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4.1 Final publishable summary report
1. Executive summary

Micronutrient deficiencies affect billions of people worldwide, contributing to 3½ million deaths per year globally, and preventing 1/3 of the world’s children from reaching their intellectual and physical potential. Micronutrient interventions are ranked among the most urgently needed interventions and proven effective interventions are available, but the challenge is to implement these effectively.

South-East Asia (SEA) is still struggling with high prevalence of malnutrition and micronutrient deficiencies. Also, obesity has emerged as a new public health problem. To develop a realistic nutrition roadmap and strategic framework to deal with this complex situation, SEA countries must strengthen local capacities and integrate international best practices into their specific local context. Acknowledging the multidisciplinary, multi-sectorial approach needed to translate the latest scientific findings into new policy, the SMILING project was built around a **North–South–South collaborative process**. SMILING focused on micronutrient deficiencies early in life (“1,000 days period”), from conception to two years.

With **Southeast Asia as the center of the action**, SMILING assessed current and future landscapes, the magnitude and severity of undernutrition and contextual factors, such as the political situation, infrastructure and economic development and human capacity in nutrition.

The overall aim of SMILING was to contribute to the alleviation of micronutrient malnutrition in infants, young children and women in reproductive age in SEA.

Mapping of interventions by SMILING (WP2) showed that vitamin A, iron, zinc and iodine deficiencies remain public health concerns across the region, often with sub-national pockets with high prevalence of deficiency remaining. Depending on the prevalence, programmes should be universal or redirected from national to being targeted to the most vulnerable areas. SMILING showed gaps in understanding of how to transfer knowledge from efficacy to effective interventions in different populations. For designing appropriate food-based interventions, the basic knowledge of composition of food habitually consumed is essential and WP3 produced updated food composition tables with high quality data on the (micro)nutrient composition (notably folate, niacin, vitamin B6, vitamin B12 and vitamin D) of especially local foods. The innovative mathematical linear programming (WP4) confirmed that habitual diets of the target populations were deficient in calcium, iron, zinc, folate and riboflavin, even in the best-diet options for the target groups. Integrated and complementary interventions must thus be implemented, either through supplementation, food fortification and food diversification and nutrition-sensitive intervention through public health and multi-sectorial actions. SMILING selected 26 key interventions (WP5), which were tested for stakeholder’s perception in a participatory process using Multiple Criteria Mapping (MCM) (WP6). MCM showed the common concerns on acceptability, impact and feasibility, but meaning of these concerns differs by stakeholders, according to the qualitative description. Food fortification was especially highlighted (WP7) in national and regional workshops.

Results from various work packages are currently being integrated into national plan of action for Cambodia, Laos and Vietnam; while they are inputs to various on-going national programs for Indonesia and Thailand. Finally, SMILING recommends creating national nutrition platforms, bringing together all the stakeholders to build consensus on the actions to be implemented at national level. The success of SMILING in driving the micronutrient agenda can be attributed to the true North-South-South partnership of the Consortium,
creating ownership of the results for all involved. For the future, expanding this partnership is essential to achieve the post-2015 Development Agenda in South-East Asia.

2. **Summary description of project context and main objectives**

2.1. **Project context**

Adequate nutrition is a basic human right. However, undernutrition is an underlying cause of 3½ million deaths per year globally and accounts for 35% of the disease burden in children under the age of 5 years (1).

Micronutrient deficiencies affect billions of people worldwide, including preventing a third of the world’s children from reaching their intellectual and physical potential (2,3). Because of their enormous potential impact on health and human and economic development, the World Bank, UNICEF and WHO rank micronutrient interventions among the most urgently needed and most cost-effective interventions (4).

The 2012 Copenhagen Consensus Expert Panel found that the combating hunger and malnutrition especially that of young children and women, should be given highest priority (5). Improving nutrition is also of critical importance to achieve the Millennium Development Goals (MDG). The global movement of Scaling-Up-Nutrition (SUN) is now the main thrust to mobilize and harmonize a broad range of national and international efforts to improve nutrition during the first 1000 day window of opportunity, from conception through the first two years of life (6). With specific regard to micronutrients malnutrition, the long-term health and functional impacts are now evident and proven effective interventions are available. The challenge is to implement these effectively in countries where the problems remain high (7). The SUN Movement supports country-led efforts to integrate specific nutrition interventions and nutrition sensitive strategies into national policy and action plans with an emphasis on women’s empowerment. South-East Asia (SEA) is a large and highly populated continent with enormous diversity within and among countries in the region. Several SEA countries have long histories of implementing policies and programs to improve the nutritional status of their populations, and priority has traditionally been given to children and women (8). However, rapid industrialization has brought marked changes in the livelihoods of people in this region of the world, making the challenges of malnutrition more complex. Countries still must deal with the unfinished agenda of under nutrition, especially childhood stunting and wasting and micronutrient deficiencies throughout the life cycle, while at the same time, childhood and adult obesity has emerged as a new public health problem, creating the so-called “Double-Burden of Malnutrition” dilemma. Moreover, there is growing evidence on the link between malnutrition in early life, during prenatal and postnatal years, and the subsequent development of obesity and chronic diseases during adult life (9, 10).

In this context, the challenge facing SEA countries was how to formulate the national nutrition strategies and programs that integrate state-of-the-art knowledge in light of a development transition scenario. SEA countries have sought to develop a realistic roadmap
and strategic framework for implementing optimal nutrition in a complex situation. Strengthening local capacities and integrating knowledge and international best practices into their specific local context require different approaches from the past.

Wishing to contribute to the international effort to control micronutrient deficiencies, the European Commission (EC) issued a call for a “Coordination and support action” in the 7th Framework Programme for Research and Technological Development (FP 7) (11) entitled “Translation mechanisms for targeting interventions on micronutrients - Mandatory South Asia and South East Asia” (KBBE-2011-2-2-04). The present consortium of five countries in SEA and four European countries responded to this call and the SMILING project was conceived and implemented from 2012-2013 in five SEA countries, ranging from mild to moderate malnutrition in women and children. The five countries also cover from low to middle income countries according to the World Bank classification.

2.2. SMILING: The concept

Acknowledging the multidisciplinary approach and multi-sectorial support needed to translate the latest scientific findings on improving micronutrient status into national policy the SMILING project is a transnational collaboration of research institutions and implementation agencies in five Southeast Asian (SEA) countries - Cambodia, Indonesia, Laos PDR, Thailand, and Vietnam - with European partners, to support the application of state-of-the-art knowledge to alleviate micronutrient malnutrition in SEA. The SMILING project has been conceived around a North–South–South collaborative approach, which means developing and learning together, rather than bringing in external expertise to teach those less advanced. Undernutrition, especially micronutrient deficiencies, early in life, i.e. during the first “1,000 days period”, covering the gestational period and the two first years of life”, is a strong determinant of health, growth and development during infancy and childhood as well as in adult life. Thus, preventing micronutrient deficiencies in women of reproductive age, before and during pregnancy, and in infants and young children is essential not only for their immediate health, but also for health and well-being later in life, and the future generations.

Southeast Asia is the center of the action, taking into account the current, transitional, and future landscapes of the countries. Indeed, SMILING includes countries with a wide range of social and economic development. Similarly, the magnitude and severity of undernutrition (stunting, wasting, and micronutrient malnutrition) in children and women ranges widely; whereas nutrition in transition occurs at a rapid rate in all countries, with a low to high prevalence of undernutrition, but a rapidly rising prevalence of overnutrition in most. Although national or large scale nutrition policy and programs exist in all participating countries, the contextual factors, including political situation, infrastructure development, economic development and human capacity in nutrition vary greatly. Nevertheless, empowerment and behavioural change of adolescent girls and women of reproductive age remain one of the keys for rapid improvement of their micronutrient status and those of their children. The use of science-based evidence for effectively implemented actions requires an understanding of nutritional problems and their complex causes, and engagement of a broad range of stakeholders, especially policy makers that need to be convinced that investment in nutrition
is essential and profitable for the country and its population. **Multisectoral integration and commitment** (health, social protection, agriculture, education, and urban and rural development) have contributed to success in alleviating undernutrition in some SEA countries. It needs to be demonstrated to address DBMN in the current national economic and social development context.

2.3. **Main objectives**

The overall aim was to contribute at the national level to the alleviation of micronutrient malnutrition in infants, young children and women in reproductive age in SEA.

The major expected outcomes were to identify strategies that have high potential to improve micronutrient status on a large scale, to identify priority interventions for each SEA country, and to develop a road map for decision makers and donors for inclusion of these priority interventions into the national policy.

The key planned actions were:

- Exploiting scientific knowledge for an evidence-based approach (state-of-the-art review of the literature on micronutrient needs and intervention studies)
- Mapping past and current intervention strategies implemented in SEA countries and analyzing enabling factors for success or impediment to effective implementation
- Taking into account the SEA country situations, specificities, and experiences in nutrition by mapping micronutrient malnutrition in women and young children, and existing and ongoing research to reduce micronutrient deficiencies and identify new interventions that are potentially effective.
- Prioritizing and characterizing the potential best practices in each SEA country to improve micronutrient status on a large scale.
- Analyzing past experience in the participating SEA countries on implementing food-based intervention, specifically, food fortification and operational requirements for strengthening or integrating into the national program
- Developing innovative tools that support nutrition policy-making and programming: the mathematical modeling technique combined with linear programming that contributes informing policy makers on the potential of food-based strategies to provide the required (micro)nutrients, and the Multi Criteria Mapping (MCM), that offers a flexible decision-aiding tool to analyze the involvement of a large panel of stakeholders
- Integrating SMILING results to nutrition policy road map and strategic framework.

**Reference list**

3. **Main outcomes of SMILING**

The SMILING project was built on three main stages.

The first stage, the "information stage" consisted in data collection and analysis and referred to the activities involved in identifying, describing, and quantifying the extent of a public nutrition problem and current policy and intervention programs in each SEA country (magnitude and severity) its patterns of occurrence, risk and protective factors, causal sequences, program effectiveness for each level of prevention, barriers to effectiveness...).

The second stage, the "strategy stage" relates to consensus building. This included using additional tools to generate strategic and practical information linking scientific knowledge to implementation, conveying the information to professional and lay audiences, specifying priority interventions and time frames, mobilizing coalitions to work on the issue and toward the objectives, developing means to foster needed changes, and publicizing these elements.

The last stage "action programming" involved the presentation and advocacy of the list of interventions selected by the SEA countries among policymakers and stakeholders with the challenge to convince policymakers to integrate these interventions into national programs and to plan their implementation in near future.

SMILING was executed through eight Work packages (WP), developed consequently or in parallel over the 2 years of the project. The five SEA countries contribute to all WP, with specific scientific contribution and expertise from European partners according to the WP.

3.1. **Mapping of data on nutritional status and micronutrient interventions for identification of best practices**

The World Summit for Children in 1990 marked the beginning of a global commitment to major reductions in micronutrient deficiencies of public health concern and by the end the millennium, nutrition programmes to control micronutrient-deficiency control have been extended in many developing countries, primarily focusing on vitamin A supplementation for children under 5 years, iron-folate supplementation for pregnant women and salt iodization...
for entire populations. In addition, other interventions and programmes aiming to increase the intake of specific micronutrients were developed.

The SMILING project started with reviewing country-specific interventions to improve the micronutrient status in the SEA countries that were either currently implemented or planned for the near future. In parallel, SMILING collected all available data on nutritional status, food availability and other nutrition-relevant data (e.g. infections rates, water, sanitation) in the SEA countries, to assess whether there were discrepancies between needs and programs. This mapping showed how the five SMILING countries have formulated national policies and programs to address micronutrient deficiencies or general undernutrition, each from their political and historical context. Moreover, the mapping informed that to tackle micronutrient problems in these countries, focusing on only a few selected micronutrients, even they have been major public health concerns is rather adequate, while embedding the findings on the key micronutrient deficiencies (which is the main objectives of the SMILING project) into the broader nutritional situation and program would be essential.

Description of the reviews of situation is given below.

**3.1.1 Literature reviews**

During the last decades, the international research community conducted numerous studies assessing efficacy, effectiveness and potential harm of different micronutrient interventions targeting different population groups. These have contributed to form and frame the current international and national recommendations and programmes (The Lancet Nutrition series 2008, 2013). SMILING conducted a generic review of the scientific literature on micronutrient interventions to provide a synthesis of the evidence based recommendations for the current and future strategies to improve micronutrient status of WRA and young children in the SMILING countries. For successful program, the translation of scientific findings to multi-sectorial implementation of programmes to improve micronutrient status may be inadequate and becomes a bottleneck towards efficient action.

*Systematic review on interventions to control (treatment, prevention) micronutrient deficiencies in young children (0-5 years of age)*

The review of systematic reviews of interventions targeting children under 5 years of age was based on a search profile in PubMed and initially identified over 600 reviews which by a stepwise evaluation of relevance based on titles and later on abstracts was reduced to 24 systematic reviews of either direct micronutrient interventions or interventions with anthelmintics on micronutrient status.

The reviewed reviews of effects of interventions on micronutrient status showed that single nutrient interventions (vitamin A, iron and zinc supplementation) improved the status on the supplemented nutrient (vitamin A supplementation improved vitamin A status etc). However, multimicronutrient supplementation tended to be more efficient than single nutrient interventions. The evidence for impact of the supplemented nutrients on improving other micronutrient status was weak. For example, the latest systematic review of vitamin A supplementation from 2011 did not confirm earlier indications that vitamin A supplementation would contribute to improved iron status, when studies in different populations were included.
in the analysis. However, this does not exclude the possibility that these effects may exist in some populations.

The evidence for other health impacts or anthropometric outcomes (such as improved growth) of micronutrient supplementation is also weak. Height for age can be improved by anthelmintic treatment or zinc supplementation. When zinc was supplemented together with iron the effect on height was no longer statistical significant. This could be due to the interference of zinc and iron with absorption or bioavailability, when supplemented together, or there can be multiple and interacting factors. On the other hand, the majority of the systematic reviews on multi-micronutrient fortification unexpectedly reported non-significant increases in height for age. Our review of systematic reviews highlights that even though direct micronutrient intervention resulted in significant increases in biochemical markers of micronutrient status, it may not necessarily improve the anticipated health and functional impacts. Other factors have to be addressed when designing policies and implementation of the recommendations. These findings highlight the importance of better understanding of the specific effects in populations, and other underlying causes before implementing micronutrient programmes. For example, iron supplementation will not substantially improve the anemia situation if genetic haemoglobin disorders (e.g homoyzogetes E) are also an important cause of anemia in that population. No further improvement to iron supplementation programs can be expected in such a context. The major lesson learned is that micronutrient interventions have largely been implemented with the assumption of ‘one-size-fits-all’ and intervening with the deficient nutrient can alleviate the problem, hence leading to failure on program effectiveness. In addition, the same interventions can have different - positive or negative - impacts under different circumstances. Common infections, as well as specific to populations (e.g., malaria) are also the causes of anemia in several populations. Broader interventions which include dietary and other health (clean water and sanitation) environmental factors need to be included as per specific country’s situation.

**Interventions for pregnant and non-pregnant women to improve micronutrient status**

The reviewing of the scientific literature about micronutrient interventions targeting women during the reproductive age (WRA) was conducted as an expert review rather than a systematic review, in the view of the heterogeneity of the target group (non-pregnant, pre-pregnant, pregnant, post-partum and lactating women, and impacts on the off-springs nutritional status). The main micronutrient intervention reaching women is iron-folate supplementation during pregnancy and much research has been conducted. However, currently no consensus has been reached on whether iron and folic acid supplements should be replaced by multiple micronutrient supplements. The appropriate cocktail of supplementation during pregnancy also depends on which outcome is anticipated, and duration of supplementation has to be considered. Overall, it was concluded that micronutrient supplementation of pregnant women is started too late in the pregnancy to have positive impact on the birth outcome. Data from China suggest that interventions should start before 12 weeks of pregnancy. This poses a very challenging requirement to implement intervention through a public health service which traditionally focuses on pregnancy period. An alternative is to reach women before conception, and probably focusing adolescent girls, through other mechanism (e.g., community-based approach), though little data exist on the
effectiveness of this strategy. Social marketing is the most used approach, but success and coverage appear to be limited. More innovative approach or other platforms are needed to reach these women at different stages e.g. adolescent girls, young women and pre-pregnant women.

3.1.2. Mapping of micronutrient situation and interventions

The specific mapping of micronutrient status and interventions in the 5 Asian countries was conducted through stepwise identification and extraction of available data (national or sub-national) by country. A protocol for mapping and data extraction was developed for systematic identification of relevant information. Surveys and other national reported data were identified by the national SMILING partners, and data extracted following a common protocol. Results from the mapping are presented in the subsequent sections.

3.1.3. Food availability in SMILING countries

Food supply data were extracted from the FAOSTAT database to provide an indication of the variation in food availability across the SMILING countries and also changes over time, and hereby a proxy for trends in dietary patterns on population level. The food supply was extracted as macronutrient and energy contribution from food groups. The energy contribution from protein and fat was recalculated from the total supply as percentage of total dietary energy supply. The food supply confirmed the importance of rice as staple food, with a small contribution from wheat. Fish and seafood are the most important animal-source foods, while dairy supply is very limited. Even in Thailand, the country with the highest supply and highest increase over time, the supply is below 10% of the average in Western Europe. Fat contribution to total energy in the SMILING countries showed a clear gradient from around 14% in Cambodia and Laos PDR to 27% in Thailand. Difference in diets such as more animal foods in some countries such as Thailand may reflect the general health gradient with the highest rates of stunting in Cambodia and Laos PDR (40% of children below 5 years with height-for age Z score < 2), falling to below public health concern in Thailand (16%). The fat energy contribution in Thailand is still below the level in Western Europe (39%) and may be appropriate on population level.

Since all five countries are agricultural-base livelihood, food-based strategies have high potential as sustainable interventions. The basic food supply reflecting the general pattern of a rice-based diet with fish and seafood and limited supply of saturated fat is a valuable background diet for food-based strategies and should be maintained. However, poverty related limitations in access to the much needed diversity of the diet to meet nutritional requirements needs to be addressed. Also improvement in agricultural practices to ensure general access to an affordable diverse diet is needed, in combination with innovation in development and formulation of food-based interventions will be crucial for long term alleviation of nutritional problems in these countries. The existence of basically healthy traditional dietary patterns could make the SE Asian region particularly successful in food-based approaches.
In Thailand a nationwide community-based nutrition program was implemented early, already during the 1980s to mid-1990s, with a multi-sectorial planning at the national level. Fortified instant noodle soup mix was launched in 1996 and mandatory vitamin A fortification of condensed milk was promulgated in 1993. Unlike most low-income countries Thailand never introduced universal vitamin A supplementation to children except in high risk areas. Also, Indonesia had early actions on micronutrient interventions, as vitamin A supplementation was implemented nationally already in the 1970s, while other programmes came later. National actions on micronutrient interventions in Cambodia, Laos PDR and Vietnam were initiated on small scales in the 1990s, in the era of global focus and development international recommendations and goals for reduction in micronutrient deficiencies.

3.1.4. Findings from national surveys on nutritional status and interventions

Comparing nutritional status across the SMILING countries relied on the availability of surveys providing recent, reliable and comparable data. It was found that the key general nutritional indicators such as anthropometric measures for young children, expressed as national prevalence of stunting and wasting, are available with a frequency of 5 years or less in each country, and the data generally provides a reliable picture of the situation. However, surveys on micronutrient status are scattered or not available across the countries, and a comparable and reliable picture of changes in the micronutrient status over time, as well as comparing across countries, is lacking. This lack of reliable data is a major limitation for evaluating impacts of the past and current micronutrient interventions. For example, Laos PDR and Cambodia both have national vitamin A supplementation programmes for children under 5, but the latest surveys on serum retinol in children are from year 2000 in both countries. In Indonesia, the latest national survey assessing night blindness as indicator for vitamin A deficiency was conducted in 1992, and a regional survey was conducted in 2007, which leaves no information about the national vitamin A supplementation programme for further decisions about this intervention.

Prevalence of anemia based on haemoglobin concentration is the most available data related to micronutrient status, and shows a picture across the SMILING countries of a considerable public health concern, a problem which is also generally recognised as a priority in national policies. Anaemia is a clinical manifestation caused by for example iron deficiency but also associated with other factors, such as intestinal infections, haemoglobinopathies, different micronutrient depletion etc.. For example, populations in the SE Asia region has a high prevalence of inherent haemoglobin genetic disorders, or haemoglobinopathies, of which haemoglobin E is particularly prevalent (up to 30% in some populations) and known to be associated with lower haemoglobin levels. This fact needs to be taken into account in the implementation and evaluation of nutrition interventions, and in setting goals for reductions in prevalence in anaemia in different populations.

The mapping of data on micronutrient status in the SMILING countries showed scattered availability of data on vitamin A, iron, iodine and zinc, and very limited data on other micronutrients. Recent data from Vietnam and Thailand showed that vitamin D deficiency may emerge as the new public health problem in the future, and better understanding of risks
of deficiency in these populations is needed. Zinc deficiency (based on serum zinc) appears to be highly prevalent throughout the region.

3.1.5. General conclusions across WP2

The reviewing of scientific evidence along with the mapping of past, current and planned interventions showed that vitamin A, iron, zinc and iodine deficiencies remain as having public health concerns across the region. Where improvement has been achieved at the national level, sub-national pockets of micronutrients problems may remain and require redirection of programmes from being national/universal to being targeted to the most vulnerable areas. The review of scientific evidence along with the mapping of past, current and planned interventions also showed gaps in the way knowledge about efficacy and effectiveness of interventions had been interpreted and used for directing policy and program in different populations.

When viewing the micronutrient situations in the SMILING countries in the light of the findings from reviews of scientific evidence of micronutrient interventions targeting children and women, SMILING concluded that even though micronutrient status in general has improved in the SE Asian countries, the interventions currently in place would still be insufficient to eliminate micronutrient deficiencies. In order to make a significant step forward to break the cycle of transmitting poor nutritional status from mother to child, it is necessary to reach women with iron and folate, or probably multiple micronutrients before pregnancy. For interventions targeting children, it is time to move away from single nutrient interventions such as vitamin A supplementation, to multi-micronutrient interventions. For a long term success and sustainability, a food-based strategy for improving micronutrient intakes of children and women must be enhanced, either as multi-micronutrient fortification of e.g. complementary foods, or a combination of improving diets (dietary diversity or enhanced intake of animal-source foods) and multi-micronutrient fortified foods.

The outcome of this review from SMILING project provides a valuable basis for conducting multi-country studies of effectiveness of selected interventions which could contribute to fill the knowledge gaps of why interventions works in some populations or in some situations, but not in different contexts. A more systematic understanding of the determinants for when interventions have impact and when it does not work would be a major contribution to improve the decisions on interventions on country level. This analysis cannot be conducted based on the past and current interventions in the SMILING countries due to lack of comparable data on micronutrient status. An earlier review conducted in 2004 of micronutrient interventions in 11 Asian countries including the SMILING countries, found that also, by that time-point, the investments in micronutrient interventions such as national vitamin A supplementation, was unbalanced by a lack of investment by donors in monitoring the impacts of the programmes. Ten year later this situation remains. Examples from Thailand showed that micronutrient interventions can successfully be developed and designed to target the specific problems identified in a country, e.g. by responding to the finding of a high risk of iodine deficiency specifically in pregnant women by redesigning the iron-folate supplementation to be a triple supplement of iron-folate-iodine. An approach with
national or regional capacity to respond to the changing situation and redesign or introduce other interventions would contribute to more efficient and effective programmes.

3.2. Updating of Food Composition Tables on selected food and (micro)nutrients for SEA (WP3)

High quality data on the nutritional composition of foods were essential for estimating the risk of inadequate nutrient intakes, selecting nutrient dense foods to improve local diets and for mathematical modelling (WP4). Without it, incorrect conclusion could be drawn regarding the adequacy of population’s diet and inappropriate interventions may be selected to improve it.

In this WP3, the quality of existing national food composition tables (FCT) were assessed using methodology developed by WU and by EuroFir (www.eurofir.org). This assessment focused on key food items consumed by target populations (young children and women) in the five SEA Partner Countries (Cambodia, Indonesia, Laos, Thailand, Vietnam), as well as on the nutrients known to be low in local diets.

A two-week training workshop was held in Vietnam in April 2012 for two representatives from each SEA Partner country to build general capacity in the field of food composition databases to develop and practice standardized procedures for the quality assessment and update of food composition data on selected foods and nutrients. Following this workshop, each SEA partner continued updating the FCT in their country, to produce updated specific FCT for each SEA partner to feed into the mathematical modelling of WP4.

Within the WP3, steps had been taken for creating country specific food composition tables (FCT) and a detailed roadmap of the process (Deliverable 3.1). All SEA partners collated national food consumption information and created an annotated bibliography (Deliverable 3.2). All SEA partners have used the developed procedures for the quality assessment and update of food composition data on selected foods and nutrients (Deliverable 3.3 & Deliverable 3.4). Foods for inclusion were selected based on two criteria a) consumption of the food by ≥10% of the population and b) consumption of nutrient dense foods not generally eaten.

The SEA partners finalized country-specific food composition tables with updated composition data on selected foods and nutrients (D3.5). Between 140 and 175 foods were selected for inclusion in the country-specific FCTs. Key-nutrients were: energy, protein, total fat, carbohydrates, iron, zinc, (pro-)-vitamin A, folate, calcium, vitamin D, vitamin B1, vitamin B2, vitamin B3, vitamin B6, vitamin B12 and vitamin C.

The SEA partners performed a detailed quality assessment of food composition data on 13 key-foods per nutrient (being those that contributed most to the intake of nutrient of interest). The developed food composition data by the SEA partners of WP3 has been used in the novel linear modelling tool Optifood of work package 4.

Nutrient data for specific local food items were often unavailable and data on folate, vitamin B12 and vitamin B6 contents were mostly missing. For many foods, documentation on sampling plan, number of samples, sample handling, analytical method and performance were not available, thereby complicating an in-depth quality assessment.
Based on the outcome of the work of WP3 it can be concluded:

- The SMILING project offered a unique opportunity to increase awareness of the importance of high quality well documented food composition data;
- Updated FCT’s with documented quality index were made available as input for a mathematic modeling program (Optifood) within the WP4 group;
- Self-reported data quality demonstrated considerable room for improvement of food data quality in some countries;
- Lessons for future and priority for research should focus on:
  - Continuous update and investment in sustainable capacity is crucial to secure maintenance and improvement of each country food composition database;
  - An urgent need remains to produce high quality data on the (micro)nutrient composition (notably folate, niacin, vitamin B6, vitamin B12 and vitamin D) of especially local foods and a plan to replace “old” data.

3.3. Innovative approach to inform nutrition policy and intervention planning on food based approaches (WP4)

Food-based approaches are considered the best long-term strategy for improving the nutritional status of populations because they simultaneously combat multiple micronutrient deficiencies and there is a low risk of adverse outcomes from excessive nutrient intakes. Locally available food-based recommendations (FBRs) promote appropriate dietary intake and can be tailored to the needs of vulnerable groups such as pregnant and lactating women, infants and young children. However, questions remain about whether a food-based approach alone can effectively address micronutrient deficiencies; and for certain situations, whether supplementation or fortification must also be considered to ensure dietary adequacy. The Optifood tool used in this project provides answers to this policy relevant question.

Work Package 4 (WP4), in the SMILING project, aimed to strengthen capacity in SE Asia for using an innovative tool (Optifood) to formulate and test alternative food-based strategies, to identify nutrients whose requirements are difficult to achieve using locally available foods as consumed (“problem nutrients”) and to test alternative strategies of interest in each SEA SMILING country. This tool. The results from these analyses will inform programmers and policy makers involved in developing micronutrient intervention action plans for the SEA region. Optifood is a mathematical modeling based on linear programming analyses, will soon be freely available to download off the World Health Organization’s website.

In this objective, research teams from each of the five SE Asian beneficiary countries (Cambodia, Indonesia, Lao PDR, Thailand and Vietnam) worked with researchers from the London School of Hygiene and Tropical Medicine to learn how to use Optifood to answer questions relevant for their national planning/policy decisions. These analyses were done using national level dietary data in all countries except Lao PDR; in Lao PDR dietary data were collected specifically for this study from women of reproductive age and young children (n=600) in one disadvantaged district in the south of the country. In all countries, market survey data were used to model diet costs. In all five countries, data were analysed for three child target groups; namely 6-8 m, 9-11 m and 12-23 m olds. In Vietnam, Cambodia and Lao
PDR, analyses were also done for three target groups of women of reproductive age; namely pregnant, non-pregnant and non-lactating and either lactating (Lao PDR and Vietnam) or adolescent girls (Cambodia). The subsequent sections highlights key questions and answers generated by using Optifood.

The first set of results of the SMILING WP4 analyses showed there were “problem nutrients” for all target groups except 12-23 m olds in Indonesia, Lao PDR, Thailand and Vietnam. The numbers of “problem nutrients” ranged from 0 for the 12-23 m olds to six for pregnant women in Cambodia; and there were higher numbers of “problem nutrients” for women than for children (i.e., 1-6 vs 0-4, depending on the target group and country). The most common “problem nutrients” across all countries and target groups were calcium and iron. Zinc was a common “problem nutrient” for young children, and folate and riboflavin were common “problem nutrients” for women of reproductive age.

The second set of results from the SMILING WP4 analyses showed that realistic food-based interventions, using locally available foods, would ensure dietary adequacy, for most individual’s in a target population, for between six (Lao PDR) and ten (9-11 m olds in Vietnam) of the 11 micronutrients nutrients modelled, for young children; and between five (pregnant and lactating women in Laos PDR) and eight (lactating women in Vietnam) of the 11 micronutrients modelled for women of reproductive age. For most target groups, the selected FBRs included recommendations to consume meat, fish and eggs, vegetables, legumes and dairy products (when consumed) at higher levels than observed on average (medians). Liver (2-3 servings/w) and green leafy vegetables (daily serving) were also important FBRs in many of the final sets of country-specific sets of FBRs selected.

In the third and final sets of analyses, four types of interventions were evaluated, which were point-of-use multiple micronutrient powders (MMP), for children in all countries except Thailand; commercially available fortified infant cereal products, for Indonesia, Thailand and Vietnam; sets of national level FBRs, for young children, currently under consideration in Thailand or currently in use in Cambodia; and the promotion of nutrient dense foods not usually consumed in Cambodia (i.e., liver or dairy products).

The results, for MMP, showed that, in all four countries and target groups, between 4 and 5 sachets of MMP/week alone would ensure dietary adequacy, for all nutrients except calcium. Further, if MMP was promoted as part of a set of FBRs, then only 3-4 sachets/week were required, and in countries where milk was consumed dietary adequacy was ensured for all nutrients.

The results for fortified infant cereals (1-2 servings/day), showed their use ensured dietary adequacy for 9 to 11 micronutrients, depending on the age group and country; although their modelled lowest cost diet was more than two times higher than that of MMP. The nutrients whose adequacies were difficult to ensure using fortified infant cereals were iron, calcium or zinc, depending on the country and age group.

The results for the evaluation of the current Thai FBRs for 6-23 m old children, showed they were unrealistic because they exceeded the average energy requirements of young children. Reducing the number of individual FBRs and using realistic serving sizes (i.e., median observed serving sizes) resulted in FBRs that would ensure dietary adequacy for 8-10
nutrients, depending on the age group; or 9-11 micronutrients if fortified infant cereal was included in the set of FBRs assessed. These results, for dietary adequacy, were comparable to the FBRs selected, using Optifood, indicating they had achieved optimal adequacy. Therefore the Optifood FBRs had fewer individual FBRs than those currently in use for Thailand by the Ministry of Health indicating the latter could be simplified to be more realistic and achievable.

The results, for the evaluation of the Cambodian FBRs for 6-23 m old children also showed they were unrealistic because they exceeded average energy requirements of young children. However, unlike the Thai FBRs, they did not compare favourably to those selected using Optifood because the FBRs are too general. The Cambodian FBRs ensured dietary adequacy for 5-6 nutrients, depending on the age group, whereas those selected using Optifood ensured dietary adequacy for 5-8 nutrients (without liver and dairy products) and 8-9 nutrients (i.e., with liver or dairy products), depending on the age group. These analyses also showed the advantages of including liver or dairy products in the Optifood generated Cambodia FBRs, if feasible to promote for young children in Cambodia.

These series of analyses generated important information for programme and policy decisions in SE Asia. First, they identified the problem nutrients based on the actual consumption of the specified target groups. Second, the analysis from Optifood showed how to strengthen food-based strategies by promoting special fortified products or nutrient dense foods that are not habitually consumed but could be promoted, to ensure dietary adequacy for SE Asian populations of women and young children. Third, they suggested that national level FBRs currently under consideration or in use should be modified to successfully improve the quality of complementary feeding diets in Thailand and Cambodia. Fourth, they highlighted the need to place more focus on micronutrient intervention actions for women of reproductive age, in SE Asia, than is currently done. This is crucial since they do not only ensure the women’s nutritional needs are met but also to ensure optimal micronutrient status of their infants during gestation and the breastfeeding period because breast milk quality on several micronutrients (especially, vitamins) depends on maternal micronutrient status.

3.4. Prioritizing and characterizing the potential best strategies for each SEA country (WP5)

Micronutrient supplementation (targeted for various population groups, such as pregnant women, children <5 years old, adolescent girls, non-pregnant women) was the most commonly selected intervention option by the SEA countries, because supplementation is generally considered the most cost-effective and feasible intervention for addressing the urgent problem of micronutrient deficiencies. As the severity of problems declines, new or innovative interventions, such as weekly micronutrient supplementation, as a preventive measure for adolescents and non-pregnant women should be considered with high priority. Food fortification was proposed by all countries. There were differences in formulation of what was considered a food-based approach interventions however, namely, promotion of exclusive breastfeeding and appropriate complementary feeding, food-based approaches through integrated farming, development of locally based complementary feeding
recommendation, or uptake of locally based complementary feeding recommendations by local governments. Nutrition education is also incorporated in most of nutrition intervention programs, although their effectiveness for behavioral changes has often been questionable or not properly evaluated. Some countries also proposed indirect or other nutrition-sensitive interventions.

With the aid of the results of WP2 and WP4, a country specific analysis was done, considering strategies already implemented, available food sources and affordability for the population. From this, the SMILING consortium built a list of priority interventions for each country that is believed to be efficient and could be adapted to the specific context of each country. This list of options was based on the proposal made by the teams of each country. The selected options had to be either new options not yet implemented in the country or existing options to be scaled up or improved for effectiveness. The countries were encouraged to choose innovative options that differed to the options already implemented in the countries.

The list of all the options proposed by the 5 countries comprised overall 23 different options presented below. The list included different actions of supplementation, fortification, food-based approaches, education, agriculture and food programs and public health actions. The options proposed targeted women (pregnant, reproductive age, lactating and/ or post-partum), children or general population. Supplementation for women (WRA, PW, LW or post-partum)

• Provide weekly multiple micronutrients supplementation for all WRA (national)
• Provide multiple micronutrients supplementation for all pregnant women
• Improve or increase IFA supplementation of all pregnant women (daily -during 180 days)
• Provide weekly Iron and folic acid supplementation for all WRA (national)
• Provide 90 days of IFA post-partum instead of actual 6 weeks IFA supplementation
• Change strategy from IFA to Multiple micronutrients during 90 days post-partum

Food fortification for Pregnant Women and WRA

• Develop or extend fortification of products specific to WRA and WP with multiple micronutrients
• Develop or extend programs for food fortification with micronutrients for general population

Education for pregnant women and WRA

• Promote or develop programs of nutrition education / behavior change in maternal nutrition before and during pregnancy and lactation.
• Promote/increase or develop national training program for midwives, and health personal on nutrition and specifically for pregnant and lactating women. Promote or develop programs of Behavior Change Communication for all the households. Strategies of Behavior Change Communication to improve the consumption of food rich in micronutrients (with a focus on Vitamin A, iron and folic acid)
Interventions specific to children under 5 years of age.

- Extend or develop COMBI (Communication for Behavioral impact) strategy to improve complementary feeding practices to a national scale
- Extend the multiple-micronutrients (“Sprinkles”) supplementation program for children 6-24 mo
- Implement mandatory specific complementary food fortification for 6 to 24 months infants
- Promote and support of early initiation and exclusive breastfeeding during the first six months
- Promote deworming for children 12-23 mo

Agriculture and food programs

- Increase access to foods or products rich in micronutrients for complementary feeding to improve dietary diversity
- Promote integrated farming systems at national scale

Others options

- Promote delayed cord clamping
- Improve or increase policy of birth spacing and delay the age of first pregnancy
- Promote /Develop use of insecticide treated nets (ITN) for all pregnant women and all the children below 5 years old.
- Social transfer programs : conditional cash transfer for pregnant, lactating women

From this complete list of options proposed by the 5 SEA countries, each country specifically selected 8 to 9 options that were submitted for assessing key stakeholders’ opinion (WP6).

3.5. Selecting the best practices in SEA countries -Stakeholders analysis (Multi Criteria Mapping)

It is now well recognised that carrying out a detailed, accurate stakeholder analysis is a critical component in the efforts to mount successful and sustainable intervention programmes. Such analysis allows identifying potential synergies and obstacles from perspectives of different stakeholder group to understand the opportunities and potential threats of alternative intervention actions and mechanisms, and when to proposed as action programs to gain stakeholder’s interest/supports.

The Multi-Criteria Mapping (MCM) methodology has been developed by Sussex University to help policy makers to setup policies about complex problems which involved multiple stakeholders. MCM is based on a computer assisted interviews of stakeholders. The main purpose of MCM is to elicit stakeholder’s views on elements and criteria for judging the proposed priority interventions, to gain broader perspectives beyond those who develop the interventions and create a participatory environment for decision making on the priority intervention. In this WP, this novel technique was used to reach consensus among stakeholders about a set of priority actions through which to mount a timely and effective response to widespread micronutrient deficiencies among vulnerable groups in SEA (i.e., children under 2 years old and Women of Reproductive age). Two representatives from each
of the five SEA countries (Cambodia, Indonesia, Laos, Thailand, Vietnam) interviewed representatives from a broad range of stakeholder groups in their respective countries who have an interest or active involvement in nutrition actions.

A key feature of the multi-criteria mapping technique is that interviewees (i.e., stakeholders) select and prioritise from a predefined list of intervention options those they consider important, and the criteria against which they will evaluate them. The technique identifies from each stakeholder’s point of view the weighting, ranking and importance of alternative policy/intervention options in each country. By comparative analyses of the quantitative and qualitative data collected, the most acceptable policy options of key stakeholder groups are identified.

The list of stakeholder categories was finalized by the 5 SEA countries based on a common core list of categories including International NGOs, UN agencies, civil society, academic researchers, funders, private sector and of course government officials. However, according to specific different governmental and civil society structures, some SEA country included, several government sub-categories such as implementer, planner, policy maker and program coordinator. Each SEA country selected a minimum of 20 individual stakeholders, i.e. at least 2 by category. Nevertheless, the stakeholders from governments were over-represented due to the high level of centralization in SEA countries.

As one of the objectives, two or more of participants of the institutions of the 5 SEA countries involved in the project were trained to use the MCM methodology by their own. The five-day workshop was held in Jakarta, Indonesia and focused on data collection and practices and development of the interviews.

The list of options for MCM was finalized from the list of interventions to address the micronutrients deficiencies in SEA countries proposed in WP5. These lists of options were specific to each SEA country and adapted to their own agenda and their own existing policies and targeted various population groups. Consequently, most of the interventions concerned the usual supplementation programs (mainly iron and folate supplementation for pregnant women and vitamin A supplementation for young children). However other approaches to address the problem were also proposed such as food based approaches, weekly supplementation for women of reproductive age, nutrition education and a few indirect interventions such as home-gardening. All the countries proposed food fortification as an option but formulation of the option and the targeted groups were country-specific and maybe voluntary or mandatory.

After finalizing the interviews, a 5-days workshop was held in Vientiane, Lao PDR. Two representatives of each SEA countries were trained by IRD on the analysis module of MCM. This workshop allowed the participants to carry out a preliminary analysis of their available data making them understanding and discussing the potential of this MCM technique. All the criteria and their definitions were translated and grouped into 6 categories of criteria: impact, feasibility, efficacy, effectiveness, resources and sustainability. This grouping allows comparing the results between all the stakeholders and understanding their different perceptions of interventions.
The MCM technique was found very informative for the beneficiaries from the 5 SEA countries and resulted in very interesting comments and exchanges between the countries. The main results from the MCM process showed that the priority interventions selected varied widely in each country according to the different stake-holder categories, and between same stakeholders from different countries. “Conventional” nutrition-specific interventions were more supported or promoted than “new” potential interventions (weekly Fe-FA) and food based approaches. Food fortification ranked low in priority in most SEA countries

- In all SEA countries daily supplementation (IFA or MNP) is widely supported by stakeholders. The qualitative data showed that the reasons of this support were the presence in all country of existing policies for decade and that these options are curative. Consequently, this approach was characterized as feasible, acceptable and effective.

- In contrast, new approaches such as weekly supplementation were not well perceived by stakeholders based on arguments that this approach was not curative, that targeting women in reproductive age is complex, compliance and acceptance are in question and cost could be high as this approach concerned not only pregnant women.

- The food based approach interventions were proposed by all the countries but surprisingly not well supported by stakeholders. The main reasons against the food based approach interventions were the limited understanding of the people on nutrition, the lack of commitment of people and political will, the limited availability of the land/seeds. This strategy is not well defined and not yet supported by governments, with lack of infrastructure and doubts on feasibility and sustainability.

- Food fortification options were not supported in 4 countries except in Indonesia where a mandatory fortification of staple foods policy exists. The main concerns from stakeholders that explain the low support were related to the diversity of food to be fortified, the absence of mandatory practices, the potential increase of product’s price, the difficulty to regulate imported product, the actual limited marketing strategies of the food industry and the potential of changing sensory properties of the fortified food.

The first conclusions of the analyses of the MCM data strongly underline the gaps between the current scientific evidence and the stakeholder perceptions. Most of the interventions promoted by the different stakeholders concerned interventions that are actually implemented in most developing countries for years. Other approaches including new promising approaches received less attention and the reasons given by the different stakeholders strongly suggest that actions have to be implemented should be advocated or properly inform relevant stakeholders of all available strategies, their characteristics and cost and their potential impact on health and well-being of populations. Evidence that a new approach actually works in their own country might be the strongest advocacy and its currently missing to convince policymakers and stakeholders to change the current policies.

SMILING is thus recommending each SEA country to create a national platform bringing together all stakeholders to provide comprehensive information to policy makers/planners, to advocate new interventions, and proper compelling evidence, proper monitoring and
evaluation of impact and to create consensus among stakeholders. Individual SEA country should define the appropriate structure and management of this platform.

3.6. Food fortification

The SMILING consortium had anticipated that food based approaches will be key interventions for achieving sustainable improvements in micronutrient status of vulnerable groups. Special attention was given to these approaches, specifically, food fortification. Despite its successful implementation in several countries throughout the world, it is underrepresented in SEA. Many SEA countries are considering or currently developing food fortification strategies, however its implementation is limited. SMILING supported its development through the dissemination of state-of-the-art scientific knowledge and by drawing on expertise from within and outside the consortium to define country-specific conditions to implement food fortification programs.

A 5-days meeting on food fortification was organized in June 2013 in Bangkok, Thailand by MU with contribution of IRD and participation of at least two participants from DFPTQ/NMCHC, SEAMEO, NIOPH, MU and NIN.

The first event was a 3-day workshop with the objective of building awareness, local expertise and skills for the development of successful food fortification programs and to compile information necessary to propose and implement food fortification programs in each SEA country (target groups, food vehicles, fortificants and existence of specific policy and implementation).

During this workshop, principles and general guidelines of food fortification were presented by different external experts and the framework of steps for each SEA country to implement food fortification was developed. This workshop also provided the SMILING consortium with an overview of the current food-based strategies and fortified food products in each SMILING country and gave an overview of the current laws and enforcement strategies for fortified foods in each SMILING country.

- Common to all countries is the mandatory iodization of salt. However, in Lao PDR, no reliable monitoring system is implemented so that the level and the coverage of salt iodizations is unknown even if regulation on level of iodine in I-salt (minimum and maximum levels) exists. In Vietnam, fortification of salt with iodine was mandatory for a period of time, but was stopped when the situation of IDD improved. It is being considered again for mandatory I-salt, as a rise in IDD is observed.

- Additional mandatory fortification exists in Indonesia and Thailand. Indonesia has iron & zinc fortification of wheat flour, multiple fortified complementary foods, and vitamin A fortification of cooking oil. Thailand has iodization of fish/soy sauce and vitamin A fortification of sweetened condensed milk to fulfill the industrial standard for the product.

- Four countries (except Laos) have voluntary fortification of condiments, staples and complementary foods as a public health strategy. In Vietnam fish sauce is fortified with NaFeEDTA, wheat flour with multiple micronutrients and vegetable cooking oil
with vitamin A. In Thailand, broken rice fortified with calcium, iron, folate and vitamin B1 is used for making complementary food and instant noodle are also fortified with multiple micronutrients. In Indonesia, a pilot implementation on oil fortification with vitamin A has been undertaken as well as rice fortification with iron. In Cambodia soy and fish sauces are fortified with iron. At pilot scale, rice is fortified with multiple micronutrients (iron, Folic acid, zinc, vitamins A, B1, B2, B6 and B12) and imported palm oil fortified with vitamin A is available.

- All countries have implemented food-based strategies as one of the nutrition programs, such as food-based dietary guidelines, food security for nutrition, nutrition education communication. However, these interventions are not necessarily specific to micronutrient deficiencies or focused as interventions for children and women. In summary, the workshop confirmed that the definition of food-based strategy or actions may be differentially defined, and some of them are not specific to micronutrients. In addition, country’s context, such as existence of the food industry to produce certain fortified foods, may not allow specific type of food-based intervention. Where food fortification is generally feasible from technical point of view, critical aspect, namely regulatory system and legal status will need to be considered in the development of food fortification program.

The second event was a 2-day Advocacy Meeting “Preventing micronutrient deficiencies in South East Asia by food based strategies”, held on June 27-28. The targets were policy-makers and stake-holders implicated in nutrition, food, agriculture and health sectors and representatives from SMILING South-East Asia countries. The overall aim of the meeting was to describe the current state of affairs with regard to food fortification in each target country, to identify the strengths and weaknesses, regulatory requirements and to strengthen food fortification policies in each country.

More specifically, the goals were: to review in each of the five SEA countries, Cambodia, Indonesia, Laos, Thailand and Vietnam, the current technical feasibility and legal framework for implementing food-based strategies; to advocate food based strategies, especially fortification program for preventing/improving micronutrient deficiencies among reproductive age women and infants and young and to identify fields of cooperation in SE Asia on food based strategies and food fortification.

Most of SMILING SEA countries plan to develop food fortification strategies but mentioned limiting factors and needs. The main limiting factors which act as barriers related to technical problems such as potential organoleptic changes of the fortified product (or even if there are no proven organoleptic changes, the fear for changes as for instance in organoleptic qualities of rice) and the selection of the best fortificants (stable in the food matrix especially during storage, high bioavailability and lowest price…). Another important concern is related to the monitoring and quality assurance of the fortification. This includes the control of the concentration of micronutrients in foods along the production process product distribution and setting up appropriate analytical method either in the factories or independent laboratories and during the distribution chain. Many stakeholders put this point forward as reason to give food fortification a low priority (“how can we check a product is fortified; we
Concerns were also expressed regarding the marketing of the products and the organization in charge of controlling voluntary fortification. Furthermore, there is also a lack of knowledge about the coverage of the fortification product so that it is difficult to evaluate the efficacy and efficiency of the programs that already exist.

Overall, it was found that policy commitment and support to the food fortification program in four of the five countries (Indonesia being the exception) is still inadequate. There should be a national level food fortification committee which may be a subcommittee of the national nutrition committee, or an independent one if the national nutrition committee does not exist. A functional and active secretariat to the national food fortification committee is essential to coordinate the multi-sectorial efforts as well as partnering with academic, non-government and international organizations.

As part of the effort in the SMILING project, country-specific recommendations/guidelines of food fortification was developed to support the implementation, monitoring (quality of fortified foods and quality assurance laboratory) and evaluation of impact of food fortification programs. The development of these country-specific guidelines was done by adaptation of the general principles and guidelines to the specific situation of each SEA country taking into account elements such as the target populations of each fortification programs (general population of specific population for instance infants or women), the food vehicles (oil, rice, condiments), micronutrient(s) to be added and the quantities to add, the food companies and the food distribution system of each country, the quality control systems in place at government and food company levels, the legislation supporting food fortification).

The meeting recommended that food fortification will be an important intervention. For food fortification to be a choice of food-based strategy, there is a need for the SEA countries to advocate for the needs and potential benefits. Some relevant issues for consideration include: a comprehensive policy on food fortification, making food fortification mandatory, setting a National Food Fortification Board responsible for all fortified foods, involvement and commitment of industry, establishing monitoring systems for fortified foods (sharing regional experience, competence and practices), and harmonization of laws at ASEAN level for imported fortified products; and impact evaluation. Food fortification should be advocated to the current ASEAN committee on food security to support the exchange of knowledge, expertise, resources in laboratory (crucial for quality assurance) and capacity building.

3.7. Integration of priority interventions in National Policies: Policy advocacy and developing a plan of action

The final objective of the project was to advocate among key policymakers and stakeholders the priority interventions that were selected by each SEA countries during the project and when possible to define a plan of action for integration of the priority interventions into national nutrition programs.

The difficulty here was the availability and mobilization of policymakers and members of government, which are of course one of the key stakeholders for this Action stage. In most of the countries beneficiaries faced difficulties to have access to the high-ranking persons that
can have a significant impact on the national road maps for Nutrition. This was especially true at the start of the project but interest of stakeholders increased together with the development of the project over months and with preliminary results being presented.

Also governments develop national plans of actions for usually 5-10 years and some plans were already in implementation during the period of the SMILING project. Moreover, these plans are often supported by international organizations (UNICEF, WHO) that have their own strategies. These difficulties were anticipated in the project indicating that national processes required usually several years and that SMILING was expecting to impact the national policies sometime after the end of this project. The exception in this case was Cambodia, where the development of a national plan of action for nutrition and the SMILING project was timely and ran in parallel, enabling SMILING to provide valuable input into the development of the national plan of action for nutrition.

Four SEA countries organized a one-day national meeting where the SMILING project was globally presented to a panel of stakeholders with a focus on the priority list of interventions to be considered for inclusion in national plan of actions or road maps. These meeting were first organized in Vietnam, Laos and Cambodia as beneficiaries work in national governmental institutes. Indonesia where the beneficiary is from a university was able to organize its national meeting later on, after preliminary results from MCM and Linear programming were available thereby creating more interest in SMILING and its outcomes. In all these countries the preliminary results of SMILING increased awareness and interest of keys stakeholders. In Cambodia, the Ministry of Planning which hosts the National Subcommittee for Food Fortification was alarmed by the low rating food fortification strategies were getting from stakeholders, acknowledging that monitoring and evaluation is a weak point in Cambodia which needs to be addressed urgently to improve overall acceptance of food fortification strategies, whereas in Vietnam, the National Institute of Nutrition, Ministry of Health, has appointed a national food fortification coordinator, to coordinate all food fortification initiatives.

In Thailand, the SMILING results with focus on W4 and WP6 were presented to stakeholders in a meeting co-organised by the Department of Health in the Ministry of Public Health. For WP4, it was agreed that results from this analysis will be used to improve the current complementary food guidelines in its next revision. The food-based recommendation results will also be incorporated in the development of the FBDG for infants and toddlers. For broader policy, the SMILING results were perceived as relevant inputs to the MOPH action plans which has adopted the WHA targets (2012), whereby goals to reduce stunting and anemia will likely include priority interventions with micronutrients identified in the SMILING project. The current revision of the national plan on iron deficiency anemia is one such plan.

At the end of the two years of the project, the main results of the SMILING project were discussed during a two-day Final Assembly regrouping the beneficiaries of the SMILING consortium, the advisory board, invited representatives of regional international organizations and institutes and 1-2 representatives of implementing unit or policy makers of each SEA countries. The following day, the main outcomes as well as the plans of actions to prevent micronutrient deficiencies in women, infants and young children were presented and
discussed in a one–day **Dissemination Meeting "SMILING for action"**. Both these meeting were organized in Phnom Penh, Cambodia by The Department of Fisheries Post-Harvest Technologies and Quality Control (DFPTQ), Fisheries Administration, Ministry of Agriculture, and the National Maternal and Child Health Center (NMCHC), Ministry of Health, Cambodia in collaboration with the Institute of Research for Development (IRD), France.

The final assembly focused on four discussion themes:

- Integrating literature review results to prioritize SEA actions: What is already good, and what can be changed?
- SEA Country plan of actions to prevent micronutrient deficiencies in women, infants and young children in SEA: Lessons learned from SMILING
- Integration of interventions with public and private sectors, civil society and international initiatives to prevent micronutrient deficiencies in women of reproductive age, infants and young children.
- From research to action: A synthesis of SMILING results for evidence based policy in SE Asia

During the Dissemination day the main outcomes gathered by the SMILING project were summarized in short presentations given by North and South beneficiaries of the SMILING consortium to give a comprehensive overview to the large audience and open to discussion with all participants. Each SEA country presentation gave special room to an intervention of one of its policymaker. This meeting was followed for the whole day by key policy bodies from Cambodia such as the secretary of State from the Council for Agricultural and Rural Development (CARD) attesting of the interest created by SMILING for micronutrient deficiencies with policymakers.

### 3.8. Lessons learned from SMILING and perspectives

The two year research project SMILING had not the ambition to give the solution (the magic bullet) to solve micronutrient deficiencies in women in reproductive age and young infants in SE Asia but to contribute to define the best strategies to prevent micronutrient deficiencies in SEA according to the specific contexts of the countries included in the project. As such, the SMILING project which was highly ambitious, has been very successful, as in each of the 5 SE Asian countries, ministries are now aware on what could be done, and where to invest in, to improve micronutrient status and health of their population. An important lesson learned is that although ministries were involved from the beginning, their interest began to develop only after the first results were presented, as many policymakers could not see in the beginning were SMILING was heading for. Due to his short duration, SMILING focused more especially on direct interventions recognized as “nutrition-specific nutrition”. However SMILING recognizes the need to develop in parallel the “nutrition-sensitive” approach notably by developing regional researches with the goal to bring scientific evidence based information to move forward to improve food security. And currently SMILING is often mentioned as the example of good collaboration between scientists and policymakers. But early involvement of policymakers was essential for the SMILING development. Hence, to
create policy change, one should involve policymakers from the beginning, but not lose heart by lack of interest. Continued advocacy may be necessary throughout the action stage.

**SMILING a human and participative adventure**

The SMILING project has been conceived around a strong North–South–South collaborative approach. Beneficiaries from South and North countries were all concerned and developed activities for years to improve the nutritional status and well being of populations, especially the most vulnerable ones. Most of beneficiaries have already worked together mainly through North-South bilateral exchanges. SMILING was a unique opportunity to bring these people together, to develop a regional consortium and to create a regional platform with a critical mass of SE Asian scientists with different background, competence and functions (epidemiology, food sciences, implementation, public nutrition, medicine, parasitology……) that enriched the discussion and exchanges.

From its conception, the SMILING project was the project of the entire consortium. The project was developed in consultation between all beneficiaries from South and North. All partners actively participated and contributed to all decisions throughout the development of the project thanks to four steering committees meetings and several regular meetings all organized in SEA countries, except for the launching meeting held in Montpellier, France. The SMILING consortium express strong willingness to build on the positive spirit created during the development of the project. SMILING has been made successful due to the strong determination and commitment of partners from South-East Asia and Europe to work together to define and develop evidence-based actions.

One of the successes of SMILING was to make this platform alive and useful for all partners and to garner their willingness to maintain it after the end of SMILING to develop future collaborative work. It is thus important and if possible to support this platform to continue, grow and spread over other countries in SE Asia and throughout Asia.

**SMILING raised the need for regular data on micronutrient malnutrition**

The five SEA countries vary widely in term of populations, development, political and social structures, human resources capacity and availability. In most of the countries except for anemia, few data were available, updated, reliable or representative. This lack of accurate information is a barrier to the implementation of appropriate interventions and also to the evaluation of their impact and nutritional changes in the population. Despite adequacy of data on micronutrient situation, it is legitimate to conclude that all SEA countries are still facing micronutrient deficiencies although at different levels. Of magnitude and severity.

SMILING recommends that each country establish a representative database of nutritional status, which must integrate undernutrition and deficiencies as well as data on overweight and obesity. For micronutrients, it is recommended to include the evaluation of the population’s status of several key vitamins and minerals (iron, zinc, B-vitamins, Vitamin D, calcium etc) in addition to the evaluation of iron, iodine and vitamin A. Regular national micronutrient surveys have to be advocated and perhaps implemented in collaboration with existing regular national survey, such as the Demographic Health Surveys, which are held
every 5 years in most countries. Cambodia has taken up this challenge put forward by SMILING, and is currently doing their first ever National Micronutrient Survey with >7 different micronutrients. International organizations, funders and government should consider as a priority to invest in regular national micronutrient surveys. It would be an excellent investment as it will guide almost all nutrition-related policies and will avoid inappropriate actions.

**Innovative tools to develop new informative decision are keys for action**

Innovation and training were also specific concerns of SMILING. The regional trainings organized in the SEA countries allowed SEA beneficiaries to integrate new tools such as the mathematical linear modelling and the Multi-Criteria-Mapping, and to update their knowledge and practices in creating/updating the food composition tables, and in planning and implementing food fortification programs.

The capacity building of the SMILING consortium members is another important feature. Through various work packages, technical capacity on compiling quality FCT data and innovative tools were introduced for all SEA countries. The SMILING project provides the great opportunity to implement the trained skills to work on actual country data or with stakeholders in the respective countries. It is important to note here the deep and sustained implication of trainers and a strong interest and commitment of trainees. Following the specific training sessions the dedicated trainers supported the work of the different teams through lengthly period missions in SEA. Consequently a real capacity and competence was developed in each SEA country with the advantage of the harmonization of tools at regional levels allowing comparisons, exchanges, collaborations. The results generated from these tools were well received and used to support the translation of knowledge to policy and action programs for alleviating micronutrient deficiencies. These tools are expected to have future application for other nutrition related issues, and the capacity built can be mobilized. It will be beneficial to extend the trained capacity to benefits other countries in the region.

The country-specific list of interventions presented to the different stakeholders generated different answers with priorities varying widely across countries but also between stakeholders in the same country. Qualitative information that will help to better understanding of the choice of options by the different stakeholders and further analysis can be done and input to the future action plan. In addition, it was clear that the level of information of all stakeholders about nutrition and the potential of the different interventions to solve malnutrition needs further dissemination and was a key element in advocating for investment in nutrition.

Consequently SMILING recommends creating in each country a national platform (nutrition coordinating alliance) that brings together all the stakeholders to receive, share and integrate comprehensive information that is needed to build consensus on the actions to be implemented at national level. For instance food fortification that was highly supported by the beneficiaries from the 5 SEA countries has been ranked low in priority in most SE Asian countries by the stakeholders especially in comparison with supplementation, mostly
because of many concerns and uncertainties that underline the need for appropriate communication to allow informed decision.

Innovative interventions such as weekly supplementation for women in reproductive age were also not well supported although there is growing scientific evidence of its efficacy and effectiveness in SE Asia. Therefore International Organizations (WHO / UNICEF / WFP) have their role to inform, advocate and to provide technical assistance (eg ELENA: http://www.who.int/elena/nutrient/en/).

Setting up complementary interventions and multi-sectorial support

The mathematical linear programming technique strongly suggests that diets of the target populations of the SEA countries were deficient in calcium, iron, zinc, folate and riboflavin even in the best- diet options. Integrated and complementary interventions must thus be implemented. They can be direct as improved micronutrient intake through supplementation, food fortification and food diversification or indirect through public health actions depending on situation of each country.

Setting up complementary interventions requires a multi-sectorial commitment of key actors and stakeholders. Food fortification was considered by almost all SEA beneficiaries as a strategy to be developed. But, the involvement and commitment of industry is essential and industry has to know about government policy and support and consumers impact. Consumers should be adequately informed, especially at level of (the poorest) communities about the benefit of improving their diets including the use of specific and staple fortified products. One possible model is to establish a national food fortification board (NFFB) responsible for and guiding policy on food fortification in all countries. This NFFB has to be linked with the national nutrition alliance as complementary interventions are needed and have to be integrated in a general strategy. The opening of the SE Asian region boarders in 2015 / 2016 as a result of ASEAN Economic Community (AEC)will provide both an opportunity to harmonize food fortification laws within the region, as well as identifying challenges for implementing monitoring systems.

Finally the SMILING consortium agreed that the action should follow a holistic approach and has to be country-specific, to include country-tailored packages of interventions and be country-accepted. The Action should address the double (triple) burden of malnutrition with a special attention on adolescent girls, women in reproductive age, thus clearly acting before conception), and on infant and young children.

SMILING is thus suggesting using a general blueprint. This systematic approach should:

- First define the real nutrition and health needs of the targeted population.
- Decide on the expected outcomes of public nutrition and health to be evaluated on a regular basis (for instance low birth weight, selected biochemical indicators, specific anthropometric indices, and choose a realistic impact and targeting goals.
- Subsequently, a package of interventions to address the health needs of target population can be selected and integrated into a multi-sectorial programmatic framework.
SMILING in the world of global international initiatives to improve nutritional status and health of women and young children.

Since its conception, The Action of SMILING was conceived to contribute to the global initiatives such as the “Scaling Up Nutrition (SUN) Movement: The countries that join the SUN Movement are committed to develop their national policies and actions to meet the global targets adopted by the 2012 World Health Assembly (15) of which the efforts to improve micronutrient status in women and children will contribute significantly to this resolution. To be successful in addressing the problem, there is a need to engage a broader range of sectors beyond those directly involved in nutrition such as agriculture, education, social protection, national development. SMILING's focus on micronutrients contributes significantly to the national mechanisms of the SUN Movement by analysis of country situation, building on the evidence for potential food-based approaches to improve micronutrient intake and status of women and children; sharing of knowledge and experiences among participating countries; identifying key stakeholders for advocacy purpose followed by recommending a policy road map and strategic framework to incorporate priority interventions appropriately. In brief, SMILING amplifies the process and the operation of the SUN Movement to achieve results at the country level. It should be noted that Laos PDR, Indonesia joined the SUN Movement early on, followed recently by Vietnam and Cambodia. Therefore SMILING is not only complementary to the SUN movement but also amplifying the SUN principle to participating countries. In addition, several consortium members of SMILING are actively involved in the networks of the SUN Movement and therefore, provide their direct contribution to this global process.

The Zero Hunger Challenge and the 2012 UN's Human Rights' Council 'Right to Food Resolution': At the Rio+20 Conference on Sustainable Development in June 2012, UN Secretary General Ban Ki-Moon launched a Zero Hunger Challenge, aiming to eliminate hunger in the world. This calls for a collective and comprehensive effort to improve access to adequate foods at all times with an emphasis on sustainable food systems and family farming. In addition, the initiative includes elimination of stunting as an aspirational goal. The latest Right to Food Resolution approved by the UN Human Rights Council in 2012 (19), calls for national plans and programs to improve nutrition in the poor households, targeting the first 1,000 days of a child’s life to address malnutrition in all its form. SMILING’s emphasis on national policies to incorporate food-based approaches and micronutrient interventions contribute directly to these global efforts.

The Second International Conference on Nutrition (ICN2): The event is a sequel to the first one held in 1992 and will be co-convened by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO) during 19-21 November 2014 in Rome. This high-level intergovernmental conference will emphasize ways and means to address nutrition challenges and aims to deliver a political outcome and framework of action. The current framework includes, amongst others, the reshaping and managing food systems to provide safe, nutritious and healthy foods, to strengthen institutional capacity and to coordinate across sectors, as well as enhance collaboration among key stakeholders nationally and internationally. These features are core components of SMILING Consortium, therefore, the
experiences of SMILING are relevant to ICN2 and should benefit the participating countries to implement the commitment thereafter.

In term of perspectives, the SMILING consortium express their strong willingness to build on the positive spirit created during the development of the project. SMILING has been made successful due to the strong determination and commitment of partners from South-East Asia and Europe to work together to define and develop evidence-based actions.

Due to the short duration, SMILING focused more especially on direct interventions recognized as “nutrition-specific”. However SMILING recognizes the need to develop in parallel the “nutrition-sensitive” approach notably by motivating regional research with the goal to bridge scientific evidence to policy and program leading to the improvement of nutrition and well-being of vulnerable population in South East asia.

3.9. Final remarks

The specificity of the SMILING project was built on the strong determination and commitment of nutritional scientists and professionals from South-East Asia and Europe to work together to define and develop sustainable evidence-based actions that will be implemented in the selected SEA countries to control Micronutrient Deficiencies in women and young children and Improve General Health In Asia. The premise was that while there is so much known from scientific research, such as those in the Lancet series on Mother and Child Undernutrition, the actual policy making and intervention programs continued to be ineffective. Hence, the translation of knowledge to suit the actual country context where these interventions will be implemented is crucial.

This project has been made possible by the strategic and funding support of the European Community for collaborative projects bringing several countries from the same region of South-East Asia, to work together and in collaboration with European countries.

Lessons from conducting the SMILING clearly reinforces that knowledge from scientific research needs another platform in order for it to be fully utilized for policy and action programs. The SMILING project provided a platform for five SEA countries encountering the problems of micronutrient deficiencies to identify such a mechanism using the actual situation, i.e. to interface scientific knowledge within the country specific context. The diversity in socio-economic and developmental stages and nature of public health problems allowed for deriving commonality and different solutions. The application of three stages (information stage, strategy stage and action programming) approach is not only logical, but also shown feasible as a guiding principle to translate knowledge to action. The two year duration of SMILING project does not allow for implementing the project results and accordingly its impact. However, the lessons learned from this project reinforce that a translation step is a must for making policy and planning of programs which is not likely to be the one-size-fits-all package. These lessons learned will be disseminated and could serve to motivate the EC and other funding organizations to support North-South-South future collaboration in research and capacity building in nutrition and in the implementation of large scale effective programs to reduce micronutrient deficiencies and malnutrition in Asia.
4. **Impact and dissemination**

4.1. **Impact**

**Creating value**

The "Copenhagen Consensus 2012 Expert Panel", including five of the world's leading economists, concluded that the fight against hunger and malnutrition especially in young children and women was the most promising strategy to improve the well-being of populations, particularly in developing countries. The negative consequences of micronutrient deficiencies on cognitive abilities, on the overall development of individual, the ability to work, and hence, the economic growth of the country no longer needs to be proven. Although this is the generally recognized significance, what is lacking is how to implement the available proven effective intervention at a national scale. Hence, SMILING provides the opportunity for countries facing the challenges to test innovations in translating knowledge to action in a real country context, and tailored interventions to suit the participating SEA countries. The collaborative efforts in the SMILING forged the spirit of working together across institutions in developing and developed countries. The anticipated value is the achievement of effective scaled-up interventions to improve nutrition of women and children, and as a side line outcomes, capacity building for countries in SEA.

**Societal impact**

The social dimension of the project is contained in its objective. SMILING used the latest scientific knowledge to define actions and policies for the well being and health of the most vulnerable populations in the context of poverty and transition. The societal challenge was to place southern populations, especially the most disadvantaged, in the way of a proper understanding of the health-nutrition-wellness relationships and thus encourage their direct involvement in their diet-nutrition. SMILING produced knowledge and tools that allow stakeholders to judge the efficiency and potential risks of interventions (including the risks associated with a lack of action) and guide their implementation. Preventing malnutrition in infancy promotes cognitive performance and reduces the development of chronic diseases in adulthood and therefore an investment in the future for both the South and the North. The link between science and society also resonated during MCM interviews and exchanges and through national seminars presenting the results of SMILING to a wide and diverse audience.

**Gender issue**

In order to establish optimal nutrition during the first 1,000 days, SMILING placed the adolescent girls and women of childbearing age in the center of the action and as privileged beneficiaries of interventions. Their understanding, empowerment and appropriate behavior regarding health and nutrition are crucial for improving their nutritional status and that of their offspring.
Women are also at the heart of the project. Indeed, over the 103 participants, 71 were women and 32 men divided into the following categories: experienced researchers (36 women, 11 men) with six researchers recruited for the project, 4 North and South 2 (5 W and 1M), PhD (5W, 1M), other participants (30W, 20M).

SMILING contributed training young researchers and created employment

The SMILING project has contributed to the training and research activities of students of whom 6 PhD including 4 from South and 1 from North. In addition, thirty young researchers from five countries ASE were trained in the design or improvement of the food composition table of their country, on new methodological tools (OPTIFOOD and MCM) and on technical requirements for food fortification. These training were conducted by SMILING experts through 6 workshops and follow-up of related field activities.

SMILING allowed the recruitment of two young collaborators at IRD (1 researcher and 1 manager), a senior researcher at LSHTM, one at Mahidol, and to SEAMEO and two researchers at Wageningen University.

4.2. Dissemination

The dissemination plan of SMILING was to share the progress of the project with a large audience and allow external contributions to the project, to disseminate the project outcomes to the main stakeholders in the target countries, and to national, regional and international audience

SMILING website

The SMILING website (http://www.nutrition-smiling.eu/) was created at the beginning of the project. It has been regularly updated during the 2-year period of the project with information regarding the development of the project and preliminary outputs. The available public deliverables have also been uploaded in the website. After the end of the project, the SMILING website will be maintained and updated by IRD.

National SMILING meetings

In Vietnam, Lao’s PDR, Cambodia and Indonesia, the outputs of the Mid-Term Workshop held in March 2013 and the work done on prioritization of main interventions (WP 5) were presented to the main stakeholders (public, private and academics sectors, international organizations, NGOs and civil society). The selected stakeholders were invited to attend a one-day meeting to present the SMILING project, its objectives and presentations particularly focussing on country-specific interventions to prevent micronutrient deficiencies.

According to the country and the beneficiary in charge of the organization of this meeting and resources available, invitations to participate were extended to other participants with activities or interest in the prevention of micronutrient deficiencies not involved/selected in the interviews of WP 6. These participants were selected by each SEA beneficiary in the
respective country. Depending on the country, number of participants ranged from 40 to 70 participants per country.

The national meetings took place in Hanoi, Vietnam, 9th August 2013, in Vientiane, Lao’s PDR, 4th October 2013 and in Phnom Penh, Cambodia, 8th January 2014 and Indonesia in April 2014. For Thailand, as the previously established multi-sectoral committee is no longer active, the adoption of the WHA target (2012) provides a forum for the country to formulate a country implementation plan. SMILING results was communicated to mid-level program managers of relevant sectors through the Ministry of Public Health. The meeting was held in July 16, 2014.

Publications

Three papers related to SMILING have been already published:


Two special issues of two nutritional journals are in discussion

**Journal 1**

- **Paper 1**: The SMILING project: key actions to prevent micronutrient deficiencies in women and Young children in SE Asia. Results from a South-South-North collaborative project. Berger J et al.

- **Paper 2**: Systematic review on interventions to control (treatment, prevention) micronutrient deficiencies in young children (0-5 years of age). M Campos Ponce et al.

- **Paper 3**: Strategies to improve the micronutrient status of Women of Reproductive Age (WRA). Dijkhuizen M et al.

- **Paper 4**: Micronutrient status of population and interventions in 5 SEA countries. Roos N et al.

- **Paper 5**: Food fortification for preventing micronutrient deficiencies in SEA countries. Winichagoon P et al.

- **Paper 6**: Multi Stakeholder Mapping in SMILING partner countries: what actions to bring forward? Kameli Y et al.

- **Paper 7**: Conclusions. Berger J et al.
Journal 2: Seven articles on the results of the "mathematical programming" approach including 1 methodological paper and 5 SEA country papers and one paper on general synthesis conclusions.

Communications and other dissemination activities

**Micronutrient Forum, 2014, Addis Ababa, Ethiopia, June 2-6 2014.**

- Ferguson, E. To what extent can food-based approaches ensure dietary adequacy for women and young children in SE Asia?


Abstracts published in Annals Nutr Metab 63(S1)

- Berger J. The SMILING project.
- Ferguson E. Potential of food-based approaches to control micronutrients deficiencies (mathematical modeling).
- Kameli, Y, Greffeuille V, Wieringa FT, Berger J. Country intervention strategy evaluation by stakeholders

**ASEAN-EU STI DAYS, 2014** Bangkok, Thailand, 21-23 January, organized by SEA-EU-NET 2, an international cooperation network funded by the FP 7. The objective of the project is to build upon and leverage strong Europe-Southeast Asia S&T relationships developed through past support and coordination actions, to deepen engagement and build momentum in S&T cooperation. It broadens the scope of Europe-Southeast Asia cooperation through stimulating sustainable innovative collaborations. SMILING was presented as a Poster

**Infopoint SMILING, 28 April 2014, Brussels, Belgique:** From science to policy: how to prevent vitamin and mineral deficiencies in South-East Asia Outcomes of the EU FP7 SMILING project and the way forward

- Mr Pedro CAMPOS-LLOPIS, Policy Officer, DEVCO C1, Rural Development, Food Security, Nutrition. Introduction
- Mrs Alexandra TUIJTLEAARS, Project Officer, DG Research and Innovation, F3 Agri-food chain. SMILING Sustainable Micronutrient Interventions to Control Deficiencies and Improve Nutritional Status and General Health in Asia.
- Dr. Maiza CAMPOS PONCE, Assistant Professor, VU University Amsterdam, The Netherlands. Sustainable nutrition intervention agenda for South East Asia.
- Dr. Elaine FERGUSON, Senior Lecturer, the London School of Hygiene and Tropical Medicine, UK. To what extent can food-based strategies ensure dietary adequacy, for SE Asian women & young children.

Tables of food composition: at the request of the FAO the five tables of composition of foods from the five countries listed in the ASE SMILING project would be published on INFOODS website http://www.fao.org/INFOODS/INFOODS/en/

**Press releases**

- A first press released was disseminated for the Kick-Off meeting in March 2012 in Montpellier. The press release was sent to local and national journalists.
- A radio interview was done for the steering committee Bangkok in September 2012, by Prof Pattanee Winichagoon on local radio broadcast.
- A second press release was prepared for the advocacy meeting on fortification and food based approaches organized in Bangkok, June 2013 by IRD and Mahidol University. The press release was prepared by the representation of IRD in Bangkok and disseminated to local journalists.
- A third press release was prepared for the final assembly and dissemination meeting, by the information and communication department of IRD. It was sent to a large network of local and international journalists but also to European embassies and representations in South-East Asia.
- The event was broadcasted on local TV in Cambodia, several times.

All press releases are available on the project website.
SMILING Final assembly and Dissemination Meeting

At the end of the two years of the project, the main results of the SMILING project were discussed during a two-day Final Assembly regrouping the beneficiaries of the SMILING consortium, the advisory board, invited representatives of regional international organizations and institutes and 1-2 representatives of implementing unit or policy makers of each SEA countries.

The following day, the main outcomes as well as the plans of actions to prevent micronutrient deficiencies in women, infants and young children were presented and discussed in a one–day Dissemination Meeting "SMILING for action". Both these meeting were organized in Phnom Penh, Cambodia by The Department of Fisheries Post-Harvest Technologies and Quality Control (DFPTQ), Fisheries Administration, Ministry of Agriculture, and the National Maternal and Child Health Center (NMCHC), Ministry of Health, Cambodia in collaboration with the Institute of Research for Development (IRD), France.