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Strengthening data availability and linkage for policies and programmes to improve maternal nutrition and the first 1,000 days of life: Country analysis – Indonesia, Philippines, and Thailand

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ABSTRACT

Background: The multiple burden of malnutrition among children and women is a major nutrition challenge for Southeast Asian countries. Maternal malnutrition remains prevalent, hindering optimal maternal and child health outcomes. This project aimed to better understand situations and challenges and identify policy/programme-relevant data to enhance the efforts to improve maternal nutrition. **Methods:** Data from large-scale national health, nutrition, and/or food consumption surveys, including key maternal nutrition indicators, relevant policies, and implemented programmes, were compiled from the Philippines, Thailand, and Indonesia. Lessons learnt and data/information gaps to strengthen policy decisions and programme performances were critically analysed. **Results:** Indonesia and the Philippines secured high-level policy commitments for the 1,000 Days of Life movement, while Thailand's Ministry of Public Health implemented the "Miracle of 1,000 Days" policy via its health system. Types and strength of evidence triggering policy decisions differed. Major challenges for all countries included data gathering and complex analyses, which hamper timely decisions. Rapid assessment tools, including digital-based ones, that can collect and analyse action-relevant data/ information in a frontline-orientated, timely, and multi-sectorally relevant manner

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are needed for actionable policies and programmes. Inclusion of dietary intake data for adolescents, pregnant and lactating women in large-scale surveys, reframing maternal nutrition as central to human capital development, and promoting closer collaboration between researchers and policy/programme planners will help in communication, priority setting, and capacity development. **Conclusion:** For effective maternal nutrition improvement, fostering the linkage of policy and programme-relevant data will readily avail them for use by frontline and multi-sectoral stakeholders, as well as policymakers.

Keywords: ASEAN nutrition policies and programmes, first 1,000 days movement, infant and child nutritional status, maternal nutrition

INTRODUCTION

Several countries in Southeast Asia have made considerable progress in alleviating undernutrition in infants and young children, and, to some extent, reproductive-age women. Meanwhile, over-nutrition among children has been rising, more rapidly in countries in developmental transition, resulting in a double or triple burden of malnutrition (under- and over-nutrition, micronutrient deficiencies). Data on dietary intakes and status of female adolescents and reproductive-age women, particularly during pregnancy and lactation, are very scarce. A major challenge facing low- and middle-income countries (LMICs) in collecting these data, especially in large-scale, nationally-representative surveys, is the cost and feasibility in routine health systems. It is even more challenging to ensure that these data are regularly collected, compiled, analysed, and interpreted specifically for effective policy decision-making, programme planning, monitoring, and evaluation.

To understand this challenge more in-depth, institutions in three ASEAN countries – Indonesia, the Philippines, and Thailand – joined together to undertake a collaborative project on *"Maternal dietary intakes and nutrition status in ASEAN countries: Strengthening data analysis for policy and programme"* conducted from January 2018 through May 2019, with support from the Bill & Melinda Gates Foundation. Project partners were the Faculty of Medicine, Universitas Indonesia; the Food and Nutrition Research Institute, the Philippines; and the Institute of Nutrition, Mahidol University, Thailand. All three countries chose to address the multiple burden of malnutrition by focusing on policies related to improving early nutrition during the first 1,000 days of life. Based on the project's process, this paper highlighted the situations, challenges, and opportunities countries faced in mobilising evidence-based data systems to inform policy and programme implementation and improve maternal nutrition during the first 1,000 days of life.

METHODOLOGY

Countries in Southeast Asia, namely, Indonesia, the Philippines, and Thailand, were selected based on their availability of periodic large-scale national health, nutrition, and/or food consumption surveys that included key maternal nutrition indicators. The first planning meeting of the country teams was convened on 26-27 April 2018 with the following objectives: 1) to provide the specific requirements of data needs from policy and programme managers' perspectives in relation to women/ maternal nutrition (including dietary intake and nutritional status); 2) to explain the profile of available national data relating to dietary intake and

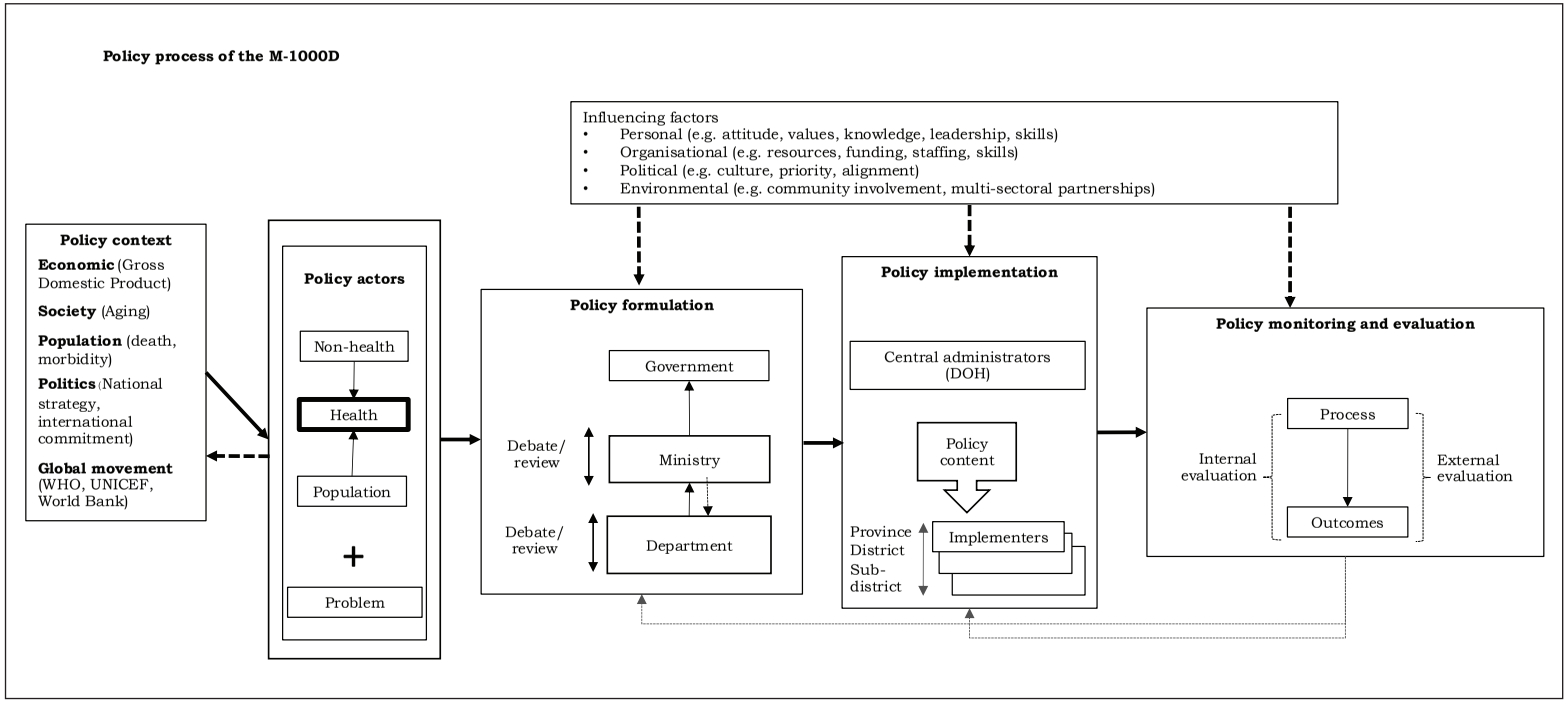

Figure 1. Evidence-based policy decision process framework for country case analysis

nutritional status of women of reproductive age/pregnant and/or lactating women; and 3) to identify the types of evidence that policymakers need for decision-making related to the policy of focus in each country. Each country partner brought together relevant and experienced national policymakers, programme planners, and experts from data units to review each country's progress in systematically prioritising, compiling, and analysing existing maternal nutritional status and dietary intake data. They then assessed how such data have been applied for policy formulation and programme implementation, as well as how to strengthen data usage for policy-making and programming.

A framework was developed for collecting country information and analysis. As depicted in Figure 1, different types of evidence were needed for different stages, from assessing the situation and understanding the context to identifying data needs for policy formulation and decision; when policy is implemented, identifying data/information needs in monitoring and evaluation of the implemented programmes. Project coordinators monitored the progress of country cases and addressed issues of concern via conference calls every three months. The first drafts of country reports were circulated for comments and revision.

A final meeting was organised (29-30 April 2019) to share the three country case reports on how national data on maternal/child nutrition and/or dietary intakes have been utilised to inform policy and programme implementation. Additionally, data generators and policy implementers from other ASEAN countries, regional experts and development partners were also invited to participate. Inputs from this final meeting were used for final revisions of the country case studies, conducting a final synthesis, and making recommendations.

Ethical approval

This study was conducted according to the guidelines laid down in the Declaration of Helsinki. All procedures involving research study participants were approved and exempted by the Committee for Research Ethics (Social Sciences), Mahidol University, Thailand (certificate of exemption no. 2018/022.2606).

RESULTS

Philippines

Nutrition data profile

The Department of Science and Technology-Food and Nutrition Research Institute (DOST-FNRI) is the main source of Filipino maternal and child nutritional status data. As mandated by law, the National Nutrition Surveys (NNS) are conducted every five years, which include nutrition and health status indicators, diet, lifestyle-related risk factors, food insecurity, government programme participation, and infant and young child feeding practices. The Philippine Statistics Authority (PSA) provides additional socio-demographic data from the National Demographic and Health Statistics and the Family Economic and Income Surveys. These data inform government policy-making and development planning activities. Relevant nutrition landscapes and data sources are highlighted in Box 1.

Nutrition policy-making and programming

DOST-FNRI, the primary research arm, provides relevant technical information for formulating policies, strategies, programmes, and intervention models regarding food, nutrition, and related science and technology services. The National Nutrition Council (NNC) is the highest policy-making body in nutrition,

Box 1: Key information on maternal and child nutrition situation in the Philippines

1. A slow decline in the prevalence of nutritionally at-risk pregnant women from 30.7% in 1998 to 24.7% in 2015.
2. The prevalence of low birth weight was 13% in 2003, increased to 20% in 2008, to 21.4% in 2013, and dropped to 15% in 2017 [Philippine Statistics Authority (PSA) and ICF, 2018].
3. Stunting among infants aged 0-5 months was over 10% and 38.6% among children under 3 years in 2015.
4. Among lactating mothers, significant increases in chronic energy deficiency (11.9% vs. 13.6%) and overweight/obesity (17.7% vs. 22.4%) from 2011 to 2015. The latter was more common among adult mothers with higher educational attainment, working, living in urban areas, and those in the richest quintile.
5. Anaemia prevalence declined from 1998 (50.7%) to 2013 (24.6%) and among lactating women (45.7% to 16.7%). Pregnant adolescents and lactating mothers were of greatest risk. Vitamin A deficiency among pregnant women declined from 22.2% in 1998 to 9% and among lactating mothers from 16.5% in 1998 to 5.0 % in 2013. Finally, iodine deficiency was more prevalent among lactating women (34.3%) than among pregnant women (27.0%).
6. Only 16.3% of pregnant women and 13.0% of lactating mothers had adequate energy intake; adequacy levels were especially low for riboflavin, calcium, and iron.

Sources: DOST-FNRI (2015); DOS-FNRI (2016), Philippine Statistics Authority (PSA) & ICF (2018)

convening related agency experts and formulating the Philippine Plan of Action for Nutrition (PPAN) through the NNC Secretariat. Policies and programmes approved by the Governing Board of the NNC are implemented. Under the Philippines First 1,000 Days Law, the government prioritises nutrition of pre-pregnant, pregnant and lactating women, adolescents, infants and young children. This provides comprehensive, multi-sectoral strategies and approaches by integrating the government's short-, medium-, and long-term plans to end hunger, improve health and nutrition, and reduce malnutrition. Key enabling factors to strengthen PPAN are strategic thrusts, which include securing policy, public advocacy, and intensified mobilisation of national agency partners and local government units for increased nutrition investments. Mobilisation of local government units for nutrition outcomes helps in strengthening the coordination, monitoring, evaluation, and management support of PPAN (National Nutrition Council Philippines, 2017).

For implementation, legislative policies trigger the mandatory implementation of programmes or new guidelines to protect and promote the health of the targeted population groups, such as the First 1,000 Days Republic Act 11148 (Health and Nutrition of Mother and Child Act). Executive or administrative policies initiate programme development or improve implementation of existing programmes by issuance of Administrative Orders (AO), e.g., AO for antenatal care (ANC) and health reforms to rapidly reduce maternal and neonatal mortality. Effective interventions, both nutrition-specific and nutrition-sensitive, identified by global experts were also considered.

For high prevalence of nutritionally at-risk pregnant women and chronically deficient lactating women, the AO No. 2008-0029 mandated an Integrated Maternal, Neonatal and Child Health and Nutrition Strategy, which includes provision of iron-folic acid supplements and nutrition counselling. The guidelines for quality ANC and nutrition for reproductive-age women (AO No. 2016-0035) were developed through a multi-stakeholder consultative process (Department of Health, 2008). By virtue of the Republic Act No. 8976, a food fortification programme was scaled up and entailed the addition of micronutrients, e.g., vitamin A in flour and cooking oil, iron in rice and flour, and iodine in salt. Other examples include revised policy on micronutrient supplementation for reproductive-age women, infants and young children and weekly iron-folic acid supplementation for female adolescents in public high schools (AO No. 2010-0010).

Strengthening data relevance for policies and programmes

To achieve ANC's full life-saving potential, timely nutrition assessment data for pregnant and lactating women is crucial to provide appropriate interventions for nutritionally at-risk and overweight/obese women. An integrated monitoring, reporting, and evaluation information system has been established. Critical indicators were identified and agreed upon by stakeholders; these serve as a basis for improving interventions, and ultimately, measuring the impact of the policy. To ensure that PPAN 2017-2022 delivered the planned outcomes and complemented the interventions in the First 1,000 Days, 38 areas with greater magnitude of stunting and wasting were prioritised to mobilise local government units (LGUs). Lessons learnt highlighted the importance of identifying critical indicators on maternal and child nutrition, coverage of nutrition-related health services, continuous capacity building for LGU staff, and community involvement in improving data quality. Integrating and coordinating data from various sources and establishing feedback loops to refine data processes are crucial for effective implementation.

Currently, monitoring systems are also in place, e.g., the Field Health Service Information System (FHSIS), which tracks basic ANC data at health facilities. While the FHSIS provides routine data, it lacks the depth and specific nutritional indicators (e.g., maternal anaemia, micronutrient deficiencies, specific feeding practices). The NNS offers valuable snapshots of nutritional status but not sufficient for continuous monitoring. Therefore, an integration between health data systems and relevant/prioritised nutrition indicators from surveys within the monitoring frameworks of the routine data system should enable continuous tracking of progress and timely interventions.

Lastly, the costing of interventions can contribute greatly to advocating for nutrition with policymakers and influencing decisions. Studies on the impact of undernutrition and return on investment in nutrition showed that the Philippines was losing around $4.5 billion/year, equivalent to 1.5% of the country's 2015 GDP. For every $1 invested in nutrition, there would be a $12 return to the overall economy (UNICEF Philippines, NNC, DOH, 2015). Moreover, by providing information on financial requirements of different interventions (e.g., micronutrient supplementation, food fortification) and all associated costs (staff, supplies, and infrastructure), it offers critical insights into decisions on choice of interventions. This helps with advocating for appropriate funding and resource allocation, thus ensuring financial feasibility and alignment with the country's needs.

Box 2. Key information on maternal and child nutrition situation in Thailand

1. Underweight (BMI <18.5 kg/m^2) prevalence among women aged 15-29 years increased from 15.4% in 2004 to 20.1% in 2014. Prevalence of overweight/obesity among women aged 15-44 years increased around 5% from 2004 to 2014.
2. Low birth weight prevalence declined to 12% in the 1980s and throughout 1990-2000; remained at 8-9%; and has been rising since 2012 (7.6% in 2012, 9.4% in 2014 and 11.1% in 2019), though the prevalence reported in the HDC [has been considerably lower (5.1-6.7% during 2013-2018).
3. Anaemia among pregnant and lactating women declined from about 40% in 1986 [to approximately 15% in 1995 and increased to 26% and 30% in 2003] among pregnant and lactating women, respectively; anaemia among reproductive age women was 18.6%.
4. Among pregnant women attending ANC, median urinary iodine concentrations (mUIC) from 2007 to 2010 were 108-142 µg/L (IDD cutoff of mUIC <150 µg/L using WHO criteria). After the iodine supplementation programme, the mUIC increased and remained around 150 µg/L from 2011 to 2016.
5. Stunting and underweight among children under five have substantially declined since 1987, but remained at 10-12% for stunting and 10-15% for underweight during the past two decades (Winichagoon, 2013).
6. Large-scale surveys conducted after 2000 have shown that overweight and obesity prevalence is 8-20% among preschool children, depending on the criteria used. Using International Obesity Task Force (IOTF) criteria, prevalence of overweight and obesity among preschool children (2-4 years) was 13.2% for both boys and girls in 2008/9, comparable to those of developed countries in the region. Using WHO growth standards, overweight prevalence among under five children has risen, e.g. from 6.8% in 2006 to 9.0% in 2019.

Sources: Winichagoon (2013); Office of Permanent Secretary, MOPH Thailand (HDC) (2018); Bureau of Nutrition (2018); Aekplakorn (2010); Thailand National statistics Office (MICS) 2007 and 2020.

Thailand

Nutrition data profile

The Thailand country team focused their analysis on the nation's maternal and child health situation from large-scale national representative surveys, namely the National Nutrition Survey (NNS), the National Health Examination Survey (NHES), and the Multiple Indicators Cluster Survey (MICS) (Aekplakorn, 2010; Winichagoon, 2013). Unfortunately, the NNS, which included children under five and pregnant and lactating women, was terminated in 2003 due to the lack of funding. A second data source was identified, which is the health information system that collects data from routine health services based on priority indicators from each health department. Currently, the real-time health data can be accessed from the 'Health Data Centre' (HDC). Nutrition-relevant indicators include child anthropometry, low birth weight, maternal anaemia, Triferdine supplement, and ANC coverage. These data are used for monitoring progress across all levels of the health system. Selected major findings and data sources are shown in Box 2.

Nutrition policy-making and programming

Thailand's achievements in health, nutrition, and social development

since its First National Economic Development Plan (1961) and those of its subsequent National Food and Nutrition Plans have received worldwide acclaim (Winichagoon, 2013). While major achievements have been made in child malnutrition, until recently, much less attention was given to improving maternal nutrition beyond the impact on birth outcomes.

Maternal nutrition initiatives include iron and multivitamin supplements for pregnant women attending ANC to reduce anaemia; weight and height (body mass index, BMI) measurements to track appropriate gestational weight gain and identify risk of low birth weight (LBW); and nutrition counselling to improve birth outcomes and preparation for lactation. Improved health infrastructure and manpower capacity at the periphery have resulted in increasing ANC coverage and child delivery at health facilities. Screenings for high-risk pregnancy, gestational hypertension, and gestational diabetes have been included in the ANC services. A policy to supplement iodine during pregnancy by providing a special formulation, combining iron, folate, and iodine (Triferdine), was rolled out in 2012. Food-based dietary guidelines (FBDG) for the general population implemented since 2008 were modified to provide specific guides for pregnant and lactating women. Intensified promotion of exclusive breastfeeding during the first six months (e.g., workplace breastfeeding and legislation for 90-day paid maternity leave) is among the current programmes.

Thailand's current 20-year National Strategic Plan (2018-2037) places human capacity and performance at its core (National Strategy Secretariat Office, 2018). Based on national survey reports and international evidence, Thai policy actors from the government together with non-governmental organisations have created and officially adopted the "Miracle of 1,000 Days" (M-1000D) policy in 2017, prioritising pregnant and lactating women, as well as infants and young children up to 2 years of age. The ultimate policy goal is the full and harmonious development of a child, both cognitively and physically. From an implementation perspective, several existing programme components have performed well, such as over 90% for ANC coverage and hospital births (Thailand National Statistical Office, 2020) and around 70% for well child clinics. Advocating for a continuum of events and reinforcing proper nutrition throughout this period can potentially reduce both short- and long-term health risks for both mothers and children. Furthermore, continued advocacy among health personnel and those from other sectors to contribute to harmonised efforts beyond health services will be essential to improve maternal and child nutrition during this critical window of opportunity.

Strengthening data relevance for policies and programmes

Monitoring and evaluation are crucially important to assess policy appropriateness and effectiveness, track progress of government policies, and identify obstacles for future improvement. The Thai M-1000D policy includes a monitoring and evaluation plan emphasising both process and outcome, with attention to monitoring indicators related to maternal nutrition during pregnancy and lactation. The question is whether the collected data have been properly identified, analysed, interpreted, and synthesised for tracking programme performance and are useful for a 'crude' effectiveness evaluation. A model of data analysis and presentation that can be easily understood by non-nutrition personnel is needed for advocacy across health and non-health sectors at all levels and

Box 3. Key information on nutritional situation among adolescents in Indonesia

1. Approximately 25% of adolescents were stunted, 26% were anaemic, and 16% were overweight or obese.
2. The national prevalence of adolescent overweight and obesity rapidly increased over a five-year period, especially among young adolescents (10-14 years), older adolescents (15-19 years), and males.
3. Prevalence of early marriage among adolescent females and the poorest quintile (17.3%) was much higher than in the richest quintile (3.9%). Age of marriage increased from 17 years in 1991 to 20 years in 2012. Nearly 40.6% of girls married at 15-19 years of age, while 3.5% of girls married before age 15.
4. While dietary intake data are limited, reports noted that 65% of adolescents skipped breakfast, and 96% had insufficient intake of fruits and vegetables. The age groups of 10-14 and 15-19 years showed the highest frequency of consuming sweet, salty, fatty, burned/roasted, preserved, caffeinated, and flavoured foods/drinks, which are risk factors that could lead to non-communicable diseases. Relatedly, the prevalence of low physical activity was high among adolescents aged 10-19 years compared to older age groups.

Sources: Agustina *et al.* (2021); National Population and Family Planning Board Indonesia (2013); Central Bureau of Statistics Indonesia (2019); Indonesia Ministry of Health (2013); Center of Public Health Research and Development (2015); Indonesia Ministry of Health (2018).

for public awareness campaigns to reach community leaders, pregnant/lactating women and their families. Policy actors should be encouraged to compare data over time or analyse time series data and compare data on a similar domain from different sources to get an overall sense of policy effectiveness.

As dietary data during pregnancy and lactation have been scarce, efforts should be made to develop a 'rapid dietary assessment' tool that can be used to collect data during ANC and postpartum visits (in conjunction with well-baby clinics). Meanwhile, existing national data of women of reproductive age can be modelled to serve as a 'proxy' for consumption patterns of pregnant/lactating mothers. Other public health-related data, including anaemia, micronutrients, obesity, and non-communicable disease (NCD) risks, can serve as an 'early warning' to inform policy and identify preventive measures to curb potential adverse maternal and child health and nutrition consequences during the first 1,000 days and beyond. At present, less attention is given to over-nutrition among reproductive-age women. Long-term follow-up is needed for women who have been pregnant to prevent the risk of obesity and NCDs during mid-adulthood.

Indonesia

Nutrition data profile

Indonesia decided to focus on adolescents as part of the 1000d framework since adolescent marriage and pregnancy have been a challenge in maternal and child well-being. The focus on adolescents helped Indonesia to build the case for advocacy to improve adolescent nutrition as a priority. Adolescence is the second window of opportunity for quality growth and development, cognition, and risk reduction for non-communicable diseases in later years. In Indonesia, adolescents aged 10 to 19 years represent almost one-quarter of the country's total

population (Rah *et al.*, 2021; WHO, 2022; Patton *et al.*, 2016). The team reviewed several national data sources on adolescent dietary intakes, lifestyles, and nutritional status, e.g., the Indonesian National Health Survey (INHS), the Individual Food Consumption Survey (SMKI), the Indonesian Demographic and Health Survey (IDHS), the National Socioeconomic Survey (SUSENAS), and the Global School Health Survey (GSHS). Selected major findings and data sources are presented in Box 3.

Nutrition policy-making and programming

The aforementioned data formed a foundation for advocacy to policymakers and relevant stakeholders towards increasing efforts to support adolescent nutrition. The Presidential Regulation (*Peraturan Presiden*) No. 42/2013 initiated a national movement to accelerate nutrition improvement in the first 1,000 days of life (President of the Republic of Indonesia, 2013). This high-level commitment led to a Ministry of Health decree (No. 41) in 2014 on balanced nutrition guidelines for different age groups, including adolescents, and joint regulations among ministries on school health programmes. The delivery of balanced nutrition guidelines among school adolescents was supported by the Adolescent Friendly Health Services in Public Health Centres using a peer counsellor approach. A multi-sectoral nutrition programme targeted at school children called *Program Gizi Anak Sekolah* (ProGAS) provided nutritious breakfast and health education largely to elementary school children (Indonesia Ministry of Education and Culture, 2018). Since 2016, a national programme on supervised weekly iron-folic acid supplementation for adolescent girls in schools was implemented to control anaemia. "Aksi Bergizi" (Action on Nutrition) was built on this national programme by including additional nutrition education and public health messages to encourage good nutrition habits.

Following this regulation, the presidential decree (*Instruksi Presiden*) No. 1/2017 was issued to enhance the Healthy Life Style Movement and included adolescents among the target population. The subsequent Presidential Regulation No. 83/2017 served as a guideline for the national and local governments, as well as stakeholders, to increase the sustainability of food and nutrition security and to provide multi-sectoral coordination among several ministries (President of the Republic of Indonesia, 2017a, 2017b). All presidential regulations and decrees have created a national movement focusing on nutrition during the first 1,000 days of life. Hence, opportunities exist to raise the profile and strengthen adolescent nutrition within these policies through a multi-pronged focus on strengthening the food system, addressing morbidity determinants, improving dietary quality and balanced nutrition. Globally, intersectoral working partnerships have been shown to be critical to effectively strengthen and increase the ownership of programmes among stakeholders (Scaling Up Nutrition, 2014).

Strengthening data relevance for policies and programmes

Since effective policies and programmes are needed in multiple settings, the national government must collaborate with researchers to identify relevant data needs and obtain scientific evidence. It is vital to generate and strengthen adolescent dietary quality guidelines and embed them into existing balanced nutrition guidelines. Hence, Indonesia will need additional data and evidence on dietary intake of food groups to develop food-based dietary guidelines. Furthermore, the food system has become an important part

of Indonesian adolescent life such that it can influence food habits and dietary quality. Strengthening adolescent nutrition programmes by developing and promoting balanced nutrition guidelines and improving food systems through multi-sector, multiple settings, and multi-level initiatives will be a prospect. Currently, a multi-sectoral programme exists, but coordination and data harmonisation among sectors and programme implementation require strengthening to increase the synergy and coordination among related stakeholders and sectors operating at multiple levels (Soekarjo *et al.*, 2018).

Another positive step is to develop a health data system platform accessible by researchers and other stakeholders engaged in activities related to adolescent health, through which regular surveillance can be conducted. This platform should embrace documentation and use of online or digital-based interventions. For instance, effective promotion of a healthy lifestyle through mobile electronic applications can be achieved by partnering with start-up companies to develop the application, managing content, and implementing the programme. These platforms can complement school-based interventions within the School Health Unit to develop and communicate food and nutrition messages embedded within the curriculum. Concerted efforts are also needed to strengthen family-based interventions by implementing the "Healthy Indonesia Programme with Family Approach", including the assessment of dietary quality among adolescents at the household level.

DISCUSSION

In all three countries, the national database related to maternal and child nutrition is either under or closely affiliated with the government health sector. The existing framework for data gathering cannot keep up with rapid changes in dietary preferences and the presence of multiple burden of malnutrition, especially in rapidly changing environments that affect the food choices of specific target groups, such as adolescents and mothers. The three countries chose to address the multiple burden of malnutrition by focusing on data and policies related to the first 1,000 days of life. From policy advocacy and formulation standpoints, both Indonesia and the Philippines secured high-level commitments at presidential and ministerial levels. For Thailand, the Ministry of Public Health introduced the M-1000D policy for nationwide implementation. The type and strength of evidence that informed policy decisions, however, differed by country context and policy process.

Strengthening data value chains for policy-making and programme planning: Synthesis from country analysis

Data from large surveys have been used effectively to frame issues and formulate core policies in all three countries. Nutritional and dietary data from nationwide surveys both in the Philippines and Thailand have been used to formulate the national nutrition policy and programmes in both countries. For the Philippines, the government is obliged to set aside resources for regular national nutrition surveys as mandated by law. This is an important lesson given the significance of such data for policy and programme decisions. Thailand, while unfeasible to maintain regular national nutrition surveys, has capitalised on the Health Data Centre, a digital platform created by the Ministry of Public Health (MOPH), to compile data from routine health services. 'Critical' data on maternal and child

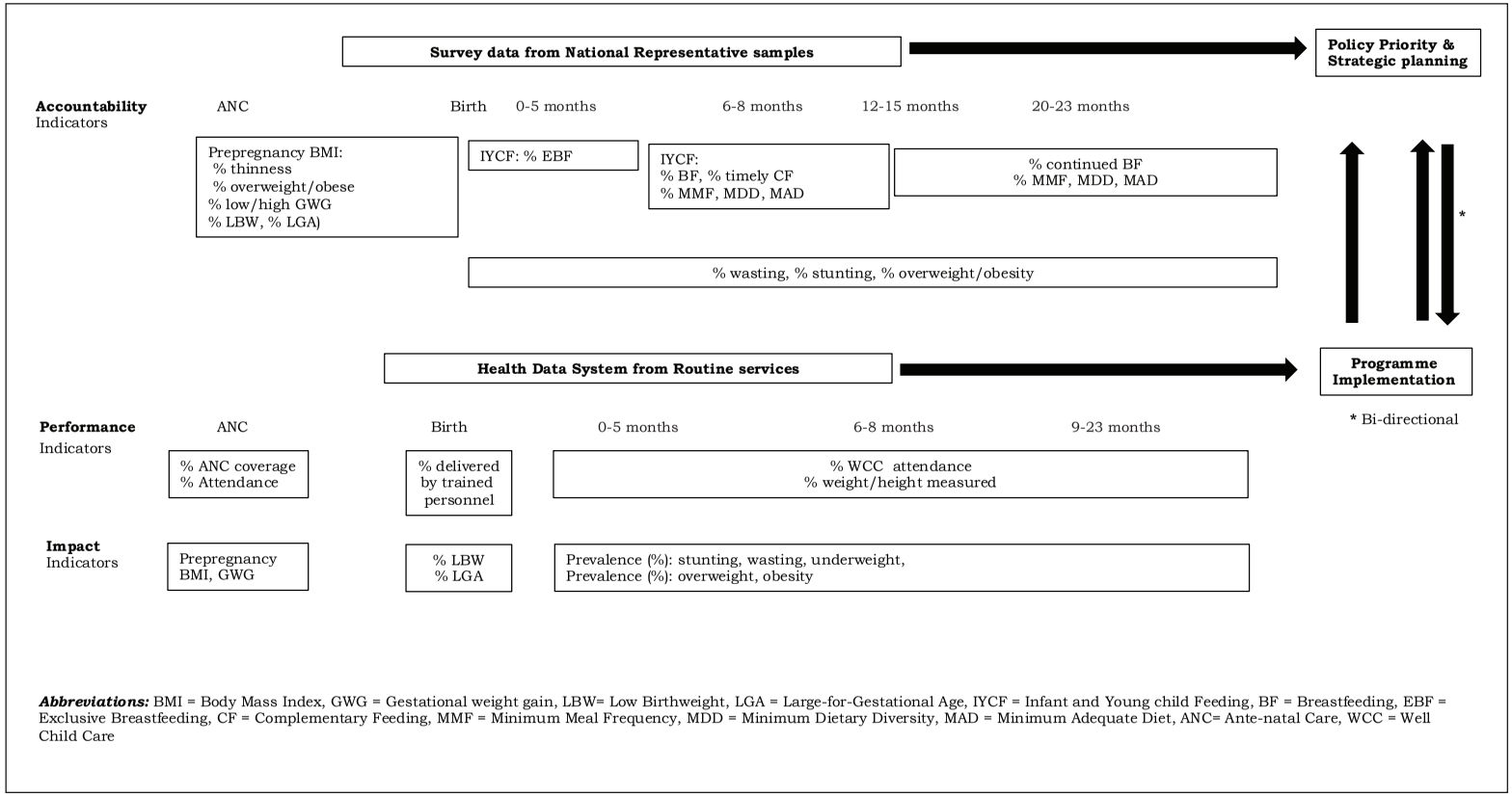

Figure 2. An integrated data value chain for policy decision and implementation: Potential indicators for 1,000 days policy

nutritional health are also included for monitoring purposes. The potential drawback is that the data are from service users, whereby imprecision and biases in prevalence estimates are inevitable. Moreover, data availability relevant to specific programmes (e.g., dietary data) may be limited or unavailable. For policy and programme formulation, Thailand also used national surveys of reproductive-age women, which could serve as surrogates to identify nutritional risks/inadequacies, potentially exacerbated by pregnancy and lactation. Nevertheless, both countries recognised that these data sources serve different purposes; the combination could lead to optimal uses, i.e., linkages to policy and programme implementation. In Indonesia, efforts have been made to compile data on healthy and unhealthy dietary eating behaviours among adolescents to make the case for explicitly advocating it as a priority policy. Considering limited resources (financial and technical) in LMICs, sentinel site surveys may be an alternative to provide data on situations and trends for policy decisions.

Appropriate analyses are needed to provide evidence-based information for decision-making on choices of effective interventions/solutions and guide implementation, provide tracking of reach/coverage, and assess intervention quality. Key priority indicators/data at a 'critical age' should be identified to track progress and reduce the burden of tracking too many indicators, which may defeat the purpose. Within the 1,000 days framework, there is a need to *reframe maternal nutrition as central to human capital development* from a life-cycle approach and the well-being of the mother-child dyad. Continuity in data tracking from pregnant mothers and their babies requires an innovative data value chain to guide a full 'first 1000d' actions.

Figure 2 depicts a framework for an integrated approach to data value chains for policy decision and programme implementation using indicators relevant to the 1,000 days. Based on country analysis, these data can be used for assessing programme performance and programmatic outputs, outcomes, and impacts. Furthermore, some of these available data/indicators can be used to assess policy accountability, i.e., achievement of policy goal(s). To address data needs for this policy process, both periodic national surveys and routine service systems that exist in many developing countries need to be strengthened and/or integrated.

Data gaps in maternal dietary intakes are a common challenge, requiring trained nutrition professionals to ensure good quality data and capacity to handle complex nutrient intake data analysis. Traditional dietary assessment methods, such as 24-hour dietary recall of intakes or food frequency questionnaires, are costly to collect and analyse, thus unlikely feasible for large surveys in LMICs. Dietary assessments traditionally report nutrient-based intakes, which provide information on nutrient adequacy but not dietary pattern/diversity. Efforts are underway to develop and validate simple dietary metrics, e.g., Dietary Quality Questionnaire (DQQ) to assess dietary diversity and risk of diet-related NCDs for use in large-scale surveys (Herforth, Ballard & Rzepa, 2024). The Healthy Diets Monitoring Initiative (HDMI), a joint mission by FAO/UNICEF/WHO is underway, aiming to enable policymakers and stakeholders to monitor healthy diets.

Distinctly, in all three countries, data linkage is still confined to health-related policies and programmes, while the national policy agenda expects the nutrition data system to address multi-sectoral implementation and decision-making. In the past, actions by different

government sectors and financing programmes were allocated through ministerial lines of administration, which can hamper potential effectiveness. In current thinking, an interaction/integration across key systems, namely health, food, social protection, and education, is promoted. Double-duty actions identified to address the multiple burden of malnutrition also call for cross-sector integration (Hawkes *et al.*, 2020). The economic aspect of malnutrition and costing of interventions can provide strong advocacy and evidence for aligning financial requirements among multi-sectoral stakeholders. Consequently, this necessitates the need for multiple data types and sources beyond nutrition indicators. A platform of interphase and close collaboration between researchers and policy/programme planners is essential to bridge various gaps.

Further, for this multi-system approach, the strengthening of current nutrition data systems requires a 'Data Conductor' (individual, committee, or unit) to design the data value chain in nutrition based on the specific purpose of use (e.g., advocacy, policy formulation, implementation, programme monitoring, and evaluation), with an efficient and timely feedback loop. Emphasis should be placed on data relevant to guiding actions and the quality and timeliness of data collection. Data systems for decision-making and problem-solving should focus on optimising and aligning the use of different sources of data to fit the needs of different levels (e.g., central, regional, local). More forward-looking analyses or integrated modelling for impactful interventions relevant for application in different country contexts should be explored. Advances in digital technology can support the development of a 'digital system' for 'time-sensitive' data analysis/synthesis and interpretation for policy and programme recommendations. By designing standard data terminologies and ontologies (interpretive and analytical frameworks) for this system, it could become a cross-country standard open-source tool for the nutrition community. Low-cost, rapid testing at point of contact/care is another prospect to get timely, additional data that are actionable. With better real-time data flows, there is an opportunity to link gaps with tailored interventions in real time.

Lastly, while the three country examples differed in data availability and fine-tuned objectives, key lessons learnt for the application to other countries in the region include: (1) Advocacy that data availability is crucial to inform policy and programmes; in this case, adolescent nutrition, maternal and child nutrition during the first 1,000 days; (2) Government investment in and sustaining data availability will allow the country to monitor the changing landscapes of nutrition/health situation of the most vulnerable groups; (3) Combined uses of relevant data from routine services and national surveys to optimise data usages, i.e., monitoring progress and timely programme improvement and policy review; (4) Fostering the linkage of policy and programme-relevant data is critical for making effective policy decisions and a wise country's investment.

CONCLUSION

Many Southeast Asian nations suffer from malnutrition in all its forms, which can be successfully alleviated by enhancing nutrition in the first 1,000 days of life. For frontline and multi-sectoral stakeholders to adopt double-duty actions and increase policy and programme effectiveness, maternal dietary data and nutritional status that are pertinent to both are required and should be easily accessible. A platform

of interphase and close collaboration between researchers and policy/ programme planners is essential to improve the nation's ability to use and convert technical facts into workable policies and programmes.

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Authors' contributions

Rojroongwasinkul N, Winichagoon P and Udomkesmalee E, co-principle investigators conceptualised and designed the study; Agustina R, Lasepa W, Atmarita, Susiloretni KA, Izwardy D, Angeles-Agdeppa I, Ducay AJD, Tagunicar, Barba C, Pongcharoen T, Winichagoon P, Phulkerd S and Udomkesmalee E, compiled and synthesised data/information of country case studies for Indonesia, Philippines, and Thailand, respectively; Winichagoon P, Rojroongwasinkul N and Udomkesmalee E, performed final synthesis; Rojroongwasinkul N and Winichagoon P wrote first draft of manuscript; Winichagoon P finalised the manuscript; all authors reviewed and contributed to the final manuscript.

Conflict of interest

The authors declare no conflict of interest.

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