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ORIGINAL ARTICLE

Shifting of undernutrition to overnutrition and its determinants among women of reproductive ages in the 36 low to medium income countries

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Summary
Objective: Objectives are to examine the shift away from undernutrition towards overnutrition for low to medium income countries (LMIC) and investigate the potential determinants of this shift using the nationally representative survey data.
Design and subjects: We analysed cross-sectional, representative samples of 540,290 women aged 20—49 years drawn from the Demographic and Health Surveys (DHS) at two time points in 36 LMIC. The ratio of overweight-to-underweight at earliest and latest survey was calculated for each country to illustrate the relative magnitude of the shifting of underweight to overweight. Potential determinants of underweight (BMI < 18.5) and overweight (BMI $\geq$ 25) were examined.
Results: In the latest DHS compared to the earliest DHS (mean duration 10 years), the prevalence of underweight significantly declined for one in two countries and the prevalence of overweight significantly increased for 80% of the listed countries. The annual increase of overweight was two folds higher than annual decline of underweight (6.4% vs. 3.3%). Although higher socio-demographic factors were associated with shifting of underweight towards overweight, over time, the risk of the highly educated, wealthy, and urban women being overweight was weakening.

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Conclusions: Findings of this study suggest that among women of child-bearing age there was a large shift away from undernutrition to overnutrition for most of the LMIC. Overtime, the contribution of higher education, wealth and urbanisation to being overweight was decreasing in the LMIC.

Introduction

The prevalence of underweight has declined considerably over the last decades for most of the low- to middle-income countries (LMIC) and many of these countries are experiencing sharply increasing prevalence of overweight and obesity more rapidly than previously thought [1,2]. Some of the countries like India, Bangladesh and Nepal [3—5] have been facing the dual problem of underweight and overweight. Although studies consistently found that the prevalence of overweight in the LMIC is increasing [6—8], the dynamics of underweight and overweight are relatively less known, especially for those countries facing nutritional disorders.

In 2005, Mendez et al. using nationally representative data for 36 countries reported that overweight exceeded underweight in women of reproductive age groups in well over half of the countries [6]. Since then many studies have been conducted in the LMIC focusing on the women of reproductive ages; some used data from a single country [3,9] and others used multiple countries [2,5,8,10]. Most of these studies focused on the epidemic of overweight and obesity and few focused on the double burden of under- and overweight [11]. Within- and cross-country trends of the prevalence of under- and overweight are relatively less studied.

Most of the studies investigated socioeconomic status (using education, household asset holdings or gross-national income) and urban—rural differences of overweight [5,8,10,12—15]. Studies have emphasised urbanisation as an underlying determinant of rising overweight in the LMIC [2,6,12,15]. Overweight and obesity are a particularly serious problem in women of higher socioeconomic status [2,6,8,10,15—17]; whereas low SES continues to be a strong determinant of underweight and wasting in most of the LMIC [16,17]. However, it is also evident that the burden of obesity generally shifts towards women of low socioeconomic status (living in both urban and rural areas) as the countries improve their level of economic development and urbanisation [18]. Less investigated are the common demographic factors like age, number of children ever born, marital status and other socioeconomic factors including wealth index, sanitation and sources of water supply which are important socio-demographic indicators of under- and overweight in LMICs.

The aims of this study are to (i) examine the shift away from undernutrition towards overnutrition for those countries that have Demographic and Health Surveys (DHS) data with measured height and weight at least for two surveys and (ii) investigate the potential determinants of this shift of women of child-bearing age for those LMIC using the nationally representative survey data.

Materials and methods

Data source

For this study we used secondary source data from the DHS. The DHS was administered by ICF International. The DHS is a data collection programme that has been running in LMIC since 1985. The surveys have been designed to be nationally representative and data on population, health, reproduction, and nutrition have been gathered in more than 300 surveys in over 90 countries to date. In this study we applied 72 surveys from 36 LMIC that occurred at the very first DHS (i.e. earliest) survey and the latest DHS survey in that country between 1991 and 2008. Height and weight of the women were collected in 54 DHS countries, but 18 countries collected measured height and weight only once, these were not included in this study. In the DHS, households were randomly selected based on probability sampling. From the household, women aged between 15 and 49 years were identified for a further in-depth interview. Country reports summarised findings of each survey, and can be found at DHS website [19].

Study population and sample size

The study population comprised of women who were not pregnant at the time of the interview who