Cross-country comparison of changes in health in U.S., England, Mexico, Taiwan, and Indonesia

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Short Abstract

Health status at older ages around the globe has changed due to changes in epidemiological environment, diet and nutrition, medical technology and public and individual health practices. However, the change is likely to vary across countries with different economic, epidemiological, and policy circumstances. Using 2 waves of nationally representative datasets from five countries with varying income levels, we examine changes in biological risk in U.S., England, Mexico, Taiwan and Indonesia. Biological risk factors include systolic and diastolic blood pressure, BMI, Total and HDL cholesterol, and glycated hemoglobin. Our analysis includes respondents age 50+ who participated in physical examination and blood collection.

We find that patterns of age-specific onset of high-risk levels of biological risk vary across countries. No single country has the highest or lowest onset levels for all biological risk factors. A relatively low-income country, Indonesia, has the highest onset rates for high blood pressure, though its rate of onset of overweight is the lowest; while the high-income countries such as U.S. and England had higher onset rates of overweight than other countries, their onset rates of high blood pressure tend to be lower. The U.S. had fairly high levels of onset of high HbA1c; while England had relatively high levels of increase in high cholesterol. Our findings indicate different levels of onset of biological risk across countries with different income.

Introduction

World-wide medical and economic advances over the last century have changed living circumstances in most countries of the world so that many more people are able to avoid and control infections, consume sufficient food which reduces malnutrition and even results in overnutrition, and work in occupations that require less physical exertion. However, these changes are heavily mediated by environmental and cultural circumstances, and socioeconomic (SES) gaps and behavioral differentials remain across and within countries. Societies that experience overall economic development and increased social investment towards public health including enhanced health technology tend to show better health status. We hypothesize that there will be a higher rate of age-specific onset of biological risk among low-income countries, countries with higher income inequality or with lower health expenditures.

We examine changes in countries with differing income levels by looking at changes in biological risk in a set of countries with a range in life expectancy from a high of 79.4 in the United Kingdom to a low of 70.7 in Indonesia (in 2009, United Nations). While life expectancy change is well-documented, we know little about how change in underlying health or physiological status, or how the process of aging differs in these countries, and how it has changed in recent years.

Methods

Data and the Samples

We are using two waves of nationally representative datasets from five countries that have varying levels of income and development: the Health and Retirement Study (HRS) (2006, 2010) for the US, English Longitudinal Study of Ageing (ELSA) (2004, 2008) for England, Social Environment and Biomarkers of Aging Study (SEBAS) (2000, 2006) for Taiwan, the Mexican Family Life Survey (MxFLS) (2002, 2006, 2009) for Mexico, and Indonesia Family Life Survey (IFLS) (2000, 2007-8) for Indonesia. The Health and Retirement Study (HRS) is a nationally representative survey of community-dwelling individuals age 50+ in the United States. The survey has been conducted biannually since 1992 and collects detailed information about health, social, economic, psychological and family circumstances. The survey includes an oversample of African-American and Hispanic respondents and currently interviews over 22,000 individuals. In 2006, a random subsample of half of the HRS households were selected to complete an enhanced face to face interview (N=8,392 respondents). This interview included measures of physical performance and collection of data to produce information on a number of biomarkers; the first follow-up of the biomarker data for the 2006 sample was done in 2010 and will be publicly available shortly (we have an early data file). In 2008, physical performance measures and biomarkers were collected from the other half of the sample.

The English Longitudinal Study of Ageing (ELSA) is a longitudinal panel study of community-dwelling individuals over age 50 in England. The original sample was drawn from the Health Survey for England and is a nationally representative sample. Surveys conducted in 2004 and 2008 included a nurse visit and contain detailed physical

performance measures as well as biomarkers. The sample of 9,171 ages 50 and over from the initial data (2004) is used for this study.

The Social Environment and Biomarkers of Aging Study (SEBAS) in Taiwan is an extension of the Survey of Health and Living Status of the Near Elderly and Elderly in Taiwan, a nationally representative sample of older adults in Taiwan. SEBAS added the collection of biomarkers and a physical examination for each respondent. The SEBAS subsample includes 1,023 adults age 54+ in 2000 who both completed the full interview and participated in the physical examination and collection of biomarkers. The follow-up of the first wave participants was made in 2006 and this second wave has been released recently.

The Mexican Family Life Survey (MxFLS) is a multistage stratified probability sample of adults age 15+ in Mexico beginning in 2002 with follow-ups in 2006 and 2009. The sample is nationally representative and contains approximately 8,440 households and 35,000 individuals, and collects detailed health, socioeconomic, and demographic indicators as well as physical measures and biomarkers. We use the sample of 5,858 in 2002 who are ages 50 and over, and its 2006 follow-up.

The Indonesian Family Life Study (IFLS) is a longitudinal survey of over 10,000 households and nearly 40,000 individuals ages 15+ from 13 of Indonesia's 27 provinces. The survey is representative of 83% of the Indonesian national population. Collected in 1993/1994, 1997/1998, 2000, and 2007/2008, this survey contains self-reported measures of general health status, symptoms, pain, doctor diagnosed chronic conditions, time spent on different physical activities, and biomarker measurements. The 2000 survey sample is 7,126, and 2007-8 sample is 6,576.

Many of these surveys have been harmonized in terms of sample selection and question development making them suitable for cross-country comparison. Our analysis includes respondents who are 50 and over who participated in physical examination and blood collection.

Measures

We examine onset of biological risk in U.S., England, Mexico, Taiwan and Indonesia using a variety of biological risk factors. Biological risk factors include systolic and diastolic blood pressure, BMI, Total and HDL cholesterol, and glycated hemoglobin. Not all measures are available in all countries. High risk is defined as follows: high blood pressure is defined as having systolic blood pressure >= 140 mmHg or diastolic blood pressure >=90 mmHg; overweight is defined as having BMI >=25; total cholesterol >=240 mg/dL is high total cholesterol; less than 40 mg/dL is low HDL; and HbA1c >= 6.4% is high HbA1c.

Analysis

We examine the age-specific onset of levels defined as clinically relevant biological risk in the five countries. We examine age patterns of the onset of risk at time 2 among those who were not at risk at time 1 within samples of individuals for countries and across countries using a pooled data set. Differential exposure between two waves will be included in hazard models: two countries have 4 year intervals between two surveys and one country has a 2 year interval between waves, while Taiwan and

Indonesia have a longer time period (6 years for Taiwan and 7-8 years for Indonesia). All hazard models will be run separately by gender.

Results

We find that patterns of age-specific onset of high-risk levels of biological risk vary across countries. No single country has the highest or lowest onset levels for all biological risks across age groups. A relatively low-income country, Indonesia, has the highest onset rates for blood pressure (56.22% for ages 80+). This is more than double the rate of Mexicans aged 80 and over (20.8%). On the other hand, England and Mexico show lower onset rates across age groups. Americans at ages 50-59 had the highest onset rate of overweight (31.3%), Mexicans of the same ages followed (25.03%). While Indonesia showed the highest onset rate for high blood pressure, its rate of onset of overweight is the lowest, almost nonexistent at the oldest ages. While the U.S. and England showed higher rates of overweight onset across age groups, Taiwan and Mexico showed relatively lower rate across ages. Mexicans aged 50-59 were the exception.

While the high-income countries such as U.S. and England had higher rates of overweight onset than other countries, their onset rates for blood pressure tended to be lower. While onset rates of high cholesterol increased at older ages (7.1% for ages 50-59 vs. 16.97% for ages 80+), the rate dropped to about half for the U.S. and England. A higher rate of onset of low HDL was found for Taiwanese aged 60-79; but the lowest risk of low HDL rate onset was in England. The U.S. had an average level of onset of low HDL. The onset rate of high HbA1c was fairly high in U.S. for all ages, and in Taiwan for ages 50-69. Our initial findings indicate that there are differences across countries in the onset of biological risk, and that the age pattern also varies across countries.

Discussion

While onset of biological risk varies by country and type of biological risk, it seems that high weight is a greater problem in high-income, Western countries, while blood pressure and cholesterol are a greater problem in middle- and low-income countries. Diet habits such a heavy consumption of fats and sugar products in industrialized Western countries may affect the increase in overweight and obesity in middle and older ages. On the other hand, even though they have a higher rate of overweight onset, the onset rates of high blood pressure and high cholesterol are lower among these countries, which may be related to the widespread use of antihypertensive and cholesterol medications.

Table 1. Onset (% of those at risk) of High Risk Biomarkers in U.S., England, Taiwan, Mexico and Indonesia

	Taiwan	England	U.S.	Mexico	Indonesia
High Blood Pressure					
50-59	28.55	12.37	20.9	19.83	35.63
60-69	36.44	22.27	23.09	25.72	45.95
70-79	46.43	26.48	29.32	30.56	49.56
80+	41.85	30.64	37.84	20.8	56.22
Overweight					
50-59	13.35	16.64	31.3	25.03	7.52
60-69	16.59	20.29	24.9	11.11	5.7
70-79	10.82	22.05	18.17	12.66	2.36
80+	15.06	16.85	21.37	11.95	0.47
High Cholesterol					
50-59	7.1	15.39	9.89		
60-69	7.87	13.34	8.05		
70-79	6.8	8.04	6.22		
80+	16.97	6.68	4.26		
Low HDL					
50-59	9.85	4.55	8.11		
60-69	17.29	4.55	6.32		
70-79	17.04	5.63	8.78		
80+	8.67	4.17	7.7		
High HbA1C					
50-59	17.27	4.23	13.51		
60-69	18.27	5.9	16.34		
70-79	9.49	9.06	12.86		
80+	2.54	7.63	13.55		