Global Food Security 17 (2018) 21–29

Contents lists available at ScienceDirect

Global Food Security

journal homepage: www.elsevier.com/locate/gfs

The global burden of chronic and hidden hunger: Trends and determinants

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ARTICLE INFO

Keywords:
Hunger
Micronutrient malnutrition
Measurement
DALYs
Determinants
Cross-country regressions

ABSTRACT

Eradicating hunger in all its forms, including chronic and hidden hunger, requires good understanding of the problem's magnitude, trends, and determinants. Existing studies measure "hunger" through proxies that all have shortcomings. We use a more comprehensive metric, Disability-Adjusted Life Years (DALYs), to quantify the burden of hunger and show related trends. While the burden of chronic hunger more than halved since 1990, it remains larger than the burden of hidden hunger. Cross-country regressions show that economic growth was a major determinant of reducing the hunger burden. However, growth and other country-level determinants have larger effects on the burden of chronic hunger than on the burden of hidden hunger. Complementary micro-level interventions are required to end hunger in all its forms.

1. Introduction

Worldwide, about 800 million people are chronically hungry, meaning that they are undernourished in terms of calories (FAO et al., 2017). More than 2 billion people are affected by hidden hunger, meaning that they suffer from micronutrient deficiencies (WHO, 2006). Although progress was made in reducing these problems, ending hunger in all its forms – as stated in the Sustainable Development Goals (SDGs) – remains a global challenge (FAO et al., 2017; Barrett, 2010; Stokstad, 2015; Obersteiner et al., 2016; Allen and de Brauw, 2018). The goal of ending hunger in all its forms involves a broad definition of hunger, including calorie deficiencies (chronic hunger), micronutrient deficiencies (hidden hunger), and related health problems.

Achieving the SDGs requires political commitment and knowledge about the types of actions that can help to reduce different forms of hunger effectively. While evidence to support concrete nutrition interventions at the community, household, or individual level is accumulating (Bhutta et al., 2013; Ruel and Alderman, 2013), lack of reliable country-level data makes it difficult to describe and monitor the magnitude of global hunger in all its forms over time (IFPRI, 2017). Given this lack of country-level data, the country-level determinants of hunger are also not yet sufficiently understood (IFPRI, 2017; Gillespie et al., 2013). The few existing cross-country studies that investigated determinants of hunger relied on data covering only a small number of countries and years (Headey, 2013; Smith and Haddad, 2002, 2015; Haddad et al., 2003; Vollmer et al., 2014; Headey et al., 2017). Nor did these existing studies solve the issue of how to measure "hunger" in its different forms. Various proxy measures were used that all quantify only selected dimensions of hunger or individual health outcomes, therefore not capturing hunger in all its forms in the broader SDG sense.

To overcome these shortcomings, Disability-Adjusted Life Years (DALYs) were suggested as a more nuanced and comprehensive measure to analyze the burden of hunger (Black et al., 2008; Muthayya et al., 2013; Stein, 2014). DALYs are a metric to quantify the burden of health problems in terms of healthy (disability-adjusted) life years lost (IHME, 2018; Murray et al., 2012; Murray and Lopez, 1996). A common metric is useful to compare the magnitude of very different types of health problems. In a hunger context, DALYs can be calculated for different risk factors, such as protein-energy malnutrition, childhood underweight, iron deficiency, or vitamin A deficiency, just to name a few. The DALYs metric was used to quantify the burden of different forms of hunger (Black et al., 2008; Lim et al., 2012; Murray et al., 2012; Muthayya et al., 2013; Stein, 2014). However, no previous study has used the DALYs metric to explicitly compare the burden of chronic hunger and the burden of hidden hunger over time and analyze the country-level determinants of these burdens with cross-country regression models. Here, we address these research and knowledge gaps.

We show that the combined burden of chronic and hidden hunger, as measured with DALYs, has been reduced by more than half since 1990. However, the burden of chronic hunger has fallen more rapidly than the burden of hidden hunger. Economic growth was a key determinant of reducing the burden of chronic and hidden hunger over time. Other country-level determinants with significant effects include urbanization, democracy, temperate-zone climates, larger food supplies, food diversity, female schooling, and access to improved sanitation and health. However, our analysis also reveals that all country-

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https://doi.org/10.1016/j.gfs.2018.03.004
Received 22 December 2017; Received in revised form 18 March 2018; Accepted 23 March 2018

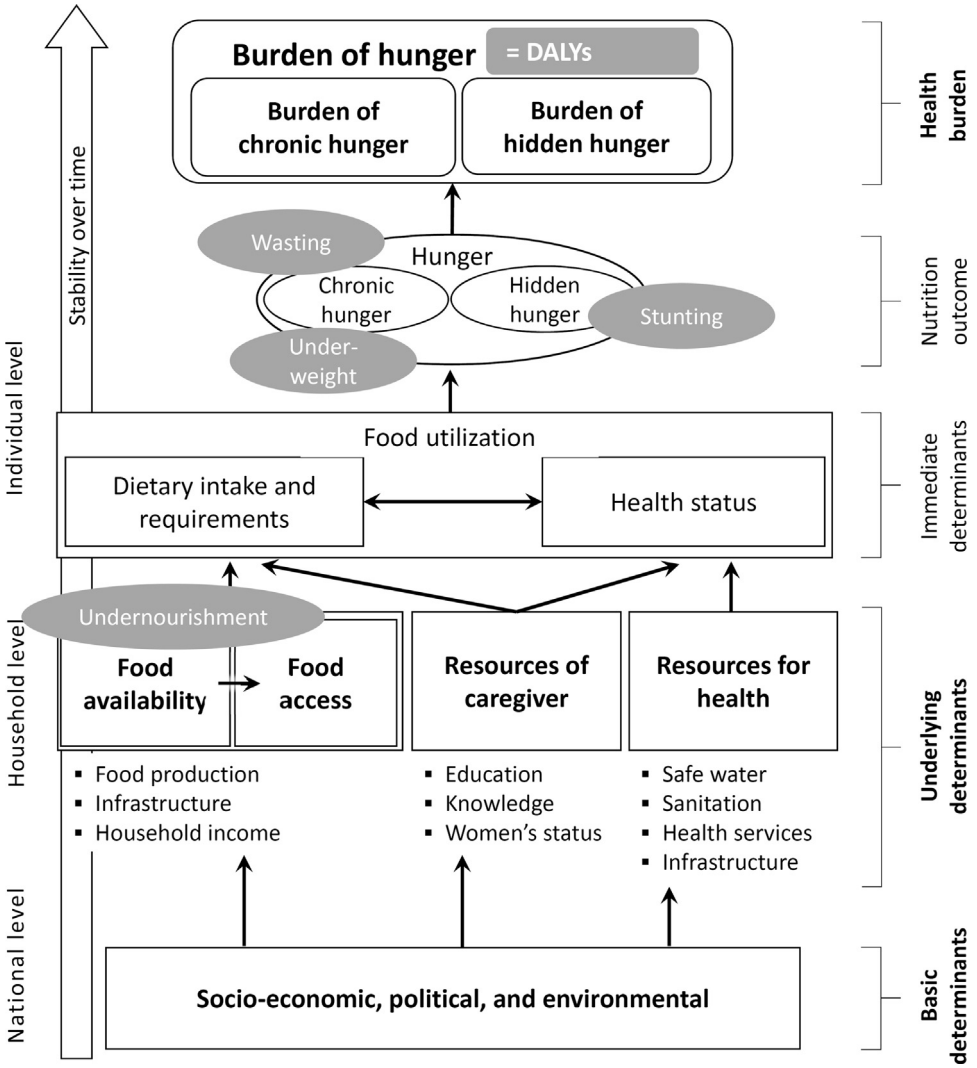

Fig. 1. Determinants of hunger including related proxy measures. The conceptual framework is based on (UNICEF, 1990), with the elements in grey showing which indicators are used in the literature to analyze hunger and measure food insecurity. DALYs, Disability-Adjusted Life Years.

level determinants are more effective in reducing the burden of chronic hunger than the burden of hidden hunger. This means that the burden of hidden hunger may persist even if appropriate policies at the national level were put in place everywhere. These results suggest that additional micro-level interventions are required to eradicate the burden of hunger in all its forms.

2. Conceptual framework

In analyses of hunger and food security, undernutrition is commonly explained using variants of UNICEF's conceptual framework for "causes of malnutrition and death" (Black et al., 2008; Engle et al., 1999; Smith and Haddad, 2015, 2002; UNICEF, 1990). We build on this framework with a few adjustments, as shown in Fig. 1. Using common terminology, a country's socio-economic, political, and environmental characteristics are referred to as "basic determinants", which are seen as indirect determinants of food insecurity at the national level. At the household level, food availability and access, as well as the caregivers' resources and the resources for health, represent the so-called "underlying determinants", which are influenced by the basic determinants and which, in turn, influence the "immediate determinants" one further level up.

Immediate determinants are individuals' dietary intakes and requirements as well as their health status that also influences food utilization. All these factors ultimately determine the nutrition status of individuals and the extent to which they suffer from adverse health outcomes due to chronic or hidden hunger. These adverse health outcomes measured in terms of DALYs are what we refer to as the burden of chronic and hidden hunger. When simply talking of the "burden of hunger", we refer to both the burden of chronic hunger and the burden of hidden hunger combined (Table 1).

The elements of this framework also reflect the widely accepted definition of food security, namely that "food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (FAO, 1996). This definition is generally understood to comprise three dimensions – "availability" of sufficient quantities of food of appropriate quality, "access" by households to adequate resources to acquire appropriate foods for a nutritious diet, and "utilization" of food by individuals through adequate diet, water, sanitation, and health care. The three dimensions are