Commission on Population and Development
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Item 2

Population, food security, nutrition and sustainable development

Report of the Economic and Social Council

Summary

The right to adequate living standards for the people was first addressed as a fundamental human right in the Universal Declaration on the Eradication of Hunger and Malnutrition and has always been considered as one of the most important rights throughout history. However, this right in many underdeveloped regions of the world has been violated due to extreme poverty, conflict and climate change. By 2015, a significant progress has been achieved, but it is still far from elimination as the UN proposed “Zero Hunger Challenge” in 2012. Today, over 800 million people are considered undernourished. It is also estimated that there will be over 2 billion people who will fall into starvation by the year 2050. As it is highly linked to the Sustainable Development Goals, urgent collaborations by different stakeholders, in particular, governments, foreign aid, food producers and consumers, have to be taken effectively to ensure the eradication of hunger and malnutrition.
I. Introduction

1. The very first international conference specifically on food security and nutrition was held at Hot Springs, US in 1943. It mainly expressed its concern on world food security, established an interim commission on food security and nutrition, and expressed the need for founding a permanent commission specifically dealing with the short-term and long-term negative consequences brought by malnutrition.

2. The Food and Agricultural Organisation (FAO) was established in the year of 1945. The first founding goals are to sustainably improve the efficiency of agricultural systems, as well as to substantially increase the overall food supply for the world population. Strategically, it approaches to the allocation of natural as well as artificial resources such as fishery, forestry, vegetation, etc. It also closely links to the elimination of rural poverty by tackling its goal to smallholder farmers. (It also pays its attention to the smallholder farmers with their family-based farms which takes approximately 90% of the farmers in the world.) Since its foundation, the FAO has always worked closely with governments, institutions, organisations, providing expertise and strategic advice to ensure the productivity and sustainability of food supply.

3. The World Food Conference convened by the UN General Assembly adopted resolution 3180 on November 16th, 1974. The Universal Declaration on the Eradication of Hunger and Malnutrition. This resolution was further endorsed by the General Assembly in resolution 3348. The thesis of this declaration stated, “Every man, woman and child has the inalienable right to be free from hunger and malnutrition in order to develop fully and maintain their physical and mental faculties.” The declaration expressed its strong concern from the international community by tackling food security issue with international human rights and geopolitical factors within a region, to achieve the physical and mental wellness of individuals.

4. The international community has expressed its strong concern in the Second International Conference on Nutritios (ICN) that took place in Rome, Italy in the year of 2014. The final outcome of this Conference was the Rome Declaration on Nutrition, as well as the Framework for Action as a guidance for its implementation. In the declaration, it recognises the negative consequences possibly caused by malnutrition onto individuals, market and society. It emphasizes the necessity of eradicating world hunger for future sustainable development. It also urges international and different forms of governmental intervention into the food system to further ensure sufficient food supply for all. The Rome Declaration on Nutrition serves also as a guideline for the future relative declarations and resolutions.

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3 OHCIR, Universal Declaration on the Eradication of Hunger and Malnutrition, https://www.ohchr.org/EN/ProfessionalInterest/Pages/EradicationOfHungerAndMalnutrition.aspx
5. The UN General Assembly listed the eradication of world hunger as well as poverty in its Millennium Development Goals. It specified its detailed goal in 1.C “Halve, between 1990 and 2015, the proportion of people who suffer from hunger”. It resulted in a significant fall in the percentage of undernourished people, from 23.3 percent in 1990-1992 to 12.9 percent in 2014-2016.

6. The “Zero Hunger Challenge” (ZHC) was launched by the former United Nations Secretary General Mr. Ban Ki-moon, supported by the Food and Agricultural Organisation, World Food Programme, International Fund for Agricultural Development, UN Children’s Fund, the World Bank and Bioversity International. The ultimate goal for this challenge is to fully eradicate malnutrition. It is detailed into 5 main goals, namely,

a. All food systems are sustainable from production to consumption,

b. An end to rural poverty: double small-scale producer income and productivity,

c. Adapt all food systems to eliminate loss or waste of food,

d. Access adequate food and healthy diets, for all people, all year round,

e. And end to malnutrition in all its forms.

This challenge was set to be more “people centered”, implementing with social justice and basic human rights as the guideline. It pointed out that this goal would not be fully achieved in isolation, hence, international cooperation for the benefit of the people is an essential element.

7. In 2015, United Nations Member States adopted the Sustainable Development Goals (SDGs), in which the eradication of world hunger was listed as a single goal (Goal 2).

2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round.

2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons.

2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment.

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2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.

2.5 By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed.

2.A Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries.

2.B Correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round.

2.C Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility.

8. It is detailed in 5 more goals, targeting on the elimination of world hunger and diseases brought by micronutrient deficiencies. It also aims the completion of sustainable farming, genetically-diverse seeds, plants, as well as the productivity of agriculture. It has pointed out three main approaches for implementation, which include increasing investment in agricultural market, preventing restrictions in agricultural trade, and adopting several measures to ensure the stabilization of food commodity market all the time.

II. Challenges

9. 821 million people in the world are considered to be undernourished, in which nearly 151 million children under five are stunted. Asia accounted for nearly 63% of all the world’s hunger population. One third of the women of reproductive age are anemic due to micronutrient deficiencies. More than one eighth of adults are considered obese.

Specifically, the world is facing rapid changes caused by potential uncertainties that are likely to happen in the future. Challenges mostly come from the demand side of the food marketing. Food consumers are potentially facing health issues such as undernourishment, obesity, micronutrient deficiencies. Also, the low affordability of certain food caused by poverty and income inequality. For the supply side of food,
scarce natural resources are both diminishing quantitatively and qualitatively. Besides, recent technological innovations of farming are bringing unsustainable growth in agricultural productivity, which sacrifices the potential future growth. Above all, there is rapidly changing climate which threaten the entire food production and satisfactory. Measuring with the Sustainable Development Goals, the growth rate of food supply could hardly satisfy the need from the food insecure population by 2030, not yet mentioned the uncertain but possibly future drastic population growth. The current model of agricultural growth could not either support the agricultural development for the suppliers of food. The land expansion strategy is finite in the long run. As yet the benefits from past agricultural technological innovation are mostly harmful to the environment. Both strategies for agricultural development in productivity are unsustainable. Brining positive changes to the current food security issue is a must.

_Vocabulary List:_

- **Food security**: all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.
- **Hunger**: uncomfortable or painful sensation caused by insufficient food energy consumption.
- **Malnutrition**: results from deficiencies, excesses or imbalances in the consumption of macro and/or micro nutrients. Malnutrition can be an outcome of food insecurity.
- **Undernourishment**: insufficient food intake, including stunted, wasted.
- **Wasted**: Low weight for the current age
- **Stunted**: Low height for the current age
- **Food security**: All people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.
- **Micronutrient**: Nutrient required by humans at a low scale.
- **Obesity**: excessive fat accumulation that may impair health
- **Food Loss**: The loss in both quantity and quality of food in food production
- **Food Waste**: The waste in both quantity and quality of food in food consumption

_Population_

10. There are three main factors from the demographic changes to food insecurity, namely, growth, ageing, and urbanization.

11. The world population is growing at an unprecedented height, with an increase by 30%, and will reach 9 billion by the year 2050. Geographically, the rate in high

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10 [Link](http://www.fao.org/3/al936e/al936e00.pdf)
13 Ibid
14 WHO, Micronutrient, [Link](https://www.who.int/nutrition/topics/micronutrients/en/)
15 WHO, Obesity and overweight, [Link](https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight)
income countries is slowing down and predictably, reaching a peak at around 2040, whilst the rate of population growth is persistently high in middle and low-income countries such as countries in Asia and Sub-Saharan Africa, especially with their technologies for maternal health is also innovating. Also, sociologically, the rate is also uneven between urban area and rural area, with rural population growth rate is usually higher than urban areas in most of the countries. Young people between 15-24 in low-and-middle income countries is expected to grow from 1 billion to 1.2 billion. Within a low-income society, it is more difficult for them to find a job and support their basic need of food. A growth in population is naturally a growth in demand of food, challenging the food supplying system to growth in a certain pace to follow the demographic growth.

12. Urbanisation of population has mainly affected the dietary choices for the majority of population. With the gradually increasing rate of urbanization, such effect has become more and more significant. It is from over 60% of the total population being rural 35 years ago, to over half of the population live in the cities nowadays. It is furthermore predicted to have another 2.4 billion people in towns and cities by 2050 while the net population growth is predicted to be 2.2 billion. Generally, it is assumed that the incomes in urban areas are higher than those in the rural area. Concerns are brought with the higher income. The first challenge is that the urban residents tend to choose food with higher nutrient quality, namely, animal sourced food, fruits and processed food. This has brought to an imbalance need in dietary diversity. The second concern is the increasing income brings an increasing opportunity cost for other businesses in the urban lives, namely, a higher cost for the time not working and earning potential income. Hence, urban residents tend to choose food with less preparation time. This preference has led to an increasing in demand of fast food. Both causes lead to a dietary choice with high fat, salt and sugar, eventually obesity and other health concerns regarding imbalanced diet.

13. Population ageing is happening with a more severe impact generally in low-income countries possibly due to a poorer life expansion of people and a poorer public health system. Ageing population will potentially lose the ability to produce, and thus become sole consumers of food. An ageing population structure within a country will cause a decrease in labour force for food production, therefore, cause a reduction in the supply of food. This has made the future development of food production further rely on technological innovation, but not a labour expansion. Though for technological innovation, older farmers are mostly harder to train and innovate their old, outdated techniques of farming, as their educational level are lower.

Challenges from food consumption

18 Ibid
20 Ibid
22 Ibid
Food insecurity/malnutrition/undernourishment

14. Food security exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. There are in total 4 dimensions in the definition of the World Health Organisation. 23

a. Food availability - secure at the level of food production, stock levels and net trade.

b. Food access - secure the income, expenditure of the household, the stabilisation of market as well as the price.

c. Food utilisation - biologically utilise all the nutrient intake and diversity.

d. Food stability- the satisfaction of the above three dimensions over time.

Malnutrition among children

15. Malnutrition among children are generally categorized as “stunted” - low height for their age, and “wasted” - low weight for the current age. Theoretically, with insufficient food intake, nutrition supply for the physical growth would not reach its expectations. However, there are both nutrition and non-nutrition consequences that may result in stunting among children. Physically, insufficient food intake will not only result in stunted and wasted, but also accounted for significant weakening immune system, hence, higher risk of being infected by prevalent diseases. The decreased immune system and constant state of sickness can cause the overall productivity for the individual to decrease. For children, it will be the attendance for their schooling which is tackled with his/her future opportunities in profession. Stunting as well increases their burden onto the family income and will further keep them within poverty. 24 Considering the interlinked nature of Sustainable Development Goals, stunting for children will contribute to a failure to meet the SDG Goal 1: end poverty in its all its forms anywhere 25, as well as SDG Goal 4: quality education. 26 Furthermore, we assume that children under 5 are usually not participate in contributing family income. Since they are not the direct cause of insufficient food consumption, there will be a burden of mental stress and lack of self-esteem. 27

Overweight and obesity

16. It is quite paradoxical that overweight and obesity are the other side of the negative outcome from the food insecurity. Overweight and obesity are fundamentally caused

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by the imbalanced energy intake and consumption, namely, either a relatively high-in-fat dietary structure or a lack of physical exercise due to the change in transportation, forms of work, or urbanisation. Overweight and obesity are measured by body mass index. It reveals the weight-for-height ratio and its calculation is to divide the person’s mass in kilograms by the square of the height in meters. Many people use the word “obese” and “overweight” interchangeably. However, a person whose body mass in between 25 and 30 is defined as overweight, whose body mass larger than 30 is defined as obesity.

<table>
<thead>
<tr>
<th>Classification</th>
<th>BMI($\text{kg/m}^2$)</th>
<th>Principal cut-off points</th>
<th>Additional cut-off points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>&lt;18.50</td>
<td></td>
<td>&lt;18.50</td>
</tr>
<tr>
<td>Severe thinness</td>
<td>&lt;16.00</td>
<td></td>
<td>&lt;16.00</td>
</tr>
<tr>
<td>Moderate thinness</td>
<td>16.00 - 16.99</td>
<td>16.00 - 16.99</td>
<td></td>
</tr>
<tr>
<td>Mild thinness</td>
<td>17.00 - 18.49</td>
<td>17.00 - 18.49</td>
<td></td>
</tr>
<tr>
<td>Normal range</td>
<td>18.50 - 24.99</td>
<td>18.50 - 22.99</td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td>≥25.00</td>
<td>≥25.00</td>
<td></td>
</tr>
<tr>
<td>Pre-obese</td>
<td>25.00 - 29.99</td>
<td>25.00 - 27.49</td>
<td></td>
</tr>
<tr>
<td>Obese</td>
<td>≥30.00</td>
<td>≥30.00</td>
<td></td>
</tr>
<tr>
<td>Obese class I</td>
<td>30.00 - 34.99</td>
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<tr>
<td>Obese class II</td>
<td>35.00 - 39.99</td>
<td>35.00 - 37.49</td>
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<tr>
<td>Obese class III</td>
<td>≥40.00</td>
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17. The world’s prevalence of obesity nearly tripled between 1975 and 2016. More than 1.9 billion adults (18 and above) are considered as overweight, of these over 650 million are obese. Overweight is generally more dangerous and cause more people’s death than undernourished. Overall, severe overweight, or obesity, is preventable. Also bear in mind that it is possible to have both a high amount of undernourished and obese people within the same country, same regions or even same community due to the fact that the causes for obesity are not limited to those previously mentioned. The chance for adult obesity is higher for people who experienced child obesity. Children are especially vulnerable when they do not have the power to decide on their own food intake. Often times they are provided with food low in cost but with poor nutrient quality, which is high in fat, sugar, and salt, but low in micronutrient. Obesity as another issue has severe health consequences for the people. The chance for having cardiovascular diseases such as heart diseases and stroke will have a significant increase. Type II diabetes is ranked the second most harmful diseases threatening millions of people worldwide. Besides, musculoskeletal disorder and some cancers

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28 WHO, Obesity and Overweight, https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight
30 Ibid
can also possibly result from obesity. These diseases are called Non-Communicable Diseases (NCD), which not only increases short-term mortality among children, but also decrease the quality of life and increase the health concern later in life. Obesity as well can result in social isolation, teasing, bullying and other mental or social disorder for individuals.  

*Food loss and food waste*

18. Food loss and waste are defined as the loss in both quantity and quality of food within the food supply and satisfactory chain. Generally, food loss is for the producers in food production and food waste is for the consumers in food consumption. The food supply and satisfactory chain could be demonstrated in the following stages:

a. Pre-harvested

b. Harvest losses: Harvested/slaughter

c. Food loss:
   i. On-farm post-harvest/slaughter operations
   ii. Transporting, storage, and distribution
   iii. Processing and packaging

d. Food waste:
   i. Retailing
   ii. Public and household consumption

19. Suppliers of food have the rationale to maximise their profit, cause loss in the production of food. Evaluating with the basic economic theory – diminishing in returns, often time there is a threshold where marginally investing machinery to reduce further food loss is not cost-effective. Hence, certain food loss would be inevitable. Besides, producers are facing producing surplus once they are capable to save and sell more food product in the market, causing a decrease in the market price. Consumers of food are incentive to consider their own health and wellbeing in food consumption. Consumers may go food shopping in a longer interval for saving his/her time, give an estimation to his/her own future food consumption and toss away any access, rather than going shopping in a shorter time interval to waste less. The value for wasted food would have been less than the time consumers save to earn from their work. Again, it is cost effective for the consumers in their food consumption. Besides, food loss and waste also cause market failures in food production and consumption,

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31 WHO, Population-Based approaches to Childhood Obesity Prevention, https://apps.who.int/iris/bitstream/handle/10665/80149/9789241504782_eng.pdf;jsessionid=DBDAD1E18EE0954E381209FB50B683A1?sequence=1
33 The equilibrium quantity consumed and produced in the market is not socially optimal, namely, either too much or too little.
eventually bring certain burden unpaid to the society. More detailed examples from different stages are provided as follow:

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**Micronutrient deficiencies**

20. Micronutrient deficiencies are severe issues for people’s physical and mental development, especially in the long-term. For instance, children with lack in Vitamin A often have preventable blindness and a much higher chance of being infected by deadly diseases. Pregnant women will also result in a night blindness and even maternal mortality. Generally, people with micronutrient deficiencies often show difficulties reaching their full growth potential, which results in stunting. Also, the uncompleted immune system will lead to a higher chance of being infected with diseases.

21. Anaemia is a type of disease that is usually shown as a low concentration of blood haemoglobin. It increases the risk of child and maternal mortality. Women are considered as the most vulnerable victim to this issue. It is commonly believed to be caused by iron deficiencies from daily diet. Besides, there are other factors to be considered as part of the root cause of this disease, including heavy blood loss by menstruation, parasitical infections such as hookworms, ascaris and schistosomiasis. There are also other acute and chronic infections including malaria, tuberculosis and HIV. The rate of anaemia is commonly used to indicate the micronutrient deficiencies within and among different regions since it considers different aspects of basic living standard.

22. Iodine deficiency on humans is often time the result caused by low soil concentration. Without proper vegetation and forests on soil, soil erosions happen and micronutrients are lost through water, and iodine is one of the elements that can be taken away by

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35 WHO, VAD, https://www.who.int/nutrition/topics/vad/en/
water easily. 37 Iodine Deficiency Disorder (IDD) is currently affecting more than 2 billion people worldwide. It is the leading cause of many mental disorders and underdevelopment among the youth, such as cretinism, poor cognitive development. These will eventually worsen the school performance of the children, and unfinished education. Besides, IDD can also cause miscarriage and maternal mortality among the pregnant women.

**Unsustainable food supply**

**Diminishing natural resources**

23. Agricultural production occupies a large percentage in many different types of natural resources. Water is one of the most significant examples. Agricultural production in the world is responsible for 70% of water withdrawal. In some of the underdeveloped regions in the world, agricultural production could take up to 90% of the total local water supply. This has caused severe water depletion in some regions such as India and China, influencing the water usage for other industries which daily consumptions and light industries are also significant contributors for economic development. 38 Moreover, high dependency on natural resources makes the whole agricultural production vulnerable for any supply shock in natural resources. Subsequently, upcoming food shortage would make food impossible to be affordable. For the future agricultural development, it is nearly impossible to increase the productivity from keep increasing the water usage, same as other essential resources such as land fertility. Hence, the future potential agricultural development could not rely on the expansion of natural resources. 39

24. Agricultural production claims uncultivated land to agricultural land, which causes forest degradation. Though the general trend has slowed down accounting from the beginning of the last century, area of the forest is still decreasing at the similar rate as the increasing cultivated land. Tropical and sub-tropical areas experience a 7-million hectare-loss in forest and 6-million-hectare gain in cultivated land. Moreover, the low-income countries still possess the highest rate of change. 40

25. Sustainable agricultural development takes both environmental protection and productivity into consideration. The agricultural market is seriously challenged. In the meantime, the rate of climate change has reached its unprecedented height. underdeveloped regions of the world often have an unsustainable agricultural system that is vulnerable to most of the extreme weather such as drought, high temperature, and extreme weather conditions such as tornadoes and hurricanes. In one aspect it has a much larger chance of having an insufficient yield of crop, hence, not feeding the population properly. Besides, by considering from an environmental point of view, the situation for land desertification, loss of biodiversity as well as the forest degradation can lead to the erosion of soil and further reduce the productivity of


39 Ibid

farmland. As significant international cooperation, the Paris Agreement and its founded UN Framework Convention on Climate Change and the Sendai Framework for Disaster Risk Reduction can be referenced as guiding approaches combating climate changes.

Green Revolution

26. Agricultural production as an industry has weakened its impact in terms of economic contribution since the second half of the 20th century, as it had been gradually insignificant compared with other newly-born and boomed industries. Considering from the profit point of view, the incentive for investing in agricultural innovation had a tendency to be weaker. However, the non-profit value for the stabilisation of the entire society is important. The development of food production for a long time had relied on the exploitation of new resources when the demographic change was still mild, a long period of time here is defined as thousands of years during ancient human history. However, with most of the Earth’s agricultural resources already utilized, and the population is experiencing an unprecedented increase, a revolution in agricultural production has to be initiated to combat the possible famine. The Green Revolution happened in the 1960s, also known as the Third Agricultural Revolution, was recognised as a great leap for agricultural productivity. The Green Revolution mainly focuses on the agricultural technological innovations and their wide application, mainly the improvement of seeds, chemical fertilizers and irrigation technology. In general it achieved the increase to two or even three folds of agricultural production. The High-Yielding Variety seeds (HYV) were primitively applied to the basic cereals, namely, rice, wheat and maize, as the first step of progress. Soon it is clear that the HYVs are not able to reach their full potential once there is no sufficient supply of chemical fertilizer or water. Both of them ought to be available accompanied with the seeds. Hence, the application of HYVs actually also boosted the application of the other two major agricultural technologies.

27. With the newly-introduced seeds being significantly superior than the traditional species, the producers are generally easy to be persuaded to adopt the new means of production. The improvement of the productivity is significant. The Wheat production in Asia experienced a steady growth, from 65.5 million tons in 1967 to 110.7 million tons in 1976. Rice rose from 252.9 million tons in 1967 to 312.5 million tons in 1976. Maize increased from 43.3 million tons in 1972 to 55.1 million tons in 1976.

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Countries in Africa and Latin America such as Kenya, Zambia, Mexico were gradually introducing the products from this Green Revolution.

28. There are also improvements left from this Green Revolution. Though it helped boost the productivity of agricultural production, it largely neglected the concept of sustainability of future agricultural development, left many negative factors for the preservation of natural environment. For instance, chemical fertilizers as well as pesticides are extremely harmful once it is not dealt well after the use. Over-fertilization, as one of the consequences often happens with a large scale of chemical fertilizer use. Besides, the Green Revolution in the 1960s mainly happened in the developed part of the world because it requires a large scale of input into a single production, which most of the smallholder farms were not able to do. Only the food production of big corporations in Europe and North America are beneficial from this revolution, instead of the smallholder farms which took the majority of the world food production especially in the developing countries. It hence failed to consider the equality of agricultural production and still left hundreds of thousands of people in hunger and food insecurity. The adoption and application of HYV rice is also not ideal compared with other grains such as wheat. The major concerns are the actual difference between the growing environments between wheat and rice. HYV wheat has been adopted to the environment with assured water and nutrient supply, while HYV rice has to be in tropical rain-fed area. The overall large use of chemical fertilizers and pesticides result in excessive fertilization with booming weed and algae. The artificial damage caused by conventional farming can be enlarged by water-rich area. Besides, the rice growing in general depends on the river-flooding and other natural pattern. Hence, there is a great chance of abnormal natural pattern results in a loss of large investment, eventually caused a high-risked investment.

Climate change

29. Sustainable agricultural development takes both environmental protection and productivity into consideration. The modern-day agricultural market is seriously challenged. The world population has increased by 30%, and will reach 9 billion by the year 2050. In the meantime, the rate of climate change has reached its unprecedented height. Underdeveloped regions of the world often have an unsustainable agricultural system that is vulnerable to most of the extreme weather such as drought, high temperature, and extreme weather conditions such as tornadoes and hurricanes. In one aspect it has a much larger chance of having an insufficient yield of crop, hence, not feeding the population properly. Besides, by considering


48 Ibid

49 Ibid

from an environmental point of view, the situation for land desertification, loss of biodiversity as well as the forest degradation can lead to the erosion of soil and further reduce the productivity of farmland. As significant international cooperation, the Paris Agreement and its founded UN Framework Convention on Climate Change and the Sendai Framework for Disaster Risk Reduction can be referenced as guiding approaches combating climate changes.

Regional progress

Sub-saharan Africa

30. Rate of undernourishment starts to rise in recent years after a steady decreasing for the continent of Africa. It is accounted for more than 250 million people within the African continent, which Sub-Saharan Africa is responsible for over 230 million. The undernourishment prevalence is considered the largest, which nearly half of the adult population faces moderate or even severe food insecurity. The estimated long-term GDP loss is 6.3%-11.5%. The root causes diagnosed for this worsening fact is composed by different factors: Climate changes can strike the agricultural production of Africa. Serious drought happened in Somalia, eastern Kenya and southeastern Ethiopia and resulted in a disrupted agricultural production, eventually led to a sharp increase in the food price, which results in the fact that a lot of less people can afford decent nutrition. African development has always been on the UN agenda for a long time. The firstly established African Union headquartered in Addis Ababa, Ethiopia, is still considered as the largest international organisation within the African continent. It is for the purpose of tightening the relationship among different African countries, as well as for the sustainable economic development for the benefit of African people. The UN Economic and Social Council soon set up a regional organisation named United Nations Economic Commission for Africa. This organisation has largely contributed to the general achievement of Sustainable Development Goals within Africa, especially to the effort of eradicating hunger and malnutrition, as the deputy executive secretary general of UNECA Mr. Abdallah Hamdock addressed in 2015, “African countries should prioritize nutrition interventions in their budget and translate their commitments into policy actions in order to end the malnutrition problems on the continent.” The most recent significant progress is the adoption of New Partnership for Africa’s Development by the UN General Assembly in the year 2001. The ambitious proposal “Africa Agenda 2063” as well as their close cooperation with the UN SDGs have made it an organisation with great potentials.

South Asia

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54 Ibid
55 NEPAD, http://www.nepad.org/agenda-2063
31. The stunting rate of South Asia remains the highest compared with other parts of the world. For instance, children stunting in Pakistan is twice the global average. According to governmental statistics, there are roughly only 5% of all stunting children currently receive help from the government for their nutrition intake, mostly due to the perception which governmental and international are only applicable when there is already a severe issue such as emergency. Also it is commonly believed that the existing malnutrition and diseases brought by it can only be solved with medications in hospitals. Logically, these perceptions stay strongly against the intention to prevent future malnutrition from happening. So far as the global food prices have risen by 10% in recent years, main food-sourced grains such as wheat have even reached 25%. With 16.1% of people living in extreme poverty and another large amount of people living right above the poverty line, this rapid increase in price will make nutritious food mostly unaffordable. Eventually, there will be massive people returning to extreme poverty, wasting the progress of ending poverty. Effective organisations have founded for regional cooperation and development. The South Asian Association for Regional Cooperation (SAARC) was founded in 1985 by Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. Its founding objective is to improve the overall happiness of South Asian people through sustainable economic development. Besides, there are South Asia Cooperative Environment Programme and the International Center for Integrated Mountain Development specifically targeting on the environmental protection and sustainability. All these regional organisations have the recognition of UN Environmental Programme, and work closely work the UN as a whole.

III. Future Priorities

Sustainable Food Supply

32. The establishment of sustainable and efficient food supply system is considered as a long-term solution to this issue. As Sustainable Development Goal 2 addressed that more than 75 percent of crop diversity was lost in the history of farming. Also, more than 500 million smallholder farms are currently rainfed. Hence, it is quite spacious for future improvement in future agricultural efficiency and sustainability. The Food and Agricultural Organisation has proposed a concept and framework for Sustainable Food System. It ideally targets on achieving profitable in the field of economics, broad-based beneficial for society in general, as well as a neutral or even positive

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61 SACEP, http://www.sacep.org
62 ICIMOD, http://www.icimod.org
63 UNEP, Regional Initiatives, https://www.unenvironment.org/regions/asia-and-pacific/regional-initiatives
impact on the natural environment.\textsuperscript{64} The basic guidelines for the future food supply system must be suitable for the future population growth, urbanisation, income inequality, globalisation, as well as the climate change and its consequences, such as depletion of natural vegetation, land erosion.

33. The role of having animals included in agricultural production can be largely beneficial. First and foremost, animal-sourced food such as milk, eggs are more “nutrient efficient” compared with most of the crops. Meanwhile, large animals such as buffalo can be used as labour force in the production of agriculture. Animal-sourced food is generally high-priced. It is beneficial for the income of smallholder farms, eventually, lifting people out of poverty. \textsuperscript{65} However, the use of animals in the sustainable agricultural development is controversial. The production of beef is considered as the largest greenhouse gas emission. \textsuperscript{66} Also, to satisfy the consumption of food for rearing animals, the land use for plantation actually exceed the direct cultivation of food for humans. Hence, there are opinions that the avoidance of meat consumption can maximize the nutrient output, hence, the most productive and sustainable future agriculture.

34. Food loss and waste are counted as major barriers from future sustainable agricultural development. Measuring and analysing the amount of food being wasted and loss can be helpful yet difficult. With a better study and management, a large amount of food loss and waste can be avoided. Hence, the UN proposed the “Food Loss and Waste Accounting and Reporting Standard” (FLW Standard)\textsuperscript{67} It strongly tackles with the SDG Goal 12.3: reducing food waste by half in 2030. It all comes back to the basic economic problem of scarcity, by reducing the food waste eventually utilise the existing resources more effectively.

\textit{Combatting Food Loss and Waste}

35. There are two different incentives for improving the current situation of food loss and waste: business cases and economic cases. Business cases focus on the benefits for producers and consumers, namely, within the market. Economic cases consider the benefits for the entire society, both within and beyond the market. \textsuperscript{68} Fundamentally, most of the benefits gained from reducing food waste and loss are significant, but in the long term. For example, reducing food loss and waste brings less cost for the society to run. Consumers have a larger gain in energy, improve their efficiency in production, and eventually have the possibility to produce more goods and services for the future consumption. Hence, the basic approach to this problem is to provide

\begin{itemize}
\item \textsuperscript{64} FAO, Sustainable Food System Concept and Framework, http://www.fao.org/3/ca2079en/CA2079EN.pdf
\item \textsuperscript{65} Ibid
\item \textsuperscript{67} SDG, UN announces first-ever global standard to measure food loss and waste https://www.un.org/sustainabledevelopment/blog/2016/06/un-announces-first-ever-global-standard-to-measure-food-loss-and-waste/
\end{itemize}
knowledge and information to the mass majority raise their awareness since long-term benefit are not easily obtained by them. 69

36. A more comprehensive and consecutive approach to monitor and analyse food loss in the supply chain is essential for the first step. To solve the problem there must be a thorough understanding of the causes, patterns, trends, stages, and distributions both geographically and sociologically. Otherwise, any form of intervention could be effortless and simply resource-wasting. The firstly created Food Loss Index (FLI) by the FAO is an ideal model, but need for further improvements. 70

37. For business cases and economic cases, the producers and consumers are always facing long-term benefit versus short-term loss. Assuming the stakeholders are rational people, refuse to take action due to the short-term loss seems always prevailing. Proper approaches could be either, as previously mentioned, laying out information for the stakeholders such as quantifying cost and benefit for them, or providing certain subsidies for the production and consumption to alter their behaviours. Especially for economic cases where the entire society is involved, quantifying cost and benefit into taxation and subsidies are classical approaches to market failure. 71

Combating Micronutrient Deficiencies

38. Agricultural intervention: As previously mentioned, the crop diversity has been heavily reduced throughout the agricultural history. Studies investigating India after the Green Revolution have shown that though it achieved proper nutrient to the people in India, crops like cereals are gradually replacing other micronutrient-dense crops such as legumes and vegetables. This eventually led to an unbalanced nutrient intake, and the prevalence of micronutrient deficiencies. Not limited to India, this is the solution that by sacrificing crop diversity and replacing with cereals, namely, crops with high calories but low micronutrient. It is direct, but costly in terms of people’s general health. Proper fertilization and other agricultural technological approaches firstly enhance the productivity. Hence, with less land use to produce sufficient calories, more land can be used to consider the diversity of nutrient, with different types of food sources. 72 High soil fertility has a direct influence on the micronutrient concentration on the plants. Since most of micronutrients such as are required for the growing of plants, it will naturally absorb the nutrients from the content. This theory applies to the explanation for zinc deficiencies revealed on human body. 73

39. Animal-sourced food generally contains higher micronutrient since the animals’ diet contains numerous micronutrients. The animals’ cycles of life can generally provides fertility to the soil. The soil with high fertility will naturally transfer its nutrient into the crops cultivated on it. Hence, the production of crops will be more

69 Ibid
70 Ibid
71 Ibid
73 Ibid
nutrient-balanced and micronutrient sufficient. However, there are several major drawbacks that make the animal farming controversial in terms of contribution to the natural environment. Studies have shown that livestock are responsible for the largest greenhouse gas emission into the atmosphere. Besides, to satisfy the need for animal consumption, the land required for growing fodder will be significantly larger than growing food directly for human consumption. To sum up, to improve the productivity as well as the crop diversity will be suitable approaches to intervene micronutrient deficiencies agriculturally.

**Combating obesity**

40. The essential element for combating obesity is the choice of diet, namely, controlling the consumption of calories-dense food high in saturated fat, high in sugar and low in vitamin and micronutrient. Through individuals, raising public awareness of making wise choices for their diet as well as routinely doing physical exercises is indispensable. For children who do not have their own power of choosing their own food intake, it will mostly be the families’ responsibility taking care of such solution. This ought to be achieved through education to the youth, as well as community services. As for the government, it is always possible for them to directly intervene into the food supply market by setting taxation and subsidising certain food product. According to the market equilibrium, consumer will naturally purchase less quantity at a higher price due to the additional taxation added on.

**Trading and international cooperation**

41. The trading of food has a strong correlation with the goal of fully eradicating hunger in the world. Here, the most common factors to consider are the following. The lower and stabilising food price is essential for the people living in extreme poverty. With a possibly negative supply shock, the food price can be high enough that a large amount of people live right above the poverty line go back into extreme poverty. To ensure the diversity of food supply creates a more competing market, hence, a more stable price with almost guaranteed food supply. Most of the policies rely on the government's provision, subsidies and taxation. International trade is yet another story where trading plays as a tricky role affecting people’s food security.

42. Most of the economists view a freer and more active market is beneficial for the food security in the present days and promote the idea of “food self-reliance”. It means actively engaging in trading to ensure the food supply within the country. What in contrast is “food self-sufficiency”, which means completely closing from the outside trading activity for food. Since the division of labour is developed along with the modern industrialisation, some countries are absolutely better in producing one type

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74 Ibid
76 WHO, What can be done to Fight the Childhood Obesity, https://www.who.int/dietphysicalactivity/childhood_what_can_be_done/en/
of food over another. This theory is further proved by the different opportunity costs as well as the differences for factors of production possessed among nations. By enhancing the trading scale, the world is able to maximize the overall diversity and productivity of food supply. Besides, trading as a “transmission belt” can balance most of the food surplus and shortage situation among nations, namely, some countries produce excess food for their own consumption while others are not producing sufficient food. Overall, an increasing scale of trading will eventually lead to an economic growth. The income of individuals will be increased, purchasing power and the demand for food will also be increased. Hence, some economists and government would advocate the removal of trade barriers to encourage market competition and specialization.

43. There are also suggestions stating that international trade can possibly have a negative impact on the local food security. The theory denies an assumption which the promotion of international trade simply neglects the source of food. With trade becoming more liberated, it is quite easy for large corporations to take over the majority of food supply. Without a proper competing market, price will no longer become stable. Furthermore, with smallholder farms and biodiversity farms making less profit, people who depend on them might get back to poverty. Their purchasing power will eventually reduce.  

44. Food security, as previously addressed, is one of the fundamental human rights, and it absolutely deserves international humanitarian aid. The founding principle of the UN as addressed in the UN charter is to achieve international cooperation in solving international problems of economic, social, cultural, or humanitarian character. The UN has founded its Office for the Coordination of Humanitarian Affairs (OCHA) managing most of the humanitarian aids issued to the regions in need. Specifically for world food security, there is a World Food Programme (WFP) on various aspects of achieving universal food security, including food delivery to low economic development regions, emergency response for food shortages caused by natural disasters, as well as creating demand for food and contributing to the income for smallholder farms. The key approaches is mostly trade protectionism, including export quota, ban, and high tariff.

Education

45. Failing education is often perceived as one of the consequences from insufficient nutrient intake. As previously mentioned, However, adequate education can also be a solution to child stunting. Study has shown that general education, especially the attendance rate of primary education in rural areas, is closely tackled with food security within a country. Schools in general have the advantage of possessing professional personnel. First and foremost, education provides an ideal platform giving and sharing public information, specifically in this case, the knowledge about food security and malnutrition. It must be addressed that one root cause for

81 OCHA, webpage, https://www.unocha.org
82 Ibid
micronutrient deficiencies is the lack of public awareness. \(^8^4\) Aside from information about malnutrition, the habit of personal dietary and daily hygiene such as the habit of handwashing has positive indirect effects on children's food safety, because of reducing the possibility of future sickness and the result losing nutrient, such as losing nutrients due to diarrhea. Furthermore, schools as public administrations are also platforms to provide healthy food and snacks for children. Hence, it decreases micronutrient deficiencies and its diseases onto the youth. \(^8^5\)

46. The Food and Agricultural Organisation has proposed the “FAO School Food and Nutrition Framework”. It serves as a guideline for the future work of FAO cooperating with local government on the school food supply. The approaches are universal but effective: promoting a healthy and safe school food system, effective food and nutrition education, stimulating inclusive procurement and value chain, as well as enabling political, legal, financial and institutional environment. The major objectives are: social protection, gender equality, Food Loss and Waste (FLW) prevention and reduction, social, economic and environmental sustainability, food safety, and partnerships with the local governments or Non-governmental Organisations. As an international organisation, the FAO focuses more on the collaboration between themselves and regional organisations, as well as encouraging the available South-South and triangular cooperation. It has so far aligned and cooerated with regional initiatives, such as the Hunger-free Latin America and Caribbean Initiative, Africa’s Commitment to End Hunger by 2025, Regional Initiative on Zero Hunger in Asia-Pacific. \(^8^6\)

**IV. Further Reading**

https://www.who.int/gho/countries/en/
Statistical data on health condition for people in specific countries and regions

FAO Report on Food Loss and Waste

FAO State of Food Security and Nutrition in the World

https://apps.who.int/iris/bitstream/handle/10665/326261/9789241515856-eng.pdf
WHO 2019 Essential Nutrition Actions: Mainstreaming Nutrition through the Life Course


\(^8^5\) Ibid


FAO, Future of Food and Agriculture, Trends and Challenges

https://www.ohchr.org/EN/ProfessionalInterest/Pages/EradicationOfHungerAndMalnutrition.aspx

Original text of Universal Declaration on the Eradication of Hunger and Malnutrition

https://apps.who.int/iris/bitstream/handle/10665/128038/9789241507509_eng.pdf?sequence=1

Country Profile on Non-Communicable diseases