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Human development, occupational structure and physical inactivity among 47 low and middle income countries

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ABSTRACT

This study aimed to (a) assess the relationship between a person's occupational category and their physical inactivity, and (b) analyze the association among country-level variables and physical inactivity. The World Health Survey (WHS) was administered in 2002–2003 among 47 low- and middle-income countries (n = 196,742). The International Physical Activity Questionnaire (IPAQ) was used to collect verbal reports of physical activity and convert responses into measures of physical inactivity. Economic development (GDP/c), degree of urbanization, and the Human Development Index (HDI) were used to measure country-level variables and physical inactivity. Multilevel logistic regression analysis was used to examine the association among country-level factors, individual occupational status, and physical inactivity. Overall, the worldwide prevalence of physical inactivity in 2002–2003 was 23.7%. Individuals working in the white-collar industry compared to agriculture were 84% more likely to be physically inactive (OR: 1.84, CI: 1.73–1.95). Among low- and middle-income countries increased HDI values were associated with decreased levels of physical inactivity (OR: 0.98, CI: 0.97–0.99). This study is one of the first to adjust for within-country differences, specifically occupation while analyzing physical inactivity. As countries experience economic development, changes are also seen in their occupational structure, which result in increased countrywide physical inactivity levels.

Introduction

The World Health Organization (2012a) identifies physical inactivity as the fourth leading risk factor for mortality throughout the world and estimates that physical inactivity has resulted in 3.2 million deaths globally (World Health Organization, 2012a). Individuals not participating in the recommended amount of physical activity have a higher risk of chronic diseases such as diabetes, obesity, and cardiovascular disease (World Health Organization, 2012a). The Physical Activity Transition is a theoretical model that suggests the prevalence of physical inactivity increases with the level of a country's economic and social development largely as a result of occupational changes from labor-intensive to sedentary service oriented professions (Katzmarzyk and Mason, 2009; Dumith et al., 2011; Khol et al., 2012).

Development is characterized by a shift from agrarian- to industrial-based economies, including changes in the occupational structure, levels of urbanization, and lower levels of work- and domestic-related physical activity (Katzmarzyk and Mason, 2009). Katzmarzyk and Mason (2009) argues that changes in daily routine, social climate, and nature of work in- and outside the home result in increased sedentary behaviors and a shift in disease patterns from communicable toward chronic diseases (Katzmarzyk and Mason, 2009). Besides changes in the economy and occupational structure, urbanization itself may lead to lower levels of physical activity. Guthold et al. (2008) assessed country-level physical activity results of 22 African countries, with results showing a linear relationship between a country's level of urbanization and physical inactivity levels, i.e., increasing urbanization led to decreasing physical activity. Research also suggests a change in the socioeconomic groupings, which tend to be physically active. Higher income groups may increase leisure-time physical activity in the face of work-related reductions (Finger et al., 2012). Lower-income groups may however confront reductions in physical activity since they often lack the financial resources to participate in leisure-time physical activity (Beenackers et al., 2012). Even so, lower income groups facing economic vulnerability still maintain higher total leisure and work/transport physical activity levels when compared to higher income groups (Beenackers et al., 2012). Knowledge of global patterns associated with the Physical Activity Transition may contribute to the development of policies and programs that will potentially buffer the potential impact of economic development and transition on more vulnerable socioeconomic groups, particularly with regard to shifts in the agricultural labor force into white collar jobs and the service industry.

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While recent research is conceptually rich, there are a number of gaps in current knowledge concerning between-country differences in the physical activity transition. These gaps are due to unavailable data and measurements. First, between-country studies often lack a global, standardized tool for measuring physical activity. Discrepancies in measuring physical activity reduce between-country comparability and result in potentially inconsistent findings. Second, no research as far as we are aware has adjusted for within-country compositional factors, particularly occupational structure, when it comes to examining the importance of development and urbanization for physical inactivity. Adjusting for within-country differences concerning the percentage of individuals in certain types of occupations or at certain levels of income is important for assessing precisely whether economic or social development characteristics are associated with physical inactivity.

Using data from the 2002–2003 World Health Survey (WHS), the following study examines the association of development and urbanization factors with physical inactivity. The WHS applied the International Physical Activity Questionnaire (IPAQ) in 47 middle- and low-income countries. Using the WHS data provides a significant improvement over previous research in several ways. The IPAQ has been tested in 12 developing and developed countries for reliability and validity (Craig et al., 2003). The IPAQ's reliability and validity is better documented in developed countries, but there has been research on its utility in measuring physical activity levels in developing countries. For example, Dumith et al. (2011) conducted a pooled analysis of three studies, which utilized the IPAQ in undeveloped, developing and developed countries, finding when countries had the prevalence of physical inactivity included twice or three times, the prevalence estimates were similar, indicating the IPAQ's reliability. The validity had more variability as Dumith et al. (2011) found that the varying physical activity levels may have been due to the varying validity of the IPAQ

Research objectives

Using data from the 2002–2003 WHS, this study has two objectives. First, the study assesses the relationship between a person's occupational category and their physical inactivity, hypothesizing that being employed in agriculture reduces the likelihood of physical inactivity, while being in white and blue-collar occupations increase the chances of physical inactivity. Secondly, the study examines the association among three country-level variables: urbanization, economic development, and human development and physical inactivity. To the best of our knowledge this will be the first study to analyze the relationship of these three factors while adjusting for occupation. Following previous literature, the hypothesis is that all country-level variables are positively associated with physical inactivity.

Methods

WHS study sample

Between 2002–2003, the WHO launched a large cross-sectional health surveillance information study in 70 low-, middle- and high-income countries (World Health Organization, 2012b). Each country selected based on their own health surveillance needs into certain health and behavioral modules, including risk factors, health systems and health services, and health care expenditures (World Health Organization, n.d.). The lifestyle module included questions pertaining to physical activity from the IPAQ, short form (World Health Organization, 2012a, 2012b). Fifty-one countries, mostly low and middle income, participated in modules containing the IPAQ questionnaire (n = 259,526) (World Health Organization, 2012a, 2012b). More information concerning the World Health Survey is available on the website (http://www.who.int/healthinfo/survey/en/).

Outcome: physical inactivity

The IPAQ short-form was used to assess the frequency (days) and duration (minutes/hours) of a person's activity over the preceding seven days, and group activity levels into vigorous-, moderate-, and low-intensity levels (IPAQ, 2005). The IPAQ asked participants whether they had engaged in the vigorous, moderate, or walking activities in the past 7 days and if so, how long (hours and minutes) (World Health Organization, 2002). Show cards were used to explain what types of activities were considered to be vigorous or moderate (IPAQ, 2005). Each type of activity was assigned a metabolic equivalent of task (MET) score: walking has a value of 3.3 METs; moderate activities are 4.0 METs; and vigorous activities are 8.0 METs (IPAQ, 2005). These values are then used to calculate a person's overall METs for a week. The IPAQ (2005) defines a person as physically inactive if they did not meet any of the following three criteria:

1. Three or more days of vigorous-intensity activity of at least 20 min per day (IPAQ, 2005).
2. Five or more days of moderate-intensity activity and/or walking of at least 30 min per day (IPAQ, 2005).
3. Five or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum total physical activity of at least 600 MET-minutes/week (IPAQ, 2005).

Country-level variables

Three country-level variables were analyzed: the human development index (HDI), economic development, and urbanization. HDI data was extracted from the 2002 United Nations Development Programme (UNDP) Human Development Report. HDI is an index composed of four country variables: life expectancy, adult literacy, combined primary, secondary and tertiary gross enrollment, and GDP per capita (UNDP, 2002). Economic development was defined as gross domestic product (GDP) per capita. Economic development data was extracted from the WHS 2002–2003. Urbanization consists of the percentage of a country's population who resided in urban areas.

Individual level variables

To account for within-country compositional characteristics, analyses were adjusted for educational attainment, household income, gender, age, and occupation and rural/urban residence. Educational attainment was categorized into five groups: less than primary schooling, primary schooling, secondary schooling, high school, and college education. Household income was split into income quintiles. Age category was based on groupings of 18–29, 30–39, 40–49, 50–59, and 60–69 years old adults. Adults over 69 were excluded from the analysis since the IPAQ—short form has only been tested for validity and reliability in adults between 18–69 years old. Employment status was binary, defined as either being employed or unemployed at the time of the survey. If participants reported being employed, they were asked to select their occupation from the following options: legislator, professional, technician, clerk, service sales worker, agriculture, craft trades, plant/machine worker, elementary worker, or armed forces. For analysis, these occupations were grouped into five categories: (1) white collar (legislator, professional, clerk, and technician), (2) blue collar (sales worker, craft trades, plant/machine worker, elementary worker, and armed forces), (3) agriculture, (4) homemaker and (5) other (unemployed). Agricultural occupation was used as the referent category.

Statistical analyses

Multilevel logistic regression allowed examination of country-level variables while adjusting for compositional differences between countries. This study designed five different models. For each model, each