Preplanned Studies

Towards Sustainable Development Goals: Study on the Consequences of Food Insecurity Among Global Population — Worldwide, 2022

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Summary

What is already known about this topic?

The global population is predicted to reach 8 billion by the end of 2022, which can delay the progress and exacerbate the challenges of achieving the Sustainable Development Goals (SDGs), especially the goal of "Zero Hunger."

What is added by this report?

During the next 15 years, it is predicted that the world's population will increase from 8 billion to 9 billion people. Although food insecurity is anticipated to decrease over the next three decades for most of the world, food insecurity is anticipated to increase in Africa. Accelerating population growth is projected to lead to larger percentages of infants with low birth weight and of children under 5 years old with stunted growth.

What are the implications for public health practice?

Rapid population growth will make it more difficult to achieve the SDGs for ending hunger and ensuring good health and well-being. It is important to develop foresight and adopt proactive planning that is guided by careful demographic analysis.

The Sustainable Development Goals (SDGs) were adopted in 2015 as a universal call to action to eradicate poverty, protect the planet, and ensure the well-being, peace, and prosperity of all people by 2030. However, progress toward achieving the SDGs has halted and efforts to meet the SDGs are facing unprecedented challenges (*1*). Of the 17 SDGs, only two — eliminating preventable deaths under five years old and universal primary and secondary education — were close to being achieved, and the goals to eliminate hunger, poverty, and inequality are the farthest off track (*2*). As the coronavirus disease 2019 (COVID-19) pandemic is in its third year, the world keeps witnessing devastating reversals of the previously steady progress in poverty reduction over the past 25 years (*3*). The war between Russia and Ukraine, the two largest global producers and exporters of certain food items, is further challenging the SDG achievement.

The world is about to enter a new demographic era, with the global population anticipated to exceed 8 billion people by the end of 2022 (*4*). Rapid population growth will inevitably exacerbate the challenges to achieving the SDGs, especially for the goal of ending hunger and ensuring sufficient access to safe and nutritious food (*5*). Difficulties are compounded in the poorest countries, most of which are the main contributors to current and projected future population growth. The total population of low-income regions is projected to double in size between 2020 and 2050; sub-Saharan Africa will account for most of the global increase expected by the end of this century. The exacerbation of food insecurity and malnutrition among millions of people in such a once-in-a-century global depression will not only elevate all-cause mortality by impairing disease management and increasing disease severity, but will also be damaging to newborns and children, severely affecting human capital development and leading to an intergenerational cycle of malnutrition (*6*).

On the arrival of the 33rd World Population Day, we aimed to investigate the consequences of food insecurity in the new demographic era. Specifically, our study examined 1) changing patterns and trends of global population growth; 2) the association between changing demographics and food insecurity; and 3) how the changing demographic patterns and their relation to food insecurity affect achievement of health-related SDGs.

Data on population trends were obtained from the United Nations Population Division, which provided detailed data on population size, mortality rates, and fertility rate by global region. Population size was based on three scenarios with low, medium, and high fertility assumptions (https://population.un.org/wpp/Download/Standard/Population/). Population food

insecurity data from 2010–2030 were obtained from the report of the State of Food Security and Nutrition in the World, 2021, which provided food insecurity data under assumptions of with, and without, the COVID-19 pandemic (*7*). Malnutrition-related data, including the percent of low birth weight newborns from 2010–2015, stunted children under 5 years from 2010–2020, and overweight children under 5 years from 2010–2020, were obtained from the United Nations Children's Fund (https:// data.unicef.org/ resources). We assumed that the rate of change in the percent of the population experiencing food insecurity would remain unchanged after 2030. Using this assumption, we estimated the scale of population food insecurity from 2031–2050 as the product of the population size and the percent of the population with food insecurity.

The United Nations Population Division predicts that 2022 is the last year the world will have fewer than 8 billion people. It took only 12 years to increase from 7 billion to 8 billion, but the growth rate was projected to decrease after 2022. According to predictions based on the three fertility rate assumptions, the world population will increase from 8 billion to 9 billion in 15 years (Figure 1). Due to aging, the mortality rate is increasing rapidly in most of the world, while in Africa, mortality is rapidly decreasing, and this will cause the largest proportion of global population increase to be in Africa (Supplementary Figure S1, available in http://weekly.chinacdc.cn).

Figure 2 shows predictions of food insecurity by region, from 2010 to 2050. Trends of populations with food insecurity are similar to trends in the proportion of populations with food insecurity. The general tendency is that the number of people living in food insecurity decreases for most of the world during 2010–2050, while in Africa, it increases during the same period. The COVID-19 pandemic led to a surge in food insecurity, from 650.3 per million in 2019 to 768.0 per million in 2020 worldwide. In Asia, the COVID-19 pandemic caused a 15.69% increase, and in Africa, it caused a 19.6% increase. Due to the small number of people living in food insecurity in North America and Oceania, our study did not make predications for these areas.

The relationship between child development, population growth rate, and food insecurity is shown in Figure 3. Accelerating population growth was related to a higher percentage of low birth weight newborns and stunted children under 5 years old. Asia, with the biggest regional population worldwide, was anticipated to have a similar trend to the global one. However, in Africa and Latin America and the Caribbean, the relationship between population growth and percent low birth weight was not evident. Similar results were found in the associations between the percents with food insecurity and with malnutrition, in which a larger percent of a population in food insecurity was associated with a higher percent of low birth weight and stunted children under 5 years. However, a relationship of overweight, population growth rate, and food insecurity was not seen.

DISCUSSION

Our study provided the most recent projections of world population growth and the number of people living in food insecurity through 2050 and potential consequences for health-related SDGs. Our analyses suggest that the world population will be almost 8 billion in 2022, increasing to 9 billion shortly after 2035, and over 10 billion by 2050. Africa will be the

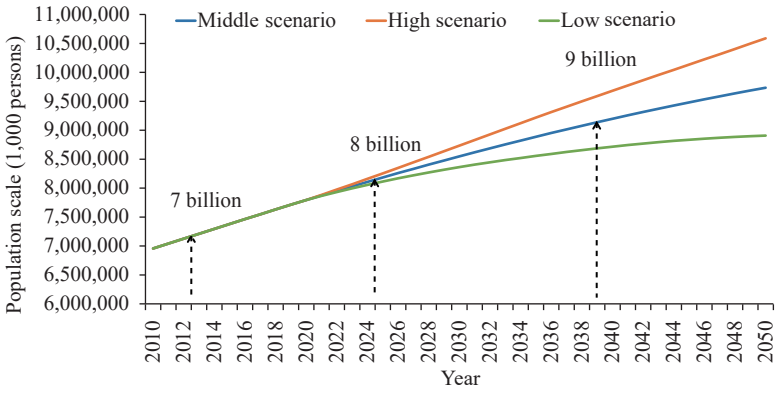

FIGURE 1. Predictions of world population scale, 2010–2050.
Note: Data source: United Nations Population Division (https://population.un.org/wpp/Download/Standard/Population/).

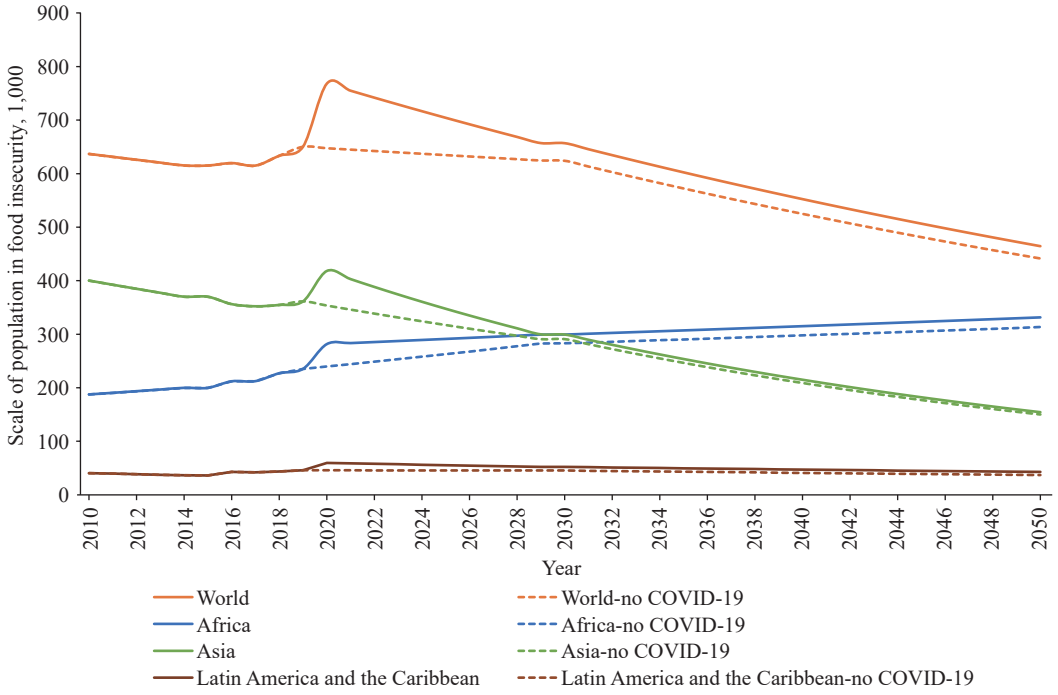

FIGURE 2. Prediction of the number of people living in food insecurity, 2010–2050.
Note: Data obtained from United Nations Children's Fund (UNICEF), The State of Food Security and Nutrition in the World 2021, 2021. No COVID-19 represents the trend of prediction of the number of people living in food insecurity under the assumption that COVID-19 has not occurred.

main contributor to population growth for the next 30 years. The number of people suffering from hunger in Africa was projected to increase to a staggering scale — a projected increase that has been significantly worsened by the COVID-19 pandemic. With these increases in population and food insecurity, the proportions of newborns with low birth weight and children under 5 with stunted growth were also projected to rise.

Our study showed that population growth was a consequence of two trends: persistently high fertility rates and substantial decreases in mortality in most African countries that are not yet aging populations (*5*). Increasing numbers of people increase demand for food. The Food and Agriculture Organization projects that by 2050, population and economic growth will lead to a doubling of global demand for food. Population growth may also affect food supply and access, since population growth in many regions is associated with land fragmentation and resettlement into fragile environments that directly reduce food production. Food insecurity has also been exacerbated by the COVID-19 crisis by affecting food costs and infrastructure. It is estimated that COVID-19 increased the number of people suffering from hunger by almost 320 million in one year (*8*).

Despite a variety of public programs, vulnerable populations such as women and children are always disproportionately affected by food insecurity (*9*). As a result, subsequent increases in low birth weight and stunting of children boost mortality across a broad spectrum of communicable and non-communicable diseases (*10*), further stalling progress of SDG 3: good health and wellbeing.

Certain limitations should be noted for proper interpretation of our results. First, data from Europe, North America, and Oceania were not included in the food insecurity and malnutrition analyses due to a very small number of people living with food insecurity in these areas compared to other regions. Second, projections of the population in food insecurity were based only on the global population; future analyses that employ more predictors are warranted. Finally, analyses on the relationship between child development, population growth rate, and food insecurity were based on data from 2010 to 2015, which may lead to potential bias in estimations.

In conclusion, rapid population growth makes it more difficult for our world to achieve the SDGs of zero hunger and good health and well-being-challenges that are more daunting in low-income countries. On the arrival of a world with 8 billion people, it is

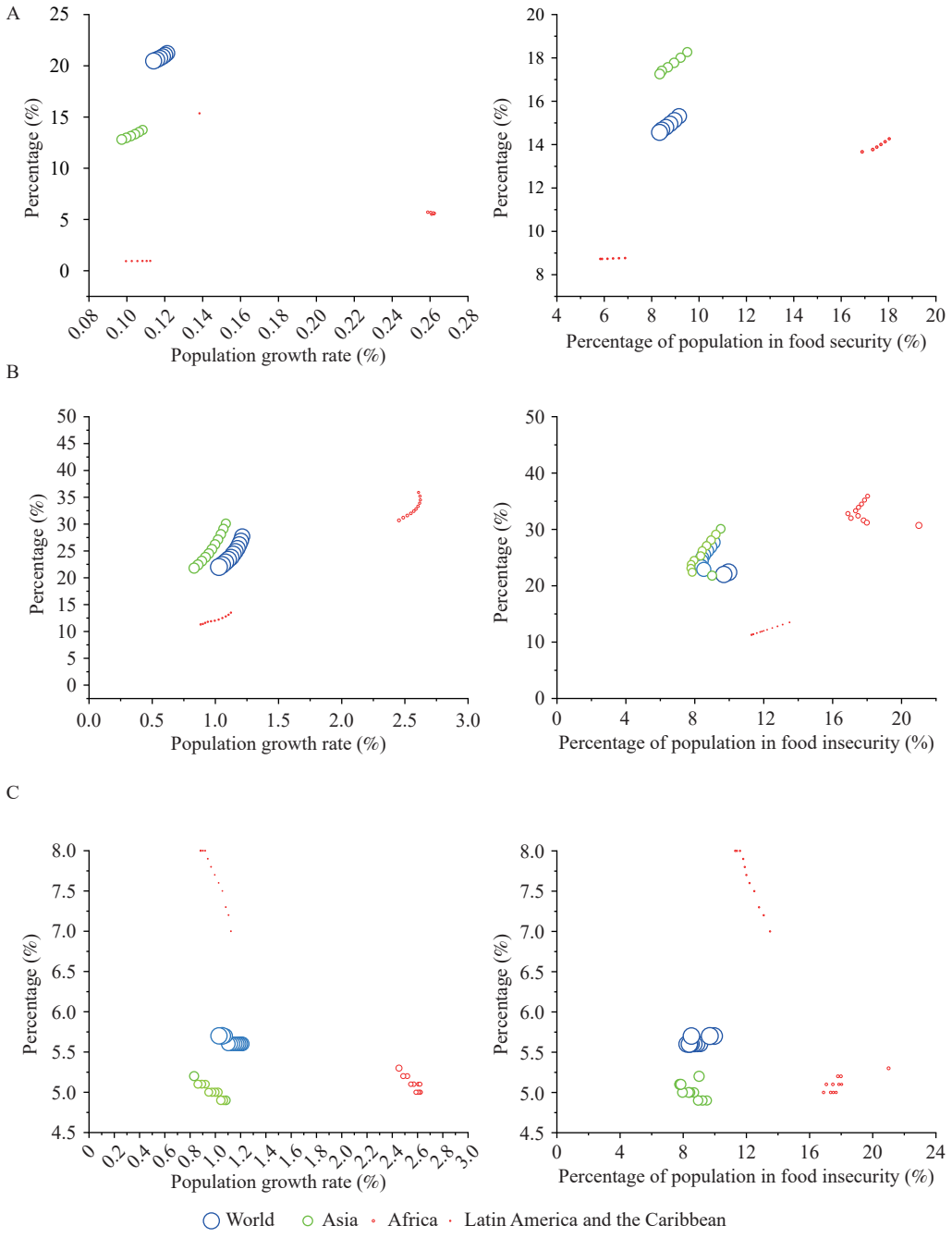

FIGURE 3. Malnutrition, population growth rate, and percent of populaiton in food insecurity. (A) Percent low birth weight (%), 2010–2015; (B) Percent stunded children under 5 years (%), 2010–2020; (C) Percent overweight children under 5 years (%), 2010–2020.
Note: Data obtained from United Nations Population Division (https://population.un.org/wpp/Download/Standard/Population/) and the United Nations Children's Fund (https://data.unicef.org/resources/resource-type/datasets/). Bubble size represents the population scale, with larger bubbles representing larger populations.

important to develop foresight and proactive planning that is guided by demographic analyses to not only ensure healthy lives and promote well-being, but also to build a more sustainable, resilient, and equitable future for all.

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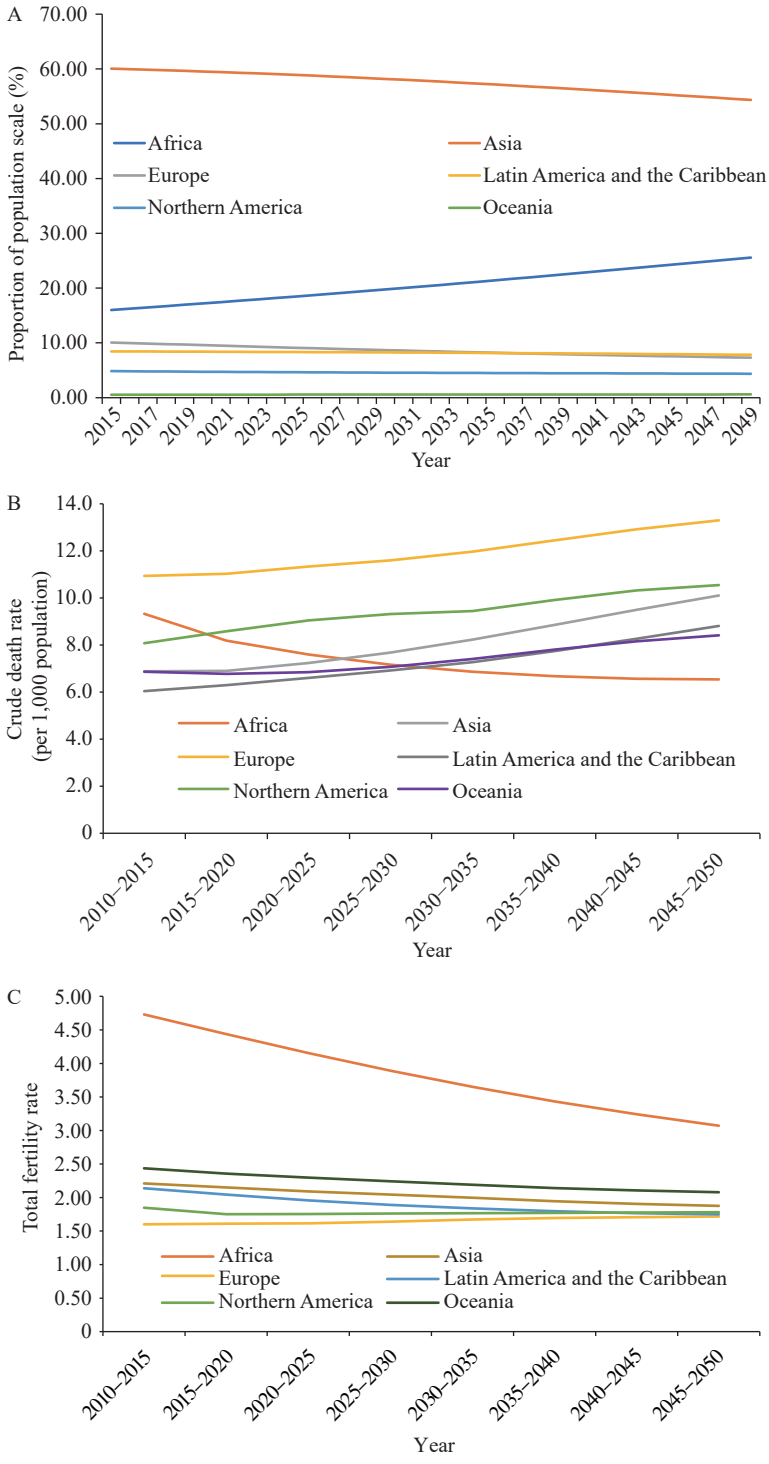

SUPPLEMENTARY FIGURE S1. Prediction of (A) population proportions, (B) crude death rates, and (C) total fertility rates by region, 2010–2050.
Note: Data source: United Nations Population Division (https://population.un.org/wpp/Download/Standard/Population/).