Review Article

Developments in clinical food and nutrition science in Indonesia

Widjaja Lukito MD, PhD[1], Lindawati Wibowo SSi, MSc[2], Mark L Wahlqvist MD (Adelaide), MD (Uppsala)[3,4,5]

[1] Southeast Asian Ministers of Education Organization – Regional Centre for Food and Nutrition (SEAMEO-RECFON), University of Indonesia, Central Jakarta, Indonesia
[2]Millennium Challenge Account-Indonesia (MCA-I), Central Jakarta, Indonesia
[3]Monash Asia Institute, Monash University, Melbourne, Australia
[4]Institute of Population Health Sciences, National Health Research Institutes, Miaoli County, Taiwan
[5]School of Public Health, National Defense Medical Center, Taipei, Taiwan

Indonesia, as a major population in the Asia Pacific region, threatened with food and health insecurity through climate change and rapid economic development, faces the challenge to build capacity among its science-based food and health professionals and institutions. The nutrition research agenda is now being more actively set within the region, rather than by external imposition. A series of papers emanating from a new generation of public health and clinical nutrition scientists is reported in this issue of APJCN. It draws attention to the importance of food patterns and background culture as contributors to the failure of the nutrient rather than a food, food system and socio-ecological approach to solve the region's intransigent nutritionally-related health problems. New understandings of human eco-social biology are providing opportunities to accelerate the resolution of these problems. The challenge is to transform the food-health construct from one which is not sufficiently concerned about the precarious state of ecologically dysfunctional health and its nutrient market drivers to one which strives for more sustainable and affordable solutions. The present reports address a range of options to these ends.

Key Words: personal nutrition, food patterns, immune function, neuronutrition, microbiomics

INTRODUCTION

The need for evidence-based food and nutrition policy and practice is an established imperative.[1] Throughout the Asia Pacific region there is an increased effort to address food and nutritionally-related health problems. Indonesia, the world's 4th most populous nation, is part of this phenomenon.[2] For too long, the nutrition research agenda has been set largely by those outside the region. As a consequence and somewhat understandably, the emphasis has been on indices of 'protein-energy malnutrition' and micronutrient deficiencies like those of iodine, iron, zinc, vitamin A, folic acid. Curiously, even though thiamin deficiency was first described in the late 19th and early 20th century in Indonesia and Malaysia for which Eijkman received the Nobel Prize in medicine and physiology, the interest lapsed and was still evident a century later as reported by Juguan and Lukito.[3] A series of papers emanating from a new generation of public health and clinical nutrition scientists, reported in this issue of Asia Pacific Journal of Clinical Nutrition, draws attention to the importance of food patterns and background culture as contributors to the failure of the nutrient rather than a food, food system and socio-ecological approach to solve the intransigent nutritionally-related health problems. It is also evident that new understandings of human eco-social biology are providing new opportunities to quicken the pace of resolution of these problems. The challenge is to quicken the transformation of the food-health construct from one which is not sufficiently concerned about the precarious state of ecologically dysfunctional health and its nutrient market drivers to one which strives for more sustainable and affordable solutions. That this can happen is encouraged by the present reports.[4-15]

NUTRITIONAL EPIDEMIOLOGY

In this progressive series of selected papers, there remains a notable deficit of population-based studies about the multiple local and traditional dietary patterns across the more than 6000 inhabited islands (of about 17,000 in total) in the Indonesian archipelago, together with how they relate to health and wellbeing. The food and health dilemmas are those shared by indigenous people globally.[16,17] Even the available cohort studies of maternal and child health provide little information about these patterns,

Corresponding Author: Dr Widjaja Lukito, SEAMEO Regional Center for Food and Nutrition, 6 Salemba Raya, Jakarta, Indonesia.
Tel: +62 21 31930205; Fax: +62 21 3913933
Email: wlukito298@gmail.com
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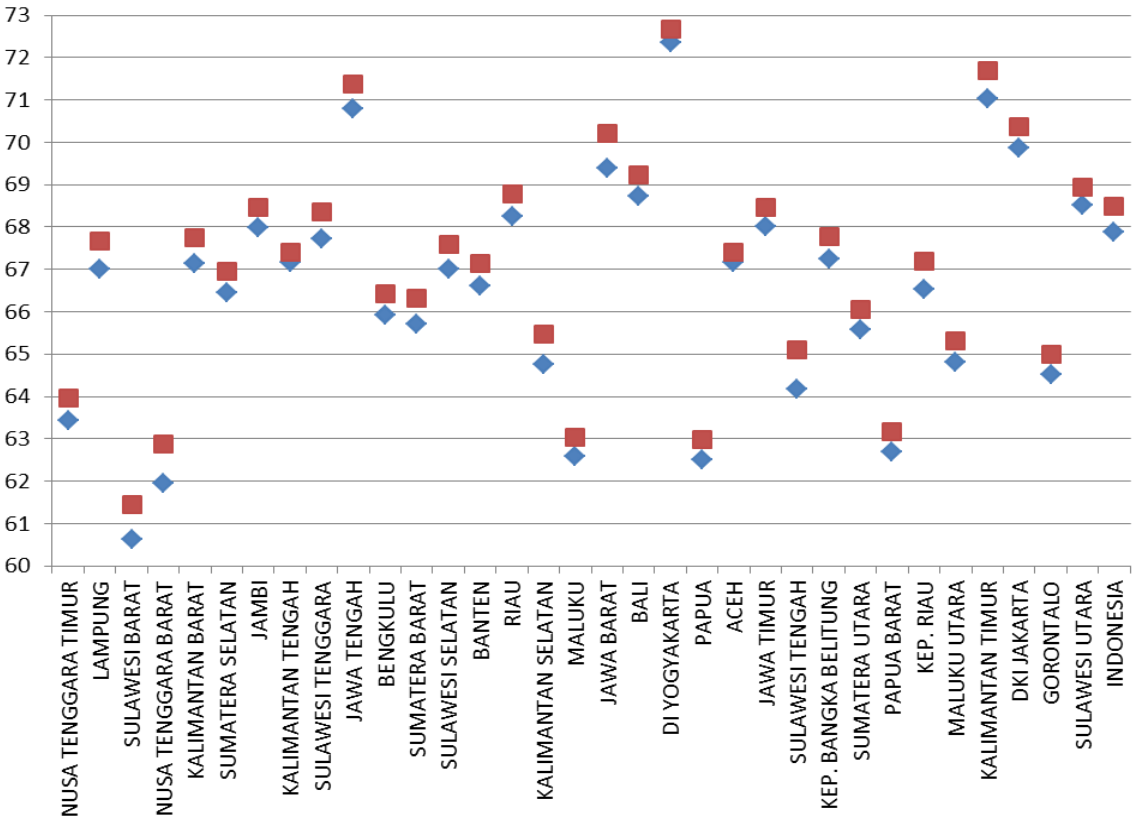

Figure 1. Trend in life expectancy for men by province in 2010 (in blue) and 2013 (in red).[24]

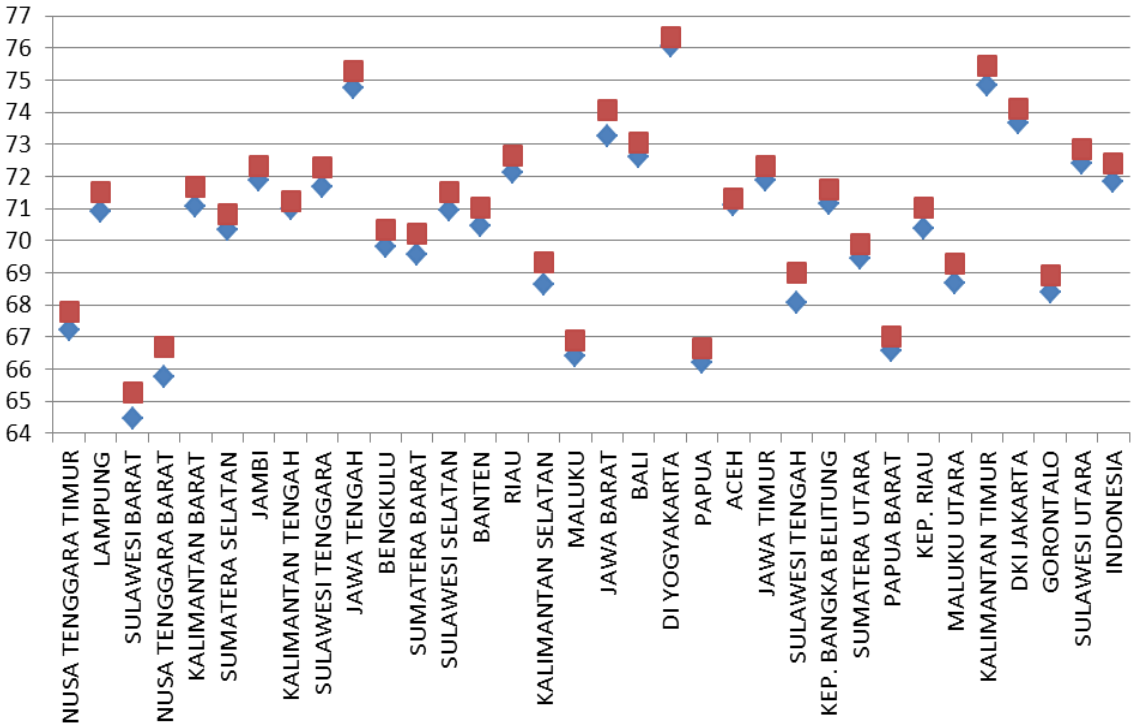

Figure 2. Trend in life expectancy of women by province in 2010 (in blue) and 2013 (in red).[24]

as in the Tanjung Sari and SUMMIT Studies.[18,19]

There is potential for administrative cohort studies by use of the Baseline Health Surveys (*Riset Kesehatan Dasar* or *RISKESDAS*) of 2007,[20] 2010,[21] and 2013,[22] but they are of households rather than individuals. Nevertheless, these could provide local food cultural patterns for consideration in regard to health profiles. The Total Diet Study (*Studi Diet Total*)[23] of 2014 would allow these relationships to be explored by province. Figure 1-4 show that life expectancies[25] and BMI for adults vary greatly by

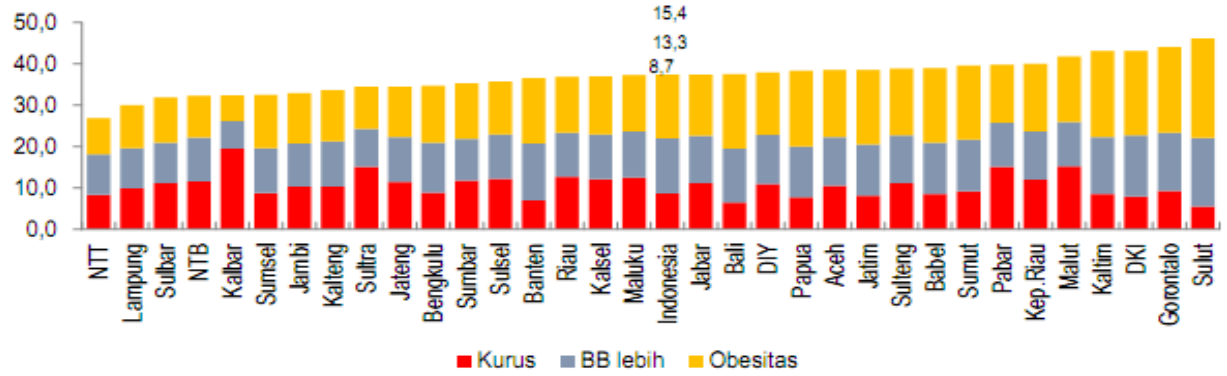

Figure 3. Prevalence of thinness (in red), overweight (in blue), and obesity (in orange) among adult (> 18 year old) based on BMI in 2007, 2010, and 2013 by province.[23]

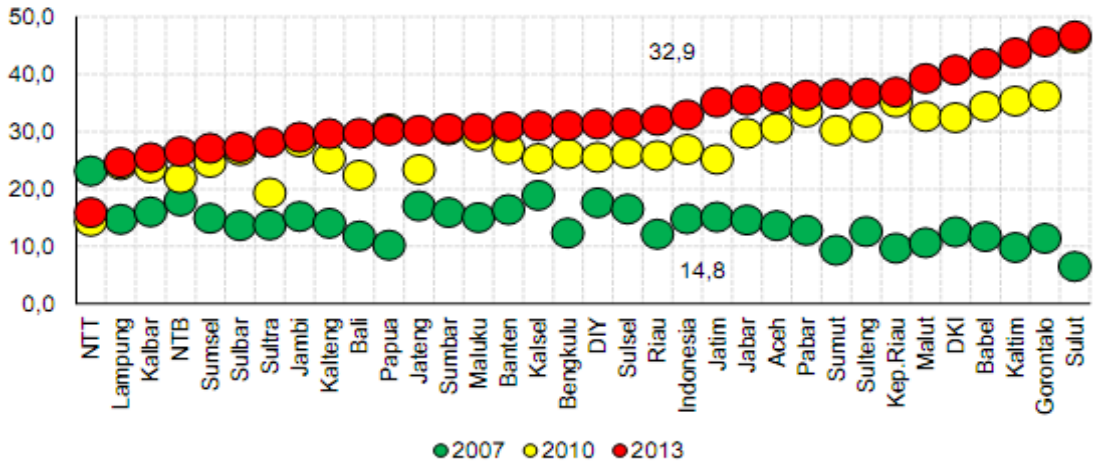

Figure 4. Prevalence of overfatness among adult women (>18 year old) based on BMI >25 in 2007, 2010, and 2013 by province.[23]

Table 1. Nutritional status among under-five children based on anthropometric indices.[23,25]

Indicator	Proportion (%)			National target 2019 (%)
	2007	2010	2013	
Based on WAZ				
Underweight & severe underweight	18.4 (medium)	17.9 (medium)	19.6 (medium)	17
Severe underweight	5.4	4.9	5.7	
Underweight	13.0	13.0	13.9	
Based on HAZ				
Stunting & severe stunting	36.8 (high)	35.6 (high)	37.2 (high)	28
Severe stunting	18.8	18.5	18.0	
Stunting	18.0	17.1	19.2	
Based on WHZ				
Wasting and severe wasting	13.6 (high)	13.3 (high)	12.1 (high)	Not available
Severe wasting	6.2	6.0	5.3	
Wasting	7.4	7.3	6.8	
Overweight	12.2	14.4	11.9	

WAZ: weight for age z-score; HAZ: height for age z-score; WHZ: weight for height z-score.

province.[23] So also do indices of child nutrition (Figures 5-7).

Table 1 draws attention to the ongoing high prevalences of not only stunting, but also wasting. In the future, it would be useful to researchers and policy makers to understand the basis of wasting and how strategies might be developed to address it. These are likely to require a knowledge of local and individual food patterns and security.

FOOD AND NUTRIENT SCIENCE: EATING PATTERNS

A general limitation in the nutrition research reported here is that background dietary information is not available or presented only as nutrients rather than food or food patterns. The notion that gains in understanding and program development are made by reduction of food to nutrients is flawed as this approach leads to a loss of information, which cannot then be used to understand the

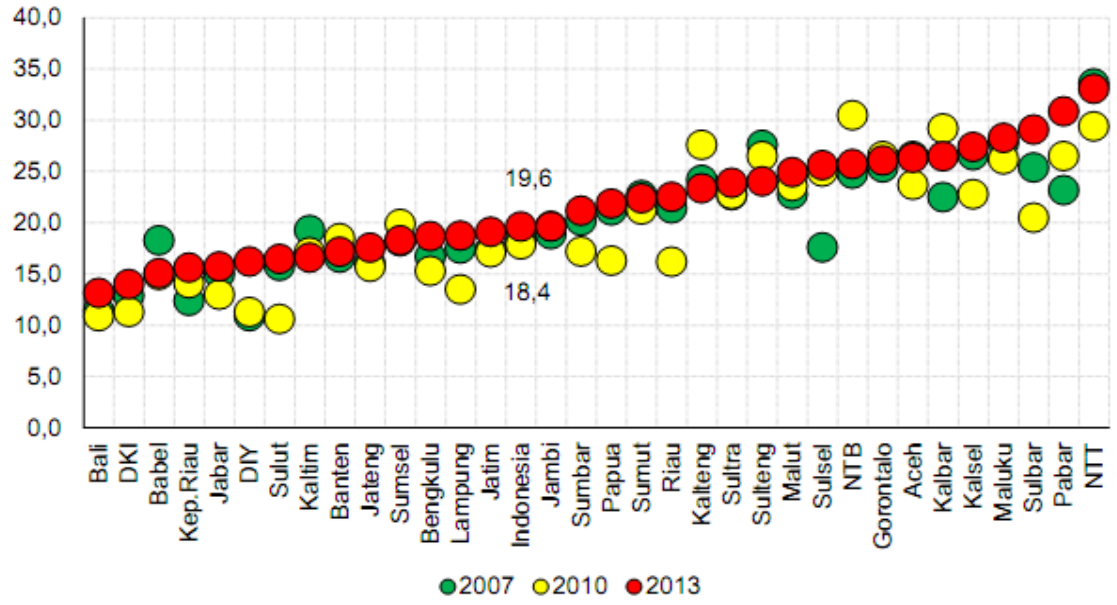

Figure 5. Prevalence of underweight among under-five based on weight for age z-score <-2.0 SD in 2007, 2010, and 2013 by province.[23]

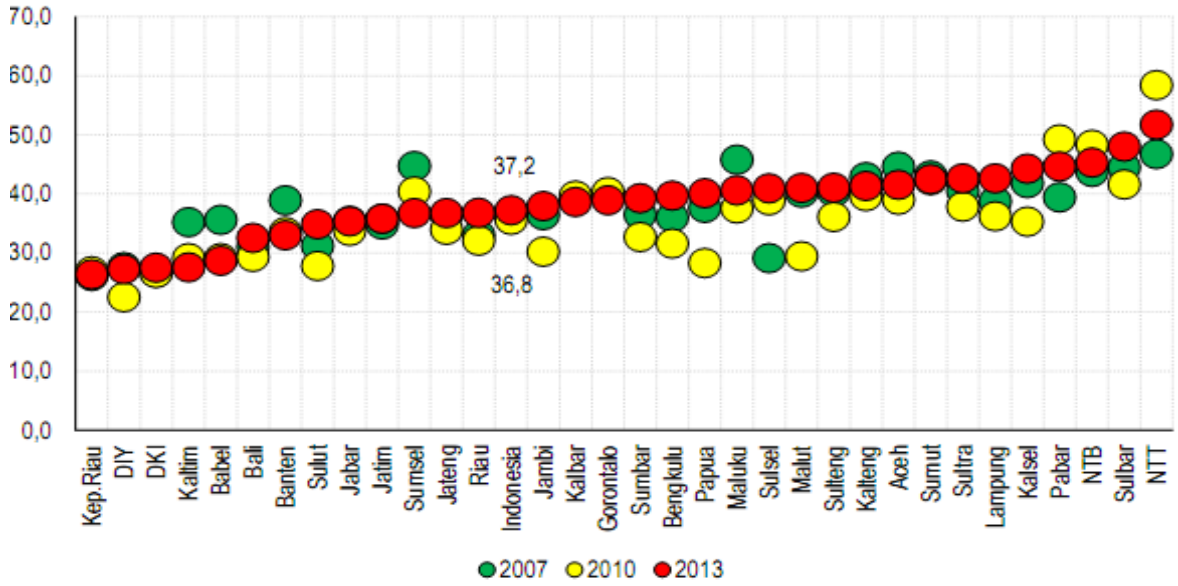

Figure 6. Prevalence of stunting among under-five based on height for age z-score <-2.0 SD in 2007, 2010, and 2013 by province.[23]

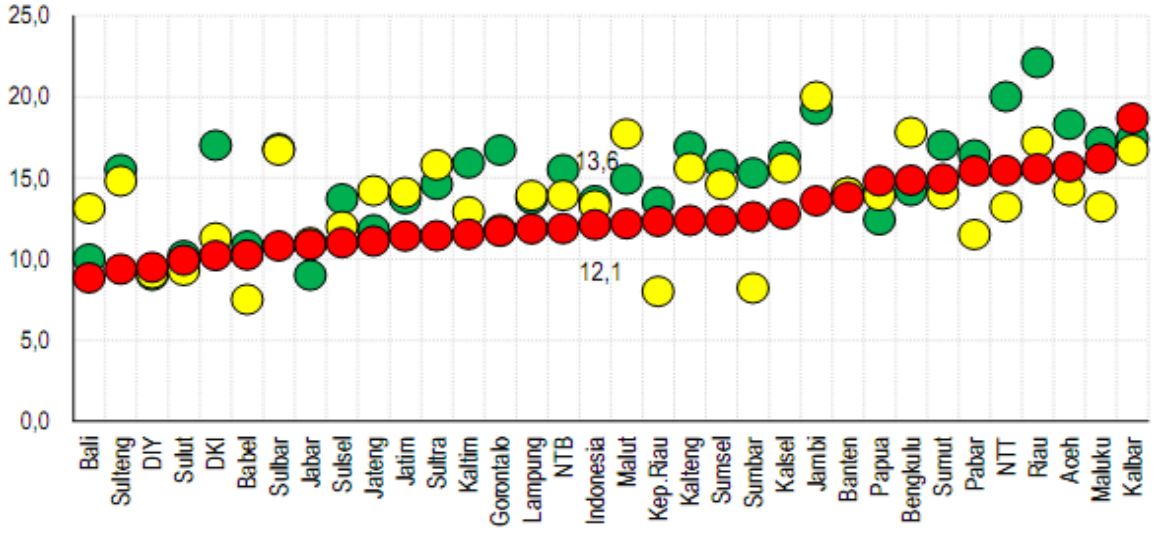

Figure 7. Prevalence of wasting among under-five based on weight for height z-score <-2.0 SD in 2007, 2010, and 2013 by province.[23]

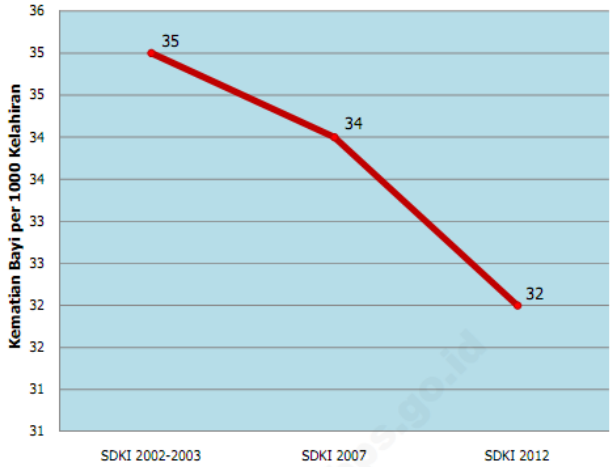

Figure 8. Infant mortality rate 2002-2012.[33]

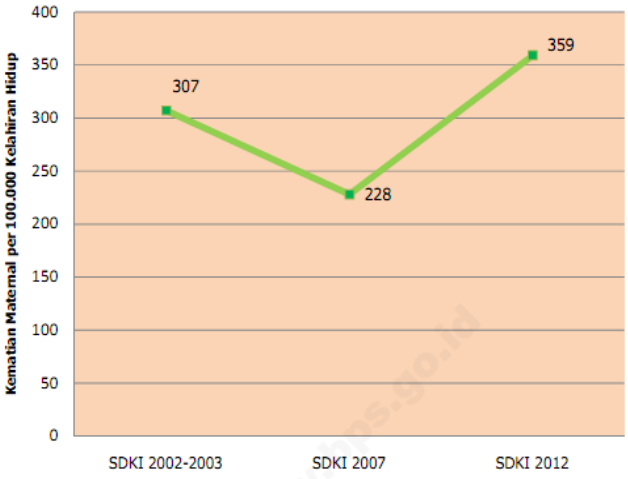

Figure 9. Maternal mortality rate 2002-2012.[33]

complexity of food-health relationships on which solutions depend. More than that, in the light of nutrient-health associations, nutrients-only as a preventive or therapeutic strategy imposes a higher risk-benefit.[26] It is increasingly clear that food patterns predict health outcomes better than anyone food and better than individual nutrients.[27] The effect of a nutrient may be markedly modified by the background diet, in part because the food matrix is a delivery system and in part because food components interact competitively and synergistically: for example, magnesium efficacy is affected by the degree of dietary diversity.[28] In Indonesian studies, this would appear to be the case with vitamin A[4] and other supplements.[5]

MATERNAL AND CHILD HEALTH AND NUTRITION

The ways in which maternal and child health are linked are more extensive than previously thought, but which, in any case, are known to involve socio-behavioural connections. Indonesian work in this area now invokes a spectrum of beliefs and customs,[6] placental function[7] and breastfeeding[8] through previously poorly understood mechanisms. Work among Bataknese women in Simalungun, North Sumatra, confirmed the belief and practice of consuming a vegetable soup with torbangun leaves as one which increases breast milk production, without loss of quality, through delayed decline in prolactin status.[29,30]

In the light of these major differences in nutritional status and health indices by province, it is clear that more detailed ecological, food intake, and disease specific information is required for problem definition, policy formulation, and action. Of particular note is the current awareness of the link between iron supplementation and fatal malaria parasitemia in endemic areas.[31] Another example of the need for local and ecological information about diet and health is that of nutrient supplementation programs for pregnant women; here there is evidence that maternal mortality maybe increased due to more prevalent obstructed labor as young age marriage is still prevalent across different ethnicities.[32] Unfortunately, these adverse events, although of local concern, tend to be ignored or overlooked and subject to publication bias with selective outcome data e.g. the reporting of infant rather than neonatal mortality (Figure 8) and of maternal mortality without infant mortality (Figure 9) in relation to various intervention programs.

NUTRITION, IMMUNOFUNCTION AND INFECTION

The well recognized link between nutritional status and infection through compromised immunofunction has gained further support through Indonesian studies of placental malaria.[7] In persistent childhood diarrhea, exocrine pancreatic dysfunction is evident and may be a consideration in therapy.[9] In pregnant Indonesian women, it may be possible to improve immunofunction by combined prebiotic, probiotic and micronutrient fortification of ingested milk.[10]

OVERFATNESS AND CHRONIC DISEASES

From childhood[11,12,15] to adolescent,[13,14] links between nutritionally determined inflammatory processes, as with n-3 and n-6 fatty acids[11,12] insulin resistance[13] are receiving attention in Indonesia.

NUTRITIONAL MICROBIOMICS

In a country still in economic transition, the nexus of dysnutrition and infection remains important. Moreover, the renewed interest in human microbiomics may provide opportunities to reduce this burden of disease[11] along with the wide spectrum of pathophysiological phenomena dependent on this dominant part of the human genome with its intimate ecological dependence.

SUMMARY

In this collection of nutrition research reports from Indonesia, we have been able to workshop their context and so consider the connections between various observations and interventions on the one hand, and different outcomes on the other. Workshopping reports among national peers adds critical value to the ultimate reports. We have come to appreciate that there are some serious disconnects among reports and in relation to needs and priorities. One of the most striking is the attribution of outcomes to nutrients rather than foods. Another is the inclination not to report favourable and adverse outcomes together. The workshop would like to have developed more dialogue

between academia and policy makers and between the various Indonesian provinces.

Nutritional biology is on the cusp of a revolution in its understanding. Food and nutrition science is responding to this revolution in several respects- from nutrigenomics to microbiomics to econutrition and nutritional socio-economics. Each of these dimensions has implications for both public health and clinical nutrition. The point at which personalised nutrition, with reference to bioactive food components and nutrigenomic, takes the place of or compliments integrated public health nutrition is vexed ,arguable and in a state of evidential flux. Indonesia, located in the vibrant Asia Pacific region, is responding to this socio-biological challenge with promise. The timing could not be more pertinent given the rate of climate and associated changes in food, water and energy security. In the future, natural disaster nutrition is bound to feature prominently in our discourse.

AUTHOR DISCLOSURES

Dr W Lukito is currently also the Chair of the Indonesian Danone Institute Foundation. The other 2 co-authors (IW and MLW) have no conflict of interest in regard to this paper.

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