Do chronic disease biomarkers predict mortality in less developed countries with a high infectious disease burden? Evidence from the Malawi Longitudinal Study of Families and Health

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Abstract

Large-scale demographic surveys have recently begun incorporating biological measures, providing valuable information on health and mortality. However, these biodemographic studies have been limited in less developed regions like sub-Saharan Africa.

In this study, we examine the relationship between biomarkers of cardiovascular disease, metabolic function, immune function and renal function and subsequent mortality in a population of adults in rural Malawi. We use data from the Malawi Longitudinal Study of Families and Health (MLSFH), a representative survey of adults in rural Malawi. The MLSFH collected biomarker information on approximately 900 participants in 2009; mortality follow-up is ongoing.

This study will provide insight into the ability of biomarkers to predict mortality in an understudied population with a high burden of infectious disease, and relatively short life expectancy.

Extended Abstract

Large-scale demographic surveys have recently begun incorporating biological measures, providing valuable information on health and mortality. These new studies of biodemography have been mostly conducted in the developed world (e.g. the Health and Retirement Study in the United States, the English Longitudinal Study of Aging in the United Kingdom, and the Social Environment and Biomarkers of Aging Study in Taiwan). Population-level biomarkers in less developed countries have been studied less extensively, although there are some notable exceptions such as the Indonesian Family Life Study and the Tsimane Health and Life History Project, which studies an indigenous hunter-gatherer society in remote Bolivia.

Studies of biomarkers in sub-Saharan Africa, including the Demographic and Health Surveys, have tended to focus on infectious diseases like HIV and malaria. Less attention has been paid to biomarkers relevant to chronic diseases like cardiovascular disease and diabetes (Dalal et al. 2011). This gap in the evidence is worrying because chronic diseases are growing in prevalence in sub-Saharan Africa, and this trend is expected to continue (Holmes et al. 2010). Further, this

population has high prevalence of both infectious and chronic diseases, and the impact of comorbidities is unknown but potentially large (Young et al. 2009).

The Malawi Longitudinal Study of Families and Health (MLSFH) has collected health and demographic information on an adult population in rural Malawi every 2-3 years since 1998. In 2009, the MLSFH began collecting blood samples from respondents to measure the following biomarkers: cholesterol (total, LDL, HDL and triglycerides) as measures of cardiovascular function; C-reactive protein as a measure of immune function; circulating blood glucose and glycosylated hemoglobin (HbA1c) as measures of metabolic function; and albumin, uric acid, total protein, urea/blood urea nitrogen, and creatinine as measures of renal function. Biomarkers were collected on a total sample size of 906 individuals in 2009. Since biomarker collection in 2009, two further waves of data (2010 and 2012) have been collected. Further details of the MLSFH biomarker collection can be found in (I. V. Kohler et al. 2012), and background on the cohort overall can be found in (H.-P. Kohler et al. 2014).

Analysis of the MLSFH biomarker data has been limited thus far. One study introduced the methods and descriptive statistics of the sample (I. V. Kohler et al. 2012), while a follow-up examined the association between biomarkers and socioeconomic status, finding only modest evidence of a relationship (I. V. Kohler et al. 2013).

In this study, we plan to answer the following research questions related to biomarkers and subsequent mortality.

1) Are biomarkers collected in 2009 associated with subsequent mortality (follow-up through 2017)?
2) If so, which one(s) have the strongest relationship?
3) Does the predictive value of biomarkers for mortality depend on HIV status?
4) How do these results in Malawi compare to studies that have examined biomarkers as predictors of mortality in other populations?

This study will provide important insight into the relationship between common biomarkers and mortality in a unique population that has thus far been understudied in biodemography.

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