Second Pre-Analysis Plan for “The Impacts of Female Education: Evidence from Malawian Secondary Schools”

Dec, 2019

**Section 1: Introduction**

This pre-analysis plan describes the hypothesis and specifications that will be used to understand the impact of female education in the context of secondary schools in Malawi. This project aims to produce two papers: the first paper will look at impacts of an education intervention on political preferences and participation. The second paper will study the impact of the education intervention on health knowledge and investment behaviors. This plan was written while the fourth follow-up data was collected, but before any data was analyzed. The organization of the plan is as follows: In section 2 we describe the study, the sample selection and the data that was and will be collected for this project. In Sections 3 and 4 we describe the hypotheses to be tested for this study and the specifications that will be performed during data analysis.

**Section 2: Overview of the study**

2.1 Motivation

Education is considered one of the most important determinants of human capital development and it is widely agreed that improved education is correlated with increased wages later in life at the micro-level (Blau and Kahn 2005) and may lead to more economic growth of a country at the macro-level (Hanushek and Woessmann 2012). However, there is a lot less evidence on the specific underlying mechanisms to connect educational interventions to test scores and later adulthood outcomes.

This project evaluates the Girls Education Support Program (GESP) for 9th – 11th graders implemented by the Africa Future Foundation in four catchment districts of rural Lilongwe. These four districts are Chimutu, Chitukula, Tsabango, and Kalumba. For the school year 2012-3, all girls in the treatment classroom received tone-year tuition support and monthly cash stipends. School tuition and fees per semester on average were 3,400 Malawi Kwacha and were directly deposited to each school’s accounts, and monthly payments of 300 Kwacha were distributed to treated students. The overall amount of support was around $70/year. Given the limited resources of the Africa Future Foundation, that could not cover scholarships for all girls, the evaluation used randomly selected classrooms within grades from a sample of schools and compared the outcomes with girls that were not selected to receive scholarships.

2.2. Sample Selection

The evaluation sample is based on 3,997 female students. About half the female students (2,102) were selected into the girls’ education support program (treatment group), and the others (1,895) were in the control group. The original sample of students comes from a 124 classrooms in 33 public secondary schools in Malawi. For the current study we have selected the 2,811 students who were in grade 9 and 10 in 2011 (since those in grade 11 are harder to track). These students come from 83 classrooms grade-school in 33 schools.

2.2.1 Catchment district selection

We selected the four catchment districts (Chimutu, Chitukula, Tsabango, and Kalumba) because they are the catchment area of the Daeyang Luke Hospital in Lilongwe, Malawi, which was the partner hospital of the Africa Future Foundation for this project.

2.2.2 School Selection

We invited all the 33 public schools in these districts to participate in the girls’ education programs, but we excluded the private boarding schools located in the catchment area.

2.2.3 Assignment to Treatment

Based on a survey of all 33 schools, we identified 124 classrooms. Assignment of the treatment to classrooms was done randomly in the project office by a computer random number generator.

2.3 Sources of data

The primary data sources are a baseline survey conducted in October, 2011 to May, 2012, a short term follow-up survey implemented in January to June 2013, and the main long term follow-up survey that has started in October 2015 and is scheduled to be finished in August, 2016.

2.3.1 Baseline survey

The baseline survey was implemented between October, 2011 and May, 2012. 7971 secondary students (3,997 girls and 3,974 boys) participated to our baseline survey. 74.4% of total 10,715 students in the school roll-call lists completed the baseline survey. In Appendix Table 1, we show that the randomization was generally successful since there are very few statistically significant differences between the treatment and control groups, for both the full sample as well as the target sample for this evaluation (girls in form 9 and 10). The baseline survey is separately attached.

2.3.1 First follow-up survey

The short-term follow-up survey will not be used in the analysis, except for understanding the impact of the intervention on a range of educational outcomes in order to understand the education impact of the Girls Education Support Program (GESP). The follow-up survey is separately attached.

2.3.2 Second follow-up survey

The second follow-up survey started in October of 2015 and will be completed by August of 2016. The second follow-up survey questionnaire is separately attached.

2.3.3 Third follow-up survey

The third follow-up survey started in Aug of 2017 and was completed by December of 2017. The third follow-up survey questionnaire is separately attached.

2.3.4 Fourth follow-up survey

The fourth follow-up survey started in September of 2019 and will be completed by December of 2019. The fourth follow-up survey questionnaire is separately attached.

**Section 3: Hypothesis**

Our long-term follow-up surveys have collected a large number of outcome variables in order to understand how the experimentally induced changes in educational achievement affect 1) measures of political preferences and participation, and 2) health knowledge and investment behaviors.

**Section 3.1: Impacts of education on Political preference and participation**

The Girls Education Support Program (GESP) may have a causal effect on political preference and participation. Below we describe the hypothesis to be tested:

**Hypothesis 3.1.1:** GESP could change average level of political preference and participation.

We use indices (standardized effect) of each domain of political preference and participation

1.) Political participation (measured in the second follow-up survey) is a standardized average treatment effect on 1) signing a petition, 2) joining in boycotts, 3) joining in peaceful demonstration, 4) joining strikes, and 5) other acts of protest.

In the fourth follow-up survey, we specifically ask study participants whether they attended or might attend the recent nation-wide protest against election fraud.

2.) Attitudes towards capitalism that consist of six questions: income inequality, state-owned business, government intervention on social safety, competition, etc.

3.) Views on political systems, democracy, and elections. In the second follow-up survey, we asked the following four questions about respondents’ opinion of the political system: the importance of 1) a strong leader, 2) rule by non-government expert, 3) army rule, and 4) having a democratic political system. These four questions will be summarized through an index. We additionally asked two questions on perception: “How important is it for you to live in a country that is governed democratically?” and “How democratically is this country being governed today?”

**Causal chain of process and mechanisms**

**Hypothesis 3.2.1:** The impacts of GESP will be greater on outcomes if the educational intervention had a larger impact on educational attainment.

**Section 3.2: Impacts of Education on health knowledge and investment behaviors**

**Hypothesis 3.2.1:** GESP may affect health knowledge in the long run.

We ask 12 questions on cause, symptoms, and prevention of malaria infection. We use indices (standardized effect) of each domain as well as overall score.

**Hypothesis 3.2.2:** GESP may affect health investment behaviors in the long run

We provide an opportunity for randomly selected 50% study participants to pick up a free multi vitamin (which has a monetary value of about $10) in a designated shop in the city center to measure health investment behavior.

**Causal chain of process and mechanisms**

**Hypothesis 3.2.1:** The impacts of GESP will be greater on outcomes if the educational intervention had a larger impact on educational attainment.

**Section 4: Estimation:**

4.1. Estimation of treatment effects

Our main analysis will focus on the reduced-form estimation of GESP impacts on outcomes. We will be estimating the following simple model using ordinary least squares:

1. Yicg = β0 +β1EScg +β2Xicg +δg +εicg

The variable Yic is one of our outcomes discussed previously for student *i* in classroom *c* at grade *g*. The variable EScg is an indicator for whether classroom *c* at grade *g* was assigned for education support program. The coefficient β1 captures the intent-to-treat effect of being selected to a treatment classroom among girls in our experimental sample. Xicg is a vector that includes the following socio-demographic controls, measured at baseline: age, orphan status, father’s education, mother’s education, father’s job, mother’s job, household assets, and school type.

All specification will also include grade and/or school fixed effects, δg since the randomization was implemented at the classroom level within grade. Standard errors will be clustered at the classroom level. In some specifications we will also control for the effect of two interventions (HIV/AIDS education and circumcision for boys) and their interactions, since the broader project consists of GESP for girls and male circumcision for boys.

4.2. Estimation of heterogeneous treatment effects: heterogeneous treatment effects will be estimated by an equation that interacts treatment status as well as all the control variables with the variable of interest.

4.3 Dealing with testing for multiple outcomes for standardized treatment effects and adjustments for multiple inference.

In order to account for multiple hypotheses testing, we follow the preanalysis plan provided by Finkelstein et al. (2010). A first approach used in Finkelstein et al. (2010) is to group outcome measure into domains. For our analysis of the first paper project, the three domains are 1) political participation, 2) attitude toward capitalism, and 3) Views on political systems, democracy, and elections. For our analysis of the second paper project, the two domains are 1) health knowledge (on Malaria), and 2) health investment behaviors. Next, we sign the outcomes in each domain, and take a standardized treatment effect in that domain, as suggested in Kling, Liebman, and Katz (2007).

4.4. Survey attrition

Specifically, we will estimate the following equation to understand attrition:

1. ATicg = β0 +β1EScg +β2Xicg +δg +εicg

where ATicg is an attrition indicator and the other variables are the same as those defined in equation (1). Standard errors will also be clustered at the classroom level. If the treatment status variable is not significant at the 5% level, we will do our estimation as described above without making any changes. If the treatment status variable is significant at the 5% level, we will perform a bounding exercise as suggested in Lee (2009).

4.5 Missing data from item non-response

No imputation for missing data from item non-response will be performed at follow-up.

4.6 Variables with limited observations

In case survey questions have the same value for more than 95% of observations within our follow-up sample, we will omit them from the analysis.

**Bibliography**

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