Executive Summary

- **Indonesia’s main food and nutrition challenges** are overcoming the triple burden of malnutrition (TBM) namely stunting, obesity, and anemia; and the Covid-19 pandemic that has the potential to exacerbate the problem. The main target groups of tackling nutritional problems are young couples, pregnant women and children under two years of age, especially in priority areas: disaster prone, disadvantaged, and affected by the Covid-19 pandemic.

- **The development of regulations and policies** is directed at the formulation of standards, production guidelines, and codes of practice that are integrated and systemized in the field of food and nutrition. Strengthening existing policies to integrate the implementation of food and nutrition systems to address the problem of TBM should be based on the development of science and technology on Indonesia’s food and nutrition system.

- **Innovations and technologies** developed to address food and nutrition issues must be thorough throughout the food chain from food production to consumption, including biofortification and encouraging environmentally friendly production systems. All of these things need to be managed systemically, so that it has a real impact.

- **Incentive policies** from central and local governments take precedence over food loss and food waste reduction programs, as well as improving community behavior including restrictions on sugar, salt, and fat. Incentives in the form of special shopping cards for side dishes, fruits, and vegetables for those who nutritionally vulnerable and very low income family should be based on real time and accurate data base which is periodically updated in a big data system.

- **Comprehensive campaign** to promote nutrition awareness and healthy living need to be prioritized at the family, village, school, and boarding school level, through investment that support adoption of balanced diet and healthy living behaviors. The active role of community leaders, millennials, and other influential figures in food and nutrition education needs to be improved. Strengthening regional capacity in policy formulation and planning of regional food and nutrition development needs to involve the role of associations of scientists and professions, universities, industries, and other stakeholders.
Background and Challenges

Indonesia’s superior human development is one of the five development agendas of President Jokowi’s government. One of the inputs of human resource development is to ensure that the whole community receives adequate food and proper nutrition. Currently, Indonesia’s food and nutrition security are still fragile. According to the Global Food Security Index in 2019, Indonesia is still ranked 62nd out of 113 countries in the world (The Economist Intelligence Unit 2019). According to the Global Hunger Index report, Indonesia is ranked 70th out of 107 countries (von Grebmer et al. 2020). The main challenges are overcoming TBM namely stunting, obesity and lack of micronutrients such as anemia (Riskedas, 2018). The cause of the problem is not only rooted in poverty and food production, but also social problems related to multidimensional behavior.

Stunting is a chronic malnutrition condition early in life that can affect intelligence, productivity, and, both physical and mental health. Stunting and obesity adversely affect the increase in non-communicable diseases (coronary heart disease, diabetes, cancer) which further affect economic growth, increasing poverty, and social inequality. In addition, environmental changes and land damage, greenhouse effects, air contamination, heavy metal contamination, and other food contamination affect food production, nutritional and health status (Bappenas, 2018). This requires serious attention because its potential impact on the presence of large proportion of sub-optimum human resources which can be a burden to various dimensions of life in the future. In the process of sustainable human development, this chain of problems must be ended.

Currently, the proportion of stunting toddlers in Indonesia is still quite large. Indonesia’s superior human development faces challenges due to TBM with the profile of human development index in 2018 is ranked 107th and Indonesia’s Human Capital Index in 2020 is 0.54 which illustrates that Indonesian toddlers will only achieve a productivity value of 54% of their maximum potential in adulthood (World Bank, 2020). The stunting factor is multidimensional, namely insufficient nutritional intake in the first 1,000 days of life due to limited access, foster care and feeding patterns in toddlers, and infection in toddlers due to low sanitation quality and poverty.

In addressing the current problem of TBM in Indonesia, there are real constraints in terms of food provision that include the sustainability of the food system, food adequacy related to the problem of environmental degradation, land transfer, food distribution problems to reach all regions of Indonesia (accessibility), affordable food prices and food diversity for certain groups of people, such as toddlers, pregnant women and the elderly.

An important part of this food system is the food trade. Food trade, which is part of the supply chain system and food and nutrition value chain, plays an important role towards food security and nutrition (KP&G) of the Indonesian people, in relation to export-import, the amount of international trade in Indonesian food products needs to be managed carefully, with the ultimate goal to strengthen food security and nutrition of the nation.

Various programs have been conducted by the government and its ranks through government regulations, national actions, various programs from the Ministry, as well as non-governmental institutions based on governance in Presidential Decree No. 1 2017, as well as various public private partnership (PPP). National commitment at the central level has been quite strong, but not accompanied by the same commitment and capacity at the district / city level, let alone the village.

The implementation of cross-sector convergence programs also needs to be aligned at the village / posyandu level. Monitoring and evaluation of the acceleration of the program needs to be done in stages (districts / cities- centers) to control stunting reduction efforts 3.4% per year. The basic condition requires a systematic, integrated, and institutionalized framework from the center to the smallest unit (village / posyandu). This is good so that the influence of programs with the aim of changing the behavior of the community that runs very slowly begins to show significant progress. The Coordinating Ministry for Human Development and Culture as a key post in organizing multidimensional solutions to Indonesia’s human development problems has established the important value of guaranteeing the quality of generations through sustainable development.

Food and nutrition development that has been implemented in a coordinated manner to date include: (1) Sustainable Food House Area program, increased food production directed at the provision
of diverse, nutritious balanced and safe food (Ministry of Agriculture), (2) Gemarikan (Eat fish campaign) (Ministry of Marine Affairs and Fisheries), (3) Non-Cash Food Assistance (Ministry of Social Affairs), and (4) socialization of Isi Piringku (What is on my plate) and Balanced Nutrition (Ministry of Health). Through these efforts, the average food consumption (kg/capita/year) has not changed since 2010–2019 although national production has increased due to the increasing population.

**Recommendations**

**Regulatory and Policy**

Clear regulations and policies are needed to manage international food competitiveness and trade. The fact that there are quite a number of cases of rejection of food exports in the global market shows that the competitiveness of Indonesian food products is still low, especially with regard to aspects of food safety and quality. Regulatory development is needed to boost product competitiveness to ensure safety and quality, such as regulation, standardization, production guidelines, and codes of practice. The regulations developed must be in accordance with the real conditions of Indonesia and therefore need to be developed based on science and technology on the condition of Indonesian products and production systems.

Product competitiveness is influenced by the condition and competitiveness of the domestic food system. Therefore, strengthening the upstream-downstream food system is necessary to boost product power in the international environment by discipline and consistently implementing science-based regulations to improve safety and quality, and also at the same time to improve the welfare of farmers, fishermen, farmers, planters, MSMEs and other workers, as well as other local communities.

The development of science and technology-based regulations in accordance with the conditions of the Indonesian food system can also avoid the potential for excessive regulation that is counterproductive. Therefore, the process of developing regulations for the field of food safety, nutrition and quality needs to be done through the identification of regulations and regulations of their implementation, analysis of relative merits, to design effectively by involving all stakeholders, the process of which refers to good regulatory practices.

Some important regulatory objectives identified are to improve the competitiveness of food producers, improve sustainability, nutritional status and public health, development of local peculiarities / advantages (geographical indications), empowerment of MSMEs, as well as encourage productive growth of start-ups and marketing innovations.

Evidence and data of research results are also indispensable for the purposes of product promotion as well as the basis in championing the acceptance of national regulations, standards, and certification systems in international forums (Codex, IPPC, OIE, WTO), to ensure compliance with the 2014 Rome Declaration, and global commitment in achieving sustainable development goals (SDGs). Based on data evidence, the humanization of global and national regulations and policies can be done. To support the need for evidence of such data, research program development is required. Competitive grant schemes in the field of research that allow to be carried out with a more targeted regulatory design output, in accordance with the conditions of food safety, nutrition (health), sustainability, economy, social and environmental will be able to improve Indonesia’s competitiveness.

The implementation of regulation needs to be translated into simple language, practical and easy to understand by businesses and in local terms to facilitate understanding. For that, it needs development of massive mentoring, empowerment and counseling schemes on all food system actors along the food chain, such as “BIMAS BARU” with the target of Food MSMEs. This empowerment needs to be complemented by improvements in basic infrastructure such as transportation, water, electricity, internet, and information data. Empowerment and counseling programs need to be developed with an integrated upstream-downstream approach with the awareness that the strength and competitiveness of the system as a whole is precisely determined by the weakest links in the food system.

Competitiveness improvement policy needs to be supported by various policies and other programs, especially to encourage the development of a new generation of food entrepreneurs at the international level such as providing facilities to become exporters, doing business in other countries, special funding schemes, innovation competitions, investment exchanges and others.
These efforts can be included in education and training programs to build the desire and courage of doing business at the international level and not only comfortable with large domestic markets. This policy can be done nationally harmonized to provinces, cities, and villages. Synergy between the Ministry of Technology, Education, and corporate social responsibility / CSR, large corporations / SOEs is needed while building a common will to alleviate the issue of competitiveness. Preparation of recommendations on the roadmap of food and nutrition research is needed to strengthen the national food system so as to encourage the emergence of innovations to solve KP&G problems, especially TBM; improve product competitiveness; and increase its sustainability.

The commitment to build food and nutrition of this nation needs to be controlled with appropriate regulations and policies, to form a more sustainable food and nutrition system, to contribute effectively to KP&G, to achieve SDGs. Innovations based on science and technology are needed to encourage the development of the food sector from the originally natural resource-based. The direction of this innovation needs to be carefully designed and oriented towards (i) upstream-downstream integration, increased productivity (including loss reduction and handling of food waste, use of modern technologies such as biotechnology, nanotechnology), (ii) increased production for import substitution including ingredients, (iii) promotion/increase of exports (especially for superior products-palm oil, coffee, cocoa), (iv) future food creation through exploration of sources and long-term potential, including innovation of environmentally friendly production systems and biofortification, (v) strengthening obesity prevention regulations through the movement of nutrition conscious families and healthy living, among others, restrictions on sugar, salt, and fat intake.

Therefore, it is necessary to develop a road map of upstream-downstream food research (research activities and at the same time downstream efforts of research results) to produce innovations in order to improve the quantity and quality of food. Research and downstream research results need to be developed in a more collaborative research and innovation ecosystem, involving governments-industries-academics-and-communities to support the transformation towards KP&G. The research roadmap towards KP&G needs to be equipped also with the development of policies, regulations and human resources as needed, to enable the program to be carried out properly. Policies linking domestic production improvement programs to imports, such as policies requiring wheat importers to produce cassava, or sago; need to be reviewed.

In relation to the objectives of KP&G, the focus on strengthening the food system should be directed to (i) improving the role of local resources, (ii) improving aspects of sustainability, and (iii) improving the status and condition of nutrition/public health.

Innovation and Technology

In building sustainable food and nutrition, an indicator should be established that refers to Law No. 12 on Food, especially with regard to food security which states that everyone’s right to obtain food that is (i) available in sufficient quantities, (ii) affordable, (iii) diverse, (iv) nutritious, (v) quality, (vi) safe to consume and (vii) not contrary to religion, beliefs, and culture of local people to be able to live healthy, active and productive in a sustainable manner. These keywords can be the basis in choosing innovations and technologies developed in the entire food chain from food produced to consumed. The policy should include inputs at the primary production level (seed), primary food production such as cultivation, capture, harvesting, post-harvest handling and secondary food production (processing). At the level of food consumption to meet nutrition, the policy should mandate food consumption at the family level, ready meals, school children’s snacks and other sectors related to food consumption. The role of innovation and technology development for the sustainable fulfillment of food and nutrition of the Indonesian nation must also be done starting from the primary, secondary food production process to the hands of consumers. All aspects must be worked out simultaneously so that it will have a significant impact.

Innovation at the primary food production stage

At the primary food input and production stage, innovation and technology development are needed to improve seed quality and cultivation processes that adhere to environmental sustainability. In primary food production, it is also possible to apply digital-based technology, artificial intelligence
and drones to support precision agriculture. The provision of nutritious food can also be started from primary food production, among others, by innovation in the development of local food sources so that a variety of food is available. The obstacle that is often encountered in the provision of local food sources is the reluctance of farmers or the lack of ability of farmers to consistently provide local food. Therefore, innovation needs to include social engineering that can stimulate farmers. Innovations in the enrichment of food nutrients including enrichment with micronutrients can also be started from primary food production by applying biofortification.

**Innovation at the secondary food production stage**

At the stage of secondary food production that produces processed food, innovations in the framework of providing nutritious, quality and safe food can be done, among others, by enrichment innovations of nutrients with fortification, including fortification with micronutrients. New technological innovations for processing and preservation such as the application of non-thermal technologies such as high-pressure processing, and electron beam can be applied in addition to thermal technology that has been widely applied. Indonesia has biodiversity potential to be developed by implementing healthy food production innovations based on local ingredients / traditional food, such as the development of “tempe” and fermented food based on local raw materials. Infants, pregnant women, the elderly and other nutritional target groups require the fulfillment of certain nutrients, so the support of innovation and technology of the food process is highly essential. Nowadays, people also expect that food is not only meeting nutritional needs, but also to satisfy sensory and healthy, so that innovation and technology also need to consider the needs of consumers. Innovations and technologies applied to secondary food production need to be adopted by all food system actors, including MSMEs who are the largest food providers. On the other hand, the ability to adopt innovation and technology by MSMEs is still limited, so there has to be an innovation design in the development of the UMKM food industry. Such innovations must also be able to ensure food safety and quality, so that not only does it provide nutritious, quality and safe food, but also contribute to competitiveness.

**Innovation at the distribution and consumption level**

Distribution is one of the problems faced in the fulfillment of food needs because of innovation and technology in distribution, including designing and implementing virtual markets, smart food transportation and food waste tracking are aspects that need to be done to provide affordable food. Nutritional adequacy is strongly influenced by diet/parenting and eating habits. Changes in eating habits are not enough just to be approached with technology, but it needs the involvement of experts in the field of social sciences humanities to conduct social engineering that can encourage changes in patterns or eating habits, especially in target groups to overcome TBM. In developing policies to manage food safety risks at the consumer level in order to fulfill nutrition, it is necessary to design food safety indicators using exposure assessment.

**Selection of innovation and technology priorities**

In implementing innovation and technology to meet food and nutrition adequacy, priority needs to be set, supported by mapping the diversity and potential of each region. Prioritization also needs to support the availability of data on potential in each region, nutritional content and bioactive components of local food, as well as accessibility to data that may currently be owned by various Ministries. The development of a database for food and nutrition needs in Indonesia must be implemented immediately so that there is integrated data that can facilitate policy making.

**Stakeholder commitment**

Sustainable food and nutrition development requires commitment from all parties; namely government, industry, academia / university, and community participation. The government as a regulator can provide funding incentives and tax relief for academics and industry who are willing to innovate and develop technology in the field of food and nutrition as well as awards for those who successfully develop such technologies and innovations. The government through various Ministries continues to foster both management aspects and updates knowledge and innovation updates to the public, academics and industry;
and make regulations and policies that stimulate the development and application of innovation and technology in the field of food and nutrition in Indonesia. Meanwhile, industry is required to guarantee food safety and quality with environmentally friendly management, application of innovation and technology priorities to improve product competitiveness, application of innovation and technology of healthy food products and follow-up of the results of innovation and development of such technologies. Academics and university researchers and research institutes can commit to continue to develop basic research in the development of local food resources including the diversity of microbiota in Indonesia. In addition, basic and applied research for food biofortification needs to be continuously improved including the assessment of food safety risks. Academics can also participate in the development of MSMEs.

In addressing the lack of micronutrients, academics and industry groups can work together in the development of food process technology and enrichment of nutrients such as biofortification, supplementation for vulnerable groups such as pregnant women, toddlers and the elderly. The development of local resources such as tempeh and other fermented products needs to be supported by all stakeholders, both governments, academics and also industries that will ultimately reduce dependence on imports of raw materials and can also improve welfare in MSMEs and promote local products on the national and international stage. Another important point is the need for innovation and application of technology to guarantee food safety and quality to improve the competitiveness of Indonesian products.

The use of technology and innovation in the field of food and nutrition, is expected to support the availability of food in sufficient quantities, affordable, diverse, nutritious, quality, and safe to consume by Indonesian people in accordance with the mandate of food law no. 18/2012.

**Socio-Economic Culture**

Given the diversity and richness of local resources and culture as food sources, the management of natural resource potential and biodiversity (local food, food quality, economic value) and traditional wisdom (good culture of the community) must be done systematically and planned.

Mapping the potential of food and nutritional content, culture, and local nutrition problems are needed in every region in Indonesia. The initiation of this program should be accompanied by incentive policies from the government. These incentives include various food loss reduction and food waste management programs, and government investment in behavioral change for the aforementioned matters.

In addition, it is necessary to sharpen the target of nutrition improvement programs for groups: a) nutritionally prone: adolescents, brides-to-be, pregnant women. Nursing mothers, infants, children under two years of age; b) difficulty in food access due to geography; c) economically weak families. Sharpening this target group is based on real-time and accurate basic data.

School-based programs such as school breakfast, cessation of sugar import subsidies, incentives for food industry products with reduced sugar, salt, and fat content, and/or increased protein and micronutrients need to be revived. Local carbohydrate sources from each region in Indonesia need to be pursued to be available in the form of flour so that it can be accessed around the clock for various needs, as well as to overcome geographical constraints of trade between regions or islands in Indonesia.

TBM problems in economically weak families need to be addressed with social assistance programs from the government, in the form of special shopping cards for side dishes, fruits and vegetables to meet balanced nutrition and as an effort to implement potential local protein sources (eggs, tempeh, tofu, local fish, and local livestock meat). These shopping cards can be made according to the target of weak economic communities based on real-time and accurate basic data and digital monitoring and evaluation systems.

Improving the effectiveness of the implementation of programs (including institutional) nutrition improvement at the regional level can start from the district / city to the village /Posyandu, and schools (when not the COVID-19 pandemic, children use most of their time in school). In order for the implementation of programs run smoothly, there has to be customized programs according to the needs of each target and region, accompanied by assistance in preparing food and nutrition programs through village funds.
The development of PPP activities in each region needs to be done in accordance with local problems and potentials. PPP is emphasized more for the benefit of the community rather than the interests of the company. Strengthening regional capacity in policy formulation and planning of regional food and nutrition development is carried out by involving the role of associations of scientists and professions, universities, industries, and other stakeholders.

Education and manpower

National policy for nutrition improvement has been carried out comprehensively, with mapped targets, and following the life cycle and Presidential Decree No. 1/2017; but the results have not been as successful as expected. Therefore, awareness of consumption patterns and adequacy of food and nutrition in each individual member of society is considered important as the starting point for achieving the strategic goals of Indonesia’s superior human development. The framework for that is outlined through development at the village level.

Priority development at the village level through the cultivation of healthy living behaviors

Healthy behavior education can be organized through formal and informal educational institutions, starting from existing groups (Dikdasmenum / menjur / Dikti / Diksi, posyandu and the like) and the family environment with a focus on mothers and mothers-to-be accompanied by simultaneous education of relatives through extended education (father, grandfather, grandmother, foster care) as family guards and public education through national and local / regional campaigns that are in line with the typical conditions of each region.

Improvement of science and technology on food and nutrition at the level of early education especially for formal education needs to have strong curriculum aspects of food and nutrition since Dikdasmenum (Directorate of primary and secondary education) / Dikmenjur (Directorate of Vocational Education) so as to achieve critical mass in the community as an agent of change. Aligning the education curriculum by integrating prevention and therapeutic efforts in public health programs at various levels of local and central government also needs to be done. That includes educational materials about understanding local food in addition to aspects of taste and gastronomy of Indonesia, namely aspects of local culture and wisdom that have been entrenched and make an important contribution in the maintenance of public health in the form of traditional food products, food impacts on health (functional and nutraceutical food), as well as culinary techniques that are easily adapted and adopted by the community in the education program also needs to be encouraged. In its implementation, it is necessary to involve religious leaders, indigenous leaders and community leaders, the involvement of Woman Organization (Dharma Wanita) at various levels of local governments and local organizations.

Direct and active action at the village level either through real work lectures (KKN) thematically aligned local conditions handled and utilizing the functions of independent and independent campuses to learn needs to be improved. On the other hand, it is also necessary to harmonize educational programs under the coordination of the Minister of Human Development and Culture collaboratively with various stakeholders: the food/medicine/nutrasetikal industry, academics/ researchers, religious leaders and community leaders in addition to regenerating posyandu cadres by involving millennials.

This needs to be accompanied by the development and implementation of a data system that is appropriate and consistent for the condition of Indonesia as an archipelago nation with a variety of distances and local conditions in order to achieve harmonization, synergy, synchronization, and availability of data for decision making and policy of food and nutrition development.

Acknowledgement

We would like to thank the speakers and moderators of Webinar 7 and 8AIPG-AIPI 2020, namely (1) Prof. Dr. Agus Sartono (Coordinating Ministry of PMK RI), (2) Dr. Arifin Rudiyanto (Ministry of VAT / Bappenas RI), (3) Prof. Dr. Hardinsyah (IPB University), (4) Irawati Setiady, MSc (PT. Kalbe Farma Tbk), (5) Prof. Antonius Suwanto, PhD (IPB University), (6) Axton Salim, BSc (PT. Indofood CBP Sukses Makmur Tbk), (7) Dr. Siswanto, MPH (Balitbangkes Ministry of Health), (8) Dr. dr. Rina Agustina, MSc (University of Indonesia), (9) Prof. dr Fasli Jalal, PhD (YARSI University), (10) dr. Widjaja Lukito, PhD, SpGK(K) (University of Indonesia).
Authors


References


Indonesian Academy of Food and Nutrition – Indonesian Academy of Sciences (AIPG-AIPI)

AIPG-AIPI was established based on Law No.8 of 1990 on AIPI.

AIPG-AIPI aims to assemble leading Indonesian scientists in the field of food science and nutrition to provide opinions, suggestions, and considerations on their initiatives and/ or requests regarding the mastery, development, and utilization of science and technology, especially in the field of food and nutrition to the Government and the public to achieve national goals by always prioritizing: a) values and ideals from Pancasila and the Constitution of the Republic of Indonesia 1945; b) the value of humanity; c) awareness and ethical responsibility; d) improving the quality of human and people’s lives; e) the integrity of the personality of the nation; and f) the balance of the environment in sustainable development.