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## Commission on Population and Development

### Fifty-fourth session

19–23 April 2021

Item 3 (b) of the provisional agenda\*

### General debate

## Population, food security, nutrition and sustainable development

### Report of the Secretary-General

#### *Summary*

The Commission on Population and Development was expected to address the special theme “Population, food security, nutrition and sustainable development” at its fifty-third session, which had been scheduled to be held in 2020. In preparation for that session, the report of the Secretary-General on population, food security, nutrition and sustainable development (E/CN.9/2020/2) was completed in January 2020. Owing to the coronavirus disease (COVID-19) pandemic, the Commission was not able to hold its formal session at the end of March 2020. In its decision 2020/101, the Commission decided to postpone full consideration of the theme to its fifty-fourth session, to be held in 2021.

The present report contains updates and enhancements to the evidence presented in document E/CN.9/2020/2, including newly available data on food security and nutrition; more recent analyses, including on the challenge of keeping food systems within planetary boundaries while reducing the health burdens associated with current dietary patterns; and additional emphasis on the interaction of population trends, agricultural transformation and livelihoods. Observed and expected impacts of the COVID-19 pandemic are also highlighted.

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\* E/CN.9/2021/1.



## I. Introduction

1. Population lies at the heart of sustainable development, including efforts to create sustainable and equitable food systems. Population trends, including population growth, urbanization, changing age distributions, changes in health and mortality, rural-urban migration and international migration, are closely linked to many aspects of food systems. Likewise, the emphasis in the Programme of Action of the International Conference on Population and Development on individual rights and human development, especially for women and girls, and its focus on sustainable consumption and production are also highly relevant. An evidence-based understanding of the interrelationships between demographic trends and food systems, food security and nutrition, and relevant policy responses will be an essential input to broader international discussions of hunger, food security, nutrition and food systems in 2021, including at the high-level political forum on sustainable development, the United Nations Food Systems Summit and the Nutrition for Growth Summit.

2. Current food systems are failing people and the planet in myriad ways. Populations are suffering from multiple and overlapping burdens of malnutrition: undernutrition, micronutrient deficiencies, obesity and non-communicable diseases. Current impacts of food systems on the environment include greenhouse gas emissions, land degradation, water use, overuse of chemical inputs, biodiversity loss and the emergence of zoonotic diseases. In turn, those impacts pose threats to future food production. It is estimated that the livelihoods of about 4.5 billion people globally are tied to food systems.<sup>1</sup> Too often, those working in food systems are themselves affected by poverty and hunger. Coronavirus disease (COVID-19) has laid bare existing weaknesses in food systems, exacerbated inequalities and vulnerabilities, compounded challenges, such as severe climate events and pest infestations, and worsened humanitarian emergencies.

3. The implications of food systems for the 2030 Agenda for Sustainable Development go beyond the Sustainable Development Goal on ending hunger, achieving food security and improved nutrition and promoting sustainable agriculture (Goal 2). Although the present report will be limited to a review of connections to the Goals on poverty (Goal 1), health (Goal 3), gender (Goal 5), employment (Goal 8), inequalities (Goal 10), sustainable cities (Goal 11), responsible consumption and production (Goal 12) and climate action (Goal 13), food systems are interrelated with all of the Goals.

4. In the present report, food security, nutrition and sustainable development are examined in the context of global population change. According to United Nations projections, the world's population is expected to grow from 7.8 billion in 2020 to 9.7 billion in 2050.<sup>2</sup> Current and future population trends vary considerably across geographic regions, with the fastest population growth projected for sub-Saharan Africa, slower population growth for Asia and for Latin America and the Caribbean, and relatively little change in population numbers for Europe and Northern America combined.

5. Populations around the world are growing older: the number of people aged 65 years or older is projected to grow from 727 million in 2020 to 1 billion in 2030 and further to 1.5 billion in 2050. In addition to supporting growing numbers of older persons, building for the future also requires a sustained investment in the roughly

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<sup>1</sup> United Nations, "Policy brief: the impact of COVID-19 on food security and nutrition", June 2020; and [A/75/189](#).

<sup>2</sup> Refers to the medium variant; see United Nations, The 2019 Revision of the World Population Prospects Population database, available at <https://population.un.org/wpp/>.

1.4 billion children who will be born between 2020 and 2030 and the 1.2 billion young people aged 15–24 who are currently preparing to enter adult life.

6. Today, more than half of the world's population lives in urban areas, a figure that is projected to grow to about two thirds by 2050. This global trend has important implications for the food security of urban dwellers, for agricultural development and for the livelihoods of rural populations.

7. In 2020, the number of international migrants worldwide reached nearly 281 million,<sup>3</sup> and hundreds of millions more have migrated internally within their countries of birth. In many countries, migrant labourers play critical roles in the food system as agricultural workers. Globally, the number of persons displaced across international borders grew to 34 million in 2019,<sup>4</sup> and the number of people displaced within countries as a result of violence and conflict increased to 46 million. Millions of displaced persons depend on food assistance for their survival.

## II. Food security, nutrition and population health<sup>5</sup>

### A. State of food security and nutrition

#### *Food security*

8. Despite progress in reducing both the number of undernourished persons and the prevalence of undernourishment in recent decades, in 2019, almost 690 million people, or 8.9 per cent of the global population, were undernourished.<sup>6</sup> Furthermore, after more than a decade of steady decline, the number of undernourished people has been rising since 2014 and is now back at levels seen in the period 2008–2009 (see figure I). The stall in global progress against undernourishment has been driven by many factors, including economic slowdowns, armed conflicts, humanitarian emergencies, disease outbreaks and pest infestations, and the adverse effects of climate change, including drought and extreme weather events. In general, undernourishment is closely linked with poverty, inequalities and social exclusion. Africa has the highest prevalence of undernourishment, which affects nearly one fifth of its population, or more than 250 million people. Asia, with a prevalence of 8.3 per cent, is home to 381 million undernourished persons. All eight of the world's worst food crises – found currently in Afghanistan, the Democratic Republic of Congo, Ethiopia, Nigeria, South Sudan, the Sudan, the Syrian Arab Republic and Yemen – are linked to both conflict and climate shocks and have been compounded by the COVID-19 pandemic.<sup>7</sup>

<sup>3</sup> *International Migration 2020 Highlights* (United Nations publication, Sales No. E.20.XIII.23).

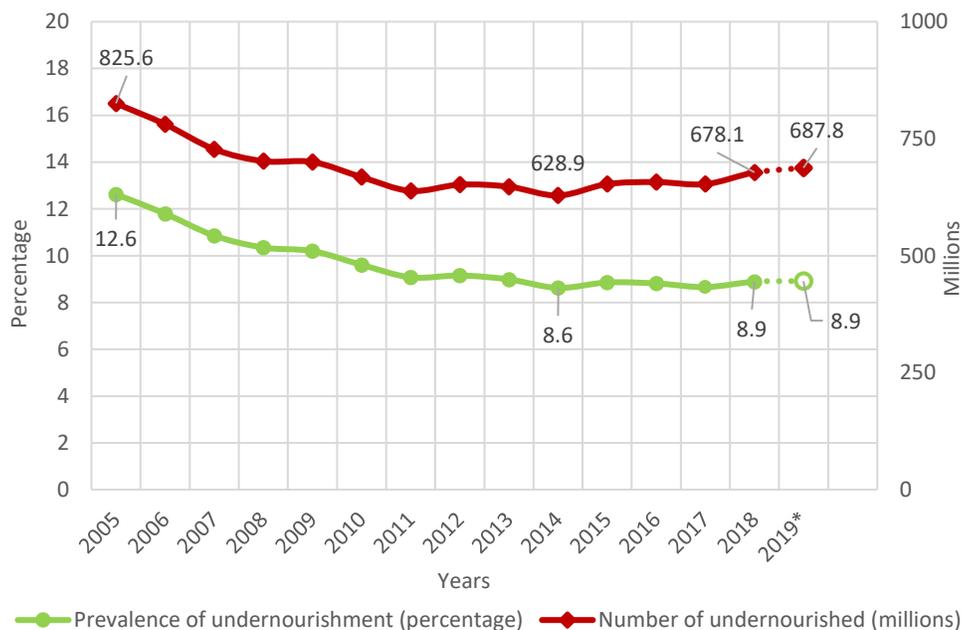
<sup>4</sup> Total includes 26.0 million refugees and 4.2 million asylum seekers. See Office of the United Nations High Commissioner for Refugees, *Global Trends: Forced Displacement in 2019* (Geneva, 2020).

<sup>5</sup> This section is based on Food and Agriculture Organization of the United Nations (FAO) and others, *The State of Food Security and Nutrition in the World 2020: Transforming Food Systems for Affordable Healthy Diets* (Rome, FAO, 2020).

<sup>6</sup> This estimate is based on new data, including new household survey data for 13 countries, including China.

<sup>7</sup> Office for the Coordination of Humanitarian Affairs, *Global Humanitarian Overview 2020*, available at [www.unocha.org/sites/unocha/files/GHO2020\\_v9.1.pdf](http://www.unocha.org/sites/unocha/files/GHO2020_v9.1.pdf).

Figure I  
Global number and percentage of undernourished persons, 2005–2019



Source: Adapted from Food and Agriculture Organization of the United Nations (FAO) and others, *The State of Food Security and Nutrition in the World 2020*, figure 1.

Note: Values for 2019 are projected.

#### Box 1

##### Definitions

Food security exists when all people, at all times, have access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Food security implies the physical availability of food, access to food, ensured by favourable social and economic conditions, and the proper utilization of food, as well as the stability of those three factors.

A healthy diet is a balanced, diverse and appropriate selection of foods eaten over a period of time. A healthy diet protects against malnutrition in all its forms, as well as non-communicable diseases, and ensures that the needs for macronutrients (proteins, fats and carbohydrates, including dietary fibres) and essential micronutrients (vitamins, minerals and trace elements), specific to the person's gender, age, physical activity level and physiological state, are met.

Sources: FAO and others, *The State of Food Security and Nutrition in the World 2020*; and [www.who.int/news-room/fact-sheets/detail/healthy-diet](http://www.who.int/news-room/fact-sheets/detail/healthy-diet).

9. New projections produced by the Food and Agriculture Organization of the United Nations (FAO) suggest that, if recent rates of increase in hunger persist, the prevalence of undernourishment in Africa will rise from 19.1 per cent in 2019 to 25.7 per cent in 2030. In Asia, undernourishment has been declining but not fast enough to achieve the 2030 target. These projections do not take into account the impact of COVID-19. Preliminary estimates indicate that the pandemic may have added an additional 83 million to 132 million people worldwide in 2020 to the ranks of the

hungry. Moreover, even with a recovery in 2021, future levels of hunger are expected to be higher than in the baseline scenario without the pandemic.

10. In 2019, approximately 746 million people worldwide suffered from severe food insecurity, and an additional 1.3 billion from moderate food insecurity.<sup>8</sup> In Africa, more than 50 per cent of the population was either moderately or severely food insecure. At the global level, the prevalence of moderate or severe food insecurity is higher among women than men, with significant differences found in almost all years from 2014 to 2019 for Africa and Latin America. Globally, the gender gap in food insecurity is larger among the less educated, poorer strata of the population, and in urban settings.

### *Nutrition*

11. Progress on nutrition is not on track to meet globally agreed nutrition targets. The global prevalence of stunting (low height for age among children under age 5) in 2019 was 21.3 per cent, or 144 million children affected. Between 2000 and 2019, this prevalence declined by one third. However, reductions in stunting are far below what is needed to achieve the global targets. Africa and Asia accounted for more than 9 out of 10 stunted children worldwide. Average levels of stunting are estimated to be more than twice as high among children living in the poorest households (43.6 per cent) compared with those in the richest (18.6 per cent).<sup>9</sup>

12. Wasting (low weight for height among children under age 5) is an indicator of acute malnutrition. Globally, 6.9 per cent of children under age 5 suffered from wasting in 2019, above the global target of less than 5 per cent by 2025. Over half of these children lived in Southern Asia.

13. In 2015, an estimated 14.6 per cent of babies born worldwide had low birthweight, with wide variation across regions: from 7.0 per cent in Northern America and Europe to 17.3 per cent in Asia. In 2016, one in three women of reproductive age (aged 15–49) worldwide were affected by anaemia. The prevalence of anaemia among women of reproductive age in Africa and Asia was more than double the level in Northern America and Europe. Global estimates of exclusive breastfeeding reveal some progress, with 44.1 per cent of infants under 6 months of age being exclusively breastfed in 2019 compared with 37 per cent in 2012. The world is currently on track to achieve the 2025 target for this indicator of at least 50 per cent, but not the 2030 target of at least 70 per cent.

14. The global prevalence of overweight among children under age 5 increased from 5.3 per cent in 2012 to 5.6 per cent in 2019, affecting 38.3 million children. The prevalence of overweight or obesity has risen rapidly since 2000 among older children, adolescents and adults. Globally, in 2016, 20.6 per cent of children aged 5–9, 17.3 per cent of adolescents aged 10–19, and 38.9 per cent of adults (those aged 18 or older) were overweight. Adult obesity continues to rise globally, from 11.7 per cent in 2012 to 13.2 per cent in 2016. No country is currently on track to meet the World Health Organization target, adopted in 2013, of halting the rise in adult obesity.

<sup>8</sup> The prevalence of moderate or severe food insecurity, an estimate of how many people do not have access to nutritious and sufficient food owing to a lack of money or other resources, is based on the Food Insecurity Experience Scale, a survey-based index; see FAO and others, *The State of Food Security and Nutrition in the World 2020*.

<sup>9</sup> Development Initiatives Poverty Research, *2020 Global Nutrition Report: Action on Equity to End Malnutrition* (Bristol, United Kingdom of Great Britain and Northern Ireland, 2020).

## B. Diets, dietary habits and burden of disease

15. Different forms of malnutrition often occur in combination: among countries with data available on childhood stunting, on anaemia in women of reproductive age and on overweight (including obesity) among adult women, 124 countries have recently exhibited a high level of at least two of these forms of malnutrition.<sup>10</sup> A key contributor to malnutrition is an unhealthy diet. Although diets are becoming more diversified globally,<sup>11</sup> current food systems are not delivering the diets needed for good health: from resource-poor and fragile contexts in which access to sufficient food may be the principal challenge, to high-income countries where social, cultural and economic drivers often lead to unhealthy choices.

16. Two important drivers of recent dietary shifts have been increased incomes and urbanization. Although rising incomes in low- and middle-income countries have led to greater demand for nutrient-rich foods, such as fruits, vegetables, whole grains, meat, seafood, dairy and eggs, there has been a parallel – and more rapid – increase in the consumption of processed foods and beverages, which tend to be rich in calories but poor in nutrients.

17. A key reason why millions of people around the world suffer from hunger, food insecurity and malnutrition is that they cannot afford the cost of healthy diets that would meet their food and nutrient needs. In many instances, the cost of healthy diets exceeds the international poverty line, established at \$1.90 purchasing power parity per day. Estimates suggest that healthy diets are unaffordable for more than 3 billion people in the world (see figure II).<sup>12</sup>

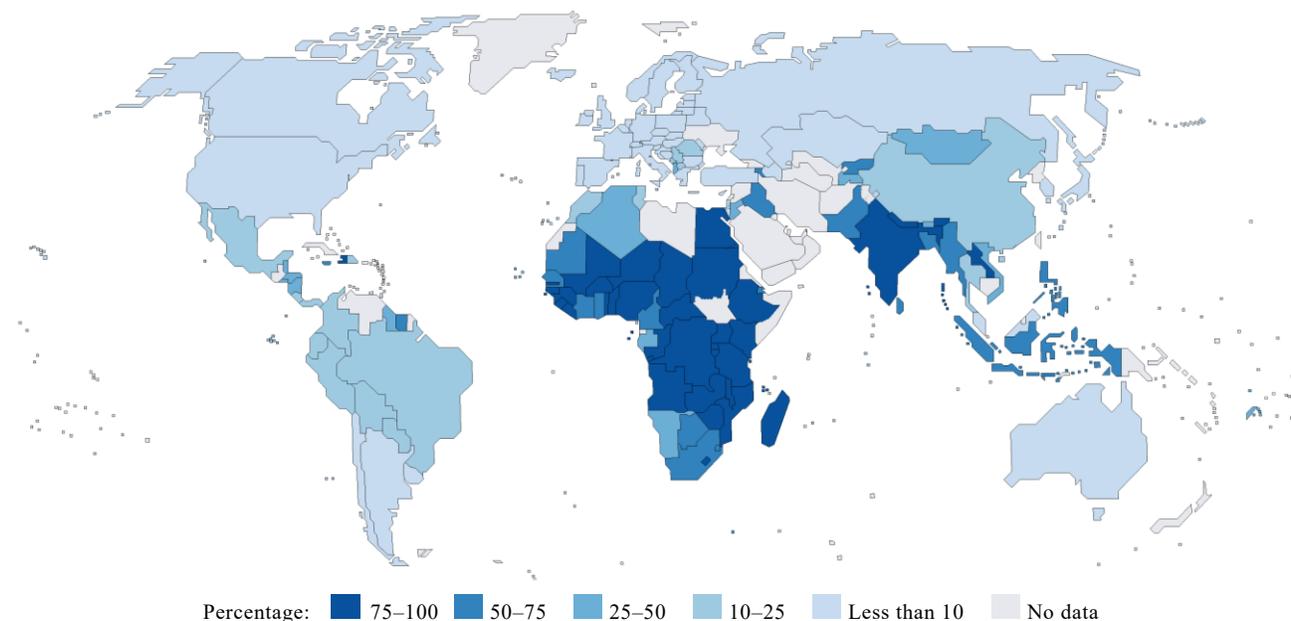
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<sup>10</sup> Ibid.

<sup>11</sup> Michael Clark and others, “The role of healthy diets in environmentally sustainable food systems”, *Food and Nutrition Bulletin*, vol. 41, Supp. No. 2 (December 2020).

<sup>12</sup> This figure is calculated by assuming that unaffordability occurs when the cost of a healthy diet exceeds the average estimated income in a country, assuming that 63 per cent of income is allocated to food. See FAO and others, *The State of Food Security and Nutrition in the World 2020*.

Figure II  
Percentage of population that cannot afford a healthy diet<sup>a</sup>



Source: FAO and others, *The State of Food Security and Nutrition in the World 2020*.

<sup>a</sup> The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. The final boundary between South Sudan and the Sudan has not yet been determined. The dotted line represents approximately the line of control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

18. Unhealthy diets are now responsible for more adult deaths and disability worldwide than tobacco use. In 2017, 11 million adult deaths were attributable to dietary risk factors. Cardiovascular disease was the leading cause of diet-related deaths, followed by cancers and type 2 diabetes. High intake of sodium and low intake of whole grains and fruits were the leading dietary risk factors for deaths and disability globally.<sup>13</sup>

19. Poor diet quality is also evident in the feeding of infants and young children. Worldwide, only 19 per cent of children aged 6–23 months eat a minimally acceptable diet, and only half eat the recommended minimum number of meals. Undernutrition is responsible for about 45 per cent of deaths among children under age 5, including the joint effects of fetal growth restriction owing to maternal undernutrition, suboptimum breastfeeding, stunting, wasting and deficiencies in vitamin A and zinc.<sup>14</sup>

20. Chronic undernutrition can delay physical maturation and extend the adolescent growth period. Approximately 12 million girls aged 15–19 give birth each year in low- and middle-income countries,<sup>15</sup> and many marry and become pregnant before they are physically mature. This situation is often associated with inadequate nutrient availability for both mother and fetus, leading to reduced adult stature of young mothers. Efforts to increase education, prevent child marriage, reduce adolescent

<sup>13</sup> Global Burden of Disease 2017 Diet Collaborators, “Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017”, *The Lancet*, vol. 393, No. 10184 (May 2019).

<sup>14</sup> Robert E. Black and others, “Maternal and child undernutrition and overweight in low-income and middle-income countries”, *The Lancet*, vol. 382, No. 9890 (August 2013).

<sup>15</sup> United Nations, The 2019 Revision of the World Population Prospects Population database, available at <https://population.un.org/wpp/>.

pregnancy and improve nutrition and access to family planning can help reduce these risks to women's and children's health.

21. Across populations, there are severe data gaps around the prevalence of micronutrient deficiencies. The micronutrients of greatest concern, in particular in low- and middle-income countries, are iron, zinc, vitamin A, folate and iodine, as requirements for them are the most difficult to satisfy without diverse diets. Anaemia, which can be caused by the deficiency of one or more micronutrients, increases the risks of maternal mortality and fetal growth restriction. Iron-deficiency anaemia is especially common among young women in middle-to-late adolescence.<sup>16</sup> The costs to meet nutritional requirements of adolescent girls are high relative to other household members owing to their need for iron-rich foods, often putting them at a disadvantage when resources are constrained.<sup>17</sup>

22. Outcomes of poor nutrition in early life may manifest in non-communicable diseases later in life. In addition, age-related health conditions, such as reductions in taste and smell, dental problems or loss of appetite, may interfere with nutritional intake. Older persons with limited mobility and insufficient social support may have trouble obtaining sufficient amounts of nutritious food.<sup>18</sup> Older persons in low-income countries, in particular in Africa, enter old age after a lifetime of poverty and deprivation, poor access to health care and a diet that is usually inadequate in quantity and quality.

23. Overweight and obesity, driven by changes in the food environment and food systems, together with sedentary lifestyles, contribute to chronic diseases that raise risks of death and disability, add to health-care costs and lead to unemployment and loss of household income. In 2017, approximately 8 per cent of deaths globally were attributable to overweight and obesity.<sup>19</sup>

24. Although it is beyond the scope of the present report to review policies and programmes to combat malnutrition,<sup>20</sup> there is a broad consensus that tackling all forms of malnutrition is not the domain of any one sector alone: the health, education, agriculture, social protection, planning and economic policy sectors all have a role to play, as do political leaders. A range of actions at the individual, household, community, national and global levels is needed.<sup>21</sup>

<sup>16</sup> Nadia Akseer and others, "Global and regional trends in the nutritional status of young people: a critical and neglected age group", *Annals of the New York Academy of Sciences*, vol. 1393, No. 1 (April 2017).

<sup>17</sup> Indira Bose and others, "The difficulty of meeting recommended nutrient intakes for adolescent girls", *Global Food Security*, vol. 28 (March 2021).

<sup>18</sup> Julie Shlisky and others, "Nutritional considerations for healthy aging and reduction in age-related chronic disease", *Advances in Nutrition*, vol. 8, No. 1 (January 2017).

<sup>19</sup> Global Burden of Disease 2017 Risk Factor Collaborators, "Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017", *The Lancet*, vol. 392, No. 10159 (November 2018).

<sup>20</sup> For more information, see [E/CN.9/2020/3](#) and [E/CN.9/2021/3](#).

<sup>21</sup> FAO and others, *The State of Food Security and Nutrition in the World 2020*.

### III. Impacts of coronavirus disease on the food system, food security and nutrition

25. The global economic and social disruptions caused by the COVID-19 pandemic are increasing poverty and food insecurity through complex pathways; the impacts will change over time and are likely to affect all dimensions of food security.<sup>22</sup>

26. Lockdown measures have resulted in major disruptions to supply chains. Interruptions to international trade have affected producers who rely on export markets. Illness among food workers has led to closures of processing facilities. Physical distancing requirements and restrictions on people's movement affect the production, transportation and marketing of high-value, labour-intensive, perishable and nutritious foods, such as fruits and vegetables, meat and dairy products. While global food commodity prices fell overall in the early months of the pandemic, they have surged upward in recent months.<sup>23</sup> Localized price increases for certain food commodities affected some countries, including those that depend on food imports.

27. The pandemic has caused an economic recession that has reduced incomes and caused a massive loss of livelihoods, with resulting impacts on access to food. The World Bank estimates that between 88 million and 115 million people fell back into extreme poverty in 2020, with further increases projected for 2021.<sup>24</sup> The International Labour Organization estimated that the equivalent of 495 million full-time jobs were lost in the second quarter of 2020, and that labour income losses of \$3.5 trillion occurred in the first three quarters of 2020 relative to the same period in 2019.<sup>25</sup> Jobs and livelihoods of workers in food systems are among those in greatest peril: 35 per cent of jobs and livelihoods in the sector were considered at risk, including smallholder farmers, rural women and youth, migrant and seasonal workers, and workers in food processing and services.<sup>26</sup>

28. In the absence of social safety nets, spending on food has decreased as incomes declined. Loss of incomes and rising prices have an impact on consumption and nutrition: poor households were likely to shift spending away from foods with high micronutrient content to less nutrient-rich foods that are often high in salt, sugar or fats.

29. COVID-19 has also had major impacts on the delivery of social protection programmes. The World Food Programme estimated that 370 million children lost access to school feeding programmes at the height of school closures in April 2020, and that 246 million children were still lacking access as of early December.<sup>27</sup> Malnutrition has also likely increased owing to health-care failures, as overburdened systems are forced to divert resources from essential activities, including antenatal

<sup>22</sup> This chapter draws from High Level Panel of Experts on Food Security and Nutrition, "Impacts of COVID-19 on food security and nutrition: developing effective policy responses to address the hunger and malnutrition pandemic", September 2020; and FAO and others, *The State of Food Security and Nutrition in the World 2020*.

<sup>23</sup> FAO, FAO Food Price Index database, available at [www.fao.org/worldfoodsituation/foodpricesindex/en/](http://www.fao.org/worldfoodsituation/foodpricesindex/en/) (accessed on 15 December 2020).

<sup>24</sup> World Bank, *Poverty and Shared Prosperity 2020: Reversals of Fortune* (Washington, D.C., 2020).

<sup>25</sup> International Labour Organization (ILO), "ILO monitor: COVID-19 and the world of work", 6th ed., 23 September 2020.

<sup>26</sup> United Nations, "Policy brief: the impact of COVID-19 on food security".

<sup>27</sup> WFP, Global Monitoring of School Meals During COVID-19 School Closures database, available at <https://cdn.wfp.org/2020/school-feeding-map/> (accessed on 5 December 2020).

care, micronutrient supplementation, and the prevention and treatment of childhood diarrhoea, infections and acute malnutrition.<sup>28</sup>

30. For mothers and children, such impacts are expected to lead to poor dietary intake, higher disease incidence with longer durations and higher risk of intergenerational transfer of poor outcomes owing to compromised maternal health.<sup>29</sup> The ultimate impact of the pandemic on malnutrition is not yet reflected in the available data. Modelling exercises have suggested that there could be a 14.3 per cent increase in the prevalence of moderate or severe wasting among children younger than 5 years of age owing to predicted COVID-19-related losses in gross national income per capita.<sup>30</sup> Combined with a projected average 25 per cent reduction in the coverage of nutrition-related health services, the model anticipates an additional 128,600 malnutrition-related deaths in 2020 among children under age 5.<sup>31</sup> Maternal deaths were also predicted to increase, mainly owing to the interruption of life-saving interventions during childbirth and, to a lesser extent, interruptions in family planning services and micronutrient supplementation.

31. COVID-19 is also intertwined with the issue of overweight and obesity. A pooled data analysis showed that individuals with obesity had higher risks of testing positive, hospitalization, admittance to intensive care units, need for ventilator use and death from COVID-19.<sup>32</sup> Obesity may also have impacts on vaccine effectiveness. At the same time, obesity trends may be influenced by dietary shifts to less expensive and more shelf-stable foods and by reductions in physical activity owing to stay-at-home orders, although data to confirm these expectations are not yet available.

32. Adverse effects of the crisis have been disproportionately high for migrant workers, who have been affected by lockdowns, travel disruptions, job losses and illness. The effects have been particularly severe for migrant workers in the informal sector and those holding low-skilled jobs.<sup>33</sup> As of October 2020, the World Bank projected that global remittances would fall by 7.2 per cent from 2019 levels, to \$508 billion, and by a further 7.5 per cent in 2021, with likely impacts on the food security of sending households, which may also have to absorb the return of migrant family members.

33. COVID-19 has increased humanitarian needs. The World Food Programme has estimated that the number of acutely food-insecure people<sup>34</sup> could increase by over 80 per cent by the end of 2020 compared with the pre-COVID-19 level – to 272 million – in 79 of the countries and territories where it works.<sup>35</sup> An early warning analysis of acute food insecurity hotspots identified 20 countries as likely to face spikes in high

<sup>28</sup> United Nations, “Policy brief: the impact of COVID-19 on food security”.

<sup>29</sup> Nadia Akseer and others, “COVID-19 pandemic and mitigation strategies: implications for maternal and child health and nutrition”, *American Journal of Clinical Nutrition*, vol. 112, No. 2 (August 2020).

<sup>30</sup> Derek Headey and others, “Impacts of COVID-19 on childhood malnutrition and nutrition-related mortality”, *The Lancet*, vol. 356, No. 10250 (August 2020).

<sup>31</sup> Timothy Roberton and others, “Early estimates of the indirect effects of the COVID-19 pandemic on maternal and child mortality in low-income and middle-income countries: a modelling study”, *The Lancet Global Health*, vol. 8, No. 7 (July 2020).

<sup>32</sup> Barry M. Popkin and others, “Individuals with obesity and COVID-19: A global perspective on the epidemiology and biological relationships”, *Obesity Reviews*, vol. 21, No. 11 (November 2020).

<sup>33</sup> Dilip Ratha and others, *Phase II: COVID-19 Crisis through a Migration Lens*, Migration and Development Brief, No. 33 (Washington, D.C., World Bank, 2020).

<sup>34</sup> Integrated Food Security Phase Classification Phase 3 or higher, see [www.ipcinfo.org/ipcinfo-website/ipc-overview-and-classification-system/ipc-acute-food-insecurity-classification/en/](http://www.ipcinfo.org/ipcinfo-website/ipc-overview-and-classification-system/ipc-acute-food-insecurity-classification/en/).

<sup>35</sup> WFP, *WFP Global Update on COVID-19: November 2020 – Growing Needs, Response to Date and What's to Come in 2021* (2020).

acute food insecurity in early 2021 owing to expanding conflict, macroeconomic crises exacerbated by COVID-19, weather extremes and desert locusts.<sup>36</sup>

34. Governments have responded to COVID-19 with measures including social protection and fiscal stimulus. Approaches to COVID-19 response are closely related to policy shifts needed for the transformation of food systems to achieve food security and good nutrition in the long run.

## IV. Food security and population change

### A. Population growth, food consumption and sustainability

35. The question of population growth has long been connected with the topic of food security. Since the 1960s, global growth in agricultural production has outpaced population increase. However, this success has come at high costs: first, food systems are already exceeding planetary boundaries for key resources and are generating tremendous food loss and waste. Second, current diets are resulting in premature mortality and susceptibility to both chronic and infectious diseases. Third, food systems continue to suffer vast inequalities, as evidenced by the persistence of hunger and food insecurity and the struggle for decent livelihoods for workers across food systems.

36. Continued population growth will substantially increase the demand for food by 2050, especially in sub-Saharan Africa and South Asia. Food demand will also be influenced by the gradual ageing of the human population and by urbanization. The different food requirements of young and old people, as well as the different consumption patterns, jobs and living conditions of urban and rural populations, will affect minimum dietary energy requirements and the demand for various types of food.<sup>37</sup>

37. While population growth is an important driver of increased food demand, its impact is amplified by changes in the types and quantities of food demanded per person. As per capita income has increased, diets have changed to include both more calories and more varied and expensive foods. A recent modelling exercise illustrates the importance of taking into account changing diets, trends in body mass index, physical activity and food loss and waste, as well as demographic changes, in predicting future increases in food demand and related outcomes for undernutrition, obesity and environmental impact.<sup>38</sup>

38. Food systems are increasingly vulnerable as a result of the pressure they exert on natural ecosystems. More than 80 per cent of agricultural production goes towards food consumption, either directly or, indirectly, through crops used to produce animal feed. Food production currently occupies 50 per cent of the Earth's habitable land, accounts for 70 per cent of freshwater consumption and produces around a quarter of global greenhouse gas emissions. High concentrations and mismanagement of pesticides and antibiotics, in particular in the livestock sector, have led to the evolution and spread of antibiotic-resistant bacteria, threatening human health and the sustainability of production systems. Food production is a major driver of biodiversity loss and of air and water pollution, often linked to poorly managed

<sup>36</sup> WFP and FAO, *FAO-WFP Early Warning Analysis of Acute Food Insecurity Hotspots: October 2020* (Rome, 2020).

<sup>37</sup> FAO, *The Future of Food and Agriculture: Trends and Challenges* (Rome, 2017).

<sup>38</sup> Benjamin Leon Bodirsky and others, "The ongoing nutrition transition thwarts long-term targets for food security, public health and environmental protection", *Scientific Reports*, vol. 10, No. 19778 (2020).

chemicals, deforestation and soil degradation. Habitat loss and pesticides harm pollinators, with negative implications for important crops, while water scarcity limits the expansion of irrigation in some regions.<sup>39</sup> Key anthropogenic drivers of the emergence of zoonotic diseases include the increased demand for animal protein, unsustainable intensification, the increased use and exploitation of wildlife, and lengthening food supply chains.<sup>40</sup>

39. Climate change already affects food security through changing precipitation patterns and an increased frequency of extreme events, such as heatwaves, severe storms, floods and droughts. The impacts are especially severe in low- and middle-income countries, where many people depend on agriculture for their livelihoods and where food security and adaptive capacity are low.

40. Models that simultaneously consider the impacts of food choices on both human health and the environment define a range of dietary options that would reduce premature mortality while also bringing food production within planetary boundaries.<sup>41</sup> Certain food choices have higher environmental burdens in terms of greenhouse gas emissions (see figure III), water use, land use, energy use and nitrogen and phosphorus applications. Encouraging consumption of healthier diets that include sustainability considerations would require a range of actions that combine nutrition education campaigns with economic measures and changes to food environments. A recent analysis of one element of this approach, national food-based dietary guidelines, found that adherence to such guidelines is generally low. While premature mortality would be reduced if current guidelines were fully realized, they are not sufficient, in general, to ensure that global health goals will be achieved.<sup>42</sup> Most of these guidelines have not been developed with sustainability as an explicit goal and therefore may not advance environmental objectives.

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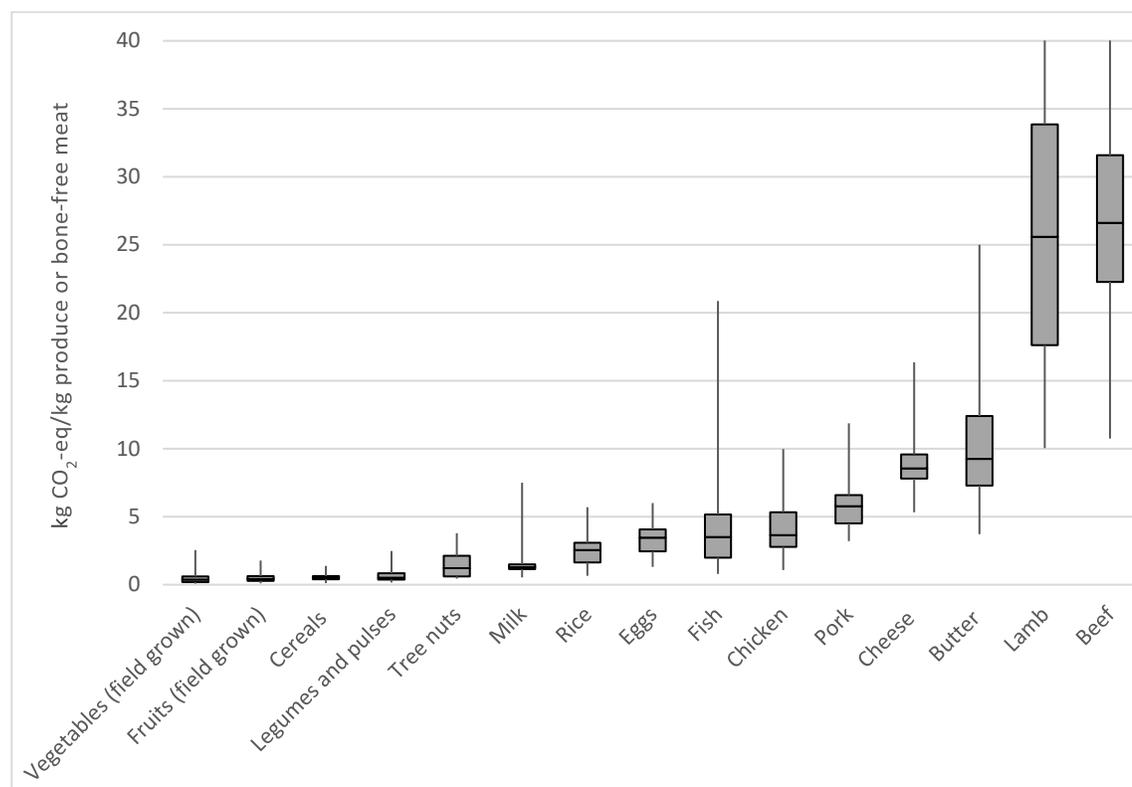
<sup>39</sup> United Nations Environment Programme (UNEP), *Global Environmental Outlook: GEO 6 – Healthy Planet, Healthy People* (Cambridge, United Kingdom, Cambridge University Press, 2019).

<sup>40</sup> UNEP and International Livestock Research Institute, *Preventing the Next Pandemic: Zoonotic Diseases and How to Break the Chain of Transmission* (Nairobi, UNEP, 2020).

<sup>41</sup> Walter Willett and others, “Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems”, *The Lancet*, vol. 393, No. 10170 (January 2019).

<sup>42</sup> Marco Springmann and others, “The healthiness and sustainability of national and global food based dietary guidelines: modelling study”, *The BMJ*, 370:m2322 (2020).

Figure III  
CO<sub>2</sub> emissions for selected broad food categories



Source: Stephen John Clune, Enda Crossin and Verghese, “Systematic review of greenhouse gas emissions for different fresh food categories”, *Journal of Cleaner Production*, vol. 140, No. 2 (2017).

41. Health and sustainability considerations are intertwined with questions about the affordability of diets. In high-income countries, major reductions in consumption of animal source foods are needed in order to meet health and environmental goals. In many low-income countries, however, current consumption of animal source foods can be insufficient to meet micronutrient needs, especially among young children.<sup>43</sup> Thus, a nuanced approach is required in promoting dietary changes in different contexts and locations, with an urgent need for actions throughout the food chain to increase the supply and affordability of nutrient-rich foods, including plant-based proteins, fruits and vegetables.<sup>44</sup>

42. Food loss and waste amount to between 25 and 30 per cent of total food production and account for between 8 and 10 per cent of global greenhouse gas emissions.<sup>45</sup> Reducing food loss and waste can contribute to nourishing the world’s population in an environmentally sustainable manner, although careful consideration is needed to target interventions at appropriate points in the food chain.<sup>46</sup>

<sup>43</sup> FAO and others, *The State of Food Security and Nutrition in the World 2020*.

<sup>44</sup> Global Panel on Agriculture and Food Systems for Nutrition, *Future Food Systems: For People, Our Planet, and Prosperity* (London, 2020).

<sup>45</sup> Valérie Masson-Delmotte and others, eds., *Climate Change and Land: An IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems: Summary for Policymakers* (Intergovernmental Panel on Climate Change, 2019).

<sup>46</sup> FAO, *The State of Food and Agriculture 2019: Moving Forward on Food Loss and Waste* (Rome, 2019).

43. The various considerations described above, including human health, the environment and the economy, are brought together in integrated assessment models and foresight exercises that account simultaneously for multiple variables. FAO has designed three scenarios for food and agriculture until 2050: (a) “business-as-usual”, characterized by a continuation of recent trends and a failure to address outstanding challenges facing food and agriculture, including climate change; (b) “towards sustainability”, characterized by proactive policies to promote sustainable food and agricultural systems, accompanied by efforts to mitigate climate change; and (c) “stratified societies”, characterized by increased inequalities between and within countries, limited innovation and intensified climate change.<sup>47</sup>

44. A “business-as-usual” scenario would lead to significant undernourishment and malnutrition by 2050. Levels of undernourishment and malnutrition could increase if there were further deterioration in income inequality, employment and income-earning opportunities, or access to basic services (see figure IV).<sup>48</sup> In moving towards sustainable food and agricultural systems, food prices would likely increase if all production and consumption costs were taken into account, including resource degradation and greenhouse gas emissions. While price increases reflecting such externalities could lead to more careful use of available resources, leading to reductions in food waste and restraining the demand for certain foods, they could simultaneously limit access to food among the poor. Yet, with a more equitable distribution of income and food within and across countries, scenario analyses have shown that environmental sustainability, food security and better nutrition can be achieved in parallel.<sup>49</sup>

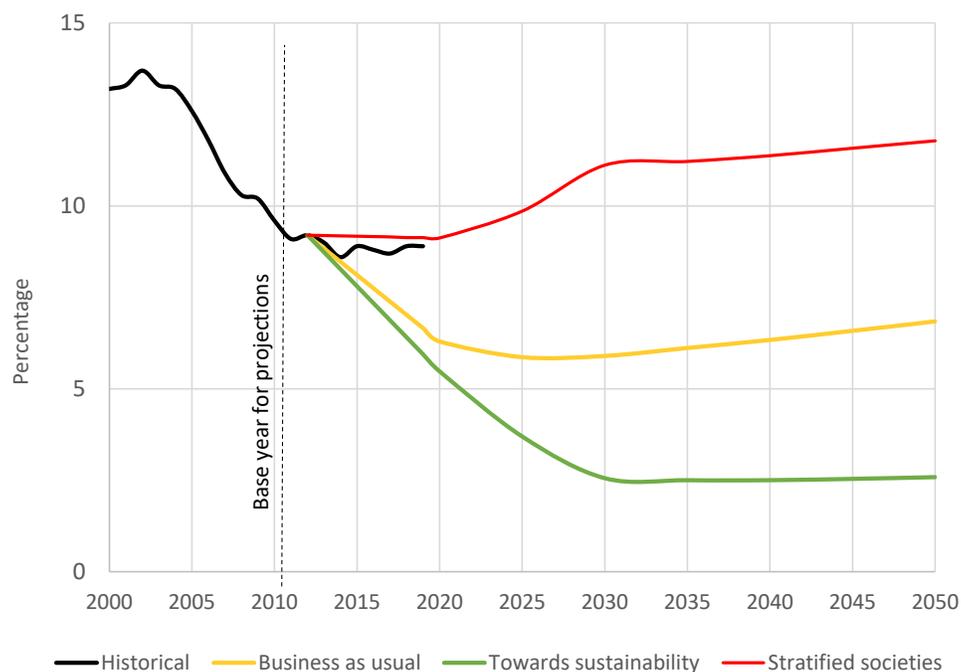
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<sup>47</sup> FAO, *The Future of Food and Agriculture: Alternative Pathways to 2050* (Rome, 2018). All scenarios assume that future population change will follow the medium variant of the United Nations projections. Scenarios take into account changing calorie requirements implied by projected changes in population age structures.

<sup>48</sup> FAO, *The Future of Food and Agriculture*.

<sup>49</sup> *Ibid.*

Figure IV  
Global prevalence of undernourishment, 2000–2050



Sources: Scenario projections are based on FAO, *The Future of Food and Agriculture*, with the base year for projections recalibrated as in FAO and others, *The State of Food Security and Nutrition in the World 2020*, from which historical data for the period 2000–2019 are drawn.

45. In the Programme of Action of the International Conference on Population and Development, it was recognized that efforts to slow population growth, reduce poverty, achieve economic progress, improve environmental protection and reduce unsustainable patterns of consumption and production were mutually reinforcing. It was also noted that slower population growth could improve the ability of countries to eradicate poverty, protect and restore the environment, and build a base for future sustainable development (para. 3.14). Going forward, the annual increase in global population is expected to diminish, gradually reducing the role of population as a driver of increased food production. Nevertheless, population growth will have a major impact on the total demand for food in 2050 and beyond, and it would be easier to meet that demand if population growth decelerated more rapidly than is currently anticipated.

46. Most simulations do not isolate the impact of population growth from other variables, which makes it difficult to study the impact on the demand for food or other resources of policies that affect fertility levels and that are used in implementing the Programme of Action, such as improving women's access to education, formal employment, health and family planning.<sup>50</sup> Some recent reviews do highlight the potential benefits to food security of accelerating the demographic transition.<sup>51</sup> Rights-based approaches that focus on ensuring universal access to sexual and

<sup>50</sup> John Bongaarts and Brian C. O'Neill, "Global warming policy: is population left out in the cold?" *Science*, vol. 361, No. 6403 (August 2018); and Wolfgang Lutz and Erich Streissnig, "Demographic aspects of climate change mitigation and adaptation", *Population Studies*, vol. 69, Supp. No. 1 (2015).

<sup>51</sup> Food and Land Use Coalition, *Growing Better: Ten Critical Transitions to Transform Food and Land Use* (2019); and Tim Searchinger and others, *Creating a Sustainable Food Future: Synthesis Report* (Washington, D.C., World Resource Institute, 2018).

reproductive health care, protecting reproductive rights and eliminating child, early and forced marriages could bring about a more rapid fertility decline by supporting the rights of individuals to decide freely and responsibly the number and timing of their children.

## **B. Agricultural transformation and livelihoods**

### *Rural livelihoods*

47. The transition from traditional societies, which are characterized by a high share of value produced and labour employed in agriculture, to economies in which the manufacturing and services sectors are prominent, with lower levels of employment in agriculture, has proceeded differently in many low- and middle-income countries than the earlier experience in high-income countries.<sup>52</sup> Farm sizes have been decreasing, rather than increasing, and the wage gap between agriculture and other sectors has remained high. In many low- and middle-income countries, manufacturing has not sufficiently expanded off-farm job opportunities; the manufacturing, agrifood and service sectors are themselves undergoing capital intensification through the adoption of information technologies (robotics, digitalization and artificial intelligence) that reduce the need for workers. The evidence to date shows that, in Africa, for instance, most of the jobs being created are in low-productivity sectors, such as traditional informal services, that lack decent working conditions. Rural transformation and urbanization have thus far been occurring with almost no increases in productivity.<sup>53</sup>

48. Given the high share of the agrifood sector in self- and wage employment in low-income countries, improving the conditions of employment in the sector would have substantial benefits for rural livelihoods. Many of these jobs are characterized by decent work deficits resulting from, inter alia, weak labour market institutions, including ineffective law enforcement, labour inspection and compliance; low productivity; informality; poor infrastructure; and limited access to social protection and other services, including education and health care. Additional challenges arise from the exposure of farmworkers to various safety, health, environmental and biological hazards. Agricultural workers experience a high incidence of working poverty and their families often suffer from food insecurity.<sup>54</sup>

49. At the same time, small-scale producers make essential contributions to the global food supply but face economic precarity and vulnerability. Small-scale producers need policy frameworks that support investment in productivity-enhancing technologies and sustainable farming practices.<sup>55</sup> Social protection programmes can link social benefits to the direct promotion of rural employment and agricultural production. To bring about rural transformation, countries need to ensure smallholder access to markets, finance and technology, and to promote digital transformation with a focus on rural livelihoods and youth employment.

50. While agrifood sector jobs have been designated as “essential” in the context of the COVID-19 crisis in many countries, the measures adopted to slow down the pandemic may place a further strain on the capacity of the sector to continue meeting

<sup>52</sup> See E/CN.9/2020/2; and FAO, *The State of Food and Agriculture 2017: Leveraging Food Systems for Inclusive Rural Transformations* (Rome, 2017).

<sup>53</sup> Aidar Abdychev and others, *The Future of Work in Sub-Saharan Africa*, African Department Paper Series, No. 18/18 (Washington, D.C., International Monetary Fund, 2018).

<sup>54</sup> International Fund for Agricultural Development, *Rural Development Report 2016: Fostering Inclusive Rural Transformation* (Rome, 2016).

<sup>55</sup> FAO, *State of Food and Agriculture 2017*.

demand, providing incomes and livelihoods, and ensuring the safety and health of agricultural workers and producers.

#### *Urban-rural linkages*

51. The expansion of cities has substantially changed the landscape and complexity of food systems. Cities function as economic magnets for surrounding areas and as communications and transport hubs. Urban shares of food consumed exceed 50 per cent in 23 African countries.<sup>56</sup> Urban areas influence wage rates, input prices, input adoption, land valuation and high-value agricultural production in nearby rural areas. The influence is also seen in agricultural commercialization, with increasing numbers of small and medium-sized enterprises involved in agroprocessing, trading and retailing. Urban wholesale food markets become critical distribution centres, giving city governments a key role in agricultural policy.

52. Rural areas need to be linked through both physical and digital infrastructure with towns and small cities, where food-storing and food-processing activities can generate additional employment.<sup>57</sup> Access to improved storage facilities would be especially valuable for smallholders in sub-Saharan Africa, where post-harvest loss is common and food safety surveillance remains a concern.<sup>58</sup>

53. The food security of urban populations, in particular access to food for the urban poor, was already a major concern before COVID-19. The COVID-19 pandemic is disrupting urban food systems worldwide, particularly affecting the food distribution and the food retail sectors.<sup>59</sup> The role of city and local governments in managing the response to the COVID-19 crisis is crucial for preventing the spread of the virus and, at the same time, for mitigating disruptions in urban food systems and negative effects on vulnerable populations.

#### *Inequalities, including gender inequalities*

54. Women make up over 37 per cent of the world's rural agricultural employment, a figure which rises to 48 per cent for low-income countries.<sup>60</sup> Women and girls face overt and implicit discrimination in access to key productive resources; they face wage discrimination in rural labour markets and are often more likely than men to be in part-time, seasonal or low-paying jobs; furthermore, they often work without remuneration on family farms. This disadvantage limits women's access to productive assets, inputs and services, including land, livestock, labour, education, and extension and financial services. It not only affects their well-being and that of their families, but also imposes a high cost on the economy through productivity losses. Ensuring that women have the same access to productive resources as men could generate significantly increased yields on farms owned or operated by women.

55. Containment measures for COVID-19 pose new challenges for rural women with regard to their roles in maintaining household food security as agricultural producers, farm managers, food processors, traders, wage workers and entrepreneurs. Gender analyses have found that more women than men reported income loss and

<sup>56</sup> Alliance for a Green Revolution in Africa, *Africa Agriculture Status Report: Feeding Africa's Cities – Opportunities, Challenges, and Policies for Linking African Farmers with Growing Urban Food Markets* (Nairobi, 2020).

<sup>57</sup> FAO, *State of Food and Agriculture 2017*; and [A/75/272](#).

<sup>58</sup> Megan Sheahan and Christopher Barrett, "Review: food loss and waste in sub-Saharan Africa", *Food Policy*, vol. 70 (July 2017).

<sup>59</sup> United Nations, "Policy brief: the impact of COVID-19 and food security".

<sup>60</sup> FAO, "Data snapshot: using sex-disaggregated data to better understand gender gaps in agriculture" (forthcoming).

lack of food as key impacts of the pandemic.<sup>61</sup> Furthermore, COVID-19 is increasing women's household work burden owing to school closures and the additional care needs of sick household members. Increased gender-based violence is an additional concern arising from tensions associated with stay-at-home measures and economic closures. It is crucial to identify the most vulnerable women and girls, as well as men and boys, and to develop measures to reduce their exposure to risks and increase their access to support services.<sup>62</sup>

56. Designing and delivering gender-sensitive social protection measures is key to reducing risks and ensuring that rural women can benefit equally from such interventions. Investing in women's leadership and engaging them in the design and implementation of COVID-19 response strategies is critical to ensuring that their perspectives and needs are adequately considered. Finally, gender analysis and the collection of data disaggregated by age and sex are an integral part of monitoring gender-related impacts and informing the design of response measures.<sup>63</sup>

57. Rural youth, especially young women, have limited access to productive resources, including land, infrastructure, capital, credit, technology, markets, information, education and training, and are around three times more likely than adults to be unemployed. These constraints reinforce other factors encouraging rural youth to move to urban areas or abroad. The lack of resources and opportunities for young people in both rural and urban areas may have disruptive impacts, including unsafe migration and social unrest.

58. Rural populations and the agricultural workforce are ageing in many parts of the world. In Africa and Asia, a high proportion of workforce participation by older persons is in agriculture.<sup>64</sup> It is important to ensure that older farmers are included in access to technologies and productive resources. Securing equal access to land and improving tenure security for older women will contribute to reducing poverty and hunger in many Asian and African countries.

*Role of technology, data and innovation in nourishing the world sustainably and improving livelihoods*

59. To address the challenges to food security, sustainability and livelihoods, a profound transformation in approaches to food production will be necessary. New technologies aim to make agriculture more resilient and productive, and crops and farm animals more tolerant to diseases, pests and environmental stresses, including the impacts of climate change.<sup>65</sup> Such technologies can help to produce more and safer food with fewer resources while reducing encroachment on natural ecosystems, including forests and wetlands. However, the applications of agricultural technologies have to be evaluated in terms of how those technologies help to meet the needs and demands of family farmers to improve productivity and incomes, as well as how they support sustainable development (see [A/74/238](#)). Agroecological approaches stress

<sup>61</sup> Emily Janoch, "She told us so: rapid gender analysis – filling the data gap to build back equal", September 2020.

<sup>62</sup> FAO, "Gendered impacts of COVID-19 and equitable policy responses in agriculture, food security and nutrition", 15 May 2020; and United Nations, "Policy brief: the impact of COVID-19 on women", 9 April 2020.

<sup>63</sup> Ibid.

<sup>64</sup> Sif Heide-Ottosen, *The Ageing of Rural Populations: Evidence on Older Farmers in Low- and Middle-Income Countries* (London, HelpAge International, 2014).

<sup>65</sup> High-level political forum on sustainable development, "Ending hunger and achieving food security for all", background note for the 2020 session, 2020.

local and indigenous knowledge and participation in developing innovations, rather than top-down approaches.<sup>66</sup>

60. “Big data” and high-performance computing, in conjunction with global positioning satellites, use machine learning to guide the management of crops, livestock, water and soil and to enable farmers to customize inputs and make informed decisions in real time. Big data are being rapidly generated on the conditions and characteristics of production, processing, distribution and storage throughout agricultural value chains for real-time monitoring.

61. However, the digital technology needs of low- and middle-income countries depend increasingly on big-data platforms managed by a small number of corporations. Such platforms contain extraordinary amounts of information on production and consumption processes, yet their implications for economic growth and the reduction of poverty and income inequality have not been fully explored. Data ownership requires clarification. Data governance arrangements should promote openness and transparency, ensure the confidentiality of personal data and serve to build the confidence and trust of smallholders and poor farmers.

62. Automation in agriculture is accelerating with the use of robotics, drones, automated harvesters and artificial intelligence, increasing productivity and efficiency. However, automation could also have significant negative impacts on employment, in particular where the proportion of the labour force engaged in agriculture is high, resulting in increased poverty despite gains in productivity.<sup>67</sup>

## V. Conclusions and recommendations

**63. The world is not on track to eliminate hunger by 2030. After dropping for decades, the number of undernourished persons worldwide has increased in recent years, exacerbated by the impacts of COVID-19. Furthermore, healthy diets are unaffordable for 3 billion people worldwide.**

**64. Population patterns and trends cut across all five action tracks of the United Nations Food Systems Summit: access to safe and nutritious food, sustainable consumption patterns, nature-positive production, equitable livelihoods and resilience. Governments are encouraged to actively participate in preparations for the Summit and to engage with diverse stakeholders to identify opportunities for improved collective action at the territorial, national, regional and global levels.**

**65. Actions to improve food security and nutrition in the context of the COVID-19 pandemic – including targeted social protection programmes, protections for vulnerable food system workers, protections for import-dependent countries and increased diversity and resilience of production and distribution systems – can also contribute to a long-term transformation of food systems.**

**66. More responsible patterns of consumption and production, in combination with slower population growth, would ease pressure on ecosystems, reduce emissions of greenhouse gases and allow the world more time to identify and adopt new technologies that mitigate the adverse impacts of climate change or facilitate adaptation.**

<sup>66</sup> High Level Panel of Experts on Food Security and Nutrition, *Agroecological and Other Innovative Approaches for Sustainable Agriculture and Food Systems that Enhance Food Security and Nutrition* (Rome, 2019).

<sup>67</sup> Ibid.

67. A sustainable transformation of food and agricultural systems is required globally at all levels and will require international cooperation, including regional and South-South cooperation, and engagement with stakeholders, including the private sector and civil society. However, there are no one-size-fits-all solutions; policies have to take into account local contexts and the impact of such transformations on the livelihoods of persons currently working in agriculture and the job opportunities available to them.
68. Achieving sustainable food systems will require reducing food losses through better storage facilities and better organization of value chains, in particular in disadvantaged areas, and by reducing food waste at the retail and consumption levels, especially in high-income countries.
69. Governments could consider adopting and strengthening policies, including incentives, regulations and dietary guidelines, to encourage people to adopt healthy diets based on foods that can be produced sustainably. Government policies can create market incentives to encourage shifts in production, while also using consumer education and school curricula to affect consumption habits.
70. Governments could integrate nutrition education and assistance into programmes for education, social protection, food security and health care, including for sexual and reproductive health-care services.
71. Government policies to promote healthy diets should focus on actions that can simultaneously reduce risks of both the nutritional deficiencies associated with underweight, wasting and stunting and those dietary imbalances that are responsible for the rising prevalence of overweight and obesity.
72. Governments could implement policies and programmes to raise incomes among the poor and create income-earning opportunities for them, as well as providing income supplements where needed.
73. Governments could ensure that programmes and policies to improve food security, nutrition and social protection benefit women, young people, older persons and others living in vulnerable situations. Many actors and partners are needed to coordinate the myriad programmes and policies in this area and to ensure that all people can secure the livelihoods they need to escape poverty, achieve food security and meet other needs.
74. Governments are urged to strengthen humanitarian assistance, including through the positioning of food in countries affected by food crises, strengthening local food systems and ensuring access to safe, nutritious and sufficient food for the poorest and most vulnerable.
75. Governments and international organizations could ensure that trade rules for food and agricultural products take into consideration their social and environmental impacts and prevent unfair competition against countries that have more stringent environmental and social regulations.
76. Innovative agricultural technologies will require significant investment in research, development and human capital to adapt them to local contexts and make them affordable to all producers. Local and traditional knowledge should be a key input in their development. Governments can create market incentives and regulatory frameworks to encourage innovation and build human capital. Although “big data” applications can be highly beneficial in the agriculture and food sectors, issues of data ownership, concentration, control and privacy must be addressed by Governments and the international community.
77. Governments and the international community are urged to support research and data collection to improve the monitoring of the nutritional status

**of all population groups, including for micronutrient deficiencies. Research is also needed to identify best practices for improving nutrition, including interventions to halt the rising prevalence of obesity.**

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