briefly discussed below in Section 1.5.1. It is for this reason that vertical programs that merely address individual diseases is no longer suitable and an integrated approach that targets all major common risk factors across different disease categories is needed for meaningful management of health conditions.

1.5.1

Links between Infectious disease and NCDs

Diabetes is a risk factor for active tuberculosis and reactivation of latent tuberculosis (33). The tuberculosis infection in turn can worsen glycemic control (33). Drug to drug interactions can lead to poorer outcomes for both treatments and potential worsening of side effects (33). Significant progress has been made over

the past two decades with 56 million tuberculosis cases cured and a 45% reduction in mortality between 1990 and 2012 (34,35). Progress made in the control of tuberculosis however has been counteracted by the increase in prevalence of diabetes in some populations with high tuberculosis transmission rates or high prevalence of latent tuberculosis infection (34). For example, in India there was an absence of a decrease in tuberculosis incidence between 1998 and 2008 despite substantial improvements in tuberculosis diagnosis and treatment (34). It is thought that this might at least partially have been due to the additional 900,000 diabetes-associated tuberculosis cases during the same period as diabetes prevalence increased from 3.0% to 3.7% between the same years (34). The convergence of tuberculosis and diabetes can also be seen in China which has both a high burden of TB and diabetes. The International Diabetes Federation has forecasted that diabetes prevalence will continue to increase to about 10% in 2035 (34). Conservative mathematical modelling suggests that such an increase would offset the current downward trajectory of TB incidence by at least 3% (34). In the poorest countries, diabetes is seen among the better off in society (36). However with economic development, this trend is reversed and those in the lower socio-economic groups are more affected by diabetes (36). The consequences of diabetes are worse amongst the poor in all countries (36). The scenario is further complicated by undernutrition which remains a key challenge for the effective prevention and care of

tuberculosis. Progression from infection to active disease is related to macronutrient deficiencies that are rapidly reversed on nutrition rehabilitation (35). Both diabetes and undernutrition increased the risk of developing active TB by 3 times; “they also increase risk of poor TB treatment outcomes, including death, treatment failure and relapse” (35). Globally about 15% of TB cases can be linked to Diabetes (37). TB is preventable and curable. The WHO and the International Union Against Tuberculosis and Lung Disease developed a collaborative framework for the care and control of TB and diabetes (36). The goal of the framework was to establish mechanisms for collaboration between diabetes and TB programmes, improve detection and management of TB in patients with diabetes and improve the detection and management of diabetes in TB patients. In May 2014, the WHA endorsed the End TB Strategy. The current global tuberculosis target is to reduce tuberculosis incidence by 90% by 2035. The new global tuberculosis strategy has a renewed focus on prevention and included amongst this is the management of comorbidities and underlying risk factors and determinants.

TB rates are particularly high in countries that have a high HIV prevalence, as HIV is the strongest risk factor for TB. Risk associations have been established between HIV management therapy and Metabolic Syndrome. HIV treatment with protease inhibitors has been associated with “increased cholesterol and triglycerides, lipodystrophy, hyperglycemia, development of insulin resistance and the onset or complications of diabetes”

(38). The DAD study (Data Collection on Adverse Events of Anti-HIV Drugs) also showed that the relative risk of a myocardial infarction was higher in HIV patients on HAART and this risk was shown to increase over time further evidencing interactions between infectious disease and NCDs (38). Several types of liver injuries have also been associated with ART in HIV-infected patients in high-income countries and emerging data suggests a higher prevalence of hepatic steatosis among HIV-infected patients in high-income countries (39).

Like TB, the scenario is further complicated by malnutrition. The HIV epidemic is occurring in populations where malnutrition is endemic, with malnutrition consistently being associated with increased risk of death in adults and children (39, 40). Observational studies have shown the association of micronutrients with increased risk of HIV transmission, faster disease progression and mortality (40). Weight loss and severe acute malnutrition are common problems in certain HIV-subgroups; in turn malnutrition and decreased access to sufficient or a quality diet significantly increases non-adherence to ART (39). A systematic review found that nearly 30% of children who were severely malnourished admitted to 17 sub-saharan African centres were infected with HIV and that 10-25% of severely malnourished children infected with HIV also have TB (39).

Furthermore, cancers are yet another disease in which the direct interaction of infectious disease and NCDs have been noted. 18% of the global cancer burden can be

attributed to a few specific infections (16). This figure is much higher (26%) in low-income countries and much lower (8%) in high-income countries (16). Cervical, liver, stomach and esophageal cancers have higher incidence and mortality in low and middle-income countries (16). Cervical, liver and stomach cancers are caused by infectious diseases. Of the 100 different types of Human Papilloma Virus, 13 are cancer causing with HPV 16 and 18 causing 70% of cervical cancers and pre-cancerous cervical lesions (41). In 2012, 275,000 women died from cervical cancer with 85% of these deaths occurring in low and middle-income countries (41). Certain LMICs also have a high incidence of nasopharyngeal cancers and Burkitt's B-cell lymphoma that have been associated with the Epstein-Barr virus. Progression to Kaposi's sarcoma is facilitated by the HIV infection. Decreased incidence of Kaposi's sarcoma has been noted with the use of highly active anti-retroviral therapy used to treat the HIV infection, showing a unique and yet direct decrease in NCD risk in response to an infectious disease treatment (32).

Low and middle-income countries represent the nexus of infectious disease and NCDs. Rural to urban migrants in particular appear to be a high-risk population. In India, cardiovascular disease and diabetes is occurring alongside poor living conditions in slums, overcrowding, inadequate access to safe water and sanitation – risk factors associated with infectious disease (32). In Accra, Ghana whilst a high burden of chronic disease was noted in populations that had a high

socio economic status, the combination of infectious disease and NCDs was noted amongst segments of the population with lower socioeconomic status (32). A life course perspective further complicates matters with recent findings also establishing links between insults in early life and susceptibility to infectious disease and NCDs in later life (32). The need for concomitant service delivery and prevention strategies for infectious diseases and non-communicable disease programs is necessary to reduce the double burden of disease.

1.6

Shared drivers of the double burden of malnutrition

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Much like infectious disease and NCDs, interactions have also been noted between undernutrition and NCDs. Increasingly, we are being faced with the “double burden of malnutrition”: the “coexistence of undernutrition along with overweight, obesity and nutrition-related non-communicable disease in the same individual, household and population across a life course” (4). On the surface the two sets of problems appear to be very different – with one about inadequacy and the other about excess (6). Yet increasing evidence indicates that there are shared drivers – biological, environmental and socioeconomic factors – contributing to the prevalence and risk of both undernutrition and overweight, obesity and nutrition-related non-communicable diseases (6,7). These are discussed briefly below.

Biological

In the context of a nutrition transition, in-utero and early life nutrition environments have bearings on multiple forms of malnutrition. Mother’s undernutrition can lead to fetal programming to a nutrition deficient environment. When the postnatal environment is food abundant or obesogenic the mismatch between energy intake, storage and expenditure increases the risk of disease in later life (42). Observational, clinical and animal studies support the fetal origin of disease for a number of conditions including obesity, insulin

resistance and non-insulin dependent diabetes. Poor maternal nutrition prior or during pregnancy can also lead to maternal anemia, pre-term birth and low infant birth weight. Low infant birth weight has been linked to an increased risk of type 2 diabetes and cardiovascular disease (43). Maternal obesity during pregnancy has been strongly associated with gestational diabetes and maternal diabetes with offspring diabetes (44). Associations have also been established with maternal BMI and BMI and adiposity in offspring (44). Alterations in phenotypic programming that take place within the critical window of development can have life-long impacts on an individual.

Socioeconomic

Poverty is yet another driver of malnutrition. Poverty and educational attainment have been associated with lower food and health literacy, poorer nutrition before and during pregnancy, an inability to afford nutritious foods and unhealthy food environments (7). Evidence also suggests a strong correlation between food insecurity, inequality, poverty and obesity (4). Poverty causes food insecurity. Food insecurity can lead to hunger and undernutrition and yet paradoxically can also lead to overweight and obesity. People living in poverty may potentially be able to meet their energy requirements but lack the dietary diversity and quality for optimal health and the prevention of chronic diseases (45). Obesity of poverty can be observed in both industrialized countries and developing economies undergoing a

nutrition transition (23). A socioeconomic gradient of overweight and obesity exists in several middle and high-income countries (4).

Gender inequalities in poverty and the increased nutritional requirement of women during pregnancy and lactation make women more vulnerable to the double burden of malnutrition (23). In some poor regions, inequalities in food allocation can also increase the nutrition vulnerability of women (23). The double burden widens the health gap between men and women and the poor and better off (46).

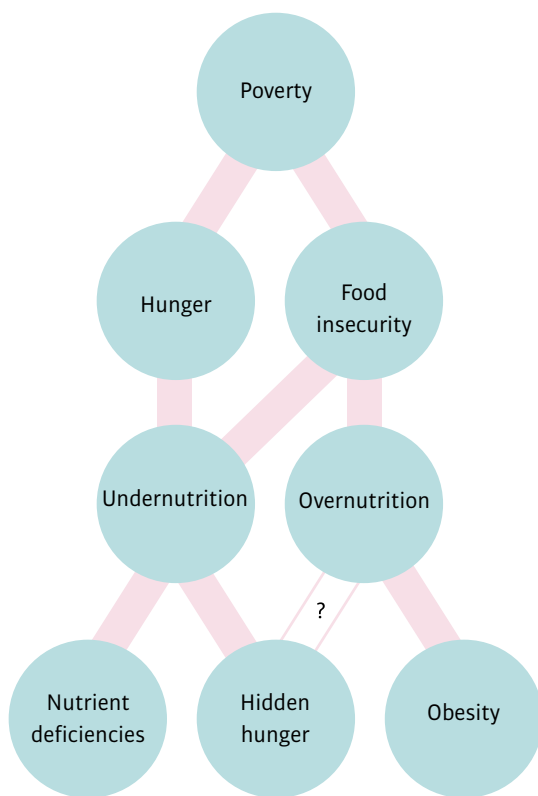


Diagram 2
Diagram taken from 'Poverty, Obesity, and Malnutrition: An International Perspective Recognizing the Paradox' showing the relationship between poverty, food insecurity, overnutrition and potential hidden hunger (45)

Environmental

The living, working and social environments of an individual can also act as drivers of the double burden of malnutrition. Living and working environments influence diets, physical activity, access, availability and choice of food (4,7). Living and working environments also affect access to affordable primary healthcare, which has implications for both undernutrition and obesity, overweight, and nutrition-related NCDs (7). In urban settings, access to safe drinking water and sanitation is vital for the prevention of both undernutrition and infectious disease (4, 7). Social and cultural environments and norms affect women's abilities to breastfeed and practice health-seeking behaviors. This coupled together with cultural perceptions such as healthy weight can influence both the risk and prevalence of the double burden as well (7).

1.7

Potential conflicts from addressing over and under nutrition in silos

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Traditionally over and undernutrition have been addressed in silos. Countries have separate “vertical programs” to address undernutrition and overnutrition and recent findings indicate that in some instances programs designed to address one form of malnutrition can inadvertently increase the risk of another type of malnutrition. For example, conditional cash transfer programs that were purposed to help children attend school and health clinics have been associated with higher BMI and blood pressure in adults (47). Liquid based nutritional supplements provided to undernourished children are increasingly being marketed to children generally for “healthy growth”. Rapid weight gain in infancy has been associated with risk factors for NCDs. While these supplements are of certain benefit to undernourished children the evidentiary basis for “healthy growth” and the longer-term implications of supplementary feeding for otherwise healthy children needs to be investigated further (48). Moreover, school feeding programs have been introduced widely to tackle the problem of undernourishment. Analyses of eight Latin American country school feeding programs have shown that there is a lack of nutritional guidance and the menu composition of meals provided is largely unknown with processed foods being served widely. The propensity to elevate risk of chronic disease within these

programs exists. Fortificants added to salty and sugary foods could be encouraging excess consumption of foods of this type. Governments advocating for healthy eating and yet subsidizing processed foods could be promoting unhealthy diets and elevating cardio metabolic risk. Poverty alleviation and development programs whilst focusing on food security may also be concomitantly increasing access to sugary, salty and fatty foods. With conflicts of interest of this nature and limited fiscal and human resources there is vast potential for double duty actions that can address more than one form of malnutrition simultaneously (7).

Double duty actions

At this stage, it is worthwhile reviewing what has been examined thus far. Over the past 25 years, the proportion of hungry and undernourished people living in low and middle-income countries has halved. Decreasing poverty and increasing food security however does not necessarily improve diets. Unhealthy diets are a primary risk factor for NCDs. NCDs are the leading cause of mortality and morbidity worldwide. Obesity and overweight is increasing in every region of the world. Tackling NCDs is an urgent global priority. Many countries are now experiencing a double burden of malnutrition. For example, in Algeria, 12% of children under 5 were stunted and an equal percentage was found to be overweight (49). In Botswana, in 2007 31% of children under 5 were stunted and 11% overweight (50). In Sierra Leone, in 2013 38% of children under 5 were stunted while 9% were overweight (51). Detailed information regarding the nutrition profile of each country can be found in the Global Nutrition Report. Given the shared drivers and potential problems of tackling over and undernutrition in silos, global commitments and work programs are calling for unified intersectoral interventions to tackle both simultaneously.

Within this context of a double burden of malnutrition in which many countries are, the World Health Organization has called for “double duty actions” to tackle both over and undernutrition simultaneously. The WHO defined double duty actions as “interventions, programs and policies that have the potential to simultaneously reduce the risk or burden

of both undernutrition (including wasting, stunting and micronutrient deficiency or insufficiency) and overweight, obesity or diet-related NCDs (including type 2 diabetes, cardiovascular disease and some cancers). Double duty actions leverage the coexistence of multiple forms of malnutrition and their shared drivers to offer integrated solutions” (7). In this report we set out to identify and examine past and present double duty actions in order to develop a better understanding of what double duty action case studies are available. The methodology and results of this search are highlighted below.

Methodology

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An online search was conducted to identify any publicly available information on double-duty actions. Search terms combined synonyms for undernutrition with terms for NCD morbidity, mortality, overweight and obesity. We searched the websites of the World Health Organization, the United Nations Food and Agriculture Organization, World Cancer Research Fund, European Union as well as government and non-government organizational websites. Key search terms are provided in Annex A.

Inclusion criteria

Studies included were those where the authors / implementers themselves explicitly highlighted the aims of the initiative as being “double duty” or as tackling undernutrition and N-NCDs or one of its risk factors simultaneously. Any initiatives which were not initially implemented as a double duty action but where upon evaluation, the findings highlighted explicitly that it had an impact on both undernutrition and N-NCDs or one of its risk factors was included. The term “actions” was taken to include policies, programs and interventions. The report only included actions at the international and national level and did not include any community / household / individual actions. International interventions were defined as those rolled out by UN agencies, international development agencies, EU and regional initiatives. National level initiatives were country-level policies / strategies introduced by

governments and programs that were rolled out by governments either nationally or sub-regionally. The report also included initiatives both which had and had not been evaluated as yet. Non-English language articles were excluded unless they were thought to add substantively to the English-language evidence base.

There were no restrictions based on type of publication. Hence journals, technical reports and website material was included. We did not include any time frame restriction. The relevant journals / technical reports / website material were reviewed in detail for relevance based on the above inclusion criteria and applicable material was summarized into the table below.

2.2

Results

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Data was extracted into Table 2 below and a narrative analysis of the double duty nature of the initiative reported.

Table 2

Double duty actions and a narrative analysis of the double duty nature of the initiative.

Policy/ Program	Features
The School Breakfast (Desayunos Escolares) program, Mexico	A school breakfast program for 6.1million vulnerable and at-risk children. The year 2007 saw a shift in focus from tackling undernutrition to educating children about food and eating habits so as to combat the growing overweight problem simultaneously which it was criticized for having contributed to (52). Strict controls were placed on fat and sugar content and an emphasis on traditional foods, whole grains and fresh produce (53). National DIF was responsible for establishing nutrition guidelines, financial control and oversight. Decentralization to the State level allows for an affordable, implementable program adapted to local needs. The program works together with various health and education programs at different levels (52). Success of the program is measured by the degree to which a state is compliant to nutrition standards. No impact evaluation has been carried out as yet. Available from: http://documents.wfp.org/stellent/groups/public/documents/communications/wfp284904.pdf

Policy/ Program	Features
National School-Feeding Programme (Programa Nacional de Alimentação Escolar – PNAE), Brazil	<p>The second largest school-feeding program in the world providing one quarter of Brazilian children with access to food. Aims to supply healthy meals covering at least 20% of the nutritional needs of a child whilst promoting healthy eating habits through educational actions. The menu includes three portions of fruit and veg and restrictions have been placed on sodium and sugar content and processed foods (52). Nutritionists act as technical leads for the program. The program has seen the inclusion of food and nutrition themes into the school curriculum. The National School Feeding policy that followed made it a universal right for all children within the public school system to have access to school meals. The Food Acquisition Program allows States and Municipalities to buy food from family farmers through a simplified public procurement system. It is mandatory that at least 30% of food purchased for school meals be from smallholder farmers (52). Strong intersectoral coordination between school feeding, nutrition, education and social protection programs. School Feeding Council set up for monitoring and supervisory measures. No program impact evaluation at national level as yet (52). Available from: http://documents.wfp.org/stellent/groups/public/documents/communications/wfp284904.pdf</p>
The 2nd National Food and Nutrition Security Plan 2016-2019, Brazil	<p>The second National Plan follows on from the 1st National Food and Nutrition Security Plan 2011-2015 in terms of maintaining focus on all forms of malnutrition (53). The National Plan aims to address a number of intersectoral development challenges including obesity, overcoming food insecurity in specific populations like the indigenous people and quimbolas, reducing poverty, increasing access to water, promoting the production and consumption of health foods and consolidation of the Food and Nutrition Security National System. It proposes 121 goals to be reached over the four-year period through 99 planned initiatives (54). Available from: https://issuu.com/informecaisan/docs/plansan_2016-19__10_05_2016_vers__o (55)</p>

Policy/ Program	Features
The 3rd National Plan of Action for Nutrition of Malaysia III 2016 – 2025	<p>A framework for action to address the double burden of malnutrition in Malaysia. NPANM III has three specific objectives: ‘to enhance nutritional status’, ‘to reduce diet related non-communicable diseases’ and ‘to strengthen food and nutrition security’ (56). Key elements include incorporating nutrition objectives, considerations and components into other national development policies and action plans, placing a greater emphasis in ensuring food and nutrition security, two new enabling strategies to prevent and control obesity and N-NCDs and sustain food systems to promote healthy diets, inclusion of maternal nutrition to the enabling strategy of promoting infant and young child nutrition and the strengthening of facilitating strategies for provision of nutrition guidelines and building community capacity for nutrition. The plan has identified 46 indicators and targets to be achieved by 2025. Spearheaded by the Ministry of Health under the purview of the NCCFN. Preceded by NPAM I 1996-2000 and NPAM II 2006-2015. Available from: http://nutrition.moh.gov.my/wp-content/uploads/2016/12/NPANM_III.pdf</p>
Dietary Education Basic Act 2005, Japan	<p>A law enacted in 2005 with the aim of improving knowledge on food and nutrition as well as the ability of all Japanese nationals to make appropriate food choices (57). Driving the law was a number of food and nutrition issues including “a rise in obesity and lifestyle-related diseases” and “an increase in irregular and nutritionally unbalanced meals” (57). Shokuiku or food education is promoted through various arms of the government – FSC, MHLW, MEXT, MAFF. Diet and nutrition teachers have been introduced through the School Lunch Act. Children and parents take part in knowledge based cooking activities. The ‘Japanese Food Guide Spinning Top’, a nutritional chart was popularized through mass media. Available from: http://www.maff.go.jp/e/pdf/shokuiku.pdf</p>

Policy/ Program	Features
National Plan of Action For Nutrition 2009-2010, Mauritius	The National Plan lays out 10 objectives that span a wide range of nutritional issues. Reduction of underweight to half the 2004 level in children aged 5-11 years, establishing dietary recommendations for prevention of chronic diet related diseases and reduction in obesity in the adult population by 3% were amongst some of the objectives (58). Planned interventions included the setting up of a nutrition task force for monitoring and evaluation of the plan, special obesity clinics, monitoring of breastfeeding and a school health program through which healthy eating was promoted via the school curriculum and guidelines were established for the provision of healthy foods from school canteens (58). Available from: http://health.govmu.org/English/Documents/nut1-8.pdf
National Nutrition Strategy 2011 – 2020, Vietnam	The program sets out to tackle the double burden of malnutrition. Improving diet, reduction of child malnutrition (particularly stunting) and management of overweight and obesity for controlling chronic diet-related diseases was highlighted as the general objective of the strategy (59). Indicators included specific reductions in rates of stunting, underweight and low birthweight in addition to serum cholesterol and overweight and obesity indicators (59). Available from: https://www.unicef.org/vietnam/national_nutrition_strategy_2011_2020.pdf
Standardised curriculum for health workers, South Africa	A standardised curriculum for health workers containing a mandatory lesson on undernutrition and overweight, obesity and NCDs (53). Available from: http://www.kznhealth.gov.za/chw.htm (60)

Policy/ Program	Features
Integrated Nutrition Program, South Africa	Amongst the goals of the INP was the prevention of an increase in mortality due to disease of lifestyle, reduction in the prevalence malnutrition in children and the optimal growth of infants and young children (61). Initiatives included the provision of supplements for undernourished children, controlling of micronutrient deficiencies through vitamin supplementation, nutrition counseling for people with chronic diseases, encouragement of breastfeeding practices to combat malnutrition, a primary school nutrition program and poverty alleviation (62). Provided by the Department of Health as primary health care. Available from: https://www.westerncape.gov.za/service/integrated-nutrition-programme
Dietary Education Basic Act 2005, Japan	This was initially rolled out as a pilot program of Prospera – the national conditional cash transfer program. ESIAN aims to address the nutrition transition in Mexico with a specific focus on the first 1000 days (63). “ESIAN aims to decrease anemia, overweight and obesity and stunting in children under 5 and future chronic diseases amongst pregnant and lactating mothers and children under 5” (63). Interventions include individual counseling to pregnant women and mothers with children under the age of 5, the promotion of breastfeeding and distribution of micronutrient supplements. Available from: https://www.spring-nutrition.org/publications/case-studies/prosperaesian-national-integrated-nutritional-strategy-systems-thinking
National Food and Nutrition Policy (PNAN), Brazil	A policy explicitly for food and nutrition within the health sector. The policy acknowledges the major social transformations that the Brazilian population has undergone over the past decades and the new emerging sets of problems related to food and nutrition (64). Micronutrient deficiencies, persistent high levels of chronic malnutrition in vulnerable groups and an increase in overweight and obesity across the adult populations are highlighted. The policy aims to improve diet, nutrition and health by promoting healthy adequate eating, food and nutrition surveillance and the prevention and comprehensive care of diseases related to diet (64). Available from: http://189.28.128.100/dab/docs/portaldab/publicacoes/national_food_nutrition_policy.pdf

Policy/ Program	Features
Action plan to reduce Double Burden of Malnutrition in the Western Pacific Region 2015 – 2020	<p>Brings together nutrition-related actions from global and regional guidance documents to address diet-related diseases and reduce nutritional risk factors. The plan aims to achieve eight nutrition targets: the six global nutrition targets and two of the nine voluntary NCD targets (to reduce salt intake and halt the increase in obesity and diabetes) endorsed by the World Health Assembly in 2012 (65).</p> <p>Available from: http://iris.wpro.who.int/bitstream/handle/10665.1/10892/9789290617037_eng.pdf?sequence=1&ua=1</p>
Nutrition Friendly Schools Initiative – WHO	<p>A school based program to address DBM. The main aim of the NFSI is to provide a framework for ensuring integrated school-based programs that address the double-burden of nutrition-related ill health, building on and inter-connecting the on-going work of various agencies and partners.</p>
One Goal, World Vision India	<p>A campaign leveraging a growing network of grassroots football clubs across Asia with the aim of transforming the eating habits of children and adolescents as a means of tackling the growing double burden of malnutrition (66). The campaign also aims to educate parents on good nutritional practices, promote research into the field of sport and nutrition while strengthening community participation and development. ‘Red cards’ are assigned to countries that have a high burden of both under and over nutrition but are undertaking policy and programmatic steps to tackle the issue (66). ‘Yellow cards’ are assigned countries that are only just beginning to take nutrition actions at a policy and programmatic level (66). Available from: https://wvi.org/sites/default/files/Exec_Summary_-_Fuelling_Asia's_footballers_for_the_future_-_One_Goal.pdf</p>

Policy/ Program	Features
Double Fardeau Nutritionnel (DFN) – Pole francophone en Afrique, West Africa	The goal of this project was to build ‘the capacity of French speaking countries in West Africa to address the double burden of malnutrition’ (67). The project created a DBM hub in Benin to posit the Regional Public Health Institute and its institutional partners for the benefit of the whole region (67). Partners were responsible for training human resources, research and communication and advocacy on DBM (67). Among other activities the project aimed to set up two university programs on diet, nutrition and health and to contribute to the prevention of DBM in urban schools. Available from: http://poledfn.org/wp-content/uploads/2013/06/2012_project_summary.pdf
Community kitchens, International Orthodox Christian charities, Lebanon	Initially began as a food assistance program delivering food parcels to refugees. It has expanded its focus from improving food security to improving dietary diversity of beneficiaries. Community kitchens were set up to achieve this aim. The project delivers hot food to beneficiaries, creates income generation opportunities for local men and women, improves social cohesion and provides opportunities for nutrition education (68). Available from: http://www.ennonline.net/communitykitchensinlebanon
National Nutrition Action Plan 2012 – 2017, Kenya	Provides practical guidance to the implementation of the Food and Nutrition Security Policy and Food and Nutrition Security strategy. Outlines 11 strategic objectives to tackle both over and undernutrition. Amongst these are “improving prevention, management and control of diet-related NCDs”, “reducing the prevalence of micronutrient deficiencies in the population”, “improve the nutritional status of women of reproductive age” and “improve the nutritional status of children under 5 years of age” (69). Overall the cost of implementing the activities of the Plan was estimated at KES 70billion of which KES 6 billion was to be sourced from various ministries including health, agriculture, water and irrigation, fisheries development and national planning and development (70). The remaining money was to be sourced from development partners. Available from: http://scalingupnutrition.org/wp-content/uploads/2013/10/Kenya-National-Nutrition-Action-Plan-2012-2017-final.pdf

Policy/ Program	Features
National Nutrition Action Plan 2012 – 2017, Kenya Global strategy and targets for tuberculosis prevention, care and control after 2015	The “management of comorbidities” as part of ‘Pillar 1: Integrated, Patient-Centered Care and Prevention’ is highlighted within this post-2015 global strategy framework. Several risk factors including diabetes, NCDs and undernutrition are identified as risk factors for TB. It is suggested that as part of basic and coordinated clinical management of TB, individuals should be routinely assessed for relevant comorbidities and these addressed as part of the complete care package. Available from: http://www.who.int/tb/strategy/End_TB_Strategy.pdf?ua=1 (71)

Double duty actions — Expanded case studies

This section presents two double duty action case studies.

They have been drawn from on-going initiatives of the Italian Agency for Development Cooperation as requested.

CASE STUDY 1

A development agency's approach to the double burden of malnutrition

Purpose

This case study was included as it demonstrates the overall approach of a development organization towards the double burden of malnutrition. It highlights the organization's commitment to intersectoral action and the alignment of non-health sectors to address the double burden and reduce NCDs.

Context

The Italian Agency for Cooperation and Development (AICS) was established by the Italian law on international cooperation (Law 125/2014) and began operating in January 2016. Its principal aim is to align Italy with its European and global partners in development (72). AICS has two local offices in Rome and Florence and 20 field offices located in various locations in Africa, South America, the Middle East and Asia through which they assess local needs, build effective partnerships on the ground, implement programmes and monitor and evaluate results (72). AICS primary fields of action are in economic development, human development, rural development and food security and emergency and fragile state initiatives. In line with its own agriculture, rural development and food security guidelines, AICS takes a multisectoral approach to nutrition, integrating

with education, healthcare, environment, infrastructure and governance sectors, acknowledging the multi-faceted nature of malnutrition (73). AICS recognizes that working across different sectors is challenging but necessary and a transformation in developmental thinking is needed to provide durable solutions. The organization intends to incorporate double burden specific goals and actions into relevant sectors so as to build the evidence base for double duty actions. AICS has initiated and undertaken a number of highly technical agriculture, livestock farming, fisheries, agro-silvo-pastoral systems and food security programs. The agriculture sector is not only viewed as a means of nutrition but a source of income and social cohesion. Partnerships with the private sector and civil society are prioritized, as is the empowerment of women in programs (73). Within the agriculture sector special attention is paid to nutrition security and food safety. The health and nutrition of the target beneficiaries is prioritized with emphasis placed on improving the quality of food production and the evolution of new technologies in food production, market demands and eating habits (73). Furthermore, the prevention and control of non-infectious chronic diseases is becoming an increasing priority for AICS (74). Multi-sector projects that are especially focused on the first 1000 days of life are being prioritized with the view that these have long terms gains in human capital, combating inequality and the prevention of chronic diseases in adulthood (74).

With shared drivers and solutions, the opportunity to take integrated actions to combat multiple forms of malnutrition is of critical importance.

Key message

Development agencies have a key role to play in addressing the double burden of malnutrition and reduction of NCDs. Commitment to tackling the double burden and NCD's must be demonstrated in their approach and overall strategies. Commitment must be demonstrated through the investment of resources. If leading development agencies adopt this practice, the development sector as a whole can be mobilized to address important determinants of malnutrition and NCDs.

CASE STUDY 2

Incorporating double burden of malnutrition indicators into agro-value chain development programs

Purpose

This case study was included as it demonstrates how to incorporate double duty actions within a non-health sector program.

Context

The Italian Agency for Development Cooperation has been involved in a number of poverty alleviation, agriculture development and food security initiatives in the Kassala State, Sudan. "Fostering inclusive economic growth in Kassala State through agro-value chains development and access to financial services" is a 12-month project set to begin in October 2017 (75). It builds on the results and recommendations of the FAO-UNIDO jointly implemented initiative "Integrated Food Security Project in Kassala State" carried out between 2011 and 2014 funded by the Ministry of Foreign Affairs, Trade and Development Canada (75). The project aims to contribute to the improvement of livelihoods and food and nutrition security of the target population in the Kassala State (75). The project will be funded by the Ministry of Foreign Affairs and International Cooperation of the Italian Republic, implemented through the Italian Agency for Development Cooperation and funds managed by the United Nations Industrial Development Organization.

The project has three primary strategic interventions: value chain integration and productivity improvement at household level, community participation in value chain integration and entrepreneurship development and access to finance through local micro-finance institutions (75). Value chain integration and improving productivity at household level will look at agricultural interventions that have the capacity to directly improve household food security such as “home gardening” or “community gardens” and indirectly by increasing a household’s income through the production of food and non-food items (e.g. fodder) for the market (75). The view is that such initiatives increase both a household’s food security and diet variety (75). Training will focus on optimum and efficient usage of land and preparation of vegetables so as to optimize the impact of the project on the nutritional situation of the targeted beneficiaries (75). This intervention will also address the need for technology and mechanization at the level of primary production and irrigation through appropriate technology. Finally it will also address value addition and market development in the form of trainings that will focus on primary processing and post-harvest management and storage of crops to reduce post-harvest losses (75).

Through the second intervention small holder farmers will be organized into enterprise groups or cooperatives so as to make maximum use of economies of scale, gain more lobbying power and make more lucrative forward linkages with markets (75). Micro-entrepreneurs will

be identified and trained on essential business skills and linked to local micro finance institutions. The third strategic intervention aims to build relationships between the community based organizations and microfinance institutions for subsidized loans and risk sharing.

The initiatives take into account culturally acceptable ways of including and promoting women in development activities and works from principles of participation, gender equity and sustainability. Investments in agriculture are important to improving food security (76). Improving productivity keeps prices low and increases incomes making food more accessible to the poor by increasing their purchasing power (76). Yet “availability is necessary but not enough to ensure access, which is necessary but not enough for effective use... food use translates food security into nutrition security” (76). The project aims to address these three issues with a variety of different activities. Child malnutrition rates in the Kassala State are amongst the highest in the country with an estimated 30% of children under the age of 5 moderately or severely malnourished (76). The children that do survive into childhood face lifelong developmental diseases and chronic health problems (77). Programming nutrition into relevant sectors is imperative to making meaningful improvements. On-going and future programmes such as these that are likely to have an impact on both undernutrition and nutrition-related chronic diseases should incorporate specific, measurable, achievable, relevant and time-

bound nutrition targets and indicators into project plans so as to build the evidence base for nutrition-sensitive double duty actions that is yet lacking.

Key message

It is important to identify opportunities to address the double burden and NCDs outside of the health sector. Integrated multisectoral approaches are needed to address NCD's and malnutrition. It is vital that program managers designing, implementing and evaluating programs on the ground understand the impact of their decisions on the double burden. Nutrition targets and indicators must be built in to nutrition-sensitive programs so as to measure the nutritional benefit to the target population of the selected intervention.

Financing nutrition

“Financing for nutrition is drawn from governments (domestic), international sources – the bilateral and multilateral aid agencies and foundations that make up the “donor” community – and directly from people themselves” (2). It is estimated that current funding available for nutrition-specific interventions to address stunting, severe acute malnutrition, exclusive breastfeeding and women’s anemia is \$3.9billion a year; \$2.9billion from governments and \$1billion from donors (2). If investment continues at the same rate, by 2025, \$39 billion will be invested into nutrition specific interventions. According to an in-depth cost analysis concluded by the World Bank, Results for Development Institute and 1000 Days, with support from the Bill & Melinda Gates Foundation (BMGF) and the Children’s Investment Fund Foundation (CIFF) an additional \$70billion is needed to achieve the global targets for stunting, anemia in women, exclusive breastfeeding and to mitigate the impact of wasting by 2025 (78). This is nearly a tripling of the current spending. National governments would need to front up an additional \$4billion a year and donors an additional \$2.6billion (78). The stated potential returns on the additional \$70billion investment are significant; 3.7 million child lives saved, at least 65million fewer stunted children, 265 million fewer women suffering from anemia as compared to a baseline in 2015 (78). The analysis suggests that if only the most cost effective interventions - all of which can be scaled up immediately - were prioritized an additional \$22billion would still be needed between 2016 and 2025 (78). 37

high burden countries were analyzed and the results extrapolated for all low and middle income countries. Low birthweight and overweight targets were not included in the cost analysis and investment framework. Limitations of the potential returns on investment will not be discussed in this report. Scaling up nutrition remains a high impact, high return proposition with a benefit-cost ratio of 16:1 and a compound rate of return of greater than 10% from nutrition investments (2).

4.1

Domestic nutrition budget allocation

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The Global Nutrition Reports published in 2015 and 2016 provide estimates for domestic budget allocations to nutrition as a percentage of total government expenditure for 24 low and middle-income countries. The estimates range from 0.06% in Vietnam to 9.23% in Guatemala (2). The mean allocation for all 24 countries was 2.1% (2). The bulk of domestic funding was directed towards nutrition-sensitive interventions (1.7%) compared to the 0.4% directed to nutrition-specific interventions (2). Budget allocations to nutrition-sensitive interventions as a percentage of total government expenditure was very small compared to allocations made to nutrition relevant sectors from which the funding is drawn. For example, in Costa Rica in 2012, 63% of the budget was allocated for agriculture, health, education and social protection compared to just 1.7% of its total budget allocated for nutrition-sensitive interventions. In Kenya, in 2012, 37% was allocated to agriculture, health, education and social protection compared to just 0.6% for nutrition-sensitive interventions (2). In the 24 countries analysed, the social protection sector allocated the highest share towards nutrition sensitive interventions (2). This was followed by the agriculture, health and education sectors (2).

4.2

Donor spending

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Less than 1% of Official Development Assistance (ODA) is spent on nutrition specific interventions (78). Trends show that ODA spending on nutrition-specific interventions has plateaued. Between 2013 and 2014 global ODA spending on nutrition-specific interventions decreased by 1% (30). In 2014, \$900million was spent on nutrition-specific interventions as ODA by 28 OECD bilateral agencies, BMGF, CIFF and the EU (78). The top 5 donors provided 75% of total financing that year (78). At least 116 different countries received nutrition-specific funding from donors but spending was mainly concentrated in 12 selected countries that received 51% of spending in 2014 (78). These countries were Ethiopia, Yemen, Mali, Mozambique, Bangladesh, Rwanda, Malawi, Niger, India, Senegal, Kenya and Tanzania (78). Ethiopia received 8% of funding in 2014, the most of any country that year (78). Multilateral donor disbursements increased by \$63million mainly as a result of increased spending by the EU and World Bank (78). Virtually all donors showed an increase in spending on nutrition-sensitive disbursements between 2010 and 2014 (78).

Background research report on malnutrition,
non-communicable diseases and associated double duty initiatives

COUNTRY	BASIC NUTRITION, % OF TOTAL ODA (2014)	BASIC NUTRITION, % OF HEALTH ODA (2014)	BASIC NUTRITION FINANCING FOR NUTRITION-SPECIFIC INVESTMENTS ONLY (\$M) ^a	ADDITIONAL NUTRITION FINANCING FOR OTHER PURPOSE CODES (\$M) ^b	TOTAL NUTRITION-SPECIFIC FINANCING FOR STUNTING, WASTING, ANAEMIA AND EXCLUSIVE BREASTFEEDING 2014 (M)
AUSTRALIA	0.3	2.8	9.5	6.8	18.4
BELGIUM	0.3	2.4	4.1	3.0	12.7
CANADA	4.8	25.8	68.9	18.8	93.8
FRANCE	0.1	1.1	4.1	3.9	30.7
GERMANY	0.4	9.9	47.9	21.0	98.8
IRELAND	3.8	19.9	14.6	1.9	18.1
ITALY	0.1	2.4	0.1	1.3	17.2
JAPAN	0.5	14.8	28.6	13.3	52.1
NETHERLAND	0.6	8.7	12.2	12.9	32.5
SPAIN	0.8	8.7	2.3	1.9	12.5
SWEDEN	0.1	1.3	1.4	11.1	20.6
UK	0.8	4.5	55.1	62.5	156.9

Table 3

Overview of nutrition ODA by various country donors in 2014 (79).

^a Excludes funding for nutrition-sensitive investments, deworming and salt iodization, as well as funding to unspecified recipients (79)

^b From 15 additional health, emergency and food aid codes. Corresponding method documents at Results For Development will be have to be viewed for further details

Background research report on malnutrition,
non-communicable diseases and associated double duty initiatives

MULTILATERAL / PRIVATE ORGANISATION	BASIC NUTRITION, % OF TOTAL ODA (2014)	BASIC NUTRITION, % OF HEALTH ODA (2014)	BASIC NUTRITION FINANCING FOR NUTRITION-SPECIFIC INVESTMENTS ONLY (\$M) ^a	ADDITIONAL NUTRITION FINANCING FOR OTHER PURPOSE CODES (\$M) ^b	TOTAL NUTRITION-SPECIFIC FINANCING FOR STUNTING, WASTING, ANAEMIA AND EXCLUSIVE BREASTFEEDING 2014 (M)
EU	0.6	17.7	59.2	42.3	101.5
UNICEF	3.0	17.4	35.8	1.9	37.7
WFP	5.6	88.8	10.5	9.4	19.9
WHO	2.6	2.8	2.5	2.4	4.9

Table 4

Overview of nutrition ODA by various multilateral organizations in 2014 (79).

^a Excludes funding for nutrition-sensitive investments, deworming and salt iodization, as well as funding to unspecified recipients (79)

^b From 15 additional health, emergency and food aid codes. Corresponding method documents at Results For Development will be have to be viewed for further details

Financing NCDs

5.1 Government allocation/ out of pocket spending on NCDs

Only 50% of countries in 2013 had a national NCD policy and an associated budget for implementation despite commitments made to “increase and prioritize budgetary allocations for addressing NCDs” and “establish by 2013, multisectoral national policies and plans for the prevention and control of NCDs”. (80). Data on current levels of government funding for NCDs is virtually non-existent in developing countries. Traditionally, limited government funds in developing countries is directed towards tackling communicable diseases and maternal and child health services (80). Where government funding of public health services is limited, out of pocket spending is common. In these circumstances, out of pocket spending is often the largest single component of domestic funding accounting for 48% and 36% of total health in low and middle income countries respectively in 2012 (80). Out of pocket spending places a heavy financial burden on household incomes. A systematic review by Jasper et al (2015) cited by the Global Nutrition Report noted that 30% of the annual family income of cardiovascular patients in India was spent on direct CVD care (2). The paper also showed that 14.3% of high income families in China, 26.3% of high-income families in Tanzania and 67.5% of high income families in Argentina reported some form of household income loss due to CVD care (2). A study of 35 low and middle

countries in 2012 found that despite insurance, diabetic individuals are more likely to experience catastrophic medical spending (81). A WHO report (2014) cited by the Global Nutrition Report (2016) noted that out of pocket spending on NCDs is much less common in high-income countries where government funding of prevention and control of NCDs often exceeds other health needs (2).

5.2

Donor spending

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Global Development Assistance for Health (DAH) was estimated at \$37.6billion in 2016, marking the 3rd consecutive year of limited growth and further evidencing the plateau in development assistance for health (82). NCDs were responsible for 60% of DALYs and 70% of global deaths and yet received only 1.7% (\$643.8million) of total DAH in 2016 (82). By contrast HIV/AIDs accounted for 3% of global DALYs and received 25% of total DAH in 2016 (82). DAH for HIV/AIDS declined by 1.4% between 2010 and 2016 suggesting a potential shift in focus for development partners (82). “Lack of data, weak evidence for interventions, un-engaging narratives, an overemphasis on individual choice, vested commercial interest and inopportune timing” were some of the potential reasons put forward by Allen (2016) for the mismatch between funding and the burden of NCDs (83).

\$129.6million (20%) of NCD DAH in 2016 was spent on mental health whilst anti-tobacco programs received \$103.5million (82). It can be inferred that a portion of the remaining money would have been allocated to combating nutrition-related NCDs. Not all nutrition related NCD allocations would be found in the health sector. DAH for NCDs increased at 8.2% annually on average from 2000 to 2015 (84). Despite this increase in DAH funding for NCDs, it remains the health focus area with the least amount funding (84).

Between 2000 and 2016, a cumulative total of \$6.2billion was disbursed through DAH for NCDs (82). Private philanthropy, at \$2.1billion was the largest source of funding in the 16-year period with much of it being channeled through NGOs and Foundations (82). The United States was the single largest bilateral source of funding providing \$768.3million while the UK and the Gates Foundation also stand out as major sources and channels of funding (82). NCDs have been largely supported by NGOs and Foundations with 43% of total NCD DAH from 2000 - 2016 being channeled through these entities (82). The UN agencies constitute the next largest channel and expended \$1.5billion while the development banks channeled \$647.6million over the same time period (82).

Little information is available on financing directed specifically to prevent and control nutrition related NCDs. The Global Nutrition Report 2016 provided the results of an analysis performed using the Creditor Reporting System dataset, identifying any activity relation to nutrition-related NCDs to produce an estimate of nutrition-related NCD funding in the year 2014 (2). 153 activities were deemed relevant, which had a corresponding expenditure of \$49.1million – a tiny fraction of the \$135.2billion of ODA disbursements that year (2).

Top 20 countries by 2015
non-communicable disease burden of
disease versus average 2012-2014 DAH

- Low-income countries
- Lower-middle-income countries
- Upper-middle-income countries

Ranking by
non-communicable
disease DALYs (2015)

Ranking by
non-communicable
disease DAH (2012-2014)

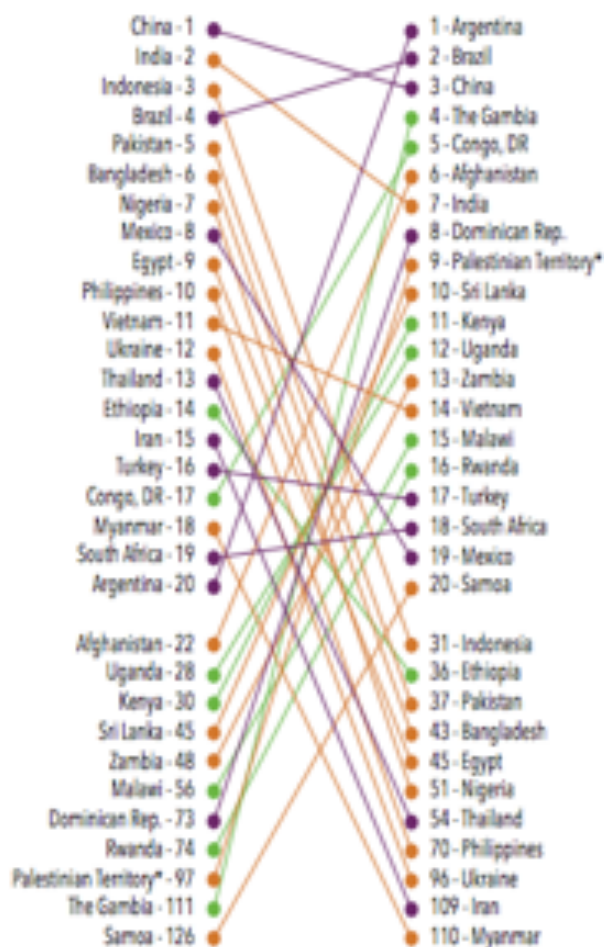


Diagram 3

Diagram 3, taken from the Financing Global Health Report 2016 shows the countries with the top DALYs alongside the top recipients of DAH NCD. With the exception of India, China, Turkey and Vietnam, few countries that ranked high for NCD DALYs are ranked high for NCD DAH (82).

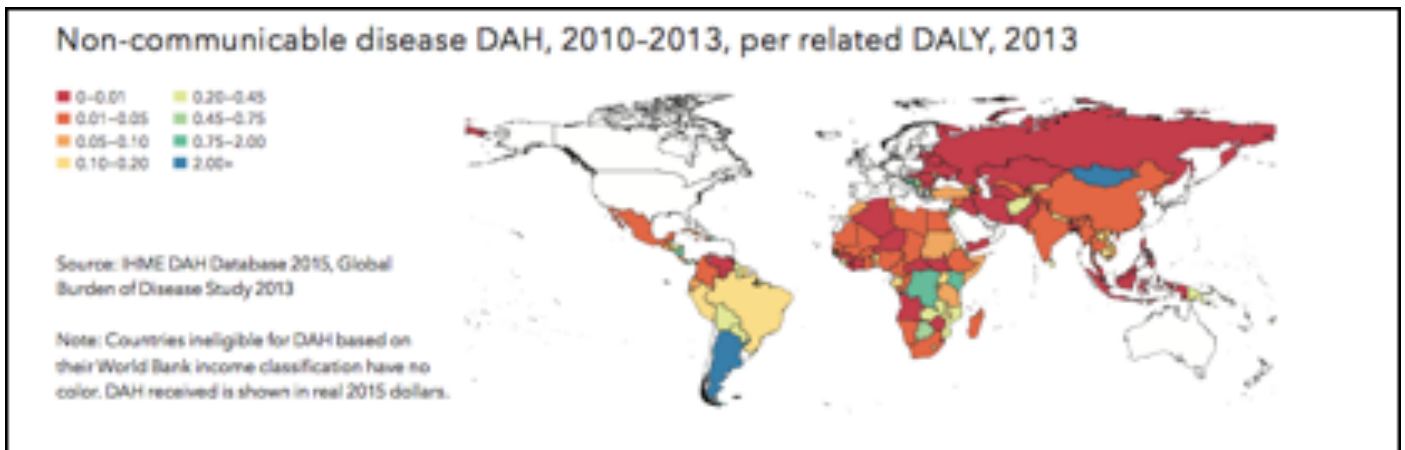


Diagram 4

below shows the non-communicable disease DAH per DALY from 2010 – 2013. Argentina and Mongolia received more than \$2/DALY. The vast majority of other countries received less than \$1/DALY (84).

Conclusion

The term malnutrition broadly covers two categories of conditions; undernutrition which includes stunting, wasting, underweight, micronutrient deficiencies or insufficiencies and the other, overweight, obesity and nutrition-related non-communicable diseases (1). Reframing malnutrition and understanding it in “all its forms” is needed to bring coherence to the most serious public health challenge the world faces today.

Many countries now face a double burden of malnutrition. Undernutrition and overnutrition have traditionally been addressed in silos. However, as discussed there are several potential conflicts from doing so. Double duty actions provide us with integrated solutions by which to simultaneously address both the burden of undernutrition and overweight, obesity and N-NCDs. Globally there has been a call for integrating programs tackling over and undernutrition. It is important to note here, that we do not have good evidence to show that focusing on double duty actions will result in a reduction in the prevalence of NCDs. With the Sustainable Development Goals (SDG) process, national governments and international partners are trying to create partnerships and improve integration. This provides a window of opportunity with political support to implement double duty actions. The following recommendations have been set out to use the current opportunity provided by the global nutrition policy landscape and to generate the evidence needed to test the hypothesis that focusing on double duty actions will in fact bring about a concurrent reduction in NCDs. Hence we call for the following:

1) *Governments, non-governmental organizations,*

international partners to implement double duty actions, taking hold of the opportunities presented by the current political environment and global frameworks

2) *International partners and researchers to develop a core-set of indicators by which to measure the impact of double duty programs*

3) *Researchers and program implementers to focus on core-indicators when implementing and evaluating programs so as to collect comparable data*

Nutrition and NCD commitments and targets that are specific, measurable, achievable, relevant and time-bound are needed to measure progress at the global and national levels (2). Generating evidence-based solutions will be imperative to tackling the double burden efficiently and successfully.

In addition, the WHO also proposes three levels for increasing the efficiency of actions through a double duty approach (85). Firstly, ensuring that current interventions “do no harm” and do not inadvertently increase the risk of another form of malnutrition. Secondly, leveraging existing actions that address one form of malnutrition to address other forms of malnutrition simultaneously. This “retrofit” approach could double returns on investments (85). Finally, identifying shared drivers such as socioeconomic status, food environments, social norms so as to provide further opportunities for action (85).

Improved nutrition is the bedrock for decreasing inequalities, breaking the cycle of poverty, improving female empowerment and making progress in health and education.





Annex A

Key search terms used	Double duty actions
to construct Table 2	Double duty initiatives
	Double duty programmes
	Double duty policies
	Undernutrition and obesity
	Undernutrition and NCDs
	Malnutrition and NCD
	Malnutrition and obesity
	Malnutrition and adult morbidities
	Double burden of malnutrition initiatives
	Nutrition-related non-communicable diseases
	School feeding programs double duty
	School feeding programs double burden of malnutrition
	Poverty and obesity

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