Relation of birth month and elderly health status

in Latin American and Caribbean countries

Mary McEniry, Alberto Palloni, University of Wisconsin
Ana Luisa Dávila, Alberto García Gurucharri, Univerity of Puerto Rico

In theory month of birth is an instrument that can help assess the effects of early growth on adult health independent of life course factors. This is true because in decades past there were important seasonal differences in nutrition and disease environment early in life. Food supply (quantity, variety, and freshness of cereals, fruits, vegetables and animal protein) varied according to season. Thus differences in access to high quality food supply could potentially influence intrauterine growth depending on the month of gestation. Infectious diseases which impact the mother and fetus alike also tend to occur seasonally, in part because of the interaction between climate and the vectors of disease that could enhance exposure but also because of the interaction between nutritional status and immune function that could impair resistance of the adult mother and her fetus. Thus, month of birth is a potential indicator for changes in early intrauterine environment.

When Doblhammer (2004) examined data from Denmark, Austria and the U.S. she found that mean age at death followed a seasonal pattern and individuals in the Northern Hemisphere who were born in October-December lived longer than individuals who were born in the spring (April-June). Results were the opposite (as expected) in the Southern Hemisphere. She also tested several hypotheses to examine the possibility that birth of month was associated with life factors. Her findings suggest that birth of month is a strong reflection of early life environment independent of life factors.

If month of birth is an indicator of early childhood nutritional status and if, as suggested by the Barker conjecture, early childhood nutritional status is an important predictor of adult health status, then we should expect a relation between month of birth and adult morbidity and mortality in developing world settings. To test this supposition, we use data from three recent studies of aging in Latin America and the Caribbean (LAC). The Mexican Health and Aging Study (***MHAS***) is a nationally representative, prospective panel study of Mexicans aged 50 and over as of 2000 with approximately 15,000 respondents. For 20% of these respondents, anthropometric measures were obtained although the larger sample has self-reported height and weight in addition to extensive data about retrospective childhood conditions. The Puerto Rican Elderly: Health Conditions (***PREHCO***) project is a cross-sectional survey of the non-institutionalized population age 60 and over and their surviving spouses who were residents of the island as of June 1st, 2000. A total of 4,293 in-home face-to-face target interviews were conducted between May 2002 and May 2003 and second wave data will be available for the project in approximately 2006. ***SABE*** (n=10,902) collected comprehensive data on representative samples of populations aged 60 from seven major cities (six of them capital cities) of the LAC region: Buenos Aires (Argentina), Bridgetown (Barbados), San Paulo (Brazil), Santiago (Chile), Havana (Cuba), Mexico City (Mexico) and Montevideo (Uruguay). All seven surveys were strictly comparable though translated to three different languages (Spanish, Portuguese and English).

We first estimate the effects of month of birth on mortality in Mexico from MHAS where we have approximately 526 respondents over the age of 50 (450 over the age of 60) who died between 2001 and 2003. We develop non-linear regression models to predict mortality as a function of month of birth and controlling for gender and age.

Although PREHCO and SABE do not provide information on mortality, we can use available anthropometric measures to estimate expected mortality risks using the so-called Waaler-type surfaces. These surfaces emanate from the work of Waaler (1984) and Fogel (2004). We take two approaches to estimate expected mortality risk. **First**, assuming that Norwegian mortality risks associated with height-weight combinations apply to LAC and assuming that Norwegians in general were, most likely, exposed to better living conditions than individuals in our sample of LAC elderly, Waaler-type surfaces identify lower bounds for the risks associated with height-weight combinations of Latin America and Caribbean elderly (i.e. less risk than might actually be the case). Thus, we can approximately assess mortality risks. Using Waaler's original data we estimate Waaler-type surfaces for (the log of) relative mortality risks as quadratic functions of height (cm) and weight (kg). We use these quadratic functions to estimate relative mortality risk for PREHCO and SABE respondents given their height and weight. We then use these estimates of expected relative mortality risks to obtain the effects of month of birth for PREHCO and SABE using non-linear methods controlling for sex and age.

A **second** approach is to develop a Waaler-type surface using MHAS data and to then impute mortality risk for SABE and PREHCO. Although we have height and weight data from only 20% of the MHAS sample, we do have self-reported height and weight for all respondents which we can use to construct a MHAS Waaler-type surface. Using procedures developed elsewhere (Palloni et al., 2004) we adjust self-reports of height and weight and then construct an MHAS-based Waaler-type surface in a similar fashion as we did with Waaler Norwegian data. Namely, we use MHAS data (adjusted self-reported height and weight) to estimate (the log of) relative mortality risks as quadratic functions of height (cm) and weight (kg).

To examine month of birth effects on morbidity outcomes we develop non-linear regression models for self-reported health, chronic conditions (diabetes, obesity, heart disease) and ADLs/IADLs controlling for sex and age.

We discuss our results and their implications in the larger context of Doblhammer's research in the developed world making reference to Denmark, Austria, Hawaii, and U.S. data. While we expect to find similarities with results obtained in the developed world, we also expect to find differences in patterns and their magnitude reflecting LAC realities.