



# The Double Burden of Malnutrition in Indonesia



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For any questions regarding this report, please contact Roger Shrimpton PhD.





# The Double Burden of Malnutrition in Indonesia



# Table of Contents

<b>Acknowledgements</b>	<b>iv</b>
<b>Acronymns</b>	<b>v</b>
<b>Glossary</b>	<b>vii</b>
<b>Executive Summary</b>	<b>1</b>
<b>Chapter 1 Introduction</b>	<b>5</b>
1.1 What is the Double Burden of Malnutrition?	6
1.2 What are the consequences of the DBM?	7
<b>Chapter 2 The Indonesian Context</b>	<b>9</b>
2.1 The socio-demographic context	10
2.2 The political/administrative context	11
2.3 The economic context	11
<b>Chapter 3 The Magnitude of the Malnutrition Problem</b>	<b>13</b>
<b>Chapter 4 Assessing the Causes of the Double Burden of Malnutrition</b>	<b>21</b>
4.1 The health/biological environment	22
4.2 The economic/food environment	26
4.3 The physical/built environment	35
4.4 The socio-cultural environment	37
<b>Chapter 5 Nutrition Capacity and Governance</b>	<b>41</b>
<b>Chapter 6 Conclusions</b>	<b>51</b>
<b>Chapter 7 Suggested Policy Actions for Consideration</b>	<b>55</b>
<b>References</b>	<b>58</b>

## List of Figure

Figure 1.	The Indonesian Archipelago	10
Figure 2.	The levels of gemukness (BMI >25) in Indonesian men and women by income quintile (Riskesdas 2010)	17
Figure 3.	Percentage of overweight and underweight in men and women over 45 years of age in Indonesian Family Life Surveys	18
Figure 4.	Anaemia (% <12g Hb/dl) in adults (25-44 years) of the Indonesian Family Life Surveys in the last decade	19
Figure 5.	Causes of Death (%) in Indonesia 1995-2007	23
Figure 6.	Hypertension (%) in adults from the 2007 Indonesia Family Life Surveys	24
Figure 7.	Prevalence of insufficient activity in the Indonesian population above ten years of age in 2007, by age group	37
Figure 8.	The four essential functions of the nutrition system	42

## List of Table

Table 1.	Malnutrition in Indonesia by age groups	14
Table 2.	Provincial malnutrition rates by age group	16
Table 3.	Comparison of indicators of obesity in adults in Indonesia across various demographic categories	17
Table 4.	Indonesia's Food Balance sheet: Availability of food at the national level by year	27
Table 5.	Average Daily per Capita Consumption of Energy (KCal) by Commodity Group 1999, 2002-2011	32
Table 6.	WHO Recommended Population Nutrient Intake Goals	33
Table 7.	Programme interventions for tackling the DBM across the life course	44
Table 8.	The Four Overarching Pillars of DBM Nutrition Policy Framework	49

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# Acronyms

BAPPENAS	Badan Perencanaan dan Pembangunan Nasional (Indonesian State Ministry of National Development Planning)
BFHI	Baby Friendly Hospital Initiative
BMI	Body mass index
BMR	Basal metabolic rate
BPS	Badan Pusat Statistics (Indonesia National Statistics Bureau)
BULOG	Badan Urusan Logistik (The Indonesian Bureau of Logistics)
CED	Chronic energy deficiency
CONSEA	Conselho Nacional de Segurança Alimentar e Nutricional (Brazilian National Council on Food and Nutrition Security)
CVD	Cardiovascular disease
DBM	Double burden of malnutrition
DepSos	Departemen Sosial (The Indonesian Ministry of Social Affairs)
DPAS	Global Strategy on Diet, Physical Activity and Health
DPD	Dewan Perwakilan Daerah, (Indonesian Regional Representative Council)
DPR	Dewan Perwakilan Rakyat (Indonesian People's Representative Council)
FAO	Food and Agriculture Organization of the United Nations
FOAD	Fetal origins of adult disease
FPI	Food Price Index of the FAO
GATT	General Agreement on Tariffs and Trade
GDP	Gross domestic product
GOI	Government of Indonesia
ICN	International Conference on Nutrition
IMF	International Monetary Fund
INACG	International Nutritional Anaemia Consultative Group
LACA	Landscape Analysis Country Assessment
LBW	Low birth weight
LIFDC	Low income food deficit country
LMICs	Low- and middle-income countries
MDGs	Millennium Development Goals
MMS	Multiple micronutrient supplementation
MOH	Ministry of Health
MPR	People's Consultative Assembly
MUAC	Mid-upper arm circumference
NCDs	Noncommunicable diseases
NFSI	Nutrition Friendly Schools Initiative
NGO	Nongovernmental organization
NPAN	National Plans of Action for Nutrition
NSP	Non-starch polysaccharides
NTT	East Nusa Tenggara
PA	Physical activity
PCM	Protein calorie malnutrition
PKH	Program Keluarga Harapan (Indonesian Hopeful Family Programme)
PMTAS	Pemberian Makanan Tambahan Anak Sekolah (Indonesian School Meals Programme)

PNPM	Program Nasional Pemberdayaan Masyarakat (Indonesian National Program for Community Empowerment)
POSYANDU	Pos Pelayanan Terpadu (Integrated Service Delivery Post)
PUFAs	Polyunsaturated fatty acids
PUGS	Pedoman Umum Gizi Seimbang (Indonesian Common Guide to Balanced Nutrition)
RANPG	Rencana Aksi Nasional Pangan dan Gizi (Indonesian National Action Plan for Food and Nutrition)
RASKIN	Beras masyarakat miskin (Indonesian Rice for the Poor Programme)
RPJMD	Rencana Pembangunan Jangka Menengah Daerah (Medium-Term Regional Development Plan)
RPJMN	Rencana Pembangunan Jangka Menengah Nasional (Medium-Term National Development Plan)
SAPs	Structural Adjustment Programmes
SUN	Scaling Up Nutrition
TEF	Thermic effect of food
TFCs	Transnational food corporations
TVRI	Televisi Republik Indonesia
UIE	Urinary iodine excretion
UNICEF	The United Nations Children's Fund
VAD	Vitamin A deficiency
WC	Waist circumference
WHA	World Health Assembly
WHO	World Health Organization
WHR	Waist to hip ratio
WTO	World Trade Organization
YKAI	Indonesian Children's Welfare Institute

# Glossary

Acute phase proteins	A class of proteins whose plasma concentrations increase or decrease in response to inflammation
Adiponectin	A hormone produced by adipose (fat) tissue that influences the metabolism of lipids and glucose
Adiposity	The quality or state of being fat
Atherogenic	Tending to promote the formation of fatty plaques in the arteries
Atherosclerotic lesions	A deposit or degenerative accumulation of lipid-containing plaques on the innermost layer of the wall of an artery
Chemokines	Cytokines with various immunoregulatory functions, including attracting white blood cells to sites of infection
Cortisol	Known more formally as hydrocortisone; a steroid hormone that is released in response to stress and a low level of blood glucocorticoids
Cytokines	Substances, such as interferon, interleukin, and growth factors, that are secreted by certain cells of the immune system and have an effect on other cells
Disaccharides	Sugars whose molecules contain two monosaccharide residues
Dyslipidaemia	High triglyceride and low LDL cholesterol levels in blood
Epigenetic	Resulting from external rather than genetic influences
Gemuk	Overweight/obese or "Fat" in Indonesian.
Gemukness	Deliberately unspecific term meaning overweight/obesity but in the Indonesian context where BMI cut-offs are probably much lower than 25/30. Gemukness is 'hidden fatness'
Gizi buruk	Severe undernutrition (marasmus/kwashiorkor)
HDL cholesterol	High-density lipoproteins, a.k.a. the "good" cholesterol
Hydrolysis	The chemical reaction of a compound with water, usually resulting in the formation of one or more new compounds
Hypercholesterolemia	High blood cholesterol levels
Hyperglycaemia	High blood sugar levels
Hypertension	High blood pressure
Hypertriglyceridemia	High blood levels of triglycerides, the most abundant fatty molecule in most organisms
Impaired glucose tolerance	A pre-diabetic state of hyperglycaemia that is associated with insulin resistance and increased risk of cardiovascular disease
Inflammatory state of obesity	A low-grade, chronic inflammation orchestrated by metabolic cells in response to excess nutrients and energy
Insulin resistance syndrome	A name for a group of risk factors that occur together and increase the risk for coronary artery disease, stroke, and type 2 diabetes
Ischaemic heart disease	A disease characterized by reduced blood supply to the heart
LDL cholesterol	Low-density lipoproteins; a.k.a. the "bad" cholesterol
Leptin	A protein hormone that plays a key role in regulating energy intake and energy expenditure
Metabolic syndrome	Comprises a group of risk factors including abdominal obesity, dyslipidaemia, hypertension, and impaired glucose tolerance
Monosaccharide	Sugars (e.g., glucose) that cannot be hydrolysed to give a simpler sugar
Myocardial infarction	Irreversible injury to the heart muscle (heart attack)
Obesogenic	Factors tending to make individuals fat, such as environments that promote decreased physical activity and/or increased intake of energy dense foods
Obesity	A medical condition in which excess body fat reduces life expectancy and/or causes increased health problems

Overweight	Having more body fat than is optimally healthy
Pathophysiological	Changes or alterations in function that accompany a particular syndrome or disease
Postprandial	During or relating to the period after a meal
Stunting	Excessively short, or below minus two standard deviations from median height for age of reference population
Underweight	Below minus two standard deviations from median weight for age of reference population
Wasting	Excessively thin, or below minus two standard deviations from median weight for height of reference population
White adipocytes	White fat cells
White adipose tissue	White fat





# Executive Summary

## The Double Burden of Malnutrition and Its Consequences

A concept first presented just over a decade ago, the DBM is the coexistence of undernutrition and overnutrition of macronutrients and micronutrients across the life course in the same population, community, family and even individual. Of particular concern is the life-course dimension of the DBM, or the link between maternal and fetal undernutrition and increased susceptibility to overnutrition and diet related non communicable diseases later in life.

The DBM is a global problem that affects rich and poor countries alike: 25% of the world's population is overweight, while 17% of pre-school children are underweight and 28.5% are stunted, 40% of women of reproductive age have anaemia, and one-third of the global population still suffers from iodine deficiency. Most lower-middle income countries (LMICs) are considered to be affected by the DBM, with overweight increasing faster than underweight is decreasing in most of them. While obesity has doubled globally in the last three decades, it has tripled in LMICs in just two decades.

The consequences of the DBM are grave and manifest across the life course. Overall country development, improved water and sanitation practices, and increased vaccine coverage mean that more children are likely to survive their first two years of life, even if they have suffered undernutrition. For those that survive this critical period, however, the damage done by this early interval of undernutrition is seen throughout the life course. When this stunted length growth is followed by accelerated weight growth later in life, there is an increased risk for obesity and other diet-related NCDs, such as Type 2 diabetes and cardiovascular disease, later in life. NCDs are responsible for the majority of deaths worldwide, and are disproportionately high in LMICs, where nearly 80% of all NCD deaths occur.

### Indonesia's DBM problem is urgent

There is evidence of overweight and underweight among young children, indicating that the DBM is already a concern in Indonesia. Stunting is the principal nutrition concern, a fact made more troubling given the links between early stunting and the risk of NCDs later in the life course, which are now the majority of the disease burden in Indonesia. This link between stunting and NCDs is not yet well understood or addressed by health workers and policy makers.

Traditionally, Indonesia has prioritized undernutrition, paying special attention to "Gizi Buruk" or severe underweight as a way to judge the national nutritional situation. However, by this measure alone, nutritional issues appear largely resolved, as the prevalence of gizi buruk is just 5.4% in children under-five. That 36% of children under five are stunted is of greater concern given the lifelong consequences.

The Indonesian Family Life Surveys, representative of 85% of the population, indicate that over a fifteen year period, the proportion of thin men and women decreased considerably while the proportion of "gemuk" (obese/overweight) men and women nearly doubled. This suggests that underweight is declining and overweight is increasing in Indonesian adults, much like it is in Indonesian children, where rates of "Gemuk" in the younger children (<5y) are greater than in the older ones (6-12y) while preschool child underweight rates have fallen at double the rate of stunting over the last two decades. This is a trend similar to that seen in most other LMICs. Maternal undernutrition and micronutrient deficiencies also contribute to the malnutrition situation in Indonesia.

### Assessing the Causes of the DBM in Indonesia

While the causes of DBM across the life course are complex, our assessment analyzed the DBM in Indonesia using a system map of obesity developed by the Foresight Project in the UK, which groups more than 100 variables into four thematic areas:



1. **Health and biological environment.** Indonesia is well on its way in its demographic transition. Life expectancy has improved and more people have access to primary health services, thanks to Indonesia's prioritization of primary health care, increased expenditures for health, and a spate of health policies in the eighties and nineties that led to better distribution of health facilities throughout the country. This aging population in turn is influencing the subsequent epidemiological transition, and the changing age structure has contributed to a shift in the burden of disease from infectious diseases to NCDs. Today, NCDs account for the majority of disability and mortality in Indonesia, with cardiovascular disease a leading cause of death (30% of all NCD deaths, followed by cancer, chronic obstructive pulmonary disease, and diabetes).
2. **Economic and food environment.** Indonesia's increase in national wealth has been accompanied by declines in poverty and an increase in food availability as energy per capita, mostly coming from fat doubling. 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.
3. **Physical/build environment.** 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 traveling 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 DBM problem, schools are not yet a venue for preventing child obesity. It is unclear where children buy their food, but likely some 35% comes from street vendors; regulating this to ensure children eat more healthily is a challenge that should be better addressed.
4. **Socio-cultural environment.** Indonesia continues to retain much of its culture even while immersing itself in all forms of modern media. Traditional customs influence maternal and early child undernutrition, and social norms dictate that many women get married while they are still children: 25% of all women of reproductive age are married before age 18, and 10% before age 16, likely contributing to high low birth rates, especially in the outer islands. At the same time, children watch around 4 hours of television a day, and the advertising of processed food dominates the media, with advertisements targeted toward children. The majority of parents report that their purchases are influenced by their children's choice more than advertisements, suggesting the need to curb these external influences, as some other countries have done.

## Addressing the DBM in Indonesia

The actions needed to strengthen the response to nutrition issues are well established and recognized under the Scaling Up Nutrition (SUN) movement, which Indonesia joined in September 2012. Focused on maternal and child undernutrition, SUN should be built upon and adopted as countries consider enhanced responses to the DBM problem, particularly as efforts to address maternal and child undernutrition are a necessary first step to prevent DBM later in the life course.

While Indonesia has made progress in micronutrients, and has begun work to promote good nutrition practices such as exclusive breastfeeding and baby friendly hospitals, there is room for improvement in coordination for improving across sectors and within all levels of the government. An overarching DBM policy framework at the country level, such as that included below, would include actions needed by several Ministries and across four pillars: food security, food safety, healthy life styles, and nutrition.

## Policy actions for consideration in Indonesia

Grouped by functional area, stage of the life course, and type of activity, the following policy actions are suggested for consideration and further in-depth discussion as well as immediate action and piloting:

### **Nutrition Policies and Plans**

- Ensure from the earliest moment possible and practical that nutrition programmes in Indonesia become oriented towards tackling the DBM, recognizing that the first priority for doing so is to tackle the problem of stunting by improving maternal and child nutrition, largely by implementing the Lancet Nutrition Series package of direct nutrition interventions
- Ensure that the plan for the high-level national nutrition council/forum eventually includes plans to tackle the DBM, building on current initiatives to follow through on the SUN.
- Consider ways to ensure that both the future National Plan for Development (RPJMN) and National Action Plan for Food and Nutrition (RANPG) adequately contemplate the DBM.

### **Maternal, Infant and Young Child Nutrition**

- Strengthen the mechanisms already in place and ensure the enforcement of the Code of Marketing of Breastmilk Substitutes so that infants are no longer given breastmilk substitutes by health professionals, especially at the time of birth
- Strengthen efforts to improve diets of young children through home-fortification, fortification of complementary foods, and/or animal source foods as appropriate.
- Further strengthen all efforts to control the multiple micronutrient deficiencies that continue to assail mothers and young children especially, through fortification and/or through supplementation. As a short term measure until sanitation levels improve, introduce deworming during pregnancy as recommended by WHO to help control maternal anaemia.

### **Food and nutrition security**

- Strengthen aspects of agricultural policy in order to promote vegetable and fruit production through small scale local farmers, not only to improve quality of food availability but also to improve incomes among the rural poor, so that both food security and nutrition security are ensured.
- Strengthen all social welfare programmes for mothers and young children by ensuring conditionality of cash transfers as well as linkages to the promotion of high nutritional cash crops such as fruits and vegetables, which could/should be provided by small scale local farmers through local farmers markets.

### **Nutrition Education and Healthy Life Styles**

- As a first priority for dealing with the “stunting-obese-NCDs” problem, develop extensive and effective nutrition education throughout the country for students, academicians, government officials, politicians, the food industry, and the general public
- Make plans to make all schools “nutrition friendly” schools, with pilot initiatives in at least five provinces, building on current efforts through PMTAS, Indonesia’s feeding program for school children.
- Ensure that all capacity building efforts to strengthen nutrition professionals and health service staff fully contemplate the DBM
- Introduce national regulations to reduce the impact on children of marketing of foods high in saturated fats, trans-fatty acids, free sugars, or salt, in function of the policy recommendation of World Health Assembly resolution WHA63.14. Advertising of any food to children through any media should be banned and infractions punished.
- Take measures to ensure that future urban planning initiatives are more “exercise friendly” by including more bike lanes, pavements, pedestrian precincts and parks.

### **Research**

- Develop models to estimate the economic and fiscal impacts of the DBM across the life course.
- Explore the potential for and possibilities of introducing taxes on imported food commodities that benefit from subsidies in the country of origin, as well as taxes on selected fast foods such as high sugar drinks, that are particularly obesogenic.
- Investigate the fat content of the national diet including the quality of the fat (how much is saturated and how much is poly-unsaturated), as well as the amounts and sources of trans fats being consumed.
- Initiate national level nutrition surveys to ascertain the situation with regard to micronutrient status, especially for iron deficiency anaemia, and iodine, vitamin A and zinc deficiencies.





# Chapter 1

## Introduction



**The purpose of this report is to assess the Double Burden of Malnutrition (DBM) problem in Indonesia.** It builds on and should be seen as complimentary to the Indonesia Landscape Analysis Country Assessment report (LACA)<sup>1</sup>, which found that overweight and underweight co-existed among young children, confirming that the DBM is already a concern in Indonesia<sup>2</sup>. The focus of the LACA was on maternal and child undernutrition and especially on the extent of scaling-up of an essential package of interventions<sup>3</sup> for improving maternal and child undernutrition. As noted then, most Indonesians, including government officials and health providers, still consider severe undernutrition (“gizi buruk”) to be the main nutrition problem to focus on. They are not aware that the trend of undernutrition, including *gizi buruk*, is declining and overweight is increasing, both among the rich and the poor. Indeed there is little awareness of the DBM issues, be it in government, the public or professional circles. While the focus of this report is on overnutrition it also looks at how undernutrition contributes to this problem across the life course, including the links to the noncommunicable diseases (NCDs), and especially those that are diet-related such as diabetes, *hypertension* (high blood pressure), *dyslipidaemia* (high triglyceride and low *LDL cholesterol*) and cardiovascular disease (CVD).

**The assessment is based on information collected during a visit to Jakarta and Yogyakarta in late November 2011 when interviews were held with the key actors involved in DBM problems in Indonesia.** During this short visit many useful and insightful perspectives were gained and much information was collected. Subsequently additional searches have been carried out using Google and PubMed as appropriate to find further articles published on topics of relevance to the DBM problem in Indonesia. A background document reviewing the global literature on the DBM was developed from October through December<sup>4</sup>, and from January to March 2012 a course on the DBM was given to MPH students at Tulane University; all of this has helped shape the development of this report. A first version of the report was shared with a group of Indonesian nutrition professionals and scholars, together with nutrition donors at a meeting held by Bappenas on the 3<sup>rd</sup> April 2012 in Jakarta, and comments received by 13<sup>th</sup> April 2012 from the professionals present<sup>1</sup> were then incorporated into this final draft.

**The report begins by describing what the DBM means as well as what its consequences are, before going on to examine the DBM situation in Indonesia and then making recommendations on what actions should be taken to both prevent and mitigate these problems across the life course.**

## 1.1 What is the Double Burden of Malnutrition?

**The DBM concept was first presented as a “new paradigm” just over a decade ago<sup>5</sup>.** DBM is the coexistence of undernutrition and overnutrition of macronutrients as well as of micronutrients, across the life course in the same population. The justification for the new paradigm was that most countries have to deal with both overnutrition and undernutrition problems, such that separating the treatment and/or prevention of these “deficiencies” and “excesses” was no longer sensible. In addition, new evidence suggested that linkages across the lifecycle mean that maternal and fetal undernutrition increases a population’s susceptibility to overnutrition and diet-related NCDs in adulthood.

**For many decades the term “malnutrition” has been commonly but wrongly used to mean undernutrition.** This misnomer derives from the early focus of nutrition research efforts on determining the causes of protein calorie malnutrition (PCM), as child undernutrition was then called<sup>6</sup>. In fact, malnutrition refers to nutritional excesses as well as deficiencies<sup>7</sup>, with undernutrition the result of insufficient intake, poor absorption and/or poor biological use of the nutrients, which can result in impaired body functions, impaired growth and underweight. Overnutrition is the result of excess or imbalanced nutrient intakes,

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which can also result in impaired body functions as well as overweight and/or obesity. Although the DBM terminology is commonly used to mean just underweight and overweight (deficiency and excess of energy derived from macronutrients), it also includes deficiencies and excesses of micronutrients.

**The lifecycle dimension of the DBM is important since it is increasingly recognized that nutritional insults during the critical periods of fetal and young child development produce lifelong consequences<sup>8-9</sup>.** Adult height is largely determined by height at two years of age<sup>10</sup>, with average child height growth after the second year of age being the same in all populations<sup>11</sup>. Differences in child growth seen across populations are primarily due to environmental differences rather than genetic ones<sup>12</sup>.

**In most developed countries a secular trend has been observed over the last century or more in which final adult height has increased by one to two centimetres per decade as living conditions improved, especially in upper income groups<sup>13</sup>.** The secular trend has now ceased in the US, with adult height even decreasing in the last decade<sup>14</sup>; the population has gone from being the tallest in the world to being among the most overweight<sup>15</sup>. While the secular trend still continues in many European countries, with the Dutch being the tallest nation, the problem of obesity has multiplied. In almost half of OECD countries 50% or more of the population is overweight, whereas prior to 1980 rates were generally well below 10%<sup>16</sup>. It is likely that in most low- and middle-income countries (LMICs) the DBM is associated with an increasingly faster transition in the factors that affect growth across the life course, such that the effects of the secular trend are becoming intra-generational, i.e. being compressed within the same generation, and overweight/obesity increasing faster than final adult height.

**The DBM is a global problem, with 25% of the world's population being overweight<sup>17</sup>, while 17% of preschool children are underweight and 28% are stunted, 40% of women of reproductive age have anaemia, and a third of the global population still suffers from iodine deficiency despite remarkable increase in the coverage of iodized salt<sup>18</sup>.** These nutritional problems are not simply divided between rich and poor countries, however: indeed most LMICs were considered to be affected by both overnutrition and undernutrition at least a decade ago<sup>19</sup>. The most common form of the DBM is probably energy overnutrition and iron deficiency, a problem common even in the US where iron deficiency is more prevalent in obese children than in normal weight children<sup>20</sup>, and in obese women than in normal weight women<sup>21</sup>. Paradoxically, the decrease in child undernutrition in Brazil during the nineties, which was accompanied by increase in adult obesity<sup>22</sup>, also saw an increase in anaemia<sup>23</sup>. Furthermore, overweight appears to be increasing faster than underweight decreases in most LMICs<sup>24</sup>, such that while obesity has doubled globally in the last three decades, it has tripled in LMICs in just two decades<sup>25</sup>. Overweight/obesity is not just a problem for the rich in LMICs; all income groups are increasingly affected. Those born in the poorest income groups and suffer early undernutrition, followed by better and/or accelerated growth later in their life course, appear to be at even greater risk.

## 1.2 What are the consequences of the DBM?

**The problems associated with the DBM are considerable, and many are manifest across the life course.** The effects of maternal and young child undernutrition during the fetal/infant period are considerable, and among those that survive the consequences are seen across the life course. Estimates suggest that maternal and child undernutrition is associated with between one-half<sup>26</sup> and one-third<sup>27</sup> of global child deaths. These differences in the proportions of child mortality attributable to undernutrition likely reflect changes in the occurrence of different diseases over time. The contribution of undernutrition to child mortality varies by disease, and is highest for diarrhoeal diseases (73%) and close to half for pneumonia, measles and severe neonatal infections<sup>28</sup>. As countries develop and progress is made in improving the household environment through improved water, sanitation and hand washing with soap, together with increased vaccine coverage, more foetuses survive beyond infancy despite having suffered from maternal and child undernutrition.

**For those fetuses that survive beyond infancy, the damage done by undernutrition during this early period can be seen across the life course.** Final adult height, which is largely determined by two years of age, is a reflection of how good nutrition was during this early period in life<sup>29</sup>. Height at two years of age is considered the best indicator of the quality of a nation's human capital, with maternal and child undernutrition associated with less schooling, and reduced economic activity later in the life of the child<sup>30</sup>. There is also evidence that constrained fetal growth produces measureable differences in immunity, as well as a greater propensity for diet-related NCDs such as type 2 diabetes and cardiovascular diseases later in the life course. Based on conservative assumptions related only to lost productivity, the costs of child undernutrition in the Asia region were estimated to be at least two or three per cent of GDP<sup>31</sup>. Earlier work suggesting that half of the economic growth of the UK between 1800 and 1980 is attributable to the improved nutrition of the workforce is thought to be a conservative estimate<sup>32</sup>.

**Later in the life course, diet and nutrition, and especially obesity, are important underlying causes of many NCDs including hypertension, diabetes, cancer, stroke, and ischemic heart disease<sup>33</sup>.** NCDs are responsible for 63% of 57 million deaths worldwide and they are disproportionately high in LMICs where nearly 80% of NCD deaths occur<sup>34</sup>. The leading causes of NCD deaths in 2008 were cardiovascular disease (48%), cancers (21%), respiratory diseases (12%) and diabetes (4%). Furthermore, 44% of all NCD deaths occur before the age of seventy, and in LMICs this ratio is higher (48%) than in high income countries (26%). Among people younger than seventy in 2008, cardiovascular diseases were responsible for the highest proportion of NCD deaths (39%) followed by cancers (27%). Chronic respiratory disease, digestive diseases and other NCDs were together responsible for approximately 30% of deaths and diabetes was responsible for 4%. As populations in LMICs age and longevity increases, NCD deaths are projected to increase and will become the most dominant cause of mortality in most countries by 2030.

**The risks of getting CVD are related to a set of conditions called “the metabolic syndrome”.** The metabolic syndrome comprises a group of risk factors including abdominal obesity, *dyslipidaemia*, *hypertension*, and *impaired glucose tolerance*<sup>35</sup>. When occurring together they increase the risk of developing CVD twofold and type 2 diabetes three-fold. The three disorders (overweight, abnormal blood lipid levels, and raised blood pressure) cause two-thirds of the CVD burden. In addition, three-quarters of type 2 diabetes is associated with overweight as an underlying cause<sup>36</sup>.

**The costs of treating the metabolic syndrome are considerable and growing, even in LMICs.** Among the few LMICs with data available, the costs of treating CVD in South Africa already accounted for up to 25% of all healthcare spending (2%-3% of GDP) a decade ago<sup>37</sup>. There is more information available on the costs of the various components of the *metabolic syndrome* in wealthy countries such as the US, where the *metabolic syndrome* was present in almost one-half of a population-based study of the elderly<sup>38</sup>, and the total costs to Medicare were 20% higher among participants with the *metabolic syndrome*. The *metabolic syndrome* per se was not an important predictor of long-term costs over and above its constituent parts however, with abdominal obesity, low *HDL cholesterol*, and elevated blood pressure associated with 15%, 16%, and 20% higher costs, respectively. Across the entire US population, overweight and obesity costs were recently estimated to be US\$147 billion or 9% of healthcare expenditures<sup>39</sup>, and *hypertension* costs were US\$109 billion a decade ago<sup>40</sup>. The total cost of diabetes in the US in 2007 after factoring in the additional costs of undiagnosed diabetes, pre-diabetes, and gestational diabetes was estimated at US\$218 billion<sup>41</sup>. The direct and indirect costs of CVD in the US were estimated at US\$368 billion in 2004<sup>42</sup>, with one in three adults having CVD and 36% of all deaths having CVD as the leading cause of death among men and women in 2008<sup>43</sup>. A recent study from the World Economic Forum suggests that globally, NCDs will cost more than US \$30 trillion over the next 20 years, representing 48% of global GDP in 2010, and pushing millions of people below the poverty line<sup>44</sup>.





## Chapter 2

# The Indonesian Context

Figure 1. The Indonesian Archipelago



**Indonesia is an archipelagic country with some 17,500 islands, only 6,000 of which are inhabited.** Straddled across the equator it spreads over 5,120 kilometres from east to west and 1,760 kilometres from north to south (see Figure 1). More than 80% of the territory is covered with water and the land area is about 1.86 million square kilometres. It comprises five main islands: Sumatra, Java, Kalimantan (Borneo), Sulawesi, and New Guinea; two major archipelagos (Nusa Tenggara and the Maluku Islands); and sixty smaller archipelagos.

## 2.1 The socio-demographic context

**With a population of 240 million, Indonesia is the world's fourth most populous country after China, India and the US.** The national average population density is 109 people per square kilometer, but there are large differences between the islands, from Java with 951 people per square kilometer to Kalimantan with only 20 people per square kilometer. Nearly sixty per cent of the population lives on Java, which is only seven per cent of the country's total area and one of the most densely populated areas in the world.

**The Indonesian population consists of many distinct ethnic, linguistic, and religious groups.** The Javanese (41%) are the largest and the politically dominant ethnic group, followed by Sundanese (15%), Madurese (3%), Minangkabau (3%), among many others (38%). Since independence seventy years ago, Indonesia has developed a shared identity defined by a single national language, ethnic diversity and religious pluralism within a majority Muslim population. Indonesia's national motto: "Unity in Diversity" articulates the diversity that shapes the country.

**The Indonesia population is at stage three of the demographic transition model, i.e. it is already a mature industrial society with an ageing, literate population<sup>45</sup>.** Forty years ago the birth rate was 41 per thousand people and the death rate was 17 per thousand people. In 1990 these rates were 26 and 9, and in 2009 they were 18 and 6 respectively. Life expectancy has improved from 48 years in 1970, to 62 years in 1990, and 68 years in 2009. In 2009 28% of the population was under-15 years of age and 6% was over 65 years of age such that the dependency load was 34% of the population. Literacy rates are very high at 92% of adults, with little gender gap in youth literacy rates (97% males and females 96%). Approximately 118 million people (52 per cent of the population) live in urban areas.



## 2.2 The political/administrative context

**Indonesia is a modern state, governed by a democratically elected governmental system.** Although proclaiming its independence with a new constitution in 1945, the Republic of Indonesia only gained a stable and development-oriented government in 1966 with the establishment of the “New Order” regime, which lasted until 1998. The governmental system is now a parliamentary one with a president who is the head of state, commander-in-chief of the Indonesian National Armed Forces, and director of domestic governance, policy-making, and foreign affairs. The president appoints a council of ministers that forms the executive body. The 2004 presidential election was the first in which the people directly elected the president and vice president. The president may serve a maximum of two consecutive five-year terms.

**The highest state institution is the People’s Consultative Assembly (MPR), whose functions include supporting and amending the constitution, inaugurating the president, and formalizing broad outlines of state policy.** It has the power to impeach the president. The MPR comprises two houses; the People’s Representative Council (DPR), with 560 members, and the Regional Representative Council (DPD), with 132 members elected by the provincial parliaments. The DPR passes legislation and monitors the executive branch; party-aligned members are elected for five-year terms by proportional representation. Reforms since 1998 have markedly increased the DPR’s role in national governance. The DPD is a new chamber for matters of regional management.

**Administratively, Indonesia consists of 33 provinces, 5 of which have special status.** Each province has its own political legislature and governor. The provinces are subdivided into regencies and cities, which are further subdivided into districts, and then into village groupings. Following the implementation of regional autonomy measures in 2001, the regencies and cities have become the key administrative units. The village or “kelurahan” administration level is the most influential on a citizen’s daily life, and handles matters of a neighbourhood through an elected chief, called the lurah.

**In the last decade Indonesia has been transformed from one of the most centralized to one of the most decentralized governments in the world.** Until 2000, Indonesian development was largely controlled by the various line ministries together with BAPPENAS (National Development Planning Agency). In 2001 a series of regulations came into effect that transferred the responsibility for the delivery of public services such as health and education to the district or municipality level, and the number of districts is around 500. Areas of competence which were maintained at the central level included foreign affairs, defence, finance, justice and religion. For the remaining areas including health, agriculture and education, the role of central level of government is restricted to that of setting standards and norms, monitoring and evaluation, and controlling, while that of the provincial government is one of supervision and facilitation.

## 2.3 The economic context

**Indonesia, a lower-middle-income country according to the World Bank, continues to achieve steady economic growth despite the current turbulent global scenario.** The country’s economic wealth has risen steadily since national development planning was instituted in the sixties, with an average GDP growth across the period of 4%<sup>46</sup>. Despite the Asian economic crisis in the late nineties, the economy soon recovered and by the year 2000 GDP was US\$2,200 and rose to US\$3,720 in 2009<sup>47</sup>. In terms of macroeconomic stability, Indonesia has managed to fulfil many of its fiscal targets during the last decade, including a significant drop in Debt-to-GDP ratio from 61% in 2003 to 27% in 2009. Meanwhile, the budget deficit is projected to be as little as 0.4% of GDP in 2011. Indonesia’s exports were US\$158 billion in 2010, an increase of 35% from US\$116.5 billion in 2009. The largest export commodities for 2010 were oil and gas (18%), minerals (15%), textiles and footwear (9%), crude palm oil (8%), electrical appliances (8%), and rubber products (5%). Meanwhile, total imports in 2010 were US\$136 billion, up from US\$96.83 billion in 2009.

**Although poverty has been greatly reduced in Indonesia, it still affects a large number of people.** Over the last three decades the rates of poverty have declined steadily from 40% in 1976, to 18% in 1996 and 13% in 2010. The absolute number of people living in poverty remains large, however, with 54.2 million in 1976, 34.5 million in 1996, and 32.0 million in 2010. Furthermore, approximately half of all households remain clustered around the national poverty line set at 200,262 rupiahs (US\$22) per month. With unemployment around 8% of the total labour force, total employment rose by 4% from March 2010 to February 2011, and the median nominal wage rose by 7%. This growth was driven by an increase of 27% in the agriculture, plantation, forestry, hunting, and fisheries sectors, which employs 40% of workers, most of them poor. These increases in employment and in real wage value will have contributed to the continued fall in poverty rates, despite increases in food prices.



**Chapter 3**  
**The Magnitude of the  
Malnutrition Problem**



**The double burden of malnutrition (DBM) already exists at the population level in Indonesia, with undernutrition and overnutrition seen in children and in adults of all income levels across the life course.** The principal nutrition problem in Indonesia is that 36% of young children are stunted, as shown in Table 1 below. One of the principal concerns with stunting is that it increases the risk of noncommunicable diseases (NCDs) later in the life course. While around one in five adults are overweight/obesity (or *gemuk*) just over one in ten children are wasted. The increasing proportion of young children that are *gemuk* compared to the proportion that is wasted is another emerging concern.

**Indonesia has traditionally used child underweight (or the adequacy of weight for age) as the principal indicator for national nutrition status, with special attention to “gizi buruk”, or severe underweight.** The prevalence of *gizi buruk* in under-fives is just 5%. However, in the last decade a deeper understanding of the implications of stunting and wasting has emerged that is not captured by the measure of underweight alone. Underweight is as much a reflection of small stature as it is of small body weight. It is now realized that the process of stunting is complete by two years of age<sup>48</sup>, such that final adult height is largely determined during this period. Furthermore, stunting, or length growth faltering, is a reflection of poor maternal nutrition as well as poor infant and young child feeding, thus suggesting a “window of opportunity” for delivery of maternal and child nutrition interventions from conception to two years of age.

**While the stunting rates in school-aged children and adolescents are essentially the same as in young children, the *gemuk* rates are much higher in adults than in adolescents.** It is to be expected that there are fewer *gemuk* children than *gemuk* adults, as there seems to be a lag in overweight/obesity trends for children compared to adults<sup>49</sup>. However, some of these differences in *gemuk* prevalence by age group reported in Riskesdas 2010 are more difficult to understand and are related to definitional issues as described below\*.

**Table 1. Malnutrition in Indonesia by age groups**

Malnutrition category	Age Groups				
	<6y	6-12y	13-15y	16-18y	>18y
Stunted	35.6	35.5	35.1	31.2	
Wasted	13.3	12.2	10.1	8.9	12.6
<i>Gemuk</i>	14.0	9.2	2.5	1.4	21.7

Source: Riskesdas 2010

**While the *gemuk* rates in young children are not alarmingly high, what is of great concern is that they appear to be increasing, as rates of *gemuk* in younger children (1-5 years) are greater than in older children (6-12 years).** Furthermore, preschool child underweight rates (adequacy of weight for age) have fallen at double the stunting rate reduction over the last two decades. The child stunting prevalence was 47%

in 1995 and 36% in 2010, signifying a 23% reduction, compared to child underweight rates, which were 32% in 1995 and 18% in 2010, signifying a 44% reduction.

**Although different growth references were used across these two decades, these methodological issues do not contribute significantly to this dramatic increase in the prevalence of child “*gemukness*”.**

It is well recognized that the greatest danger from a NCD perspective is when weight growth becomes accelerated in later childhood after length growth has been constrained during the period of conception through two years of age<sup>50</sup>. An increased rate of *hypertension* later in the life course is one consequence of this. <sup>51</sup> What is most concerning, however, is that these risks will be amplified across the life course and increasingly so over time. With increasing global urbanization, the third of the population that is stunted early in life, and especially those among the poorest income groups, becomes increasingly exposed to *obesogenic* urban environments later in their life course.

**International BMI cut-offs used for categorizing obesity and/or overweight may be underestimating the magnitude of the overnutrition problem in adults in Indonesia.** Riskesdas 2010 categorized adult obesity as BMI  $\geq 27.0$ , which would seem appropriate for an Asian country since it is recognized that the international cut-off for obesity of 30.0 is unlikely to be applicable in Asian settings<sup>52</sup>. However, the BMI  $\geq 25$  used to define overweight in Riskesdas is not appropriate. The Indonesian Society for the Study of Obesity has suggested that the BMI cut-off for obesity in Indonesia should be 25<sup>53 54</sup>, and WHO has recommended a

BMI  $\geq 23$  kg/m<sup>2</sup> as the trigger for public health concern (i.e. the definition of overweight) for use in Asian populations<sup>55</sup>. More recent work has suggested the BMI cut-off for overweight in the Asia Pacific region should be  $\geq 21$ <sup>56</sup>. Furthermore, the risk of *hypertension* appears to be greater for Indonesians than for Chinese and Vietnamese with the same BMI<sup>57</sup>.

**National averages hide the enormous variability of the malnutrition problem across Indonesia.** In Table 2, the indicators of adequacy of physical growth by age group are listed by province. In order to rank the provinces in terms of the severity of their DBM problems, the rates of low birth weight (LBW), stunting, wasting and *gemuk* were categorized arbitrarily into three groups and given a colour code. For low birth weight: Best <10% (green), Medium  $\geq 10\%$  to 15 %< (yellow), Worst  $\geq 15\%$  (red); For wasting and *gemukness*: Best <10% (green), Medium  $\geq 10\%$  to 15 %< (yellow), Worst  $\geq 15\%$  (red), Really Worst  $\geq 25\%$  (blue); and for stunting: Best <30% (green), Medium  $\geq 30\%$  to 40% < (yellow), Worst  $\geq 40\%$  (red).

**East Nusa Tenggara (NTT) has the highest low birth weight rate in Indonesia at 19%, and there are ten provinces with a rate above 15%.** NTT is also the province with the highest prevalence of stunting at 58%, and there are seven provinces with a stunting prevalence over 40%, categorized by WHO as “very high”. Young child wasting rates are also high, with eighteen provinces with a prevalence above 15%, which is considered by the WHO to be an emergency situation necessitating supplementary feeding programmes. Yet ten provinces also have young child *gemuk* rates over 15%, and in three provinces - Riau, Bengkulu, and Sulawesi Tenggara - both young child wasting and *gemuk* rates are over 15%. Adult *gemukness* is over 15% in all provinces except one (NTT) and is over 25% in eight (Sumatra Barat, Bangka Belitung, Kepulauan Riau, Kalimantan Timur, Sulawesi Utara, and Gorontalo, Maluku and Maluku Utara).

**Although the problem of undernutrition early in the life course is of greater proportion in the outer islands than on Java, the rates of adult overweight/obesity are also of a similar if not greater magnitude on the outer islands.** So while the largest concentration of *gemukness* is in Java, due to the size of the population, the greater DBM problem is in the outer islands where poverty rates are higher. In the outer islands, poor maternal and young child nutrition contributes to the increased risk of *gemukness* later in the life course among the increasing numbers of adults that survive childhood undernutrition and move to more *obesogenic* urban environments.

**Maternal undernutrition is an issue in Indonesia, as the Riskesdas 2007 data indicated that 14% of women have chronic energy deficiency as measured by mid-upper arm circumference (MUAC) <23.5 cm.** Although this represents a decline in prevalence from the 2003 level of 17%, the prevalence remains greater than 15% in eight provinces. According to WHO<sup>58</sup>, prevalence between 10-19% is considered a medium prevalence, indicating a poor nutrition situation.

**The problem with obesity in adulthood is not just the amount of body fat; it is the distribution of fat in the body that determines the associated health risks.** Abdominal or visceral fat in adults appears to be more strongly associated with the cardiovascular risk factors of the *metabolic syndrome*. Waist circumference (WC) is the simple clinical measure for measuring abdominal fat and the one recommended for population assessment of the obesity risks of coronary heart disease, which include type 2 diabetes, *impaired glucose tolerance*, *hypertension* and *dyslipidaemia*.

**A review of the literature concerning the appropriateness of indicators for defining excess body weight found that measures of central obesity were more strongly associated with type 2 diabetes compared to body mass index (BMI), although this was not the case for hypertension and dyslipidaemia, which were similar for BMI, WC and waist to hip ratio (WHR)<sup>59</sup>.** Furthermore, in Asia it has been recommended to use a WC cut-off of 90 centimetres for men and 80 centimetres for women<sup>60</sup>. A more recent publication suggests that a cut-off of 90 is equivalent to a BMI of 30 (i.e. obesity), and that a pre-obese or overweight category of WC is needed, which should be  $>84$  and  $<90$  centimetres, as the risk of CVD already increases from here in Asian populations<sup>61</sup>.



**Table 2. Provincial malnutrition rates by age group**

Province	LBW	Stunted					Wasted					Gemuk				
		<5 y	6-12y	13-15y	16-18y	>18y	<5 y	6-12y	13-15y	16-18y	>18y	<5 y	6-12y	13-15y	16-18y	>18y
Aceh	11.0	38.9	38.8	44.5	37.3	14.2	12.9	5.6	8.6	11.1	16.2	11.6	2.4	1.0	24.3	
Sumatera Utara	8.2	42.3	43.3	45.2	39.8	14.0	12.0	7.9	6.0	8.7	18.3	10.5	3.0	1.0	25.4	
Sumatera Barat	6.0	32.8	36.2	39.7	33.0	8.2	11.0	12.8	10.1	14.1	8.3	3.8	2.7	1.5	21.9	
Riau	9.3	32.2	40.2	36.6	34.0	17.2	13.9	8.8	7.8	9.2	16.0	10.9	2.2	1.0	21.4	
Jambi	12.4	30.2	37.1	39.9	34.5	20.1	11.7	6.2	5.5	11.6	9.6	7.0	3.7	1.1	22.5	
Sumatera Selatan	11.4	40.4	46.4	37.8	32.9	14.6	10.7	10.2	7.8	14.9	16.8	11.4	2.3	1.0	19.2	
Bengkulu	8.7	31.6	33.4	32.4	31.3	17.8	8.9	8.6	6.4	12.7	15.5	8.9	3.7	0.0	19.3	
Lampung	9.0	36.8	40.8	46.6	38.9	13.9	10.0	9.0	5.5	12.0	16.4	11.6	2.2	0.7	17.3	
Bangka Belitung	10.4	29.0	28.6	28.0	33.3	7.5	9.8	6.1	6.8	10.2	9.6	7.0	3.0	3.4	26.4	
Kepulauan Riau	14.1	26.9	23.6	17.6	33.9	8.0	10.5	9.0	11.5	9.1	10.6	9.7	2.4	2.8	30.8	
DKI Jakarta	9.1	26.6	23.9	20.1	20.1	11.3	10.9	9.6	10.4	9.7	19.6	12.8	4.2	2.7	28.5	
Jawa Barat	10.9	33.6	34.2	34.9	31.1	11.0	10.2	8.8	10.0	12.5	14.6	8.5	2.5	2.1	22.8	
Jawa Tengah	9.9	33.9	34.1	33.6	29.7	14.2	13.3	9.9	8.3	13.7	14.0	10.9	2.8	0.7	18.8	
DI Yogyakarta	9.3	22.5	23.1	20.1	17.9	9.1	8.6	10.7	13.8	17.5	13.6	7.8	2.6	4.1	21.8	
Jawa Timur	10.1	35.9	31.3	30.7	24.4	14.1	12.8	9.8	9.0	12.3	17.1	12.4	2.0	1.6	20.6	
Banten	10.3	33.5	23.9	21.8	17.2	14.1	13.4	12.2	9.7	15.3	11.7	9.2	3.4	1.5	21.7	
Bali	12.1	29.3	15.6	17.8	8.5	13.1	11.5	8.7	7.3	11.0	17.5	7.1	3.1	0.4	20.9	
Nusa Tenggara Barat	15.1	48.2	39.6	33.7	29.1	13.9	17.7	17.4	11.9	16.1	12.5	4.4	1.3	1.1	16.8	
Nusa Tenggara Timur	19.2	58.4	58.5	59.1	50.7	13.2	17.0	20.1	20.1	19.7	11.9	4.9	0.4	0.0	13.0	
Kalimantan Barat	13.9	39.7	43.6	45.2	40.5	16.6	16.6	14.6	14.6	14.7	10.8	8.7	1.5	0.7	18.1	
Kalimantan Tengah	18.5	39.6	41.8	49.2	57.4	15.6	13.4	8.4	8.4	12.1	9.0	6.2	1.0	0.5	19.5	
Kalimantan Selatan	16.6	35.3	41.3	40.0	43.7	15.6	17.2	15.8	15.8	18.6	9.8	6.1	3.0	2.0	21.3	
Kalimantan Timur	9.3	20.1	27.5	66.0	35.8	12.9	13.3	8.7	8.7	8.4	9.6	8.6	3.0	1.5	29.4	
Sulawesi Utara	13.8	27.8	27.8	23.8	33.1	9.3	7.5	6.0	6.0	6.0	8.5	6.4	3.4	2.1	37.1	
Sulawesi Tengah	17.6	36.2	37.7	30.3	46.7	14.8	11.5	4.8	4.8	10.2	10.2	5.9	0.8	1.3	24.1	
Sulawesi Selatan	16.2	38.9	40.1	36.3	39.1	12.0	12.6	13.6	13.6	14.6	6.9	3.9	1.6	0.9	20.7	
Selawesi Tenggara	10.4	37.8	41.7	45.3	43.0	15.8	15.4	10.0	10.0	10.9	18.1	14.7	3.9	0.4	17.0	
Gorontalo	16.7	40.3	38.0	40.3	49.3	11.8	11.7	8.8	8.8	11.6	7.8	2.5	2.3	2.4	27.4	
Sulawesi Barat	14.9	41.6	50.9	44.8	55.4	16.7	12.9	7.6	7.6	9.9	11.8	9.0	2.1	0.0	20.8	
Maluku	9.6	37.5	37.6	42.6	22.0	13.2	13.9	14.0	14.0	10.6	8.2	2.1	0.6	0.0	24.6	
Maluku Utara	17.0	29.4	39.4	35.7	34.2	17.7	9.3	7.9	7.9	10.4	5.0	3.1	1.1	1.2	27.2	
Papua Barat	13.5	49.2	49.2	47.0	48.5	11.5	11.6	14.1	14.1	10.4	14.8	14.4	1.9	3.3	27.5	
Papua	17.9	28.3	37.4	32.0	34.3	13.9	9.1	13.7	13.7	9.2	10.7	7.8	5.6	1.6	24.8	
Indonesia	11.1	35.6	35.5	35.1	31.2	13.3	12.2	10.1	8.9	12.6	14.0	9.2	2.5	1.4	21.7	

Source: Riskesdas 2010



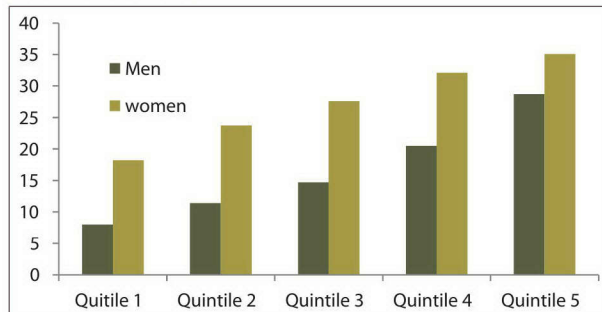
**Table 3. Comparison of indicators of obesity in adults in Indonesia across various demographic categories**

Category		Central Obesity (WC male >90cm, Female >80cm)	Overweight and Obese (BMI>=25)
<b>Age group (years)</b>	15-24	8.0	6.1
	25-34	17.9	18.8
	35-44	24.4	26.4
	45-54	26.1	26.0
	55-64	23.1	19.6
	65-74	18.9	12.6
	75+	15.8	7.7
<b>Gender</b>	male	7.7	13.0
	female	29.0	22.8
<b>Residence</b>	Urban	23.6	22.7
	Rural	15.7	14.5

Source: Riskesdas 2007

was little difference in the obesity rates in the bottom four wealth quintiles, such that the largest volume of obesity is in the poorer wealth segments of the population.

**Figure 2. The levels of *gemukness* (BMI >25) in Indonesian men and women by income quintile (Riskesdas 2010)**



Source: Riskesdas 2010

and overweight is increasing in Indonesian adults, just as it is in under-five year old children. This is a global trend that is seen in most other LMICs<sup>63</sup>.

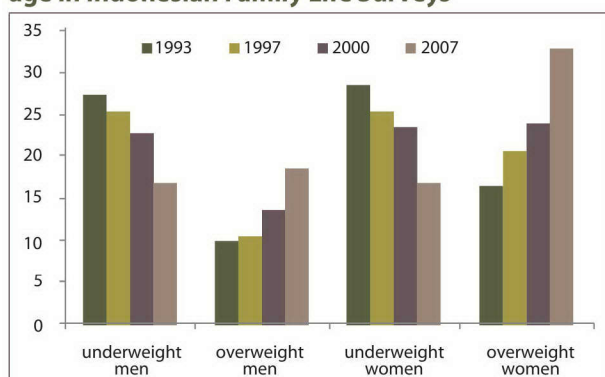
**Micronutrient deficiencies are also common in Indonesia.** A decade ago at least half of the population was considered to be suffering a deficiency of at least one micronutrient<sup>64</sup>. Vitamin A deficiency (VAD) was common in Indonesia until twice-yearly massive dose capsule distribution began in the seventies. By 1992 the clinical signs of VAD (xerophthalmia) were reduced to 0.33%, a level no longer considered to be a public health problem, even though 50% of children under five still had low serum retinol levels. Riskesdas 2007 found that 72% of children 6-59 months old received a massive dose capsule during the last campaign, and Riskesdas 2010 reported that 52% of young mothers reported getting a massive dose vitamin A capsule during the birth of their last child in the last five years. There have been no further national representative serum retinol studies, however, so the current situation for VAD is not known.

As shown in Table 3, the Riskesdas 2007 collected WC data, and using the Asia appropriate cut-offs, found that 19% of the population over 15 years of age had excessive abdominal fat, a rate similar to that of overweight/obesity based on BMI in adults. Obesity levels were greater in women (29%) than in men (8%), and increased with age (peaking at 26% in the 45-54 year age group) as well as educational level, with 26% of higher education graduates so affected. Housewives were the workforce category most affected (36%) as were urban dwellers (24%) in comparison to rural ones (15%).

***Gemukness* is not just a problem for the wealthy.** As shown in Figure 2, although the rates of *gemukness* increase with income, peaking at 23% in the upper wealth quintile, the lower wealth quintiles were also affected. Indeed there

Another source of information which shows how the problem of *gemukness* has increased in the last few decades is provided by the Indonesian Family Life Surveys<sup>62</sup>. These surveys were carried out in 321 communities in 13 provinces from 1993 through 2007, and are considered to be representative of 85% of the Indonesian population. As shown in Figure 3, over the fifteen-year period the proportion of underweight men and women (BMI<18.5) decreased considerably while the proportion of *gemuk* men and women (BMI>25) almost doubled. There were more *gemuk* and underweight women than *gemuk* and underweight men at all times, and the greatest increase was in *gemuk* women. We can conclude that underweight is declining

**Figure 3. Percentage of overweight and underweight in men and women over 45 years of age in Indonesian Family Life Surveys**



Source: Indonesia Family Life Survey 1993, 1997, 2000, 2007

**Iron deficiency, although still very common, does seem to be improving.** Anaemia affected 50% of pregnant women in Riskesdas 1995, and 40% of pregnant women in Riskesdas 2001. The 2007 Riskesdas data indicated that in urban areas 20% of non-pregnant women of reproductive age (>14y) (<12gHb/dl), 13% of men (>14y) were anaemic (<13gHb/dl), and 10% of children (<14y) were anaemic (<<11gHb/dl). Even though not entirely comparable data, this suggests that there has been considerable improvement in the prevalence of anaemia during the last two decades. This improvement is further supported by the anaemia results obtained from the Indonesia Family Life Survey, which is summarized in Figure 4 below. This improvement may be the consequence of the consumption of foods made from iron fortified wheat flour, which was mandated in 2000, as discussed elsewhere in this report.

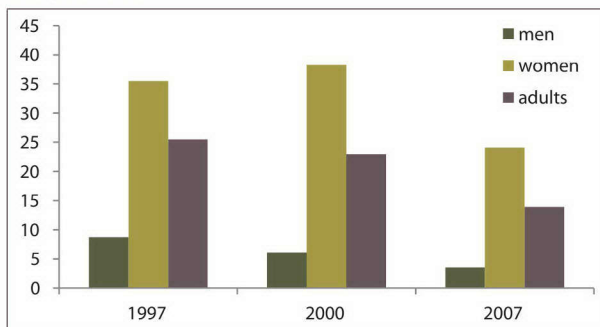
**The cut-offs for anaemia used in the Indonesian Family Life Survey are not the same as those used in the Riskesdas surveys, so cross study comparisons are not strictly possible, but both indicate a trend towards reduction of anaemia prevalence in adults.** Despite this improvement, a quarter of women were still anaemic in 2007, although few men were so affected. Riskesdas 2010 reported that although 81% of women received iron/folic acid tablets during their last pregnancy, only 18% took at least 90 tablets during the last trimester of pregnancy as recommended by the Ministry of Health.

**Although iron deficiency has improved it is still a matter of concern.** During the 1997/1998 financial crisis, mothers were the first to show signs of undernutrition, as reflected in increased prevalence of anaemia associated with reduced consumption of high quality food. This was also associated with increased wasting in their children born during this period<sup>65</sup>. A more recent study has suggested that 20% of early neonatal deaths in Indonesia could be attributed to a lack of iron and folic acid supplementation during pregnancy<sup>66</sup>. Part of the anaemia problem and its persistence is also likely to be related to the high rates of gastrointestinal parasite infestations, as has been shown in Central Java<sup>67</sup>.

**Iodine deficiency also used to be a serious problem in Indonesia.** Since the 1980s, considerable investments have been made toward achieving universal salt iodation; consequently, the prevalence of clinical iodine deficiency in school children dropped from 28% in 1998 to 10.0% in 1999. Since then further urinary iodine surveys suggest a general improvement in iodine intake over the last two decades. While national median urinary iodine level was 146 µg/L in 1998, it rose to 229 µg/L in 2003. At that time it was found that 23% of school children still had inadequate urinary iodine levels<sup>68</sup>. This same level had been maintained in 2007 when Riskesdas data indicated a national median urinary iodine excretion (UIE) of 229 µg/L. In addition the distribution curve for UIE appears to be shifting to the right and narrowing<sup>69</sup>, which suggests that improvements are not due to excessively high intakes of iodine. However, Riskesdas 2007 still found that although 92% of households consumed iodized salt, only 62% consumed adequately iodized salt (>15ppm iodine). A study among urban families in Indonesia in 2004 found that non-use of adequately iodized salt was associated with a higher prevalence of child malnutrition and mortality in neonates, infants, and children under five years of age<sup>70</sup>. Studies elsewhere in Asia have shown that the consumption of iodized salt improves birth weight<sup>71</sup>, which helps to explain these findings. Much still remains to be done to eliminate iodine deficiency in Indonesia.



**Figure 4. Anaemia (% <12g Hb/dl) in adults (25-44 years) of the Indonesian Family Life Surveys in the last decade**



Source: Indonesia Family Life Survey 1997, 2000, 2007

more than 50% of the mothers and infants<sup>73</sup>. Furthermore, in the same location, addition of zinc to standard iron and folic acid supplements for mothers during pregnancy reduced the number of diarrhoeal episodes in their infants during the first six months of life<sup>74</sup>. In another trial of zinc and beta-carotene supplementation during pregnancy, plasma retinol concentrations were higher six months postpartum in the women who received zinc during pregnancy than in women who did not<sup>75</sup>. Infants born to mothers supplemented with beta-carotene and zinc had higher plasma retinol concentrations, with the frequency of vitamin A deficiency reduced by over 30% compared with the other three groups. Studies in children showed that supplementation of zinc-iron, but not zinc alone, increased linear growth of stunted infants with low haemoglobin in Nusa Tenggara Barat province<sup>76</sup>, while zinc alone and iron alone but not the two together improved linear growth in infants in Java<sup>77</sup>. Wheat flour has been fortified with zinc since 2002 and although fortified flour is known to improve zinc status<sup>78</sup> there are no survey data yet which confirm this.

**Among other micronutrients, zinc may be deficient in the Indonesian population.**

Although there are no population based surveys to confirm this, a study of lactating mothers in East Jakarta found that while 40% were anaemic, 29% had a low plasma zinc concentration, and 24% had a moderately low plasma vitamin A concentration. Breast milk from 70% of the women had a low concentration of vitamin A, and 66% had a low concentration of zinc<sup>72</sup>. A study of lactating mothers and their infants in West Java found that 17% of the infants and 25% of the mothers were zinc deficient, together with marginal vitamin A deficiency in 54% of the infants and 18% of the mothers, and anaemia in

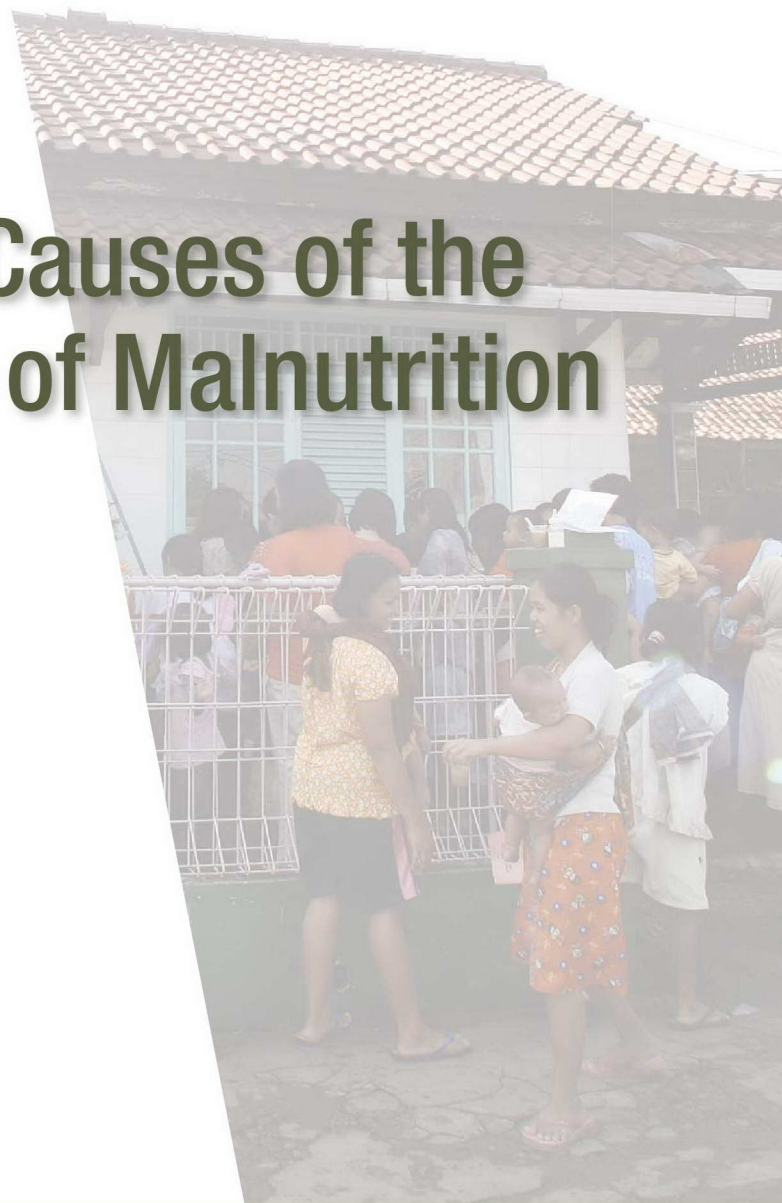






## Chapter 4

# Assessing the Causes of the Double Burden of Malnutrition



**Understanding the risks associated with and the causes of the double burden of malnutrition (DBM) is not an easy task, not only because of the complexity of the issue, but also because of the rapidly evolving situation in most low- and middle-income countries (LMICs).** The conceptual framework proposed by UNICEF<sup>79</sup> in 1990 for analysing the causality of child undernutrition is now widely accepted and used globally, but it is not easily adapted to analysing the causality of both forms of malnutrition across the life course, especially considering that early life course undernutrition can facilitate overnutrition later in the life course. The life course approach to understanding chronic disease epidemiology is recognized to be methodologically challenging<sup>80</sup>. The difficulty is in separating out the joint neighbourhood effects of exposure to parent and offspring, as well as the sensitive periods later in the life course when changes are more plastic and some degree of mitigation may be possible.

**Various models have been proposed for trying to understand the causality of obesity.** These examine how both human biology and the environments which populations inhabit can affect behavioural patterns and body composition<sup>81 82</sup>, with individual level factors as well as the socio-political, socio-cultural, socio-economic and socio-environmental contexts. A system map of obesity developed by the Foresight project in the UK has over one hundred variables with either direct or indirect influence on energy balance<sup>83</sup>. These variables can be grouped into four crosscutting themes, which include: 1) the biological/health environment, consisting of an individual's starting point including the influence of genetics and ill health; 2) the economic/food environment, including factors which influence the availability and quality of food near to home as well as economic access to food which influences consumption; 3) the physical/built environment, including factors influencing individual activity behaviour; the type, frequency, and intensity of activity; and access to "healthy" food; and 4) the socio-cultural environment, including the influence of media, education, peer pressure or culture and how these impact individuals' drive for particular foods and consumption patterns, or physical activity patterns or preferences.

**None of these four themes are necessarily dependent on any other, especially because each may be operating differently at different times across the life course.** In the analysis that follows, these four themes are used to categorize the DBM problem from a life course perspective. DBM issues are considered during the window of opportunity from conception to toddlerhood, as well as the period from childhood to adolescence, including issues of teenage pregnancy.

## 4.1 The health/biological environment

**The health/ biological environment is an individual's starting point, and includes the influence of diseases as well as genetic influences.** As mentioned previously, Indonesia is well advanced in its demographic transition and has an ageing population with life expectancy improving from 48 years in 1970, to 62 years in 1990 and 68 years in 2009. In association with the demographic transition, the epidemiological transition is also underway. Infectious diseases were replaced by noncommunicable diseases (NCDs) as the most important causes of disability and mortality around the turn of the millennium. These health transitions are the results of many changes, including urban infrastructures and the changing patterns of work and travel associated with industrialization.

### 4.1.1 The health system and the disease burden

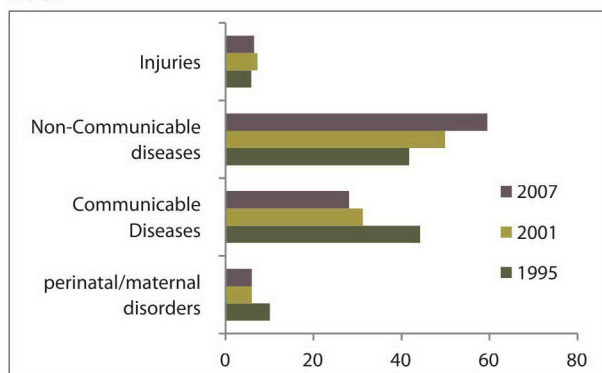
**The availability of health facilities and of water and sanitation services in Indonesia, although still with room for improvement, has made great progress to date.** The relatively good distribution of health facilities in Indonesia was achieved during the 1980s and 1990s through the establishment of public hospitals at the district level and public health centres at the sub-district level, both staffed through a system of compulsory service for doctors, nurses and midwives. Indonesia's subsequent health policy, which emphasized giving priority to primary healthcare and boosting expenditures for health, has resulted in overall increases in public facilities and workforce numbers since the mid-1990s<sup>84</sup>. More recently, and especially since decentralization, these public sector staff also established solo-provider facilities for their



own private practice; these solo-provider facilities, of which nurses contribute almost half, comprise the largest category of outpatient care facilities, although most are not included in official statistics<sup>85</sup>.

**According to Riskesdas 2010, coverage of immunizations in children aged 12-23 months was 78% for BCG, 67% for polio, 62% for DPT-HB, and 74% for measles.** While 57% of recent births were performed in health facilities, only 55% were by trained health personnel and 39% of those mothers had never had Tetanus Toxoid immunizations. Only 18% of women aged 10-59 years had never used contraception, 56% were currently using contraception, and the unmet need for family planning was only 14%. The population using improved drinking water sources increased from 72% in 1990 to 80% in 2006, while those using an improved sanitation facility only increased from 51% to 52%. The prevalence of gastrointestinal parasites is still high, with positivity rates among children reported in published literature varying from 60% to 90%<sup>86 87 88 89</sup>.

**Figure 5. Causes of Death (%) in Indonesia 1995-2007**



Source: Riskesdas 2010

**The infant mortality ratio is reasonably low at 34 per thousand live births, while the maternal mortality ratio is still moderately high at 228 per 100 thousand live births<sup>90</sup>.** According to Riskesdas 2010, the proportion of total mortality caused by NCDs in Indonesia surpassed that of the communicable diseases around the turn of the millennium, and in 2007 NCDs accounted for virtually 60% of mortality, as shown in Figure 5. Cardiovascular disease accounted for 31% of all NCD deaths, followed by cancer (13%), Chronic Obstructive Pulmonary Disease (7%) and diabetes (3%)<sup>91</sup>. Stroke was the leading cause of death at 15%, followed by tuberculosis (7%), which was the most common communicable disease cause of mortality. Although obesity does not figure in

the list, this is probably because it is considered to be a risk factor or an underlying cause rather than a disease.

**The Landscape Analysis Country Assessment (LACA) report uncovered the limited capacity of the Indonesian health system for implementing nutrition interventions aimed at improving maternal and child undernutrition, and highlighted the lack of awareness both of stunting and of overweight/obesity as problems among health professionals.** Indeed there is considerable debate in the literature over whether or not obesity is a disease. Obesity has been described by some as the disease of the twenty first century<sup>92</sup>, but others have questioned the scientific basis for this, claiming that obesity lacks the symptoms and impairments of function that warrant characterization as a disease<sup>93</sup>. Opponents argue that obesity is not a disease because it results from a person's chosen lifestyle, eating habits, and environment (i.e. residential location, social circle, economic status). Proponents stress that obesity is a disease because it is caused by genetics, biological factors or illnesses that cause weight gain, and by *obesogenic* environments. None of these arguments adequately convey the pending threat wrought by vast numbers of stunted impoverished people in today's LMICs that are now and will increasingly be exposed to *obesogenic* urban environments, particularly after suffering from constrained fetal and infant growth. Unless LMICs such as Indonesia treat obesity, or *gemukness*, as a disease, a health disaster of diet-related NCDs will surely unfold and the poorest will suffer most because they will not be able to pay for treatment.

#### 4.1.2 Biological aspects

**Blood lipid levels are already considerably deranged at the population level in Indonesia.** The most extensive data on blood lipid levels is provided by the Indonesia Family Life Surveys of 2007, which showed that women seem to be more affected by *dyslipidaemia* than men. Of those aged 45 years and older, 22% of

women and 11% of men had high cholesterol levels, while 67% of men and 40% of women had low levels of HDL (high-density lipoprotein) cholesterol. These levels were the same across the life course in men, but the percentage of women with high total cholesterol doubled after 44 years of age and then remained the same. A study looking at the plasma lipid profiles of four Indonesian ethnic groups (Minangkabau, Sundanese, Javanese and Buginese) found that Minangkabau women over 40 years of age had the highest mean plasma total cholesterol (209.77 mg/dl) and LDL (low-density lipoprotein) cholesterol (146.02 mg/dl), and the highest prevalence of *dyslipidaemia* based on category risk level of total and LDL cholesterol<sup>94</sup>.

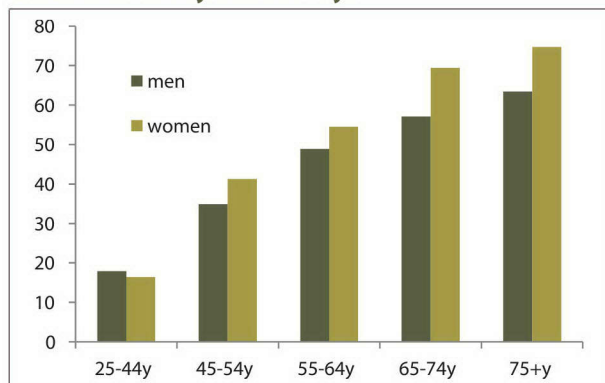
**Diabetes is also a growing concern in Indonesia, as Riskesdas 2007 found that 5.7% of the population over 15 years of age had diabetes and 10.2% was pre-diabetic with an impaired glucose tolerance based on early morning blood samples taken before eating any food.** Fortunately the importance of *gemukness* as being central to the problems of type 2 diabetes in Indonesia is already recognized by some experts, as is as the role of *leptin* and of the *inflammatory state of obesity* in adipose cell and energy metabolism<sup>95</sup>. The prevalence of the *metabolic syndrome* among adults was 28.4% in five areas of Jakarta in 2006, with no difference of prevalence between men and women. The prevalence of the *metabolic syndrome* increased with age, central obesity, and the level of *glucose intolerance*. The component most commonly found in men was *hypertension* while in women it was central obesity<sup>96</sup>.

**The only large study data on hypertension comes from the Indonesia Family Life Surveys indicating between 45.8% of men 53.4% of women over 45 years of age affected in 2007, with little change over the previous decade.** As shown in Figure 6, *hypertension* is not only worse in women but it increases considerably with age, with three-quarters of women over 75 years of age affected.

What is most concerning about the high prevalence of *hypertension* affecting the majority of Indonesian adults over 45 years age is that only 40% of women and 20% of men knew they had the condition, and more than 90% of them were not taking any medication.

**Obesity is associated with many impaired functions that classify it as a disease.** These are related to alterations in the metabolism of steroid hormones, metabolic alterations including lipid and glucose levels, and increases in the turnover of free fatty acids that lead to *insulin resistance syndrome*<sup>97 98 99 100</sup>. In addition, excess *adiposity* has been linked to impaired immune function due to the increased *cortisol* secretion<sup>101</sup>, possibly influencing the adverse *pathophysiological* effects of environmental and psychological stress. Vitamin D insufficiency has also been found to be associated with the *metabolic syndrome* in a variety of different populations<sup>102 103</sup>, but whether there is any causality in the relationships and which direction that causality goes is as yet unclear.

**Figure 6. Hypertension (%) in adults from the 2007 Indonesia Family Life Surveys**



Source: Indonesia Family Life Survey 2007

**While obesity is fundamentally a problem of energy balance and, as such, can only develop when energy (food) intake is in excess of total energy expenditure, it is important to recognize that the metabolic mechanisms involved seem more suited to a hunter-gatherer lifestyle than man's modern day existence.** Differences between intake and expenditure are primarily buffered by changes in the amount of *lipid* deposited in the specialized fuel storage organ, white adipose tissue (or white fat)<sup>104</sup>. *White adipose tissue*, and especially that in visceral fat, is now recognized as the source of key hormones that play an important role in the regulation of energy balance – particularly *leptin* – and a diverse range of protein factors and



signals termed “adipokines”, which are involved in overall metabolic regulation. It seems that the decreased circulating *leptin* observed during energy restriction is related to increased sensations of hunger in human subjects.

**Obesity is also associated with a general state of inflammation, which appears to be part of the energy control mechanisms, but which can have far reaching consequences.** A number of inflammation-related proteins are released by *white adipocytes*, as well as *adiponectin*, and these include *cytokines*, *chemokines* and *acute phase proteins*. It has been proposed that the inflammation of obesity is part of a mechanism for controlling energy metabolism<sup>105</sup> during situations of energy imbalance, by controlling body fat distribution between subcutaneous and visceral fat<sup>106</sup>. The *inflammatory state of obesity* also seems to play a key causal role in the development of type 2 diabetes and the *metabolic syndrome*<sup>107 108 109</sup>. Furthermore, the development of *atherosclerotic lesions* leading to *myocardial infarction* or stroke encompasses a cascade of cellular and molecular events that can also be characterized as a chronic immune mediated inflammation<sup>110 111</sup>.

**There is evidence that the appetite mechanisms that evolved in our ancestral forefathers on a mixed diet mostly made up of fruits, nuts, vegetables and game are not suited to dealing with the high energy density “convenience foods” common in the modern Western diet, especially when they are eaten as “snacks” between meals**<sup>112 113</sup>. A small extra amount of energy, as little as 150 kcal if consumed every day, can lead to the gradual accumulation of fat, which eventually becomes overweight and then obesity<sup>114</sup>. The difficulty is not just in losing that weight, however, but in keeping it off, as the body becomes used to having those reserves and continues to try to maintain them<sup>115</sup>. It seems that decreases in *leptin* during energy-restricted weight-loss regimens may contribute to the strong propensity for weight regain<sup>116</sup>.

**The inflammatory state of obesity is also a potential cause of anaemia.** In the US, iron deficiency has been shown to be more common in obese children than normal weight children<sup>117</sup> and in obese women than normal weight women<sup>118</sup>. The iron deficiency found together with obesity and overweight in the US is not associated with anaemia, however<sup>119</sup>, and so the reduced circulating iron in serum may just be a consequence of the chronic systemic inflammation state found in obese and overweight people<sup>120</sup>. However, several other studies have shown that increased *adiposity* is associated with increased risk of postpartum anaemia among women taking iron supplements during pregnancy in the US<sup>121</sup>, and a reduced response to iron fortification in women and children from transition countries<sup>122</sup>. The decrease in child undernutrition in Brazil during the 1990s, which was accompanied by increase in adult obesity<sup>123</sup>, paradoxically saw an increase in anaemia<sup>124</sup>. This biological link between obesity and anaemia observed in the US and Brazil is unlikely to be the main reason for anaemia in Indonesia, where too low micronutrient intake is still the main cause, but as *gemukness* continues to increase over time it will become a factor.

**It has been suggested that the effects of the nutrition transition and the emergence of the DBM problems may also be influenced by genetic disposition of the populations concerned.** The possibility has been raised that genetic factors could endow individuals that were able to efficiently collect and process food with the ability to deposit fat during periods of food abundance, which has been called the “thrifty genotype” hypothesis<sup>125</sup>. Genetic traits not only affect metabolic capacity to store energy, but also affect people’s perceptions of hunger and satiety. Multiple studies of families, adoptees, twins and, most powerfully, adopted twins, have all confirmed that heritable factors are likely to be responsible for 45% to 75% of the inter-individual variation in BMI<sup>126</sup>.

**There is currently little evidence, however, that the ancestral genomes of native Asian or African populations carry particular risk alleles for obesity.** Although a study of genetic polymorphism in Balinese women found a relationship between the Arg64 allele and obesity in rural women<sup>127</sup>, and in certain populations obesity may be related to one gene locus, the vast majority of obesity is related to more than one gene locus, reflecting the many different environmental situations that humans have adapted to in the last ten thousand years<sup>128</sup>. One useful way to think about the relationship between genes and obesity



was expressed by George Bray when he said, “the genetic background loads the gun, but the environment pulls the trigger”<sup>129</sup>. The sudden rise of obesity prevalence during the past few decades clearly cannot be accounted for by population genetic changes. *Epigenetic* contributions to obesity will need to be addressed through minimisation of the environmental triggers, rather than manipulation of the genetic guns<sup>130</sup>.

**The “thrifty phenotype” hypothesis says that constrained fetal growth is strongly associated with a number of chronic conditions later in life**<sup>131</sup>. The influences of today’s “modern diet” are likely to be greatest during the critical period of fetal and infant growth, when plasticity is greatest and epigenetic changes are most likely to determine the many NCD risks<sup>132</sup>. We know that impaired embryonic, fetal and infant environments can lead to greater risk of visceral obesity and metabolic compromise in later life<sup>133</sup>. Indeed relative visceral fat is already present from birth in small-for-gestational age children<sup>134</sup>. This developmental plasticity, which is designed to permit the fetus to better adapt to the expected environment outside the womb<sup>135</sup>, is dangerous if an environmental mismatch occurs. Also known as the fetal origins of adult disease (FOAD) theory, it suggests that part of the DBM problem is due to a mismatch between the environment of the womb and that of the world outside when the child is born<sup>136</sup>. Recent research further suggests that epigenetic effects really are related to a later propensity for obesity in childhood<sup>137</sup>. Humans today live in a nutritional environment that differs considerably from that for which our genetic constitution was selected. In the case of Indonesia in particular, and especially among its stunted populations that are migrating from rural to urban areas, the risks of such a mismatch are likely to increase greatly. Furthermore, this mismatch is not only between pre- and post-natal, but also between early childhood and later life.

**Decreasing infant mortality rates due to vaccinations and improved health services result in more children avoiding infections during the ‘window of opportunity’ and surviving as stunted children.** The fact that child stunting rates have remained stagnant around 30% for over a decade is probably a reflection of this accumulation, in addition to continued poor maternal and infant feeding practices. With economic growth and urbanization, these children are likely to suffer from accelerated weight growth during childhood, and so become even more susceptible to becoming *gemuk* and suffering from NCDs in the future. In fact, it is the most impoverished and most stunted segments of the population that are most likely to experience this FOAD phenomenon across their life courses.

## 4.2 The economic/food environment

**There are two components of the food system in a country that are important to understand in order to enact policy and programme interventions to reduce the DBM problems.** The first concerns the sorts of foods either produced locally or imported and available for consumers to obtain, as well as the factors which influence this such as international trade agreements, food processing and distribution systems, food subsidies and prices. The second concerns the actual amounts and sorts of food acquired either through home production, exchange or purchase, how they are prepared and consumed, and the amounts of nutrients ingested.

### 4.2.1 Food availability and access

**Indonesia is considered to be a low income food deficit country (LIFDC) by FAO**<sup>138</sup>. The LIFDC classification is determined by several criteria. First, a country should have a per capita income within the last five years that is below the ceiling used by the World Bank to determine eligibility for assistance and loans. The second criterion is based on the net (i.e. gross imports less gross exports) food trade position for a broad basket of basic foodstuffs (cereals, roots and tubers, pulses, oilseeds and oils other than tree crop oils, meat and dairy products) which are converted and aggregated by the calorie content of individual commodities. The food balance sheets produced by FAO are a summation of foods produced and food imported, less food exported, which allow the calculation of foods available for purchase at the national level.

**Table 4. Indonesia’s Food Balance sheet: Availability of food at the national level by year**

National Population and Available Food Characteristics	Year				
	1967	1980	1990	2000	2007
Population (millions)	108.9	146.6	177.4	205.3	224.7
Energy (kcal/ capita /day)	1784	2220	2356	2498	2538
Protein (g/capita /day)	34.8	44.2	49.1	54.1	56.8
Fat (g/capita /day)	27.6	34.8	42.2	44.8	53.0
Animal food sources (% energy)	2.9	3.3	4.7	5.0	6.3
Fish and seafood (% energy)	1.1	1.1	1.3	1.8	1.9
Meat (% energy)	1.1	1.2	2.2	1.8	2.4
Milk (% energy)	0.2	0.4	0.3	0.4	0.6
Vegetable Oil (% energy)	5.8	6.1	6.7	6.4	8.6
Wheat (% energy)	0.8	3.1	2.8	5.5	6.1
Rice (% energy)	49.0	56.1	55.2	52.2	48.8

Source: FAO

**As shown in Table 4, food availability has increased considerably over the last four decades in Indonesia.** While the population doubled in this period, availability of food energy on a per capita basis increased by almost a third. The percentage of energy coming from animal sources doubled, as did the availability of fat per capita. In the food available at the national level, the percentage of energy coming from rice during the period remained quite stable at around half, while that from fish and meat doubled, from milk tripled, and from wheat increased seven fold. All of the wheat and two-thirds of the milk is imported.

**The remarkable increase in food production, seen globally and in Indonesia during the last fifty years especially, has been made possible mainly due to the “Green Revolution”.** At the global level, while the population almost doubled from the early sixties to the late nineties, the supply of calories for human consumption rose by just over 20% on a per capita basis<sup>139</sup>. The Green Revolution entailed adoption of crop rotation, the mass production and use of petroleum-based fertilizers and chemical pesticides, the use of petroleum driven machinery, expanded irrigation, and the introduction of genetically superior, disease-resistant cultivars (cultivated crops).

**However, after global grain production nearly tripled from 1950 to 1996, there was considerable concern when it seemed to reach a plateau during the early part of this last decade.** Production fell short of consumption most years during the 1990s, and world cereal production in 2006 remained flat at approximately two billion tons - 2.4% less than in 2005. Still, there is no danger of there not being enough cereals for humans, since almost one-third of global production is being used to intensively rear cattle. World cereal production continued to climb in 2007. World cereal production has continued to climb since 2007 and FAO forecasted in 2011 a new record high world cereal production<sup>140</sup>. Food stocks also recovered in 2008, climbing back over 500 million tons for the first time since 2001, although they are still considered insufficient.

**Since 2000 the world food situation is being rapidly redefined by new driving forces, including income growth, climate change, and perhaps most importantly the increased production of bio-fuels motivated by higher oil prices<sup>141</sup>.** The major driver of food prices is the price of oil<sup>142</sup>, and although the Food Price Index (FPI) of FAO fell progressively after the 1974 oil crisis, facilitating two decades of cheaper food, in 2007 it jumped 26% followed by another 24% increase in 2008, all linked to increases in oil prices. The cost of food reached an all-time high early in 2011, and the FPI is twice the level it was a decade ago<sup>143</sup>. Oil continues to cost around US\$100 a barrel, and with the continued uncertainty in the Middle East region linked to the “Arab spring” it seems likely to remain priced around that level. It is estimated that global food prices will continue to increase by at least 10% a year over the next few decades<sup>144</sup>. The era of “cheap food” appears to be over.

**During the last four decades the Government of Indonesia (GOI) has invested heavily in trying to achieve food self-sufficiency, particularly with regard to rice, which was achieved for the first time in**



**1984.** In order to achieve this, subsidies were provided for fertilizer, pesticides and irrigation that amounted to approximately US\$725 billion over the period of 1970 to 1984<sup>145</sup>. Such subsidies have persisted, with over fifty per cent of agriculture sector resources in 2008 directed to subsidies for seeds, credit, fertilizer, and rice, amounting to 0.4% of GDP<sup>146</sup>. The budget for fertilizer subsidies alone was almost double that of the budget of the Ministry of Agriculture at the central level. While most farmers benefit from fertilizer subsidies, they are regressive in nature, since the largest farmers, making up 40% of the total, captured 60% of the subsidy. Furthermore, there is evidence of a U-shaped relationship between fertilizer use and rice yields, with overuse causing reduced yields.

**There has been considerable variation in the policy regulating the price of rice in Indonesia over the last several decades.** Rice is the most important commodity in Indonesia because it is the main staple food, and the single most important determinant of poverty. Prior to the Asian Financial Crisis of 1997 to 1999, rice import policy aimed to stabilise domestic rice prices at approximately the average international price, which allowed rice production to quadruple during the 1980s and 1990s<sup>147</sup>. With the country's transition to a more democratic form of government, the successful lobbying power of pro-farmer political groups led first to heavy tariffs on rice imports. Then in 2004, rice imports were officially banned, although limited quantities of imports were periodically allowed. As a result of this policy, the price of rice within Indonesia increased during the last decade relative to other prices by approximately forty per cent<sup>148</sup>. Those who benefited from the higher rice prices brought on by the control of rice imports were undoubtedly the wealthier minority of farmers that owned larger farms, and not the poorer majority of the population<sup>149</sup>. In January 2011 the price of rice in Indonesia reached new record highs and was 23% above that of a year earlier. In late January, in order to ease rice prices and limit food inflation, the GOI announced the suspension of the import duty on rice until the main harvest in March, and since then has been actively buying rice in the international markets<sup>150</sup>.

**Since the early 1970s and the development of the "Washington Consensus" around the conditionality for Structural Adjustment Programmes (SAPs) from the International Monetary Fund (IMF), LMICs have been increasingly forced to open up to free trade and to privatize national industries, as well as to reduce state support to local agricultural production**<sup>151</sup>. The conditionality for structural adjustment was the precursor to the conditions of free trade agreements including the General Agreement on Tariffs and Trade (GATT) and the North American Free Trade Agreement (NAFTA) through to the World Trade Organization (WTO). Free trade has meant an increase in food imports by most LMICs. Imported foods are cheap because of continued state support to the industrial agriculture sector in wealthy countries, allowing the dumping of cheaper food commodities onto the world market. In 2010, while the European Union paid €39 billion in direct agriculture subsidies, the US government spent US\$21.3 billion to subsidize mainly large-scale farmers<sup>152</sup>. Most of these subsidies contribute to making wheat and maize products cheaper. Agreement on the basis for agricultural sector trading has been a blocking point at successive Doha rounds of the WTO.

**In fact, food is now a major item of international trade with the aggregate value of agricultural exports at the world level expected to reach a record US\$1.29 trillion in 2011, surpassing the trillion dollar mark for the third time in the past four years**<sup>153</sup>, and constitutes around 10% of all global trade<sup>154</sup>. High food prices disproportionately affect LMICs, however, as they are expected to pay 30% more than last year as compared with wealthy nations whose food import bills are likely to rise by only 20% from 2010. Putting this in a broader perspective, expenditures on imported foodstuffs for LMICs could account for roughly 18% of all their expenditures on imports, compared to a world average of around 7%. The household level consequences of increases in food prices are most acutely felt in LIFDCs where a 50% rise in staple food prices causes a 21% increase in total food expenditure, increasing total food expenditures from 50% to 60% of income. In a high-income country this rise in prices causes a 6% rise in retail food expenditure with income expenditure on food rising from 10% to 11%<sup>155</sup>. It seems that some of these distortions may have been caused by speculative trading in the commodities markets, contributing to rising food prices<sup>156</sup>.



**Trade liberalization can affect the availability of certain foods by removal of barriers to foreign investment in food distribution.** It can also enable foreign investment in other types of food retail; multinational fast-food outlets have made substantial investments in middle-income countries. Availability of processed food has risen in developing countries after foreign direct investment by multinational food companies. Transnational food corporations (TFCs), franchises and manufacturers such as KFC, McDonalds, Kraft and Nestlé, are all drivers of the fast-food market, processed foods and Western lifestyle that have become so widespread in developing countries<sup>157</sup>. Policies of trade liberalization, which have facilitated the rising availability and consumption of meat, dairy products and processed foods,<sup>158</sup> are therefore contributing to the nutrition transition that is associated with rising rates of obesity and chronic NCDs such as cardiovascular disease (CVD) and cancer. At the same time the potential contribution of trade liberalization to increasing dietary diversity obviously has many positive sides that also need to be recognized and built upon.

**Access to food, particularly in urban areas, is greatly influenced by the sort of commercial outlets available.** The trend the world over in urban areas is away from small family-owned shops and toward larger supermarket chains. Indeed the nutrition transition in LMICs is affected by this radical change in global food marketing and distribution systems associated with urbanization, which also seems to be underway in Indonesia, and will continue to be so as cross-border trade becomes increasingly more open. The emergence of supermarkets in developing countries is at the heart of this development, with Latin America taking the lead<sup>159</sup>. In 2000, supermarkets had roughly 60% of the national retail sectors in South America and Mexico, up from 15% in 1990. This means that structural changes in the food distribution system that took fifty years in the United States have taken place in little more than a decade in Latin America. This rapid expansion was only possible as supermarkets moved far beyond their original niches, expanding from large to small and poor countries, from metropolitan areas to rural towns, and expanding their customer base from the upper/middle to the poorer working classes. This expansion of supermarkets now extends well beyond Latin America and is only about five to seven years behind in East and South-East Asia<sup>160</sup>. Supermarkets are often the distribution channels for cheaper, unhealthy snacks and provide the platform for fast food chains and “junk” food. It must also be recognized that often and in addition to this supermarkets can also increase access to fortified processed foods, including complementary foods, and animal source foods. These trends are expected to continue, and may even accelerate, driven by a growing internationalization of food distribution systems; the spread of supermarkets and rapid urbanization are major factors behind that diffusion. It would seem important to ensure that these chains make fruits and vegetables from local farmers more available, in addition to fortified processed foods and animal foods as appropriate.

**Global economic policies concerning agriculture, trade, investment and marketing affect what the world eats.** As high-income groups in LMICs accrue the benefits of more dynamic marketplace, lower-income groups may well experience convergence towards poor quality *obesogenic* diets, as observed in Western countries<sup>161</sup>. Health policy-makers should pay greater attention to these policies in order to address some of the structural causes of overweight/obesity and diet-related chronic diseases worldwide, especially among impoverished populations.

#### 4.2.2 Food consumption

**Perhaps the most important aspects of food consumption are those that occur during the early part of the life course, when the young body is still being formed and biological mechanisms are being set for the rest of the life course.** Unfortunately, infant and young child feeding practices in Indonesia are far from adequate and contribute to both undernutrition in early childhood as well as an increased propensity for overnutrition later in the life course.

**The practice of breastfeeding is eroding fast in Indonesia.** Riskesdas 2010 reported that only 15% of infants are exclusively breastfed for the first six months of life, as recommended by WHO and UNICEF. This is only half of the 32% reported to be exclusively breastfed in the 2007 DHS survey, and far less than the 40% reported in the 2002 DHS survey. In addition, only 43.9% of children start breastfeeding within an hour of birth and 64.6% receive a prelacteal feed. Mixed feeding is still common, however, with 83% of babies still being breastfed for six months, even if not exclusively. Complementary feeding practices are also far from optimal, with just 41.2% of infants aged 6-23 months achieving a minimum acceptable diet in the 2007 DHS survey.

**In addition, young children in Indonesia are receiving complementary foods too early.** According to DHS 2007 more than half (52.9%) of infants 4-5 months of age are receiving some form of solid or semi-solid foods. Complementary feeding should start at six months and children should receive three or more food groups a minimum number of times according to their age group in addition to breast milk. DHS 2007 data indicate that only 52.5% of infants in Indonesia are optimally fed in this way. Only 67.0% of mothers offer complementary foods the minimum number of times per age group per day in addition to breast milk, and only 75.0% consume sufficient number of food groups, i.e., a diversified diet. Poor feeding practices also contribute to micronutrient deficiencies. According to the DHS 2007, only 87.4% and 69.7% of 6-35 month old children were reported to have received vitamin A and iron rich foods respectively in the past 24 hours.

**Indonesia has long supported the Baby Friendly Hospital Initiative (BFHI) promoted by UNICEF and WHO to ensure that all maternities, whether freestanding or in a hospital, become centres of breastfeeding support.** UNICEF reported in 1995 that the number of hospitals declared baby-friendly in Indonesia had increased from 30 to 91<sup>162</sup>. A 2009 health bill further provided for the promotion of exclusive breastfeeding until six months and made any attempt to obstruct breastfeeding punishable with imprisonment up to one year and a fine of up to US\$10,000, although the legal mechanisms were not clearly defined. Despite these various declarations and laws, the violation of nearly all provisions of the Code is still commonplace in Indonesia, with breast milk substitutes promoted in healthcare facilities, to healthcare professionals, to mothers and future mothers, and to the general public<sup>163</sup>. Riskesdas 2010 found that despite 84.0% of young mothers having carried out antenatal care with a health service professional, 82.0% having a medical professional assist the birth, and 55.0% having delivered in a health facility, 71.3% of young children had been given formula milk at birth.

**Evidence about the adequacy of food consumption in other parts of the life course is more difficult to evaluate.** Both Riskesdas 2007 and Riskesdas 2010 reported on the reduced consumption of energy and protein among the population, with results that are somewhat difficult to interpret and reconcile. Riskesdas 2007 reported that 59.0% of households consumed less than the average household consumption of energy and 58.5% consumed less than the average household consumption of protein. What “below average consumption” means in terms of biological risk, be it for energy or for protein intake, is unclear and is not discussed. Furthermore, even among the highest wealth quintile 53.7% of households were below this level of energy intake and 48.0% were below average protein consumption. Riskesdas 2010 reported that 40.7% of individuals consumed less than their “minimum energy needs” and 37.0% consumed less than their “minimum protein needs”. The most inadequate consumption of energy was seen in adolescents (54.0%) and of protein in seniors (49.5%), but even in the highest wealth quintile 34.6% had consumed below minimum requirements of energy intake, and 26.0% had consumed below minimum required protein intake. What the exact consequence of these “inadequate” intakes means is very hard to interpret and no indication is given in either of the Riskesdas publications.

**This paradoxical situation of increasing food availability, increasing overweight and obesity, yet apparent decreasing energy consumption has been observed elsewhere<sup>164 165</sup>, and it seems likely that this is due to both energy expenditures having decreased, and energy intakes being underestimated<sup>166</sup>.** Indeed as discussed below, it seems certain that energy expenditures are much reduced in Indonesia today.



**The National Statistics Bureau (Badan Pusat Statistics – BPS) also reports estimates of dietary energy consumption.** These are likely to be more accurate than Riskesdas since BPS estimates are based on household expenditure surveys. It is well recognized that estimates of energy consumption from household expenditure surveys are generally greater than those obtained by 24-hour recall<sup>167</sup> as in Riskesdas, and that 24-hour recall tends to underestimate actual energy intakes<sup>168 169</sup>. The BPS average consumption of energy by food commodity group is shown in Table 5, and shows that average daily energy consumption in 2007 was 2,015 KCal, as compared with 1,735 KCal reported by Riskesdas 2007, i.e. 16% higher.

**Table 5. Average Daily per Capita Consumption of Energy (KCal) by Commodity Group 1999, 2002-2011**

Commodity	1999	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Cereals	1 066.50	1 039.91	1 035.07	1 024.08	1,009.13	992.93	953.16	968.48	939.99	927.05	919.10
Tubers	60.73	55.43	55.62	66.91	56.01	51.08	52.49	52.75	39.97	37.05	43.49
Fish	36.04	42.53	46.91	45.05	47.59	44.56	46.71	47.64	43.52	45.34	47.83
Meat	20.07	35.01	41.71	39.73	41.45	31.27	41.89	38.60	35.72	41.14	44.71
Eggs & Milk	24.39	39.63	37.83	40.47	47.17	43.35	56.96	53.60	51.59	56.20	55.97
Vegetables	32.28	37.44	40.95	38.80	38.72	40.20	46.39	45.46	38.95	38.72	37.40
Legumes	52.40	71.66	63.93	62.24	69.97	64.42	73.02	60.58	55.94	56.19	54.17
Fruits	32.71	40.75	42.75	41.61	39.85	36.95	49.08	48.01	39.04	40.91	39.44
Oil and Fats	205.90	246.66	241.70	236.67	241.87	234.50	246.34	239.30	228.35	233.39	232.03
Beverage stuffs	103.35	120.00	115.54	114.75	110.73	103.69	113.94	109.87	101.73	100.29	97.69
Spices	15.42	18.28	15.89	16.41	19.25	18.81	17.96	17.11	15.61	16.00	16.14
Miscellaneous food	28.76	41.66	39.60	40.16	52.84	48.14	70.93	66.92	58.75	59.18	59.70
Prepared food	170.78	198.09	212.31	219.09	233.08 *)	216.83 *)	246.04 *)	289.85 *)	278.46*)	273.84*)	304.35*)
Alcoholic beverages	0.04	0.09	0.09	0.09	-	-	-	-	-	-	-
Tobacco and betel	0	0	0	0	0	0	0	0	0	0	0
<b>All</b>	<b>1,849.36</b>	<b>1,987.13</b>	<b>1,989.89</b>	<b>1,986.06</b>	<b>2,007.65</b>	<b>1,926.74</b>	<b>2,014.91</b>	<b>2,038.17</b>	<b>1,927.63</b>	<b>1,925.61</b>	<b>1,952.01</b>

\*) includes Alcoholic beverages

Source: BPS 2012. National Socio Economic Survey. Available at:[http://dds.bps.go.id/eng/tab\\_sub/view.php?tabel=1&daftar=1&id\\_subyek=05&notab=5](http://dds.bps.go.id/eng/tab_sub/view.php?tabel=1&daftar=1&id_subyek=05&notab=5) (Accessed 02 03 2012)

**According to BPS, average per capita energy consumption increased by 10% from 1999 to 2008, and then decreased 4% by 2011.** Of the total energy consumption in 2011, 47.0% was in cereals, 15.6% was prepared foods, 11.9% was oils and fats, 7.6% was fish, meat, eggs and milk, and 6.7% was as vegetables, legumes and fruits. From 1999 to 2011, the greatest increase in contribution to total energy was in meat, fish and eggs (almost doubling from 4.3% to 7.6%) and prepared foods (from 9.6% to 15.6%), while the contribution of cereals and tubers fell (from 61.0% to 49.3%) and the contribution of vegetables, fruits and legumes (6.4% to 6.7%), and oils and fats (11.1% to 11.8%) remained the same. So not only has household energy consumption grown in the last decade, but such growth has come in the more expensive parts of the diet such as animal protein foods, as well as foods prepared outside of the home, most probably “snack” foods.

**But while the BPS household expenditure survey allows a better estimate of the quantities of food being consumed, it does not offer insight into the quality of the diet, nor whether qualitative dietary goals and targets are being met.** Riskesdas 2007 reported that nationally, in the population over nine years of age, 94% did not eat sufficient vegetables and fruits during the preceding twenty-four hours (five portions a day during seven days), and this varied from 86.0% in DI Yogyakarta to 97.9% in Riau. Riskesdas 2010 also reported that 61.0% of dietary energy came from carbohydrates, 25.6% from fat, and 13.3% from protein. Unfortunately, the type of fat consumed was not discussed.



**The qualitative diet-related results from the 2007 and 2010 Riskesdas are intended to assess the extent to which the national diet achieves dietary targets set by Ministry of Health in its Guide to a Balanced Diet, or “Pedoman Umum Gizi Seimbang” (PUGS).** First established in 1993, and updated several times, the latest 2003 PUGS had the same thirteen basic messages<sup>170</sup>. These included amongst others: eating a balanced and varied diet; with sufficient energy to meet needs; with carbohydrates being predominantly complex ones; and not more than 25% of energy from fats and oils; to only use iodized salt; eat iron rich foods; eat breakfast daily; exclusively breastfeed for 6 months; get exercise daily; avoid drinking too much alcohol; and avoid eating “risky foods”.

**Unfortunately the PUGS was not widely published and disseminated, and therefore there were effectively no dietary or nutrition guidelines in Indonesia from the 1990s through 2010.** The thirteen messages were perceived to be overly complicated<sup>171</sup> and therefore not well understood, even by school children<sup>172</sup>. In 2011 a group of nutrition experts from various universities established a new nutrition guideline known as “Sehat dan Bugar berkat Gizi Seimbang” or Healthy and Fit Due to Balanced Nutrition<sup>173</sup>. In the foreword of the guide, Vice-Ministers of Education, Agriculture, as well as the Director General of Community Health of the Ministry of Health (MOH) recognized the new nutrition guide. Different from the previous guide published by the MOH in 2003, which was available only for government officials, the new guide is available for purchase in bookstores by the public. The present guide forgoes detailed messages and instead aims to educate the public about the four principals of balanced nutrition, which are: 1) eating a variety of foods (according to needs), 2) keeping clean and practising hygiene, 3) being physically active, and 4) monitoring weight<sup>174</sup>.

**A more complete set of dietary goals and targets was set by the World Health Assembly (WHA) in 2004 when it endorsed the Global Strategy on Diet, Physical Activity and Health (DPAS)**<sup>175</sup>. DPAS built upon the findings and recommendations of the expert consultation on diet, nutrition and the prevention of chronic disease<sup>176</sup>, which reviewed and summarized the ample evidence available for the importance of diet and physical activity for the prevention of chronic disease. The WHA resolution 57.17 urged member states to adopt the following recommendations for populations and individuals: 1) To achieve energy balance and a healthy weight; 2) To limit energy intake from total fats and shift fat consumption away from saturated fats to unsaturated fats and towards the elimination of trans fatty acids; 3) To increase consumption of fruits and vegetables, and legumes, whole grains and nuts; 4) To limit the intake of free sugars; and 5) To limit salt (sodium) consumption from all sources and ensure that all salt is iodized.

**The WHO expert consultation Report No. 916 also provided guidance for a range of population nutrient intake goals to be used to drive the development of national dietary guidelines.** The nutrient intake goals are as shown in Table 6. The recommendations for total fat are intended for countries where usual fat intake is above 30% as well as those where it may be very low, but 20% is considered consistent with good health. In Riskesdas 2010, the fat content of the Indonesian diet was 25.6%, which might be considered moderately high.

**Table 6. WHO Recommended Population Nutrient Intake Goals**

Dietary Factor		Goal (% of total energy unless otherwise stated)
Total Fat	Saturated fatty acids	16-30%
	Polyunsaturated fatty acids (PUFAs)	<10%
	n-6 Polyunsaturated fatty acids (PUFAs)	6-10%
	n-3 Polyunsaturated fatty acids (PUFAs)	5-8%
	Trans fatty acids	1-2%
	Monounsaturated fatty acids (MUFAs)	<1%
		By difference
Total Carbohydrate	Free sugars	55-75%
		<10%
Protein		10-15%
Cholesterol		<300mg/day
Sodium chloride		<5g/day
Fruit and vegetables		>400g/day

**The quality of fat consumed is also important, and the diet should contain little or no trans fatty acids, and be low in saturated fat.** Unsaturated fats that were prominent in traditional diets are being replaced by saturated fats as part of the Westernization of the diet. These dietary changes have affected both the type and amount of essential fatty acids as well the antioxidant content of food<sup>177</sup>. The mass production of cheap snack foods relies on industrial hydrogenating of liquid unsaturated fats, such as soya and corn oil to make them into solid saturated fats for baking purposes. The hydrogenation process can lead to the formation of harmful trans fatty acids however, which are very *atherogenic*. Modifying the process of hydrogenation of vegetable oils can help in the elimination of trans fatty acid, and this has been largely achieved in most countries both through legislation and manufacturers complying with public health directives.

**The type of unsaturated fat consumed in the “modern” diet has also changed with increases in omega-6 fatty acids and decreases in omega-3 fatty acids, such that the ratio of omega-6 to omega-3 fatty acids has increased from 1:1 to greater than 15:1<sup>178</sup>.** This change is related to the increased consumption of meat of intensively reared animals fed on grain (rich in omega-6 fatty acids) instead of grass (rich in omega-3 fatty acids)<sup>179</sup>. Unsaturated fats should include both n-6/n-3 polyunsaturated fats in a ratio no greater than 3. However, it is not just the ratio but also the total amount of both that are important, as both are essential.

**It is hard to evaluate the quality of the dietary fat in Indonesia, however, as no analysis seems to have been done in this regard.** It is likely that most of the oils and fats in Table 5 are palm oil, but whether or how much of this is refined is difficult to judge. Palm oil has been stigmatised as a *hypercholesterolaemic* fat because of its high saturated fat content, despite human studies that show it does not raise serum cholesterol levels<sup>180</sup>. In Mauritius, the government required a change in the commonly used cooking oil from palm oil to soybean oil, changing the population’s fatty acid intake and reducing their serum cholesterol levels<sup>181</sup>. Much would seem to depend on the extent to which the natural palm oil is refined<sup>182</sup>. A prospective cohort study conducted in workers in East Kalimantan found the mean intake of trans fatty acid was 0.48% of total dietary calories, with fried foods contributing half of this. The consumption of fried foods was associated with an increased risk of *hypertriglyceridaemia*, a high ratio of total cholesterol/ *HDL-cholesterol* and *dyslipidaemia*<sup>183</sup>.

**WHO Report 916 also recognized that higher intake of free sugars threatens the overall nutrient quality of the diet by adding significant energy without nutrients, or “empty calories”.** Free sugars are all *monosaccharides* and *disaccharides* added to foods by the manufacturer, cook or consumer, plus sugars naturally present in honey, syrups and fruit juices. Addition of free sugars promotes a positive energy balance, and drinks rich in free sugars also increase overall energy intake by reducing appetite control. Wholegrain cereals, fruits and vegetables are the preferred sources of non-starch polysaccharides (NSP), and the recommended intake of fruit and vegetables together with the consumption of wholegrain foods is likely to provide >20g/d of NSP (>25g/day of total dietary fibre). Again, it is not possible to evaluate,



from Riskesdas or the BPS reports, the quality of the Indonesian dietary intake with regard to the type of carbohydrate consumed.

**Wheat flour is penetrating the Indonesian dietary pattern through instant noodles, one of the “prepared foods” in Table 5.** Noodles are a traditional food in many Asian countries, and in the past were more of a luxury food, eaten in dishes prepared from fresh noodles made from rice flour. The advent of instant noodles made from wheat flour in the early fifties changed all that. Instant noodles are essentially a “fast food” as they are already partially cooked by frying in palm oil before being packaged so that they can be shipped and stored easily; they are prepared just by adding hot water, together with the sauce/flavouring that is usually included in the package. Consumption of instant noodles grew strongly during the first half of the 1990s, rising from 4.7 billion packs in 1992 to almost 8.6 billion packs by 1997, making Indonesia the world’s second largest consumer of instant noodles, behind only China. Because of instant noodles, wheat flour consumption has risen steadily in Indonesia through the last few decades, reaching 51.5 g per capita per day in 2008<sup>184</sup>. Indonesia represents 4% of total world wheat imports, and is in the top five leading wheat importing countries in the world, following only Egypt, Japan, and Brazil<sup>185</sup>.

**Categorizing foods by their degree of processing is a relatively new and important concept with regard to understanding the potential *obesogenicity* of diets<sup>186</sup>.** Nearly all food requires processing in order to be eaten, even if only by washing it. But three food groups have been proposed based on the degree of processing, namely: Group 1 unprocessed or minimally processed foods such as fruits and vegetables; Group 2 processed culinary or food industry ingredients; Group 3 ultra-processed food products. Processing of Group 1 foods includes the removal of inedible fractions, grating, squeezing, drying, parboiling, fermentation (non-alcoholic), pasteurization, freezing, or wrapping and bottling. The processing of Group 2 foods includes the extraction and purification of components of single whole foods for use as culinary or food industry ingredients, through pressing, crushing, milling, refining, hydrogenation, *hydrolysis*, extrusion and use of enzymes and additives. For example, these foods include vegetable oils, margarine, butter, whey, cream, lard, sugar, sweeteners, salt, flours, raw pastas and noodles, high fructose corn syrup, and gums. The processing of Group 3 products includes the combination of Group 2 ingredients with Group 1 ingredients through baking, battering, frying, curing, smoking, and pickling, in order to create durable accessible, convenient and palatable drinks and/or ready-to-eat or ready-to-heat food products.

**The problem is not the ultra-processing of foods, however; it is the balance between the consumption of each of these three food groups in the everyday diet of the population.** Group 3 “convenience foods” require little if any preparation before cooking, and can be eaten as purchased, and/or microwaved and/or eaten after reheating. They are most suited to snacking, which when coupled with their higher energy densities and high glycemic indexes, can become a problem. Processed foods are also most suited to fortification, and as such can be an important source of micronutrients, as is the case with iodized salt and instant noodles in Indonesia that are fortified with iodine and iron and zinc respectively.

**High glycemic index foods are those that cause a high and prolonged *postprandial* glucose level in the blood stream.** Numerous observational, experimental and epidemiological studies suggest that *postprandial hyperglycemia* plays a pivotal role in the pathogenesis of CVD<sup>187</sup>. Furthermore, the metabolic cost of assimilating the energy in processed foods appears to be half that of whole-foods<sup>188</sup>. Over time these small differences in energy balance can gradually cause a person to gain weight. A small extra amount of energy, as little as 150 kcal if consumed every day, can lead to the gradual accumulation of fat, which eventually becomes overweight and then obesity<sup>189</sup>.

**All over the world Group 1 and Group 2 foods are being displaced by Group 3 ultra-processed products.** In Brazil ultra-processed foods were already contributing around a third of dietary energy in 2003<sup>190</sup>. In the UK eight ultra-processed products - bread, cakes, pastries, confectionery, biscuits, processed meats, cheeses and soft drinks - together supply almost half of total household purchased calories<sup>191</sup>.



In the US the five most commonly consumed foods are “regular” sugared soft drinks, cakes and pastries, burgers, pizzas, and potato chips<sup>192</sup>. Furthermore, Americans’ tax dollars are directly subsidizing junk food ingredients<sup>193</sup>. In the last fifteen years US\$16.9 billion went into subsidizing just four common food additives: corn syrup, high fructose corn syrup, corn starch, and soy oils, helping to make processed foods cheaper. Outside of commodity crops, other agricultural products receive very little in federal subsidies, with only US\$262 million spent since 1995 subsidizing apples, which is the only significant federal subsidy of fresh fruits or vegetables. While the price of vegetables and fruits increased 40% in the US in last 20 years, the price of sodas decreased 30%<sup>194</sup>.

**Swinburn and colleagues<sup>195</sup> postulate that an energy balance flipping point has occurred during the last century in most high-income countries.** Furthermore, there are two distinct phases with the so-called “move less, stay lean” phase (1910–60), characterised by decreasing physical activity levels and energy intake, and a population that remained lean, and the subsequent so-called “eat more, gain weight” phase from 1960 onwards, characterised by increasing energy intake and a concomitant rise in population weight. Food supply data from the US lends support to this flipping point hypothesis, as well as a recent study which found that the dietary factors showing the strongest positive association with the average 1.5kg weight gain over a four year period in US adults included the intake of potato chips, potatoes, sugar-sweetened beverages, and negatively with the intake of vegetables, whole grain, fruits and nuts<sup>196</sup>.

**How current increases in the price of food occurring globally will affect the dietary component of the nutrition transition in LMICs, and in Indonesia in particular, is difficult to predict.** Most likely it will mean that consumption of cheaper ultra-processed foods (many of which benefit from EU and US subsidies to keep their prices low) will increase even more than before. Group 1 foods especially are likely to become increasingly expensive, while the mass produced Group 3 foods, made from food supply chains that benefit from subsidies in the EU and US, will become comparatively cheaper. Unless measures are taken to avoid this, Group 3 ultra-processed foods will become even more attractive to the poorest segments of the LMIC population. Energy dense foods composed of refined grains, added sugars, or fats are well recognized to represent the lowest cost option to the consumer<sup>197</sup>. That obesity is paradoxically more common in the poorer segments of the developed countries is most likely because high energy dense “fast foods” are cheaper to buy and/or easier to prepare than the more healthy foods such as fruits and vegetables<sup>198</sup>.

### 4.3 The physical/built environment

**The physical/built environment includes factors that influence individual activity behaviour, including the type, frequency and intensity of physical activity, as well as access to “healthy” food.** Many changes in lifestyle occur together with urbanization, including people becoming increasingly sedentary<sup>199</sup>. With people moving from rural to urban areas comes a shift of the workforce away from agriculture towards manufacturing and service employment, and a concomitant reduction in the energy expenditure of work. Increased mechanisation and motor-driven transport means less physical effort is needed to carry out daily life. Access to healthy foods is also often limited in urban environments, when the population has to travel from home to school and to work, so that increasing amounts of food are purchased readymade and eaten outside of the home.

**Energy balance depends on regulating intake and expenditure of calories, and the key variable of energy output is the degree of physical activity.** This can be seen by the following comparison: In sedentary adults the basal metabolic rate (BMR) is 60% and the thermic effect of food (TEF) is 10% and physical activity (PA) is 30% of total energy expenditure; in very active adults BMR is 40%, TEF is 10% and PA is 50% of total energy expenditure. For any individual, BMR and TEF are constant and so modifying PA is an essential component of energy expenditure in order to achieve energy balance, and/or lose weight<sup>200</sup>. This is especially true in an environment where the food available is predominantly energy dense.

### 4.3.1 Activity environment

**Urban planning can play an important role in increasing opportunities for exercise, and local governments have an important role to play, through creating parks and open spaces for exercise as well as bike lanes and pavements to encourage pedestrians<sup>201</sup>.** The availability, accessibility and convenience of destinations and facilities, as well as the general functionality of the neighbourhood (e.g., the presence of sidewalks, traffic conditions) and aesthetics have been shown to be positively associated with various levels of physical activity<sup>202</sup>. Indonesian cities are slow in adjusting to the needs of pedestrians and bicyclists, with automobiles still tending to hold sway. An Indonesian non-governmental organization (NGO) called Bike2Work reports that many provincial capitals including Balikpapan, Yogyakarta, Surabaya, Denpasar, Bandung and Palembang have begun to introduce bike lanes. The first (and only) 1.5 km bike lane, introduced in Jakarta in May 2011, was developed with funds raised by an NGO (*Komite Sepeda Indonesia*) rather than by the city authorities.

**The capacity of schools as a setting for preventing child obesity in Indonesia is not clear, especially since decentralization.** With public awareness of the DBM problem largely absent, it seems unlikely to be covered adequately in the school curriculum. There was once a school meal system, but that seems to have been largely disbanded, and/or is left up to district authorities to organize. It seems that sales of food from vending machine in Indonesia remained negligible up to 2011, with the concept of automated vending machines remaining a foreign concept in the country<sup>203</sup>. On the streets, mobile vendors have a strong presence, as they do not have to rent any space, and can also avoid taxes. There is also normally a high density of independent traditional kiosks or convenience stores, which makes vending redundant as a retail channel. Where children get their food is unclear, but it seems that approximately 35% of food comes from street sellers and local stores<sup>204</sup>. Regulating this and trying to ensure that children eat healthy food is challenging. Indonesia will more tightly supervise the sale of food products sold in and around schools, if a government agency-backed effort to reduce the impact of unhealthy snacks on the country's fifty million 6-18 year-olds is approved.

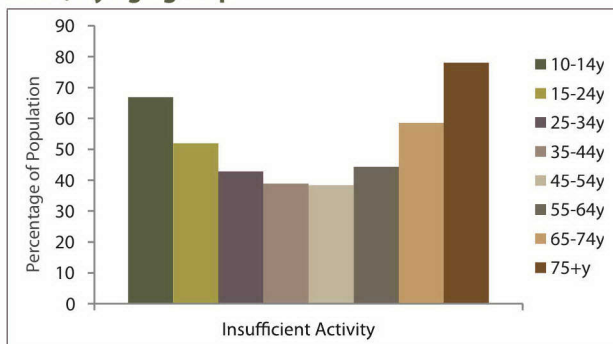
**Worksite interventions, by offering education, screening for risk factors, offering incentives to walk or ride a bike to work and facilities for exercise during breaks, as well as healthy foods in cafeterias, can reduce staff sick days and health costs to the benefit of both employers and employees.** Whether Indonesia has any initiatives of this sort was not readily apparent at the time of this research.

### 4.3.2 Activity behaviour

**The WHO Report 916 recommended a goal for physical activity which focuses on maintaining healthy body weight.** The recommendation is for a total of one hour per day of moderate-intensity activity, such as brisk walking, on most days of the week. This is different from the widely recognized public health recommendation of half an hour a day of moderate physical activity, which reduces the risk of cardiovascular risk, although it does not reduce risk for all of the other NCDs. High levels of fitness protects against mortality from cardiovascular disease and diabetes at all levels of BMI (i.e. even in those that are overweight/obesity). Regular exercise increases the capacity of muscles to use fat rather than sugar during physical activity. Preventing weight gain after weight loss requires 60-90 minutes of moderate physical activity a day.



**Figure 7. Prevalence of insufficient activity in the Indonesian population above ten years of age in 2007, by age group**



Source: Riskesdas 2007

**The majority of the Indonesian population is inactive.** Riskesdas 2007 reported the amount of physical activity among the population aged ten years and older, as shown in Figure 7. Inadequate physical activity was considered to be that less than 30 minutes a day of moderate activity (brisk walking) during at least five days a week. Even the most active age groups (45-54 years of age) still had over a third getting insufficient exercise. The most inactive were those aged 75 years or more, with three-quarters having insufficient activity, which is perhaps not surprising. But the next most inactive age group were children 10-14 years of age, with 67% not achieving the required level of exercise.

**That 10-14 year old children in Indonesia get so little exercise is surprising, as they are nearly all in school, and presumably should be getting exercise there.** It is therefore important to investigate how Indonesian schools are performing in this regard. A recent analysis<sup>205</sup> concluded that school health and nutrition has not figured significantly in efforts to improve the quality and equity of education, through the setting of standards for district authorities that are responsible for delivering primary and secondary education. It would seem that the potential in this area still remains to be exploited.

## 4.4 The socio-cultural environment

The socio-cultural environment includes the influence of media, education, peer pressure or culture and how these impact an individual's drive for particular foods and consumption patterns, or physical activity patterns or preferences.

### 4.4.1 Socio-cultural influences (societal norms and customs)

**The culture of Indonesian society has been shaped by long interaction between original indigenous customs and multiple foreign influences over many centuries.** The many indigenous cultures have been influenced by a multitude of religions, including Hinduism, Buddhism, Confucianism and Islam. When Indonesians talk about their cultural differences with one another, one of the first words they use is "adat" (custom or tradition). This is different from the word "budaya" which concerns the artistic dimensions of culture, including music, dance, painting, and the ancient legends transmitted through puppet shows, for example. The meaning of "adat" has undergone a number of transformations over time, and in some circumstances has assumed a kind of legal status; certain adat laws (hukum adat) are recognized by the government as legitimate. These ancestral customs may pertain to a wide range of activities: agricultural production, religious practices, marriage arrangements, legal practices, political succession, or artistic expressions. The status of women in Bali is subject to adat law, for example.



**In Indonesia, as in many LMICs and in the rural areas especially, certain traditional customs continue to contribute to maternal and early child undernutrition.** Gender-related issues are especially relevant in rural areas where women often still do a lot of the hard physical work but are not favoured in terms of food access. Hard physical labour and an excessive workload during pregnancy contribute to constrained fetal growth, as does the stress associated with marital violence during pregnancy.

**Early timing of pregnancy, including teenage pregnancy, is likely to be a factor contributing to the high child malnutrition rates in Indonesia.** A quarter of all women of reproductive age in Indonesia are married before 18 years of age<sup>206</sup> and 10% before 16 years of age. A strong correlation is known to exist between age of first marriage and age of first birth<sup>207</sup>. The higher rates of chronic energy deficiency (CED) seen in adolescent women of reproductive age in Indonesia are most probably because they are still growing and they have not yet reached maturity. In the US it has been observed that for pregnancy during adolescence (<18y), the growth of the mother (who is still a child) takes priority over the growth of her fetus, which is born on average 200g lighter<sup>208</sup>. As a consequence, the mother gains more weight than she would if she was mature, and maternal height growth is cut short. The development of maternal obesity in mothers over twenty years of age has been shown to be related to teenage pregnancy and parity in Brazil<sup>209</sup>.

**The increased completion of schooling by girls, especially at the secondary level, will gradually contribute to the reduction of child marriages and of teenage pregnancies in Indonesia.** Schools should also be offering in their curriculum healthy life skills in this regard, in addition to those relating to eating a healthy diet and taking sufficient exercise. Cigarette smoking, still so widespread among Indonesian men, is fortunately not practised by women. Riskesdas 2007 reported that while 46% of men smoked every day, just 3% of women did so. Most men had started smoking while still at school, suggesting that once again much could be done in school to prevent this habit being formed so early in boys.

**Indonesia is modernizing rapidly, and modern media permeates everywhere.** Nearly universal education in “Bahasa Indonesia”, the one common language, allows universal coverage of the same media channels and formats. Television dominates the media landscape in Indonesia. More than 90% of Indonesian households have at least one TV set. Most of the adult population in the country watches the news on television at least once a week<sup>210</sup>. There are more than ten private national television networks that operate in competition with the publicly owned Televisi Republik Indonesia (TVRI), which until 1989 was the only television station in the country. Research by the Indonesian Children’s Welfare Institute (YKAI) in 2000 found that Indonesian children are heavy viewers of television, glued to the screen more than 26 hours a week, or nearly four hours a day<sup>211</sup>. On Sundays, children watched TV more than seven hours. The number of hours spent watching television has been shown to be related to the prevalence of overweight/obesity in children in the US<sup>212 213</sup>. A cross-sectional study among adolescents in three Indonesian cities found that there was a greater likelihood of obesity in those who spent greater amounts of time using a computer or Play Station<sup>214</sup>. Among junior high school students in Yogyakarta, obese adolescents spent more time in sedentary activity than non-obese adolescents, and the relationship was independent of calorie intake, or parental obesity<sup>215</sup>.

**The advertising of processed foods can be seen everywhere in Indonesia from billboards, to newspapers to TV spots.** A multi-country survey of the influence of television advertisements on children<sup>216</sup>, which included Indonesia, reported that advertising to children was widespread across the countries surveyed, and that while all six countries had common core food-based messages in national nutrition guidelines, the diet actively being promoted on television in all countries goes in the opposite direction. The report found that 16% of children in Indonesia watched over eight hours of television a day, and that for each hour of children’s programming there was fifteen minutes of advertising, of which food advertising was dominant. The majority of children in Indonesia loved watching TV advertisements (61%), which they thought informed them about product quality/features (75%) and updated them about new products (91%). Multinational and domestic food companies, which promote energy-dense foods and drinks, use highly effective marketing techniques to encourage regular consumption, repeat purchases, and

brand loyalty, especially among children. While 75% of parents in Indonesia based their buying decisions on their own judgement, and only 33% said these were influenced by advertisements, 58% said they were influenced by their children. In all six countries, piecemeal legislation exists alongside self-regulation codes, and punitive measures could be taken against those that violate such codes, but only in the Philippines was there provision for suspension/retraction of licences to advertise. Indonesian advertising control was said to be solely based on a “complaint feedback” mechanism. Two subsequent reviews carried out under the remit of WHO confirmed that the findings of the Consumers International survey are largely applicable and relevant for most countries across the globe<sup>217 218</sup>.

#### 4.4.2 Individual psychology

**There is no evidence that the capacity to make rational decisions is reached at any different age in Indonesia than elsewhere in the world.** That the human brain is not fully mature until 25 years of age, i.e. the end of adolescence, has only recently been fully recognized. The maturing brain goes from straight processing of facts before the age of 12 years, into a slow progression to abstract thinking starting between 12 and 14 years, and maturity is only fully achieved by around 25 years of age<sup>219</sup>. Before maturity is reached, adolescents are not yet fully able to make “rational” decisions, and are much more influenced by “emotional context”. This argues for limiting advertising of food especially to children<sup>220</sup>.







## Chapter 5

# Nutrition Capacity and Governance

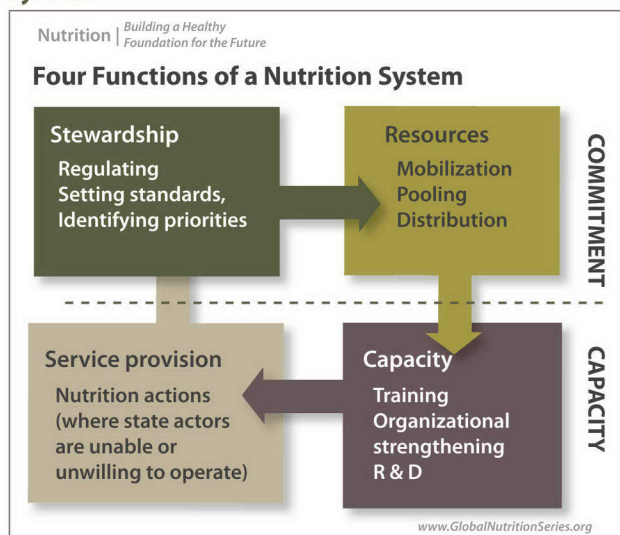


**When considering how to tackle the double burden of malnutrition (DBM) in low- and middle-income countries (LMICs), the renewed momentum to act on nutrition that is gathering pace across the globe could, should and must be built upon.** A process of dialogue called the SUN (Scaling up Nutrition) Global Movement<sup>221</sup> developed over the last few years has been widely endorsed by over a hundred international development institutions in recognition that development funding for nutrition interventions to reduce maternal and child undernutrition has been far too small<sup>222</sup>, especially considering the magnitude of the consequences these bring in terms of mortality, morbidity, and human capital development. The SUN movement recognizes that taking to scale a package of evidence-based high impact nutrition interventions such as those proposed in the Lancet Nutrition Series<sup>223</sup> will not only prove to be cost-effective over the long run, but will also make a big contribution to achieving most of the Millennium Development Goals (MDGs). Although the SUN movement is focused on maternal and child undernutrition, it is important to recognise that this is one of the most important first steps LMICs should be taking to prevent the DBM in the future. Conversely, much of the capacity development needed for scaling up nutrition should be designed with consideration of the DBM.

**The SUN Movement agreed to a Framework<sup>224</sup> which calls on all partners to scale up efforts against maternal and child undernutrition by, among other things:**

- Developing a coordinated, multi-stakeholder approach;
- Using the Paris Accra Principles of Aid Effectiveness;
- Mobilizing key stakeholders in an inclusive approach to country ownership;
- Using the “Three Ones” (i.e. One agreed overarching policy framework that provides the basis for coordinating the work of all partners, One national coordinating authority, One agreed national monitoring and evaluation system);
- Developing strong prioritized country nutrition strategies that, while grounded in country specificity, take particular account of the “window of opportunity” from conception to two years of age;
- Ensuring efforts are multi-sectoral, linking agriculture and food security, social protection and public health; and
- Including elements of capacity development and monitoring and evaluation.

**Figure 8. The four essential functions of the nutrition system**



Source: Lancet 2008

**The LACA report found that coordination for improving nutrition across sectors, within sectors, at all levels of government, and in the UN, is lacking in Indonesia.** National level coordination is needed for strategy and policy development, while at sub-national levels (district and sub-district), coordination is needed for implementation. A recent analysis of the international nutrition system published in the Lancet Nutrition Series considered the system to be fragmented and dysfunctional, and recommended the creation of a new governance structure<sup>225</sup>. Perhaps more importantly, however, the Lancet Nutrition Series called for a more functional international nutrition system which is connected to and serves the needs of the national nutrition systems, which should be its building blocks<sup>226</sup>. While the Lancet Nutrition Series article only considered maternal and child undernutrition, the concept of the essential functions of a nutrition system that was proposed is equally valid for the DBM.



**Helping to build commitment to and the capacity of the nutrition system requires that the four functions shown in Figure 8 are strengthened.** Commitment is measured by the level of stewardship and resources made available, and is largely a central function. The capacity of the nutrition system relates to the service delivery mechanisms and the installed capacity to ensure that nutrition interventions are delivered, which are more field level functions. Efforts to build capacity and commitment for improved nutrition outcomes are strengthened when both undernutrition and overnutrition are considered together, especially in Indonesia.

**As shown in Table 7, a programme framework has been proposed for the DBM which includes interventions that can contribute to prevention and treatment of the DBM across the life course.** This builds on the table developed by Gillespie and Haddad<sup>227</sup> in 2001 for reducing the DBM in Asia, draws upon the more recent Lancet Nutrition Series evidence-base for interventions for tackling maternal and child undernutrition<sup>228</sup>, as well as recent reviews of evidence on interventions for tackling overweight and obesity<sup>229-230</sup>. The table includes both direct and indirect nutrition interventions, and is organized by the stages of the life course. Such a programme framework could be used to guide the development of future National Plan for Development (RPJMN) and National Action Plan for Food and Nutrition (RANPG).

**Direct interventions are those targeted at the individual level, and have also been termed “nutrition specific” interventions in the SUN Framework.** These include nutrient supplements, food supplements, nutrition education, and food fortification. Indirect interventions are those delivered at the level of the household or community, and include cash transfers, and fiscal policy instruments as well as codes of practice concerning marketing of foods.

**The implementation of direct interventions during the early part of the life course in Indonesia still requires considerable improvement, especially with regard to breastfeeding.** In addition to the well-recognized benefits of breastfeeding in reducing mortality in infants and young children, there is increasing recognition of its benefits for preventing overweight/obesity later in the life course. Recent research suggests that exclusive breastfeeding during early months is central to the mechanism by which breastfeeding protects against later obesity<sup>231</sup>. Future growth seems to be programmed during the first six months of life, when normal growth in exclusively breastfed babies is much slower than in bottle-fed ones. Furthermore, there is a dose–response effect for the prevention of obesity, with longer duration of breastfeeding being associated with lower tendency to later obesity. The risk of being overweight is 20% greater if exclusively bottle-fed than exclusively breast milk-fed during the first six months of life.

**The International Code of Marketing of Breast-milk Substitutes (The Code) was adopted by the World Health Assembly (WHA) in 1981 as a “minimum requirement” to be enacted in its entirety in all countries.** The Code aims to promote safe and adequate nutrition for infants by protecting breastfeeding and ensuring appropriate marketing of breast-milk substitutes. The Code bans all advertising of breast-milk substitutes, as well as the provision of samples and gifts to mothers and health workers, and the use of healthcare systems to promote breast-milk substitutes. Indonesia ratified parts of the Code in a 1997 decree of the Minister of Health, which only covered infants 0 to 11 months, did not properly differentiate between breast-milk substitutes and complementary foods, had four months as the limit for exclusive breastfeeding, and did not specify any legal penalties for those that perform infractions<sup>232</sup>. A new regulation is supposed to come into force this year that will include penalties of fines and even jail for those promoting the use of breast-milk substitutes for infants.

**Anaemia during pregnancy also needs continued attention, as the 2010 Riskesdas found that although 80% of mothers of infants reported taking iron pills during their last pregnancy, only 18% of mothers reported having taken the full 90 tablets as recommended by the GOI.** Considering that the WHO recommendation is 180 tablets, there is still a long way to go here. But there is also a need to consider giving a multiple micronutrient supplement, especially given the extent of vitamin A and zinc deficiency that is known to occur in the same populations. It is well recognized that preventing zinc deficiency at



**Table 7. Programme interventions for tackling the DBM across the life course**

Stage of life course	Direct interventions	Indirect interventions
Conception to birth	<ol style="list-style-type: none"> <li>1. Micronutrient (Iron/folate or multiple micronutrient) supplements</li> <li>2. Balanced protein energy supplements*</li> <li>3. Deworming</li> <li>4. Reduction of household/cigarette smoke</li> <li>5. Presumptive radical treatment for malaria*</li> <li>6. Insecticide-treated bed nets*</li> </ol>	<ol style="list-style-type: none"> <li>1. Salt iodization</li> <li>2. Flour fortification</li> <li>3. Oil fortification</li> </ol>
Young Children (0-5 years)	<ol style="list-style-type: none"> <li>1. Exclusive breastfeeding promotion,</li> <li>2. Appropriate complementary feeding promotion</li> <li>3. Hand washing and hygiene interventions</li> <li>4. Young child supplementation with vitamin A and zinc, and other micronutrients as appropriate</li> <li>5. Deworming</li> <li>6. Management of severe acute malnutrition</li> </ol>	<ol style="list-style-type: none"> <li>1. Prevent child marriage and teenage pregnancies</li> <li>2. Conditional cash transfer programmes (with nutrition education)</li> </ol>
Children (5-18 years)	<ol style="list-style-type: none"> <li>1. School based</li> <li>2. Providing healthy meals</li> <li>3. Promotion and provision of daily physical exercise</li> <li>4. Weekly iron supplements/deworming</li> </ol>	<ol style="list-style-type: none"> <li>1. Code of marketing of breast milk substitute</li> <li>2. Conditional cash transfer programmes (with nutrition education)</li> </ol>
Adulthood (18+ years)	<ol style="list-style-type: none"> <li>1. Medical service provider counseling on healthy diet</li> <li>2. Worksite encouragement to exercise and eat healthy foods</li> <li>3. Taking regular exercise</li> </ol>	<ol style="list-style-type: none"> <li>1. Fiscal food policies <ol style="list-style-type: none"> <li>a. Food subsidies</li> <li>b. Fat/sugar taxes</li> <li>c. Levies</li> </ol> </li> <li>2. Urban planning <ol style="list-style-type: none"> <li>a. Bike lanes</li> <li>b. Parks</li> <li>c. Pedestrian precincts</li> <li>d. Sanitation</li> <li>e. Smoke free houses</li> </ol> </li> </ol>

the population level is best achieved through multiple micronutrient approaches, be they fortification or supplementation<sup>233</sup>. Since the Lancet Nutrition Series, more recent reviews of multiple micronutrient supplements during pregnancy have shown considerable impact on birth weight, for example<sup>234</sup>.

**Trials of multiple micronutrient supplementation (MMS) during pregnancy have shown considerable impact in Indonesia.** A trial of MMS compared to iron iron folic acid supplements in Java found that the mean birth weight was 40 g higher in the MMS group and that among those who consumed 90 or more iron supplements during pregnancy, there was a 50% reduction rate of miscarriage, stillbirth, or neonatal death<sup>235</sup>. A considerably larger trial in Lombok showed that MMS as compared with regular iron folic acid supplements reduced post-natal infant mortality between one and three months of age by 18% overall, by 25% in mothers who were undernourished at enrolment, and 38% in mothers who were anaemic at enrolment<sup>236</sup>. Interestingly the effect of MMS on birth weight was found to be an increase of 50g, but only in non-wasted mothers<sup>237</sup>. Perhaps more importantly, the use of community facilitators in the Supplementation with Multiple Micronutrients Intervention Trial (SUMMIT) led to significant increases in the use of birth attendants at delivery, resulting in a 30% reduction in early infant mortality independent of the impact of micronutrient supplementation<sup>238</sup>. Therefore, if women were to consume multiple micronutrients on a regular basis and to use a trained birth attendant at delivery, the risk of early infant mortality could be

reduced by nearly 50%. Ensuring high coverage of micronutrient supplements through the local midwife, and ensuring that all births are covered by the midwife could be achieved through the Posyandu. Such changes have not yet been adopted, however, and even deworming during pregnancy, as recommended by INACG, WHO and UNICEF<sup>239 240 241</sup>, is not implemented.

**The Lancet Nutrition Series<sup>242</sup> recommended maternal food supplements that are balanced in energy and protein in food insecure areas, and used a cut-off of 10% for excessive thinness (i.e. BMI less than 18.5) in women of reproductive age, in order to model the effects of the intervention.** Programme guidance on when and how to provide balanced energy-protein supplements to mothers during pregnancy is not readily available, however, and improving maternal nutrition status to improve fetal development is not simply a matter of improving dietary intake as has been reported by several technical consultations<sup>243</sup>  
244.

**Indonesia has established legislation regarding the fortification of certain staple foods with micronutrients, and plans to do more.** All salt has been required to be fortified with iodine since 1994 and all wheat flour with iron, zinc, folic acid, vitamin B1 and vitamin B2 since 2001<sup>245</sup>. As mentioned above, the salt iodization programme is still far from achieving its goal of eliminating iodine deficiency. So far there does not seem to be any evaluation or monitoring of flour fortification to assess its effectiveness, although the improvement in anaemia levels noted earlier in this report may well be due to this. There are reports that the consumption of fortified instant noodles is contributing to reducing iron deficiency anaemia in young children<sup>246</sup>. Cooking oil fortified with vitamin A has been tested in one province and is being initiated with the expectation that it become mandatory in 2012. Rice fortification is also being tested in two provinces, using rice from the Rice for the Poor Family (RASKIN) programme described below. It is important to carry out national surveys to measure the current situation of micronutrient deficiencies in order to gain a better understanding of how effective the various micronutrient supplementation and fortification efforts have been.

**Among the indirect interventions for tackling maternal and child undernutrition, the principle programme is a food subsidy policy called RASKIN, which began during the economic crisis in 1997/8 and has been implemented as part of a larger social safety net package from 1999 onwards.** The RASKIN program is one of the GOI's key programs for improving food security, and in 2005 aimed to supply 20 kg of rice per month to 9 million poor families. The programme has had administrative difficulties, and part of the subsidy never reached households at all, going instead into the Indonesian Bureau of Logistics (BULOG's) operating costs. A review of the cost structure of RASKIN found that the cost of the food subsidy as a percentage of GDP tended to increase from 0.18% in 2006 to 0.23% in 2009, and that the efficiency of the subsidy also deteriorated in the period studied, with distribution costs of almost 20% of total cost in 2009<sup>247</sup>. An evaluation of RASKIN found a positive impact of the programme with beneficiaries increasing expenditures on nutrient rich animal source foods, as well as health expenditures<sup>248</sup>. However, extra income due to the programme was also spent on adult goods such as alcohol and tobacco, which had an even greater impact than on the expenditures on animal source foods. There was also considerable "leakage" with ten per cent of the highest income quintile households being beneficiaries. The gender-related aspects of economic and social risks have also been overlooked by RASKIN, and could be better addressed by dealing specifically with the vulnerabilities of mothers and young children from conception to toddlerhood<sup>249</sup>.

**The GOI introduced a second generation of social assistance programs following the partial removal of regressive fuel subsidies in 2005.** A portion of the savings from the fuel subsidy cuts were reallocated to four programs: operational aid to schools (Bantuan Operasional Sekolah, BOS), health insurance for the poor (Asuransi Kesehatan Miskin, Askeskin), village infrastructure (Infrastruktur Pedesaan, IP) and rice for the poor (Beras Miskin, RASKIN). These programs are the basis of an emerging, permanent social safety net, providing income support for poor and near-poor households. Askeskin, re-named Jamkesmas (Jaminan Kesehatan Masyarakat), now covers around 76 million beneficiaries, making it the largest social assistance program in Indonesia. RASKIN continues to distribute rice to millions of families across the country. These programs joined the array of small social welfare programs already implemented by the Department of Social Affairs (DepSos), targeting especially vulnerable groups, such as orphans or the disabled.



**More recently, the government has begun introducing and re-defining social assistance programs to break the generational transmission of poverty.** In 2007 the GOI piloted a conditional cash transfer program (Program Keluarga Harapan, PKH) executed by DepSos. PKH assistance is transferred only when families obtain preventive basic health and nutrition services, and send their children to school. To date, the program has reached around 700,000 poor households and is preparing for further expansion. Block grants for community development are also being used to promote social development through the National Program for Community Empowerment (Program Nasional Pemberdayaan Masyarakat Mandiri, PNPM). Mandiri is the main government community-driven development program.

**As part of its commitment to improve the health of its population, the GOI has piloted two programs aimed at improving access to basic health and education services since 2007.** Nasional Pemberdayaan Masyarakat Generasi Sehat dan Cerdas (PNPM Generasi) is an incentivized community block grant program that aims to enable communities to address both demand and small-scale supply-side problems that restrict access to services and hamper their ability to improve health and education performance as part of PNPM Rural. PNPM Generasi supports community efforts to improve a core set of health and education outcomes. PNPM Rural is based on the assumption that communities are best placed to identify the needs and actions required to achieve outcomes. As part of the Generasi project, communities receive assistance from trained facilitators to diagnose problems and identify ways to use funding provided by village-level block grants to achieve twelve health and education indicators.

**An evaluation of the PNPM Generasi programme has shown significant reduction of malnutrition by 2.2 percentage points (weight-for-age).** Yet the results of the evaluation have showed that impact can be enhanced by increasing the demand for quality health and nutrition services. As such, strengthening the capacity of health providers in nutrition counselling and knowledge sharing will improve the quality of maternal and child health services, and most likely increase the demand thereof. In addition, improving the capacity of PNPM Generasi facilitators to identify the causes of health and nutrition problems is essential as they in turn assist communities to assess problems and to use the funds to solve them.

**Ensuring that these social assistance programmes not only contribute to reducing poverty, and to reducing maternal and child undernutrition, but are also consistent with the reduction of the DBM across the life course is necessary, albeit challenging.** Making all such programmes effectively into conditional cash transfer programmes is one possibility to consider. Another is linking the provision of such cash transfers to the promotion/production of highly nutritional cash crops such as fruits and vegetables, which could/should be sold by small-scale local farmers through local farmers markets<sup>250 251</sup>. Animal source foods and fortified foods are also important for mothers and young children in order to prevent stunting. Food stamps can be linked to the purchase of these foods, as well as of fruit and vegetables in local farmers markets as is done in the US, for example, where the USDA Federal nutrition assistance programs provided approximately US\$10 billion in support of fruit and vegetable consumption in Fiscal Year 2005. These funds support: the purchase and distribution of fruits and vegetables by the USDA to schools, food banks, and other program providers; the purchase and use by program providers through the Child Nutrition Programs; and participants' purchases in the marketplace through Food Stamps, Women, Infants and Children (WIC) and the farmer's market nutrition programs<sup>252</sup>. A result of these programs for agricultural and food production policies is increased support for the production of high value crops, such as fruit and vegetables through small-scale farmers rather than to rice self-sufficiency through industrial agriculture.

**Schools have been found to be the critical setting for preventing child obesity<sup>253</sup>, as well as for reducing other chronic disease risk factors and improving fitness<sup>254</sup>.** School-based programmes should cover the role of both nutrition and physical activity in maintaining physical and mental health, with school food services providing healthy meals and the promotion and provision of daily physical exercise as part of the curriculum. The excessive consumption of sugar-sweetened beverages is an important driver of the current obesity epidemic in the US<sup>255</sup>, and is associated with a significantly elevated risk of type 2 diabetes<sup>256</sup>. Most US states have recently adopted laws that regulate the availability of sugar-sweetened beverages in school settings<sup>257</sup>, and in France and the UK vending machines have either been banned in schools or are no longer filled with sugar-sweetened beverages or Group 3 processed snack foods. Indonesia should consider



promoting the WHO-led Nutrition Friendly Schools Initiative (NFSI)<sup>258</sup>, which aims to increase access and availability of healthy foods as well as opportunities to be physically active, and to decrease access to and availability of unhealthy or “junk” foods as well as to support healthy lifestyles. A successful Indonesian model upon which to build and adapt as needed is the community-based school feeding program which was implemented through block grants to schools in “left behind villages” during the economic crisis in the 1990s<sup>259</sup>, as well as through PMTAS which is currently being implemented.

**Another promising arena for intervention in Indonesia is the workplace, which offers the potential for public private partnerships to be developed.** An example is provided by Johnson & Johnson in the US which introduced Live for Life in 1979; by the end of the third year of the program, savings to the company were more than US\$400 per year per employee<sup>260</sup>. A recent systematic review of worksite nutrition interventions for controlling overweight and obesity provides further support to these findings<sup>261</sup>.

**Training medical staff to address overnutrition, and prioritizing obesity as a disease among the NCDs is particularly important to consider.** The Department of Noncommunicable Diseases plans to train health staff in health centres to address NCDs, including overweight/obesity. Hopefully, this will draw on experience from the US, which has shown that interventions by healthcare providers can be effective, especially if the professionals are trained to measure BMI and/or waist circumference (WC) to detect patients who are either overweight and/or gaining weight. Even brief messages from health professionals about nutrition through diet counseling can influence behavior, and the magnitude of the effect is related to the intensity of the intervention<sup>262 263</sup>.

**The GOI, like many national governments, has developed policies with dietary recommendations for their population, PUGS, which are largely based on the recommended nutrient intakes in the WHO Report 916.** The objective of these is to help develop dietary guidelines for the public to be incorporated as part of nutrition education efforts. These recommendations are often depicted graphically, such as in PUGS and the ‘the Food Guide Pyramid’ that originated in the US in 1992 by the USDA and now have been adopted or adapted in many countries, including Indonesia. Healthy diets based on the food group and pyramid approach have been much criticized, however, not least because during the thirty years of the food pyramid in the US, obesity rates soared. In Indonesia, as in most countries, dietary guidelines seem to have been little assimilated by the general public, in part because the messages were too complicated, but also because they were drowned out by food industry advertising<sup>264</sup>.

**One of the problems with the US food pyramid based dietary guidelines was that it focused more on “what to eat” than on “how much to eat”.** The original food pyramid aimed at limiting fat intake, and in general seems to have had an effect, with low-fat diets and special “light” foods becoming popular. But with no differentiation between types of fats, the benefits of “good” unsaturated fats were forgone<sup>265</sup>. Also, guidelines recommended increased consumption of starchy foods, and in particular grains (cereals) and cereal products, with little or no consideration given to the benefits of eating reduced carbohydrate diets<sup>266</sup>. Recommendations often give preference to “minimally processed” or “high-fibre” or “wholegrain” versions. However, the cereal part of the food pyramid does not differentiate between the type of processing that the cereal and/or starches have been subject to, such that Group 3 processed foods are considered acceptable<sup>267</sup>.

**Although dietary guidelines are important, efforts of the food industry promote the consumption of products that are, usually, not aligned with dietary guidelines.** Globally, the food industry spends US\$40 billion a year on advertising food, most of which promotes the consumption of ultra-processed foods<sup>268</sup>. Transnational soft drink and fast food companies market their products extensively worldwide, especially to children and youth<sup>269</sup>. As revealed by a consumers union report in the US, the US\$11.26 billion spent on advertising by the food, beverage, and restaurant industries in 2004 dwarfed the mere US\$9.55 million spent on communications by federal and state of California “5 A Day” programs to encourage eating five or more servings of fruit and vegetables each day<sup>270</sup>. In consequence, the majority of the American public still remains unaware that eating at least five servings of varied vegetable and fruits each day can improve health outcomes and help manage weight gain.



**Based on evidence provided to it, the sixty-third World Health Assembly in May 2010 endorsed resolution WHA63.14, which called for national and international action to reduce the impact on children of marketing of foods high in saturated fats, trans fatty acids, free sugars, or salt.** Advertising to children of any kind is banned in several Scandinavian countries, for example, and Brazil has outlawed all TV advertisements aimed at children. Hopefully Indonesia will follow suit, although it may take some time as Indonesia has yet neither signed the Framework Convention on Tobacco Control nor adopted all provisions of the International Code of Marketing of Breast-milk Substitutes. There is a growing consensus that a framework convention for obesity control is needed, similar to the one developed for tobacco control<sup>271</sup>.

**Transport policy and environmental design have fundamental effects on the determinants of physical activity and therefore influence the risk of obesity and other chronic diseases.** Limiting the role of automobiles is one important area for intervention and can be achieved through a variety of channels, including making private car ownership and use more expensive, through higher taxes on cars and fuel, and introducing road tolls and congestion charges, as well as parking fees. The fees collected can be used to improve the provision of public transportation. Walking and biking can also be encouraged by creating special bike lanes, as well as by making town centers pedestrian-only precincts. Increasing the space available for leisure activities such as playing fields, parks, and public gardens, will also encourage more walking, running and sports.

**By law, all foods that are processed or imported in Indonesia must have a label.** Labels which describe the nutrition content of foods can, in theory, permit the more discerning consumer to make more informed purchases. Evidence for the effectiveness of “front of pack” labelling is still weak, however<sup>272</sup>. Nutrition labels on pre-packaged foods, which are among the most prominent sources of nutrition information, are perceived as highly credible sources and many consumers use nutrition labels to guide their selection of food products. Evidence also shows a consistent link between the use of nutrition labels and healthier diets. However, the use of labels varies considerably across subgroups, with lower use among children, adolescents and older adults who are obese. Labels are most used by educated and wealthier segments of the population.

**Standards and guidelines related to texts for food products have been developed by Codex Alimentarius, but as described in the recent review of the global regulatory environment, there is considerable variation of approaches and regulations in countries around the world<sup>273</sup>.** In all countries of Southeast Asia except Malaysia, nutrition labelling is voluntary unless nutritional claims are made<sup>274</sup>. WHO provides guidance on developing or adapting nutrient profile models<sup>275</sup>. The aim of this work is to harmonize nutrient profile model development in order to produce consistent and coherent public health nutrition messages for the consumer, and ultimately to improve nutrition and public health. Based on these nutrient profiles, claims such as “low fat” or “healthy choice” on food labels and in marketing can be regulated by national food standards authorities. The food industry has also pledged to self-regulate, but stringent standards are needed if self-regulation is to be effective. Voluntary nutrition-labelling adopted by the food industry in the US is considered far from ideal in many ways<sup>276</sup>.

**Fiscal policies such as subsidies and taxes can either stimulate or reduce consumption of products, including foods.** Capitalist economics has been considered to have a central role in the global obesity epidemic, and economic policies are arguably the optimal target for intervention. Heavy taxes on cigarettes helped reduce their consumption in many countries, for example. Poland provides an example for food, where reduced subsidies on lard and butter soon after the transition to a democratic government resulted in a rapid increase in the consumption of cheaper non-hydrogenated vegetable fat. In consequence the ratio of dietary polyunsaturated to saturated fat increased from 0.33 in 1990 to 0.56 in 1999 and mortality from coronary artery disease dropped 28%. A tax on sugar-sweetened beverages has many proponents, and if the tax is sufficiently large (20%) has great potential to reduce obesity as well as to raise revenues. A useful guide on ways to develop fiscal policies in the Asian region has been developed by WHO, which provides guidance in relation to free market issues and the WTO, for example<sup>277</sup>.



**There is currently no overarching coordinating mechanism for nutrition in Indonesia and this gap was identified as a need in the LACA.** The resource function depicted in Figure 7 ensures that necessary funds are provided to reach national goals and achieve national targets. The stewardship function sets goals and targets, regulates them, and govern what activities should be done, by whom and with what priority. In Indonesia, the stewardship and resource functions are divided between the various line ministries including Health and Agriculture as well as the National Development Planning Agency (BAPPENAS). With the emerging and escalating problem of the DBM, many more sectors are involved and consideration is needed for how to provide the necessary oversight going forward. Improved coordination and functionality for nutrition is essential for developing more coherent national nutrition policies and programmes tackling the DBM, and creating national nutritional councils has been recommended<sup>278</sup>.

**Implementation experience from the National Plans of Action for Nutrition (NPAN), which stemmed from the International Conference on Nutrition (ICN) also suggests that some central coordination mechanism was essential.** The ICN efforts to implement national nutrition programmes, which were for both overnutrition and undernutrition, showed that strategies from different sectors could be best grouped into the four pillars depicted in Table 8. This overarching DBM policy framework was found to facilitate the delegation of service delivery within the Ministry of Health as well as across other sectors, and to assign responsibility for setting goals and strategies to achieve them<sup>279</sup>. It is presented as an illustrative example of how such a high-level coordinating body might be organized to help facilitate the full range of programmes involved in tackling the DBM across the life course.

**Table 8. The Four Overarching Pillars of DBM Nutrition Policy Framework**

Sector	Nutrition Policy Pillars			
	Sustainable Food Security	Food Safety	Healthy Lifestyle	Nutrition
<b>Health</b>		<ol style="list-style-type: none"> <li>1. Food safety and hygiene regulations</li> <li>2. Food Inspections</li> <li>3. Food standards</li> </ol>	<ol style="list-style-type: none"> <li>1. Promotion of healthy eating</li> <li>2. Promotion of exercise</li> <li>3. Infection Control</li> <li>4. Family Planning</li> </ol>	<ol style="list-style-type: none"> <li>1. Micronutrient supplementation</li> <li>2. Nutrition education</li> <li>3. Dietary Guidelines</li> <li>4. Nutritional surveillance</li> </ol>
<b>Public Works and urban planning</b>	<ol style="list-style-type: none"> <li>1. Rural roads</li> <li>2. Irrigation</li> </ol>	<ol style="list-style-type: none"> <li>1. Water and Sanitation</li> </ol>	<ol style="list-style-type: none"> <li>1. Urban bike lanes</li> <li>2. Pedestrian walkways</li> </ol>	
<b>Agriculture</b>	<ol style="list-style-type: none"> <li>1. Food availability (Food production)</li> </ol>	<ol style="list-style-type: none"> <li>1. Food standards</li> </ol>		
<b>Education</b>	<ol style="list-style-type: none"> <li>1. School gardens</li> <li>2. School meals</li> </ol>	<ol style="list-style-type: none"> <li>1. Hygiene education</li> </ol>	<ol style="list-style-type: none"> <li>1. Physical exercise</li> <li>2. Life skills and sex education</li> </ol>	<ol style="list-style-type: none"> <li>1. Nutrition education</li> <li>2. Anemia control</li> </ol>
<b>Social Welfare/ Security</b>	<ol style="list-style-type: none"> <li>1. Food Access (cash transfers)</li> </ol>			
<b>Industry and Trade</b>	<ol style="list-style-type: none"> <li>1. Food availability (manufacture and marketing)</li> </ol>	<ol style="list-style-type: none"> <li>1. Food Standards</li> </ol>		<ol style="list-style-type: none"> <li>1. Food fortification</li> </ol>
<b>Public Information</b>			<ol style="list-style-type: none"> <li>1. Marketing of food to children</li> </ol>	<ol style="list-style-type: none"> <li>1. Code of marketing of breast-milk substitutes</li> </ol>
<b>Finance/ economy</b>	<ol style="list-style-type: none"> <li>1. Food Subsidies</li> <li>2. Import/export restrictions</li> </ol>			<ol style="list-style-type: none"> <li>1. Food Taxes</li> </ol>

Source: Authors

**While global experience to date with creating national nutrition councils has not been entirely positive and there are not many good examples to draw upon, this may well be because past efforts were largely focused solely on undernutrition.** The challenges posed by the burgeoning problems of the DBM in LMICs are much more multi-sectoral and far-reaching than undernutrition alone, which may well justify creating such high-level coordination mechanisms. The one example of a successful high-level coordination mechanism for nutrition comes from Brazil, where during the last few decades there has been a spectacular fall in child undernutrition, as measured by stunting in particular<sup>280</sup>. Brazil has a high-level coordinating body called CONSEA (National Food and Nutrition Council) for oversight and broad policy setting, as well as a coordination mechanism for implementation.

**As noted in the LACA report<sup>281</sup>, the capacity to act for nutrition in Indonesia needs to be strengthened.** Service provision has primarily revolved around child growth monitoring and is largely misdirected to the under-five year olds rather than focused on children under two and their mothers. Less priority is given to preventive activities related to counselling of mothers on infant and young child feeding than to the curative function of detecting and treating wasting, and when counselling is done it is mostly done by minimally trained community-based posyandu cadres. Attention to maternal nutrition is limited to iron/folate tablet distribution with little prioritization or promotion. Although a sufficient number of nutritionists are being trained, the training curriculum is outdated and incomplete; it hardly recognizes the DBM problem, for example. Nutritionists are under-employed, especially in the implementation of service delivery, and there is little or no in-service training in nutrition.

**A recent study of the capacity of the nutrition workforce in Indonesia concluded that it was inadequate to meet the challenges that Indonesia faces, especially because current diet-related NCD problems are not widely recognized as being due to poor nutrition across the life course<sup>282</sup>.** The report further recommended that workforce capacity be strengthened by improving the quality of nutrition education in Indonesia by:

1. Establishing nutrition service standards;
2. Developing consensus on nomenclature, scope, and the practice of different practitioners;
3. Enumerating current workforce attributes;
4. Projecting workforce needs;
5. Developing shared competency standards for the spectrum of modes of practice (clinical dietetics through community nutrition, to research and teaching).

**Any capacity development efforts in Indonesia need to be linked to and guided by the policy and programme components of a national nutrition plan.** As noted in the Indonesian LACA, the National Plan for Development 2010-2014 (RPJMN) is focused on stunting and the Essential Nutrition Intervention package from the Lancet Nutrition Series. Although provinces and districts plans (RPJMD) are supposed to refer to the RPJMN when defining their own plans, there is often a disconnect between the planning processes at central and sub-national levels. The National Action Plan for Food and Nutrition (RANPG) for the five year period 2011-2015 is based on the RPJMN at both national and provincial level. Its main objective is to reduce stunting by five per cent in five years (from 37% to 32%). The RANPG is only concerned with maternal and child undernutrition, however. The problems of overnutrition and of overweight/obesity are part of the national NCD policy and strategy, aimed at controlling risk factors and prevention of NCDs, early detection, and health promotion measures. The NCD unit of the Ministry of Health was only created in 2005 and so activities in this area are relatively new. The current RPJMN and RANPG do not address the DBM problem as a whole, and so the main objective should be to ensure that the next RPJMN and RANPG are developed in a more harmonious way and cover both aspects of the nutrition problem.



## Chapter 6

# Conclusions





**Indonesia has a big double burden of malnutrition (DBM) problem and needs to take urgent steps to both prevent it as well as to mitigate its effects across the life course.** In Indonesia, undernutrition is still given more priority because overweight and obesity is believed to be a problem of the wealthy and an issue of personal choice. However this is not the case as *gemukness* is already a serious problem across all income levels, and is conditioned by increasingly *obesogenic* environments, especially among the poorest adults who are the most stunted. Furthermore, consequences of the DBM are increasingly likely to be greatest among the poorest that are least capable of accessing treatment for the cardiovascular diseases that are increasingly pervasive.

**A challenge of addressing *gemukness* is that it is a hidden problem.** Asians have a higher proportion of body fat than Caucasians, and therefore greater risk of diet-related noncommunicable diseases (NCDs) such as cardiovascular disease. Among Asians, Indonesians are at greater risk of NCDs at the same level of *gemukness* than Chinese or Vietnamese, for example. *Gemukness* affects twice as many women as men, and tends to increase with age, peaking at 45-54 years.

**Of greatest concern is that the prevalence of *gemukness* has doubled in the last two decades and seems to be accelerating, while the rate of stunting, which reflects inadequate growth during the period from conception to two years of age and is itself associated with a greater risk of NCDs including *gemukness*, has remained static around 30% over the same period.** It is the combination of increased weight gain across the life course coupled with constrained fetal and young child growth that is known to potentiate the risks of diet-related NCDs in adulthood. This problem is supported by the fact that the levels of *gemukness* in adults are greatest in the Outer Islands where maternal and child undernutrition rates are highest. One likely cause of constrained fetal and young child growth is the on-going problem of micronutrient deficiencies, likely to still be affecting at least a quarter of young mothers, as well as teenage pregnancies.

**Assessing the health and biological causes of the DBM reveals that the problem is related, in part, to an ageing population.** Because of the demographic and epidemiological transition that Indonesia has experienced, largely due to family planning and health service coverage, NCDs and especially cardiovascular diseases are now the main causes of death. Unfortunately sanitation coverage is still far from universal and gastro-intestinal parasite infections are still exceedingly common, which contributes to the on-going problem of maternal anaemia. The health system in Indonesia is not well-equipped to deal with the new disease reality, however, largely because of a lack of awareness of the overnutrition problem and insufficient capacity to deal with its consequences.

**Increased cardiovascular diseases are also reflected in population-based blood analysis.** *Hypertension* affected 46% of men and 53% of women over 45 years of age in 2007, reaching to 75% of women aged 75 years and over. Perhaps worse is that only a third knew of their condition and over ninety per cent were not receiving any treatment. Blood lipid levels worsen with age, and of those aged 45 years and older, 22% of women and 11% of men had high cholesterol levels, while 67% of men and 40% of women had low levels of *HDL cholesterol*, which is protective against cardiovascular diseases. These differences probably reflect the higher rates of smoking in men and of overweight/obesity in women. Diabetes is already affecting at least 6% of the population and 10% is pre-diabetic.

**There is no evidence in Indonesia that genetics plays any part in the growing obesity problem.** The mechanisms that are likely to be in play are *epigenetic* not genetic, and are caused by the constrained fetal growth, as reflected in stunting, coupled with increasing wealth and increased weight growth during childhood. Among the *epigenetic* changes associated with constrained fetal growth and stunting is the creation of visceral adipose cells, as an insurance against the bleak times expected after birth.

**Diabetes, increased blood pressure, and *dyslipidaemia* affecting a large percentage of the population are consequences of the inflammatory state associated with being overweight, and especially of**

**abdominal obesity.** Adipose cells in the visceral fat deposits produce hormones and inflammatory markers as part of the body's energy balancing mechanisms. In the absence of food and energy sources coming into the blood, the adipose cells in the fat gland produce *leptin* which stimulates hunger centres in the brain. If too much energy is consumed and subcutaneous fat cells get full then energy gets diverted to the visceral fat gland by the inflammatory markers, and over time this leads to diabetes. Appetite mechanisms that evolved during hunter-gatherer existence are not able to cope with continuous snacking on energy-dense foods, such that as little as a 150 extra calories a day over the course of a year can lead to an average weight gain of a kilogram and a half a year. Once these fat reserves are created they are difficult to lose and easy to put back on again, thanks to the efficiency of the fat gland's energy conservation mechanisms. The *inflammatory state of obesity* is also a potential cause of anaemia, and may be associated with the persistence of anaemia in Indonesia.

**Assessing the economic and food environments associated with the DBM reveals that the steady increase in national wealth has been accompanied by impressive reductions in poverty.** In parallel, food availability as energy per capita has grown by 40% (20% from fat) in the last three decades while the population has doubled. While rice availability per capita remained the same, the availability of fish and meat doubled, milk tripled, and wheat increased sevenfold. These production increases achieved due to the Green Revolution were largely made possible by using oil-based inputs, so that while oil was cheap food was cheap. But that is changing fast: with oil prices high and increasing commodity speculation, global food prices are at all-time highs and are likely to remain so. With the increased global trading in foods, and opening up of borders to trade, increasing amounts of processed food are being imported and distributed through growing supermarket chains. Many of these commodities are artificially cheap because of subsidies given to farmers in the EU and US. All wheat in Indonesia is imported and largely used to make instant noodles.

**Food consumption patterns, although difficult to evaluate from the data available, also suggest increased food intake.** Consumption estimates based on food expenditures are 16% higher, and show a five per cent increase in energy per capita purchased by households across the last decade. The greatest increase to this total came from meat, fish, and eggs, and in prepared foods, both of which nearly doubled. So not only has food consumption increased quantitatively in the last decade, but this growth has been in the more expensive items such as animal protein and food consumed outside the home. Vegetable and fruit consumption has remained stable and low at 4% of total energy purchased, with 94% of the population reporting not to have consumed the recommended five portions a day. There does not seem to be any information available to evaluate the quality of the diet, including the type of fat and the type of carbohydrates being consumed, and more research is needed here. It seems likely, however, that the increase in "prepared foods" from outside the home consists of processed foods such as instant noodles that are made from wheat and other wheat-based products, all of which are energy dense. The increased consumption of these "Group 3" processed foods is likely to be contributing to the increases in *adiposity*. The increasing price of foods is likely to promote consumption of the cheaper processed foods, made from imported commodities that continue to be subsidized in the country of origin.

**Inadequate breastfeeding is another poor food consumption pattern, and that continues to deteriorate despite GOI efforts to protect it.** Only a third of babies are put to the breast within an hour of birth, and only 15% are exclusively breastfed for six months. Seventy per cent of babies are fed formula milk at birth. Exclusive breastfeeding not only protects against young child growth failure and mortality, but also protects against future obesity. In addition, child feeding practices in older children aged 6-24 months are far from adequate, contributing to young child stunting and increasing the risks of NCDs later in the life course.

**Assessing the physical and built environments of the DBM in Indonesia reveals an urban environment that discourages exercise.** There are few if any bike lanes, sidewalks or pedestrian precincts, and parks are a rarity. Access to processed foods in the street is almost the only option when commuting. In consequence,



the majority of school children, for example, purchase snack food from street vendors and local shops. Perhaps not surprisingly, the majority of the population do not get sufficient exercise to protect them from the risks of cardiovascular disease and weight gain. One of the most inactive age groups is school children.

**Assessing the socio-cultural environment of the DBM in Indonesia reveals a culture that retains much of its traditional customs while being totally immersed in all forms of modern media.** Social customs drive child marriage, and a third of women do indeed get married while still children. This custom is likely to be contributing to elevated low birth weight rates seen in the Outer Islands especially. The reach of television is almost universal, however, and most adults watch the news at least once a week. Children watch around four hours of TV a day, more time than is spent in classrooms. The advertising of processed foods especially dominates the media, and is targeted at children. The majority of parents report that their purchases are more informed by their children's choice than the influence of advertisements. It is now well-recognized that the capacity of adolescents to make rational choices only reaches maturity at around twenty-five years of age.

**The capacity to deliver nutrition actions and the governance mechanisms that control these need strengthening, and actions are underway under the umbrella of the SUN (Scaling-Up Nutrition) Movement.** The SUN Movement aims to develop a coordinated multi-stakeholder approach with one agreed overarching policy framework, one national coordinating authority, and one monitoring and evaluation system. While the SUN Movement targets maternal and child undernutrition and not the DBM, it should develop with the DBM in mind and recognize overnutrition as an equally important problem as undernutrition, with many overlapping interventions. The first priority for tackling the DBM is to address maternal and child undernutrition. A programme framework for the DBM is proposed, with evidence-based interventions organized by phase of the life course, and by direct and indirect interventions similar to the nutrition specific and nutrition sensitive language of the SUN framework.

**Many of the interventions in the DBM programme framework are already being implemented in Indonesia, although not organized under such a framework.** An assessment of the coverage of the various interventions reveals a mixed picture with many advances and many gaps that still need to be filled. Non-implementation of the Code of Marketing of Breast-milk Substitutes is one example of such a gap, now existing for two decades or more. Policies, programmes and legislation exist but enforcement is lacking.

**Many advances have been achieved though food fortification with micronutrients, such as through iodized salt, but maternal anaemia in particular is still a problem.** Social welfare programmes have done well in ensuring food security even among the poorest of the poor, but the emphasis to date has been more on food quantity than quality, and targeting has often been poor. Schools are critically important for fostering healthy lifestyles that will mitigate the effects of the DBM, but very little yet seems to have been done in this regard. Health systems and medical professionals can also be effective in tackling the DBM, but the lack of awareness of overweight/obesity and stunting as problems among health staff will need to be rectified. Little or no mechanisms exist for controlling the advertising of food to children, and food labelling and nutrition profiling seem still to be incipient. In addition, there are challenges posed by decentralization and the lack of adequate nutrition guidelines for districts to follow in preparing local development plans, as well as the lack of capacity in nutrition, especially at the district level.

**The lack of an overarching coordinating mechanism for nutrition in Indonesia has already been recognized.** In constructing such mechanisms it is essential to envisage programmes for the DBM, and not just maternal and child undernutrition. Indeed the financial implications of the DBM are massive, with effects way beyond the Ministry of Health. A policy framework for such a coordinating body is proposed to organize the various programme interventions by the ministry under four pillars, namely: food security, food safety, healthy lifestyles, and nutrition. The capacity to act in nutrition has already been recognized as in need of strengthening, and actions are already underway to do this.



## Chapter 7

# Suggested Policy Actions for Consideration





**In order to tackle the double burden of malnutrition (DBM) in Indonesia the following policy actions are suggested.** These are grouped into various functional areas, both by stage of the life course as well as type of activity.

### **Nutrition Policies and Plans**

1. Ensure from the earliest, practical moment possible that nutrition programmes in Indonesia become oriented towards tackling the DBM, recognizing that the first priority for doing this is to tackle the problem of stunting by improving maternal and child nutrition, largely by implementing the Lancet Nutrition Series package of direct nutrition interventions
2. Ensure that the currently evolving high-level national nutrition council/forum for coordination and oversight for nutrition programmes and policies includes plans to tackle the DBM, building on current initiatives to follow through on the SUN Movement.
3. Consider ways to ensure that future RPJMN and RANPG adequately address the DBM.

### **Maternal, Infant and Young Child Nutrition**

1. Strengthen the mechanisms already in place and ensure their enforcement so that the Code of Marketing of Breast-milk Substitutes becomes a reality and infants are no longer given breast milk substitutes by health professionals, especially at the time of birth.
2. Strengthen efforts to improve diets of young children, be it through home-fortification, fortification of complementary foods and/or the use of local animal source foods as appropriate.
3. Further strengthen all efforts to control the multiple micronutrient deficiencies that continue to assail mothers and young children especially, through fortification and/or supplementation. Furthermore, in order to control maternal anaemia, introduce deworming during pregnancy, as recommended by WHO, as a short term measure until sanitation levels improve.

### **Food and Nutrition Security**

1. Strengthen aspects of agricultural policy in order to promote vegetable and fruit production through small-scale local farmers, not only to improve quality of food availability but also to improve incomes among the rural poor, so that both food security and nutrition security are ensured.
2. Strengthen all social welfare programmes for mothers and young children by ensuring conditionality of cash transfers as well as linkages to the promotion of highly nutritional cash crops such as fruits and vegetables, which could/should be provided by small-scale local farmers through local farmers markets.

### **Nutrition Education and Healthy Lifestyles**

1. A first priority is for dealing with the stunting/obesity/NCDs problem is to develop extensive and effective nutrition education throughout the country starting with students, academicians, government officials, politicians, the food industry as well as the general public. In order to do, this some short term awareness-raising effort aimed initially at policy-makers may be needed.
2. Develop plans to make all schools “nutrition friendly” schools which promote the use of healthy foods and physical activity, starting in 2013 with pilot initiatives in at least five provinces, building on PMTAS.
3. Ensure that all capacity-building efforts to strengthen nutrition professionals and health service staff fully address the DBM.
4. Put into national law regulations to reduce the impact on children of marketing of foods high in saturated fats, trans fatty acids, free sugars, or salt, as recommended by the World Health Assembly resolution WHA63.14. Advertising of any food to children through any media should be banned and infractions punished.
5. Take measures to ensure that future urban planning initiatives are “exercise friendly” by including more bike lanes, pavements, pedestrian precincts and parks.

## Research

1. Develop models to estimate the economic and fiscal impacts of the DBM across the life course.
2. Explore the potential for and possibilities of introducing taxes on imported food commodities that benefit from subsidies in the country of origin, as well as taxes on selected fast foods such as high sugar drinks that are particularly *obesogenic*.
3. Investigate the fat content of the national diet including: the quality of the fat, the proportion that is saturated versus poly-unsaturated, and the amounts and sources of trans fats being consumed.
4. Conduct national level nutrition surveys to ascertain what the situation is with regard to micronutrient status, especially for iron deficiency anaemia, iodine, vitamin A and zinc deficiencies.



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