Economics Letters 149 (2016) 90–93

Contents lists available at ScienceDirect

Economics Letters

journal homepage: www.elsevier.com/locate/ecolet

The impact of HIV testing on subjective mortality and investments in children: Experimental evidence From Malawi

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HIGHLIGHTS

- Evaluate impact of learning one's HIV-negative status using a randomized experiment.
- Wife's mortality risk and fertility decrease when her husband learns his status.
- Results highlight the importance of considering both a husband and wife's HIV status

ARTICLE INFO

Article history:
Received 13 June 2016
Received in revised form
10 October 2016
Accepted 13 October 2016
Available online 24 October 2016

JEL classification:
J12
D83
C93

Keywords:
HIV
Malawi
Mortality
Fertility
Beliefs

ABSTRACT

We investigate the causal effect of HIV testing on subjective mortality and investment in children using experimental data from Malawi. When a wife's husband learns his negative HIV status, we see an upward revision in a woman's subjective mortality risk and less household investment in children. There is no statistically significant effect of the woman learning her HIV negative status.

1. Introduction

HIV testing has been limited in Malawi until recently, despite a high HIV rate of 10.6% as of 2010 (Measure, 2010). HIV testing can resolve uncertainty about one's HIV status and potentially lead to changes in mortality beliefs and behavior (Durevall and Lindskog, 2011). For a married woman, her perception of her husband's HIV status is also an important input to her decision-making. Women are more biologically susceptible to HIV (Dunkle et al., 2008) and are more at risk from infection by their spouse than men, who often bring HIV into the marriage through extramarital affairs (Carpenter et al., 1999; Hugonnet and Mosha, 2002).

We extend the literature by exploiting experimental variation in the 2004 wave of the Malawi Longitudinal Study of Families and Health (MSFLH) to separately identify the causal effects of a woman and her husband learning their HIV negative status on the wife's subjective mortality and household investments in children two years after testing.

We find an upward revision of a woman's subjective mortality risk two years after her husband learns his HIV status. We also find a decrease in fertility in the two year period post-testing. When a woman learns her HIV negative status, we do not find a statistically significant effect on subjective mortality risk or fertility.

2. Data

We use the 2004 and 2006 waves of the MLSFH, which follows ever-married women and their spouses in three rural sites in Malawi: Rumphi (in the northern region), Mchinji (in the central

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http://dx.doi.org/10.1016/j.econlet.2016.10.017
0165-1765/

region) and Balaka (in the southern region). Individuals were offered HIV testing and counseling in the 2004 wave. We limit our sample to couples in the 2004 wave who were currently married, of child-bearing age (wife's age less than 43), accepted the HIV test in 2004, and were present in the 2006 survey wave where we measure the outcomes of interest. Our sample is limited to couples in which both individuals are HIV negative due to the small number of HIV positive individuals.

Summary statistics are presented in Appendix Table A.1 (see Appendix A). The first set of outcomes we consider are measures of a woman's self-reported subjective mortality risk. Respondents in the 2006 survey wave were asked their mortality risk over one, five, and ten-year horizons. The survey used a bean counting method as a representation of probability (Delavande and Kohler, 2012), where individuals chose the number of beans on a scale of zero to ten. We multiply this by ten in the analysis to ease interpretation. On average, women report a 19% likelihood of dying in the next year, 38% likelihood of dying in the next five years, and 58% likelihood of dying in the next ten years.

For our first fertility measure, we create an indicator for whether a woman is pregnant at the time of the 2006 survey. As an alternative measure, we count the number of births between the 2004 and 2006 surveys. Fertility is high in our sample: twelve percent of the respondents are pregnant at the time of the 2006 survey, and women had an average of 0.48 births in the two years between the 2004 and 2006 surveys. Finally, yearly household expenditures on children's schooling, with an average of 435 Kwacha, are used as an additional outcome variable to measure investments in quality of children.

3. Identification strategy

We estimate the impacts of a woman and her husband learning their HIV negative status in 2004 on the wife's outcomes in 2006 using the following estimating equation:

$$Outcome_i = \beta_0 + \beta_1 Wife\_result_i + \beta_2 Husband\_result_i + X_i'\mu + \varepsilon_i \quad (1)$$

Wife_result and *Husband_result* are equal to one if the woman or her husband received her or his result, respectively. A vector of controls, $\boldsymbol{X}$, is included; for each spouse, we include age, age-squared, and indicators for some primary and some secondary school completion. At the household level, we include region fixed effects and the number of children in the household in 2004. The outcomes of interest are the woman's subjective mortality risk, actual fertility, and expenditures on children's schooling. When evaluating the effect of a husband learning his HIV negative status on his wife's subjective mortality risk, one factor to consider is whether test results were shared between spouses: 78% of wives reported that their spouse shared his results.[1]

Identification of β_1 and β_2 requires an instrumental variable approach, as detailed in Thornton (2008). Thornton randomized the location of the nearest Voluntary Counseling and Testing (VCT) center and offered a randomized financial incentive ranging from zero to three dollars to individuals for returning to a VCT center to obtain their results.[2] For both spouses, we include as instruments an indicator for receiving any incentive (*WifeAny* and *HusbandAny*) and the value (*WifeIncentive* and *HusbandIncentive)* and the value-squared of the incentive ($WifeIncentive^2$ and $HusbandIncentive^2$). We also include the total-squared household incentive ($Total^2$) and the distance ($Dist$) and distance-squared ($Dist^2$) to the nearest VCT center. Eq. (2) is estimated separately for the endogenous variables *Wife_result* and *Husband_result*:

$$\begin{aligned} Result_i = {} & \alpha_0 + \alpha_1 WifeAny_i + \alpha_2 WifeIncentive_i \\ & + \alpha_3 WifeIncentive_i^2 + \alpha_4 HusbandAny_i \\ & + \alpha_5 HusbandIncetive_i + \alpha_6 HusbandIncentive_i^2 \\ & + \alpha_7 Total_i^2 + \alpha_8 Dist_i + \alpha_9 Dist_i^2 + X_i'\gamma + \varepsilon_i. \end{aligned} \quad (2)$$

Results from the first stage are shown in Table 1, which shows that the instruments predict the two endogenous variables well. The first stage passes the Limited Information Maximum Likelihood (LIML) Weak Instrument Test, and the F statistics are close to or above 10 (Stock and Yogo, 2005). The identifying assumption is that the incentives do not affect the outcomes of interest except through their effect on the probability of receiving results.

Our instruments do not predict any of our covariates (see Appendix Table A.2, Appendix A), evidence that the randomization of incentives worked in our sample. To address threats to internal validity, Appendix Table A.3 shows that our instruments do not predict attrition from the sample (see Appendix A).

Because we consider six separate outcome variables, there is the concern that our tests for statistical significance of the estimated coefficients are not factoring in that we are testing multiple hypotheses. To address multiple testing, we present adjusted p-values from the Romano and Wolf (2005) step down procedure for results in Tables 2 and 3.

4. Results

The effects of each spouse learning his or her HIV negative status on the wife's subjective mortality are presented in Table 2. Relative to an HIV negative woman who does not learn her HIV negative status, a woman who learns her HIV negative status reduces her subjective mortality risk by 5.1 percentage points over a one-year horizon (Column 1), 10.7 percentage points over a five-year horizon (Column 2), and 11.8 percentage points over a ten-year horizon (Column 3). These coefficients are not statistically significant.

We observe a different pattern for the effect of a husband learning his HIV negative status on his wife's mortality risk. A woman whose husband learns his HIV negative status reports an increased mortality risk of 10.1 percentage points over a one-year horizon (Column 1), which is statistically significant. There are no significant effects over the longer time horizons (Columns 2 and 3). A potential concern with the estimated coefficients is that the two receiving results variables are highly correlated. In fact, this is not the case as we show in Table A.4.

We next turn to our fertility and children's school expenditure results, which are presented Table 3. The point estimates for effect of the wife learning her HIV negative status are positive but insignificant on the likelihood of being pregnant during the 2006 survey (Column 1), the number of births over the two-year period between surveys (Column 2) and schooling expenditures (Column 3). We observe a large significant effect on the husband learning his HIV negative status on his wife's birth outcomes. In particular, women have 0.39 fewer births when the husband learns his HIV negative status. Point estimates are negative but insignificant for the likelihood of being pregnant (Column 1) and schooling expenditures (Column 3).

[1] On the other hand, there is very little incentive to report one's HIV status if an individual is HIV positive, which likely leads to skepticism of a self-reported HIV negative status. We are more conservatively identifying the effect of the husband learning his own HIV status on his wife's beliefs. The wife may be responding to observed behavioral changes in her husband after testing rather than learning the status of her spouse directly.

[2] The VCT centers were actually tents, and meant to be temporary in nature.