Do School Closures During an Epidemic have Persistent Effects? Evidence from Sierra Leone in the Time of Ebola*

Oriana Bandiera, Niklas Buehren, Markus Goldstein, Imran Rasul, Andrea Smurra†

July 2020

Abstract

School closures are a common short run policy response to viral epidemics. We study the persistent post-epidemic impacts of this on the economic lives of young women in Sierra Leone, a context where women frequently experience sexual violence and face multiple economic disadvantages. We do so by evaluating an intervention targeting young women that was implemented during the 2014/15 Ebola epidemic in Sierra Leone. This provided them a protective space where they can find support, receive information on health/reproductive issues and vocational training. Our analysis document the impacts of the intervention on 4,700 young girls and women aged 12 to 25 tracked from May 2014 on the eve of the Ebola crisis, to the post-epidemic period in 2016. In control villages, school closures led young girls to spend significantly more time with men, teen pregnancies rose sharply, and school enrolment among young girls dropped by 17pp post-epidemic, long after schools had re-opened. These adverse effects on enrolment are halved in treated villages because the intervention breaks this causal chain: it enables girls to allocate time away from men, reduces out-of-wedlock pregnancies by 7pp, and so increases re-enrolment rates post-epidemic. A long term follow up in 2019/20 shows persistent impacts of the intervention on the human capital accumulation of young girls, time they spend with men, and quality of partners matched with. Our analysis has important implications for school closures in response to the current COVID-19 pandemic in contexts where young women face sexual violence, highlighting the protective and lasting role safe spaces can provide in such times. *JEL Classification: I25, J13, J24.*

*We thank all those at BRAC Sierra Leone and IPA Sierra Leone, Gieltje Adriaans, Abdulai Bah and Fernando Fernandez for excellent research assistance. We have benefited from comments from Chris Blattman, Aureo De Paula, Esther Duflo, James Fenske, Erica Field, Elizabeth Foster, Sebastian Galiani, Rachel Glennerster, Francesco Giovannoni, Jessica Goldberg, Scott MacMillan, Berk Ozler, James Robinson, Sanchari Roy, Matthias Sutter, Michela Tincani, Frank Windmeijer, Yanos Zylberberg and numerous seminar participants. We thank JPAL, IGC, UNICEF and the World Bank Group's Umbrella Facility for Gender Equality for financial support. The views presented are the authors' and do not represent those of the World Bank or its member countries or DfID. This is an output of the Africa Gender Innovation Lab. Human subjects approval was obtained from the IRB at IPA (#:13October-001). The study is listed on the AEA registry (AEARCTR-0000300). All errors remain our own.

†Bandiera: LSE, o.bandiera@lse.ac.uk; Buehren: World Bank, nbuehren@worldbank.org; Goldstein: World Bank, mgoldstein@worldbank.org; Rasul: UCL, i.rasul@ucl.ac.uk; Smurra: UCL, a.smurra.11@ucl.ac.uk.

1 Introduction

Low-income countries are susceptible to various kinds of aggregate shock, including commodity price fluctuations, conflict, climate change and viral epidemics. As the current COVID-19 pandemic has starkly illustrated, viral epidemics can cause societies to have to rapidly face simultaneous health and economic challenges [Rasul 2020]. A common policy response is to enforce social distancing measures, through travel restrictions and school closures. We study whether temporary school closures during the 2014-16 Ebola epidemic in Sierra Leone had persistent impacts on the economic lives of young women.

We do so by overlaying the Ebola shock with a randomized control trial evaluation of an intervention targeted to young women. The intervention, provides young women a safe space (a club) at which they can socialize, and receive life skills and vocational training. By combining the two, we provide novel insights on the microeconomic mechanisms through which the severity of the Ebola epidemic, and temporary school closures, impacted the economic lives of young women in a low-income and fragile state.

Sierra Leone is a setting in which women face a range of social and economic disadvantages. As Panel A in Figure A1 shows, on the eve of the outbreak, Sierra Leone ranked near the global bottom of the UNDP Gender Inequality Index.[1] Relative to the Sub-Saharan Africa average, it has high rates of adolescent fertility (Panel B) and the highest rate of maternal mortality in any country for which data exists (Panel C). This is partly driven by the extremely low levels of public health care provision (Panel D): pre-epidemic there were 0.2 doctors and 3 nurses per $10,000$ people (the corresponding figures for most OECD countries are 30+ doctors and 100+ nurses), in a country with an estimated 1.4 million women of child-bearing age and 1.1 million under-five children. According to the WHO, teen pregnancy is one of the leading causes of death for mothers in Sierra Leone and illegal abortions are common. It is also a setting where there is a high prevalence of sexual exploitation and violence towards young women. For example, over half of women in Sierra Leone (56%) report having suffered some form of gender based violence during their lifetime [Amnesty International 2015].

It was in the context of pre-crisis Sierra Leone that our data collection exercise was originally planned. This was for a randomized control trial evaluation of the Empowerment and Livelihood for Adolescents (ELA) intervention, delivered by the NGO BRAC, and intended to build on our earlier work showing positive effects of the same intervention in Uganda [Bandiera *et al.* 2020]. The intervention provides girls a safe space (clubs) where they can meet and socialize, receive

[1] This index aggregates information on maternal mortality rates, adolescent fertility rates, education by gender, female held parliamentary seats, and gender inequality in labor market participation.

life skills to improve their reproductive knowledge and health, and vocational training to improve their labor market prospects. Fieldwork for our baseline survey was completed a week prior to the first cases of Ebola being reported in May 2014.

The 2014-16 Ebola outbreak led to the *"longest, largest, deadliest, and...most complex [Ebola outbreak] in history"* [UNDG 2015]. The outbreak affected Sierra Leone, Guinea and Liberia, infecting 28,652 individuals, with 11,352 deaths [CDCP estimate, April 2016]. There were more cases and deaths in this outbreak than all earlier outbreaks combined. Sierra Leone was the most affected country, hosting half of all cases. Rapid contagion forced the government to implement familiar policies to enable social distancing: village lock-downs and travel bans, and all primary and secondary schools were closed through the 2014-15 academic year.

In this context, school closures could have especially acute consequences for young women. Without the protection of time in school, young women might have become more exposed to early pregnancy and sexual abuse. Furthermore, just before schools were due to re-open in April 2015, the Ministry of Education surprisingly announced the continuation of a pre-Ebola policy; that 'visibly pregnant girls' would be unable to re-enrol. These policies create a precise link why ELA clubs matter during and after the epidemic. Most directly, if ELA clubs reduce the likelihood of pregnancy – because they offer alternatives to spending time with men during the crisis when schools are closed – young girl beneficiaries are more likely to be able to re-enrol when schools re-opened post-epidemic.

These factors combine to link short run school closures with long run human capital accumulation among young girls. We study – theoretically and empirically – the chain of outcomes that form this link: time spent with men spent engaging in sexual activities, teen pregnancy, and re-enrolment back into school post-epidemic.

We draw together the features of our context and intervention to develop a simple model of young women's time allocation between school, ELA clubs and socializing (including time with men). This makes precise how school closures during an epidemic can have persistent impacts on schooling post-epidemic. Intuitively, the provision of safe spaces during an epidemic reduces the likelihood of becoming pregnant, and thus increases the *intertemporal* likelihood of reenrolling into school post-epidemic. However, post-epidemic, safe spaces substitute for other *contemporaneous* time uses, including schooling and so reduce long run enrolment all else equal. The treatment effect of providing ELA clubs on post-epidemic school enrolment can be positive or negative, depending on which of these effects prevail. The model pins down that the pregnancy risk young girls face during the epidemic determines heterogeneity in the sign of treatment effects on schooling. This maps directly into our research design.

Our evaluation sample comprises 200 villages in four districts of Sierra Leone. The intervention was randomly assigned to 150 villages with the other 50 held as control villages. The fact that our evaluation was underway at the time of the outbreak was entirely coincidental: the ELA program is not intended as a response to the crisis. We exploit the timing of events and randomized roll out of ELA clubs to document: (i) how the severity of the Ebola shock correlates to changes in the economic lives of the 4,700 tracked girls and young women aged 12 to 25; (ii) whether the availability of ELA clubs mitigated any of these impacts.

With the onset of the crisis and all fieldwork suspended, we implemented two village-level phone surveys: (i) a monitoring survey to ELA club mentors in treatment villages in June/July 2015 to provide information on club functioning; (ii) a village leaders survey administered between June and October 2015, providing information on the localized health impacts of Ebola, and policy responses (such as the functioning of schools and health facilities, and other relief efforts). After fieldwork restrictions were lifted, our endline survey was fielded between February and May 2016. This is well after schools had reopened and measures outcomes post-epidemic. Finally, we engaged in one further round of data collection between June 2019 and January 2020, to study long term outcomes and persistent impacts of the crisis, ELA clubs and their interaction.

Our monitoring data confirms there was an extensive roll out of the ELA program despite the circumstances: 70% of clubs opened on time (by September 2014). There was also high demand to participate: 71% of survey respondents in treated villages ever participated in an ELA club meeting or activity (versus 4% in control villages).

Following the simple intuition of the model that the impact ELA clubs have on schooling varies with pregnancy risk, we use a 2×2 research design, where one dimension is the random assignment of villages to ELA, and the second dimension exploits variation in the rise in pregnancy risk that girls and young women face specifically during the epidemic. We construct a village-specific index of pregnancy risk using data collected from village leaders survey during the crisis. The index combines information on whether the nearest secondary school re-opened on time (some school re-openings were delayed from April 2015, but all schools would have re-opened by the time of endline survey in February 2016), and disruptions to services provided by local primary health units (PHU). These components relate directly to increased pregnancy risk for young girls and women because: (i) prolonged school closures increase the period over which they are at risk to unwanted sexual abuse or demands from men; (ii) PHU closures reduce access to contraceptives.

We make precise the identifying assumptions for the design to provide causal impacts of ELA clubs, and their interaction with girls' exposure to greater pregnancy risk. We provide supportive evidence for these assumptions.

That young women face a range of disadvantages in this setting is starkly quantified in our baseline data: respondents are on average 18 years old, yet 60% are in relationships, 28% are married, and nearly half have children. While their age at marriage is 16, the average age at marriage of their husbands is almost double, at 31. For those in relationships, 46% report being subject to intimate partner violence. These traits of early marriage, childbearing and exposure to violence all have clear long term consequences on women's ability to acquire human capital and lead financially independent lives.[2]

We conduct our analysis separately for younger girls (those aged 12-17 at baseline), and older girls (18-25 at baseline). The younger cohort are our primary focus of attention because for them the chief concern is that school closures in response to Ebola meant that without the protection of time in school, they faced a higher risk of becoming pregnant during the epidemic. This was compounded with the policy of not allowing 'visibly pregnant girls' to re-enrol in schools once they reopened. These factors combine to link short run school closures with long run human capital accumulation among young girls, and provide a clear channel through which the safe space that ELA clubs provide, can help mitigate these effects. Hence for younger girls, we present evidence along the causal chain of outcomes of this link: time spent with men spent engaging in sexual activities, teen pregnancy, and re-enrolment back into school post-epidemic.

Of course, older girls can also benefit from the availability of ELA clubs. Hence we also trace out treatment effects for them related to time spent with men, risky behaviors and childbearing.

Our main results are as follows.

First, in control villages absent ELA clubs, the post-epidemic impacts on younger girls of higher pregnancy risk during the crisis are that: (i) they spend more time exposed to men for sexual relations: post-epidemic the time spent with men increases by 1.27hrs/wk (a 50% increase over the baseline mean); (ii) rates of teen pregnancy rise by 10.5pp, mostly driven by a rise in out-of-wedlock teen pregnancies; (iii) time spent in formal learning activities falls by 12.2hrs/wk (25% of the baseline mean), with this time being reallocated towards work/income generation and household chores; (iv) this all translates into far lower school enrolment rates post-epidemic, by 17pp. To reiterate, the fall in enrolment is measured well after the country is declared Ebola free and schools have actually reopened.

The availability of ELA clubs breaks this causal chain in treated villages. More specifically, in high pregnancy risk villages the treatment effect of ELA clubs on young girls are that: (i)

[2]It is now well recognized that economic development and women's empowerment are closely linked [Doepke *et al.* 2012, Duflo 2012, Jayachandran 2015], and that core dimensions of disadvantage stem from women having limited agency over their bodies, facing barriers to investing in their human capital, and having poor labor market prospects [Field and Ambrus 2008, Dupas 2011, Jensen 2012].

they reduce the amount of time young girls spend with men by 1.86hrs/wk – ELA clubs provide a clear alternative to spending time with men with whom they are sexually active; (ii) rates of out-of-wedlock teen pregnancy fall by 7.2pp; (iii) time spent engaged in any formal learning rises by 9.84hrs/wk (81% of the direct effect of higher pregnancy risk) – this time comes from girls being less exposed to spend time on household chores; (iv) this all translates into a treatment effect on schooling post-epidemic of 8.7pp (closely matching the fall in pregnancy rates), while ELA clubs also increase the likelihood that girls can combine school and work by 9.7pp.

Third, the availability of ELA clubs also have impacts on older girls (those aged 18-25 at baseline). In treated villages, older girls report increases in unwanted sex (by 5.4pp or 38% of the baseline mean), and report engaging in more transactional sex (also by exactly 5.4pp, 115% of the baseline mean). As in Dupas and Robinson [2012] and later studies, the use of transactional sex is one form of income generation available to women in a time of severe aggregate crisis when conventional economic opportunities are scarce. Reassuringly, ELA clubs prevent these changes translating into higher fertility because older girls take on the life skills provided by ELA and increase their use of female controlled contraceptives.

Fourth, our long term follow up – conducted four years after the end of the Ebola epidemic in 2019/20 – establishes that for young girls, there is hysteresis in outcomes of being exposed to higher pregnancy risk during the epidemic, but also of having access to ELA clubs, as the country enters a path to recovery. In particular, among those aged 12-17 at baseline in 2014, we find that in the long term follow up, those in higher pregnancy risk control villages are almost 15pp more likely to have become pregnant since baseline, spend almost 7hrs/wk less on learning activities, and have enrolment rates that are 11pp lower.

However, the impacts of the availability of ELA clubs are equally persistent: the treatment effect in high pregnancy risk villages is that by 2019/20, younger girls have 13pp lower pregnancy rates, 14pp higher enrolment rates, and still spending less time with men (by 1hr/wk). To be clear, this cohort of girls are aged 17 to 22 in this long term follow up, so these women are studying at the highest tiers of the formal education system (even withstanding the year of lost education though school closures).

For the older cohort of girls, those aged 18 to 25 at baseline in 2014, we find those in higher pregnancy risk control villages are 11pp more likely to have become pregnant since baseline. For high pregnancy risk villages, we find long run persistence in the treatment effect of engaging in transactional sex – but this does not lead to increased pregnancies, because of long lasting changes in female-controlled contraceptive use.

We show these core findings to be robust to adjusting p-values for randomization inference

or multiple hypothesis testing, alternative constructions of the pregnancy risk index, and social desirability biases, following the approach set out in Dhar *et al.* [2020].

Finally, our long term follow up gave us the opportunity to interview men for the first time in our study. We selected partners of tracked respondents, and shed light on whether the characteristics of partners relates to the availability of ELA clubs to girls and young women during the epidemic. We find positive treatment effects of ELA clubs on partner traits: for example they are better educated and more averse to gender based violence. While only suggestive, these results point to another promising marker of long run welfare improvements for girls and young women that had ELA protective spaces available to them during the Ebola epidemic.

Our analysis breaks new ground in three literatures: on the economics of epidemics, on household responses to aggregate shocks, and on the link between economic shocks and gender inequality.

Prior to COVID-19, a nascent literature had begun to study individual behavior during epidemics.[3] Work on the Ebola epidemic in West Africa has focused on measuring real time impacts of the crisis on households and firms [Thomas *et al.* 2014, Bowles 2016, Glennerster *et al.* 2016, Casey *et al.* 2017], or exploiting quasi-experimental variation in the geographic incidence of Ebola to understand government responses [Fluckiger *et al.* 2019, Maffioli 2020]. In contrast, our work tracks a sample of young girls and womens over the pre-crisis, crisis and post-crisis periods, to understand how the epidemic impacted their human capital accumulation, that is key for lifetime welfare. Methodologically, the paper most complementary to ours is Christensen *et al.* [2020]: they also overlay a pre-planned RCT in Sierra Leone with the epidemic shock. They document how interventions implemented pre-epidemic to improve accountability of local health facilities, later led to those facilities functioning better through the epidemic, in terms of higher reported Ebola cases and lower Ebola deaths.

On household responses to shocks, a vast literature studies *ex ante* and *ex post* mechanisms to mitigate idiosyncratic risks. A smaller literature examines responses to aggregate shocks, given greater identification challenges. In the presence of aggregate shocks, coping strategies for dealing with idiosyncratic risk (such as temporary migration), often break down. Households might then be forced to engage in behaviors that do not maximize their long run welfare or permanent income, such as pulling children out of school [Jacoby and Skoufias 1997, Ferreira and Schady 2009], marrying off daughters to obtain bride prices [Corno *et al.* 2019], or women engaging in transactional sex [Dupas and Robinson 2012]. We document how the latter coping strategy is relevant for older girls and women in the context of the Ebola epidemic.

Most importantly, hard-earned gains in women's empowerment can be quickly erased by ag-

[3]This includes Adda [2016] on flu; Agüero and Beleche [2017] on H1N1; Bennett *et al.* [2015] on SARS; and Lautharte Junior and Rasul [2020] and Rangel *et al.* [2020] on Zika.

gregate economic shocks, and it is in times of greatest crises, that gender differentials in outcomes are most likely to open up [Duflo 2012] – an issue at the fore of policy discussions in all countries in the current pandemic. There is an emerging experimental literature evaluating interventions designed to empower women in periods of stability [Baird *et al.* 2011, Duflo *et al.* 2015, Buchmann *et al.* 2018, Ashraf *et al.* 2020, Bandiera *et al.* 2020, Dhar *et al.* 2020, Edmonds *et al.* 2020].

Our findings add to this body of work in two important ways. First, we document precisely how gender gaps can open up in times of health shocks such as epidemics. We do so by demonstrating how school closures, a common policy response to aid social distancing in viral epidemics, have persistent detrimental impacts on the lives of young girls and women.[4] Second, we show that simple policy interventions can help offset these effects. This insight has direct relevance for much of the ongoing discussion of whether the optimal policy responses to COVID-19 differ in low- and high-income countries given differing trade-offs and state capacities, as well as issues that many countries are grappling with in terms of how the pandemic and policy responses to it are having hugely differential impacts across generations.

The paper is organized as follows. Section 2 provides background on the Ebola epidemic, policy responses it, and the ELA intervention. Section 3 describes our data and presents motivating descriptives. Section 4 develops a simple model of young women's time allocation. This makes precise how school closures during an epidemic can have persistent impacts on schooling post-epidemic, and how these impacts are heterogenous with respect to pregnancy risk during the epidemic. Section 5 maps the model to data, describes our research design, its identifying assumptions and presents evidence to support them. Section 6 shows our core results on the impact of pregnancy risk during the epidemic on the economic lives of young girls, and the mitigating effects of ELA clubs. Section 7 extends our findings to those for older girls and young women, and documents the long term impacts on both cohorts. Section 8 discusses policy implications and future research. Additional results and robustness checks are in the Appendix.

2 Context and Intervention

2.1 The Ebola Epidemic

Ebola Virus Disease (EVD or Ebola) is an acute hemorrhagic fever that can be fatal if untreated. Ebola first appeared in simultaneous outbreaks in South Sudan and the Democratic Republic

[4] To our knowledge, Archibong and Annan [2020] is the only other study that documents how gender gaps open up in such times, in the context of the 1986 meningitis epidemic in Niger. They show a significant reduction in years of education for school-aged girls relative to boys following the epidemic, driven by households responding to the shock by marrying off daughters in order to claim bride prices.

of Congo in 1976. Figure A2 charts the history of Ebola outbreaks in Sub-Saharan Africa, with fatality rates varying between 25 and 90%. The virus is transmitted from wild animals and spreads through human-to-human transmission via direct contact with the blood, secretions, organs or other bodily fluids of infected people, and with surfaces contaminated with these fluids (such as bedding or clothing). Transmission can also occur in burial ceremonies involving contact with the deceased body. Individuals remain infectious as long as their blood contains the virus. Hence social distancing measures are a key policy instrument used to tackle Ebola outbreaks.[5]

Sierra Leone was the country most affected by the 2014-16 epidemic, hosting about half of all cases. The virus is thought to have been brought into the country by an individual entering from Guinea around May 2014. By October 2014, it had spread to all 14 districts in the country, with rapid contagion caused by high rates of geographic mobility and the use of traditional burial practices. Figure 1 charts the timeline of the epidemic from May 2014, showing the number of weekly cases (confirmed and probable). The peak flow of weekly cases occurred in December 2014, but it was only in July 2015 that the epidemic started to slow down. Sierra Leone was declared Ebola free in November 2016, 42 days after the last patient was discharged. The WHO estimates there were 14,124 cases in the country (including suspected, probable and confirmed cases), resulting in 3956 deaths. Hence the 28% fatality rate is lower than in some earlier outbreaks, but the scale and spread of the outbreak in Sierra Leone was unprecedented.[6]

2.1.1 Policy Responses

The Sierra Leoneon government use three policies to combat rapid contagion, all of which are well familiar as responses used to also combat COVID-19: (i) health workers were mobilized to record door-to-door cases and track contagion, and some health facilities were transformed into Ebola holding centers; (ii) social distancing measures were used, including village lock-downs and travel bans; (iii) primary and secondary schools were closed through the 2014-15 academic year. The lower part of Figure 1 shows the timeline of polices enacted.[7]

The epidemic had severe consequences for health care provision in Sierra Leone, that as Panel D in Figure A1 shows, was already weak pre-epidemic. Ebola impacted the health system in two ways: (i) the human capital of health workers; (ii) public trust in using health facilities

[5]Ongoing vaccine trials reported encouraging results [Huttner *et al.* 2018]. In December 2019, as a result of a year long clinical trial in the DRC, the trial's cosponsors at the WHO and NIH announced that two of the treatments appear to dramatically boost survival rates (https://www.wired.com/story/ebola-is-now-curable-heres-how-the-new-treatments-work/). Anthony Fauci was a leading figure in these efforts.

[6]For the 2014-16 outbreak, the WHO estimates Liberia had 10675 cases and 4809 deaths (a 45% fatality rate), and Guinea had 3811 cases with 2543 deaths (a 67% fatality rate).

[7]Other social distancing measures were enacted to close bars and restaurants. Whether this was enforced outside of big cities is questionable, and does not appear to have impacted participation in ELA clubs.

[Christensen *et al.* 2020]. On the first dimension, health workers were under-equipped and under-prepared for Ebola. Their inability to rapidly implement infection prevention and control measures left them exposed to infection during routine contact and enabled further transmission to other health workers [Evans *et al.* 2015].[8] On the second dimension, health facilities became associated with Ebola as some were transformed into holding centers. Visits to health centres were thought to be among the largest causes of Ebola transmission. Combined with a lack of a cure and huge uncertainty, confidence in the health system was undermined, leading families to keep sick members at home, thus further spreading the virus.

The collapse of the health care system meant access to standard medical services, such as ante-natal and maternal care, was severely hampered during the outbreak. A combination of capacity constraints and fear of hospitals led to considerably fewer women accessing antenatal care or giving birth in health facilities during the crisis [UNICEF 2014].

The economic consequences of the aggregate shock were also severe. In a year, GDP growth plummeted from $+8.9\%$ to -2.0%: border closures shut down international trade (predominantly in agriculture), internal travel bans resulted in the breakdown of domestic trade, and all periodic markets were forced to close. The self-employment sector, accounting for 91% of the labor force, shed around $170,000$ jobs (with revenues for surviving enterprises falling 40%), and a further $9,000$ jobs were lost in wage employment [Thomas *et al.* 2014, 2015, Evans *et al.* 2015, Himelein *et al.* 2015, Casey *et al.* 2016].[9]

The final policy response related to the education system. Schools were closed in May 2014 and re-opened in April 2015 as the epidemic began to slow down (the school year runs from September to July). School closures might have had particularly acute impacts on young women. The loss of one year of human capital accumulation – if permanent – would be non-trivial given their lower levels of human capital to begin with. Moreover, without the protection of time in school, young women might have become more vulnerable to sexual abuse, that would further limit their ability to accumulate human capital in future [Amnesty International 2015].

These gender-specific consequences of school closures were compounded by another policy response during the epidemic. Just before schools were due to re-open in April 2015, the Ministry of Education, Science and Technology announced the continuation of a pre-Ebola policy, that 'visibly pregnant girls' would be unable to re-enrol. Given the difficulty of correctly identifying

[8] Evans *et al.* [2015] document how Ebola deaths were disproportionately concentrated among health personnel. For example, by May 2015, while .06% of the population had died from Ebola, 6.85% of health care workers had died from Ebola. In absolute terms, this corresponded to 79 doctor, nurse, and midwife deaths. By the end of November there had been a further 179 confirmed Ebola cases among health workers.

[9] The best data on impacts on food prices comes from tracker surveys conducted at 200 markets during the crisis [Glennerster *et al.* 2016]. They document relatively modest price increases (e.g. for rice), but more pronounced impacts on price dispersion, with increases and decreases back to normalcy during the crisis.

a pregnant girl, school principals gained discretion in exactly how they enforced this ban. In short, this policy increased the long run cost of school closures for young women, that without the protection of time in school faced a higher risk of becoming pregnant during the epidemic.[10]

These factors combine to link short run school closures with long run human capital accumulation among young girls. We study the chain of outcomes that form this link: time spent with men spent engaging in sexual activities, teen pregnancy, and re-enrolment back into school post-epidemic.

2.2 The ELA Intervention

The empowerment and livelihood for adolescents (ELA) intervention aims to kickstart young women's socioeconomic empowerment through the provision of life skills, vocational skills and microfinance. The ELA program was designed and implemented by the NGO BRAC in Bangladesh, where female disempowerment is also a major concern. Since 1993, BRAC has established 9,000 ELA clubs worldwide, reaching over a million young women. The program has proved to be scalable and cost-effective across countries. In earlier work, we evaluated the program in Uganda [Bandiera *et al.* 2020], and based on the encouraging four-year impacts documented, we designed a follow-up evaluation with BRAC in another Sub Saharan context.

The ELA intervention offers a multifaceted approach to simultaneously tackle multiple disadvantages young women face, related to having agency over their bodies and barriers to accumulating human capital. All program activities are delivered out of ELA clubs, a fixed (rented) location in each village, with no attendance fee. This is a physical space jointly 'owned' by club members. ELA clubs offer a space where young women can safely gather and socialize, away from men. Clubs were originally designed to be open five days a week during after-school hours. During the crisis, ELA clubs can also serve as a partial substitute for schools: they provide a safe space where girls can meet, and they also provide information, on reproductive health for example, that are not supplied by the education system.

ELA clubs can also crowd out time spent at informal institutions of secret societies that exist for men and women in Sierra Leone [MacCormack 1979, Bledsoe 1990, MCormack-Hale 2018]. The primary role of these women's societies (known as *Bondo* in the North and *Sande* in the South) is to initiate girls into adulthood through various rituals, that have historically included female genital mutilation.[11] These societies create distinctions between women who have experienced

[10] In May 2015, it was announced that an alternative 'bridging' education system would be established to allow pregnant girls to continue schooling, but in different premises or times to their peers. Other temporary measures, such as community learning centres and home-based approaches, were also implemented. At best, this bridging system varied in effectiveness, and did nothing to help pregnant girls find an alternative way to take national exams.

[11] Sierra Leone has some of the highest levels of FGM, indicating the pervasiveness of secret societies. The 2013

the secrets of childbirth and those who have not, and society leaders typically further attempt to separate girls undergoing initiation from their uninitiated peers. Secret societies also instill notions of morality and norms over sexual behavior, they promote women's social/political interests, and express solidarity among women vis-à-vis secret societies for men.

All intervention components are delivered from ELA clubs. An older girl from each village is selected and trained to be a club mentor. Her main responsibility is to manage the club activities and facilitate the life skills training courses. Table A1 details the curriculum for the 10 life skills modules, that covers reproductive health, menstruation, pregnancy, STDs, HIV, family planning, rape, legal knowledge on bride price, child marriage and violence against women. As sex education is not obligatory in schools, the life skills provided through ELA give young women access to information they might not otherwise have received. Girls aged 17 and above are eligible for the vocational skills component, delivered by BRAC professionals. Finally, those aged 18 or older were eligible for the microfinance component.[12]

2.2.1 Implementation and Participation

We use our ELA club mentor survey conducted in June/July 2015, to provide evidence on the roll out of ELA clubs during the epidemic. Panel A of Figure A3 provides time series evidence on ELA club openings: (i) 70% opened on time (by September 2014) and by January 2015 all had opened; (ii) the majority were continuously open through the epidemic. Panel B shows: (i) the majority of clubs provided life skills training; (ii) vocational training took off after travel quarantines were lifted in January 2015 (these trainings are delivered by professionals, not club mentors). Panel C shows the median club has 30 members, implying membership rates of around 31%. Panel D shows the ratio of club attendance, based on an unannounced spot check in May 2015, to club membership. On any given day, ELA clubs can have many non-members present.

There is high demand for ELA clubs. Panel A of Table A2 shows that 31% of eligibles in treated villages are registered club members. Panel B reports statistics from the endline survey. There is widespread knowledge of ELA clubs: 89% of girls in treated villages have heard of them, as have 27% of girls in control villages. Participation rates are more than double membership

DHS reports 90% of women aged 15 to 49 have been circumcised. During the outbreak the government introduced a moratorium on FGM, but this is not thought to have been enforced.

[12]Skills provided include tailoring, soap making, hairdressing, and tie dying. Clubs provide diversified courses rather than training all participants in one activity. All courses involved a financial literacy module, and upon completion, participants received basic business inputs, e.g. sewing machines were provided to those completing tailoring courses. Each course was offered daily for six hours per day, with courses varying in length depending on the human capital investment required. Loans were renewable on repayment. On the microfinance component, loan sizes were up to $100, repayable over a year, with a weekly repayment schedule and a 30% interest rate. The first loan cycle started in April 2015.

rates: 71% of girls in treated villages have *ever* participated in an ELA club meeting/activity. Conditional on ever participating: (i) 82% of young women have participated in life skills (77% report attending at least once a week and the majority can recall at least four topics covered); (ii) 25% have received financial literacy training; (iii) 34% have participated in vocational skills training (in T2/T3 treatment arms); (iv) 13% report having received a microfinance loan in T3.

These patterns of awareness and participation are very similar for young and old age cohorts (although the older cohort is more likely to have received microfinance). Hence the demand for ELA clubs comes both from girls enrolled full time in school pre-crisis, as well as older girls who were predominantly engaged in income generation pre-crisis.

3 Data and Descriptives

Our evaluation covers four districts: Port Loko, Kambia, Moyamba and Pujehun, where 20% of the population resided pre-crisis. Figure 2 shows our timeline of data collection, and how this relates to the timing of the crisis and ELA club activities. In October 2013 we first conducted a census in the 200 evaluation sample villages, covering 94,338 individuals in 17,233 households. This census was used to draw a sample of women aged 12 to 25 and thus eligible for ELA.

Our baseline was conducted between February and May 2014, thus ending just as the first cases of Ebola were being reported in Sierra Leone. The survey covered 5,775 young women, corresponding to 27% of all eligibles in the 200 sample villages, and recorded information on their time use, education and skills, labor market activities, and pregnancies/risky behaviors.

Given that ELA clubs provide an alternative activity for young women to engage in, time use data plays an important role in our analysis. To elicit reliable information, rather than just asking about hours, we asked respondents to use a physical representation of time (beans) to show how they divided their time over the past week. We did so for broad activities (education, socializing, income generation, household chores), and also specifically for time devoted to subcategories of socializing (sexual relationships with men, with friends, social activities, alone).[13] The baseline and endline surveys took place during the school year so respondents could feasibly have been attending school in the week of the survey. The credibility of the time use data is underpinned by the fact that: (i) the number of beans recorded across categories summed up to 24 for 90% (99%)

[13]The question wording for the broader categories is, *"Now I would like you to do a simple exercise. Here on these cards are some ways you can spend your time in a typical week. Here are 25 beans. Please divide these beans between the cards according to how much time you spend in each activity."* For time use related to socializing, the question wording is, *"Here are the 25 beans again. Here on these cards are some ways you can spend your free (leisure) time. Please divide these beans between the cards according to how much time you spend in each activity. If there are any other activities not listed on these cards, you can write them on these blank cards."*

of respondents at baseline (endline); (ii) 87% of respondents report sleeping 5 to 10 hours per night; (iii) the average number of hours spent per week at ELA clubs is three, which is realistic. We convert time use measures into hours per week.

With the onset of the crisis and all fieldwork suspended, we implemented two village-level phone surveys. The first was a monitoring survey to ELA club mentors in treatment villages conducted in June/July 2015, providing information on club functioning. The second was a village leaders survey administered between June and October 2015, providing information on village impacts of Ebola (in terms of the number of households quarantined, Ebola related cases and deaths), and policy responses (such as the functioning of schools and health facilities, and other relief efforts).[14]

After fieldwork restrictions were lifted, the endline survey was fielded in person between February and May 2016 (so like the baseline, taking place during the school year). As Figure 1 shows, this is around six months after the inflow of new reported cases of Ebola declined to near zero, and well after schools had reopened. It was still before Sierra Leone was declared to be Ebola free (November 2016). The endline covered the same topics as the baseline survey with an additional module related to the crisis and experiences during it.

The endline survey measures outcomes post-epidemic. We do not claim the *onset* of any changes in behavior always started during the crisis. Rather, the results should be interpreted as capturing *persistent* impacts into the post-crisis period of the epidemic, and of ELA clubs.

On attrition, 83% of respondents were tracked from baseline to endline (4,790). Among those tracked, 81% (3,865) resided in the same village, while others were typically tracked to a nearby village. Hence although geographic mobility is high, it does not lead to severe attrition. Appendix Table A3 presents correlates of attrition and shows treatment assignment and the intensity of pregnancy risk during the epidemic does not predict attrition, nor does their interaction, and nor is there differential attrition on observables with treatment or risk.

Finally, we engaged in a final round of data collection between June 2019 and January 2020, to study long term outcomes. Among girls tracked to endline, we had funding to survey 71% of them in this long term follow up. We managed to track 84% of this intended sample, corresponding to 2852 respondents. The main purpose was both to examine the persistence of outcomes post-epidemic, but also to collect new data from their partners. The final Column of Table A3 show that treatment assignment and the intensity of pregnancy risk during the epidemic does not predict attrition between the endline and long term follow up, and nor does their interaction.

[14]The village leader survey collects data coded from focus group discussions. Prominent members of the socioeconomic and administrative life of the community attended these meetings, with the average focus group involving 11 participants (the minimum (maximum) was 5 (18)). 85% of these meetings were attended by a Chief (either a Paramount, Section, Regent or Village Chief). Village elders, women's and youth leaders, imams, pastors, head teachers, nurses and ELA club mentors were also invited.

3.1 Randomization and Baseline Balance

The ELA program was randomly assigned to 150 villages, with 50 remaining as controls. Districts were the randomization strata. The original evaluation design had three treatment arms: in t1, ELA clubs would only provide life skills training; T2 would be as T1 but clubs would also provide vocational training, and T3 would be as T2 but clubs would also provide microfinance. This design was meant to unpack the impacts found in our work on ELA in Uganda [Bandiera *et al.* 2020]. Given the epidemic and delayed roll out of these skills components, we pool treatment arms throughout. Common to all is that ELA clubs provide a safe space for young girls and women.

3.1.1 Villages

Panel A of Table 1 shows that treatment and control villages are well balanced. Hence, there was high fidelity with randomization protocols even with an unfolding epidemic. The remainder of the Table shows data from the village leader survey, conducted during the crisis. Panel B highlights the stigma associated with pregnant girls: there is near universal agreement among elders with the statement that "girls who are visibly pregnant have a bad influence on their non-pregnant peers." In control villages, only 12% of elders agree with statements that pregnant girls should be allowed to continue their education, or to take formal exams. Panel C details that few villages were quarantined (6%), but nearly all were visited by contact tracer teams. There are no differences between treatment and control villages in the receipt of assistance from NGOs in terms of food aid or school supplies (excluding BRAC).

3.1.2 Young Women

Table 2 shows that treatment and controls are well balanced on individual characteristics at baseline. Panel A shows our respondents are on average 18 years old, and 60% are in a relationship. While girls' age at marriage is close to 16, the average age at marriage of their husbands is almost double, at 31. Despite their young ages and the recently formed marriages, nearly half have children. For those in relationships, 46% report being subject to some form of intimate partner violence. Even absent the Ebola crisis, these traits of early marriage, childbearing and exposure to violence all have long term consequences on the ability to acquire human capital and lead financially independent lives. Indeed, only 23% of our sample of young women are literate (based on an assessment combining basic reading ability, reading comprehension and writing sentences).

Panel B shows baseline measures of sexual activity. 75% are sexually active, with their age at debut being 15. Respondents report spending around 5hrs/wk with men (that they are engaged in sexual relations with). The minority of sexually active girls report using contraception. 10%

report having experienced unwanted sex in the past year, and 4% have engaged in transactional sex. Figure 3A shows how sexual activities vary by age at baseline. By age 17, the majority of girls are in relationships and sexually active, with more being sexually active than in relationships at each age. The right side axis shows that among older girls, over 10% at each age experience unwanted sex, and there is a weak gradient in age of engaging in transactional sex.

The economic activities of young women are best described as a four-way type distribution: 27% of young girls in control villages are in school full time; 34% are exclusively engaged in income generating activities; 18% are engaged in both schooling and income generation, while 20% report being engaged in neither activity, hence spending their time engaged in household chores or as caregivers.[15] Figure 3B shows how these activities vary by age at baseline. The majority of girls aged 12-14 are in school at baseline, pre-Ebola. There are no sharp discontinuities in enrolment rates at key cut-off stages of the education system (ages 15 and 18) but rather gradual declines in age, partly due to grade retention. There is a steady increase in specialization in income generation with age, with 17 being a critical cross over point: up until that age more girls are enrolled in education full time than are only working, and the situation reverses thereafter.[16]

Given these age profiles of sexual activity and school enrolment, we split our analysis between girls aged 12-17 at baseline, and those aged 18-25. The younger cohort are our primary focus of attention when understanding the policy relevant impacts of the safe space provided by ELA clubs, because for them the chief concern is that short run school closures can lead to long run impacts on their human capital accumulation.[17]

3.2 Enrolment and Pregnancy Rates Over the Epidemic

We present two descriptives highlighting how school enrolment and pregnancy rates might have been impacted over the course of the Ebola epidemic. We do so focusing on young girls residing in control villages, so that were never offered the safe space of an ELA club.

Figure 4A shows school enrolment rates by age: (i) at baseline in 2014 (pre-epidemic); (ii) at endline in 2016 (post-epidemic) when all schools had reopened; (iii) their difference. Aggregate enrolment fell from 45% to 38%, with falls being observed at all ages. If this were just picking up a cohort effect (as in the cross section at baseline in Figure 3A) then the magnitude of the drop

[15] Income generating activities at baseline are forms of self-employment, such as small trade/business (40%), food processing (20%) and household land cultivation (15%).

[16] The key exam school stages are at ages 15 and 18. The time allocations across the age distribution are plausible: the youngest girls report spending around 60 hrs/wk on all forms of learning except ELA. Work hours rise to just over 35 hrs/wk for older women in our sample. At each age, respondents report on average spending at least 40 hrs/wk engaged in household chores.

[17] This age split broadly aligns with the separation by age in secret societies in rural Sierra Leone: in turn this might limit information flows or spillovers between younger and older age cohorts.

would be increasing in age but this is not so: falls in enrolment by age are non-monotonic, being largest for those aged 14 and 15 at the onset of the epidemic.

Figure 4B shows reasons for dropout changed through the epidemic. We compare reasons given by girls aged 12-17 that had already dropped out at baseline, to those in the same age band that dropped out between baseline and endline, i.e. those that did not re-enrol after schools reopened. Pre-crisis the most common reason given for dropout was cost, followed by pregnancy. Post-crisis, pregnancy becomes the modal explanation, applying to more than a third of drop outs.

Without the protection of time in school, school closures might have left young women more vulnerable to sexual abuse, limiting their ability to accumulate human capital in future. Figure 4C examines this dimension of vulnerability by showing evidence on the likelihood girls became pregnant during the epidemic. The horizontal axis represents time, in months, from either May 2014 (the start of the epidemic) or May 2012 (the start of a counterfactual two-year pre-epidemic period). For the crisis period sample, the first vertical dashed line shows when schools started to reopen and the second shows when Sierra Leone was declared Ebola free. At time zero, each sample includes only girls aged 12-17 in the reference year that had never been pregnant. The vertical axis measures the share that became pregnant over time by month, in each sample. Relative to the pre-epidemic counterfactual, pregnancy rates increase substantially for these girls, with the survival functions immediately starting to diverge and doing so evenly over the crisis: a log-rank test of equality of the survival functions rejects the null of their equality ($p = .001$). In the two-years pre-epidemic, 10% of young girls became pregnant. In the two-year window of the crisis this rises by nearly half again, with around 15% becoming pregnant.

Figure 4D repeats the analysis for girls aged 12-17 in the reference year that already had one child. We see a similar divergence in survival rates in the epidemic period relative to the counterfactual, but the magnitude is less pronounced. Taken together with Figure 4C, this suggests the rise in pregnancies during the epidemic was more concentrated among young girls that did not have children pre-epidemic.

4 Modelling Persistent Effects of School Closures

We draw together the features of our context and intervention to develop a simple model of girl's time allocation between school, ELA clubs and socializing (including time with men). This makes precise how school closures during an epidemic can have persistent impacts on schooling post-epidemic. Intuitively, the provision of safe spaces during an epidemic reduces the likelihood of becoming pregnant, thus increasing the *intertemporal* likelihood of reenrolling into school post-

epidemic. However, post-epidemic, safe spaces substitute for other *contemporaneous* time uses, including schooling and so reduce enrolment all else equal. The treatment effect of providing ELA clubs on post-epidemic school enrolment can be positive or negative, depending on which of these effects prevail. The model pins down measurable dimensions determining this heterogeneity in the sign of treatment effects on schooling, and we map this into our research design.

4.1 Set Up

Each period t, girls allocate their time between schooling s_t, a safe space (i.e. ELA clubs) c_t, and socializing l_t. We use a three period model to map to our data collection: (i) $t = 0$ is the baseline pre-epidemic period; (ii) $t = 1$ is when the Ebola epidemic occurs, with school closures in place; (iii) $t = 2$ is the endline period after schools reopen.

The state variable $z_t \in \{0, 1\}$ captures a girl's fertility status. $z_t = 1$ indicates she begins period t having had a child. Preferences are described by a CES utility function,

$$u(s, c, l) = \left[\alpha_s s^\rho + \alpha_c c^\rho + \alpha_l l^\rho\right]^{1/\rho}, \tag{1}$$

where the taste parameters are such that $\alpha_s + \alpha_c + \alpha_l = 1$ and the elasticity of substitution between time uses is $\sigma = 1/(1 - \rho)$. We assume girls are not pregnant at $t = 0$ ($z_0 = 0$), and have a time endowment scaled to unity: $s_0 + c_0 + l_0 = 1$.At the end of the first and later periods, a girl can become pregnant. As time spent socializing includes time spent with men, each unit of l_t can result in a pregnancy at the end of the period with probability $\pi \in [0, 1]$:

$$\begin{aligned} \mathbb{P}[z_{t+1} = 1 | l_t, z_t = 0] &= \pi l_t, \\ \mathbb{P}[z_{t+1} = 1 | l_t, z_t = 1] &= 1, \end{aligned} \tag{2}$$

where we model pregnancy, $z_t = 1$, as an absorbing state. Hence being pregnant and having a child represent the same state, and we do not model having multiple children. Having a child entails a time cost $\psi \in [0, 1]$, as time needs to be devoted to childcare and household chores.[18] Hence given fertility status z_t, the time constraint can be rewritten as: $s_t + c_t + l_t = 1 - \psi z_t$.

[18] In our data, the average respondent who is single, has no children and is aged 12-17 spends 38 hours/week on household chores. This rises by 18 hours when the first child is born, but does change when a second and third children are born. This is in line with our modelling assumption of $z_t = 1$ being an absorbing state, and not needing to track the actual number of children in terms of time cost incurred.

4.2 Baseline: No Ebola Epidemic, No ELA Clubs

We first ensure the model maps to baseline patterns of time in school (absent the epidemic shock and ELA clubs). In this benchmark $c_t = 0 \; \forall \; t$ so the time allocation problem is:

$$\begin{aligned} V_t(z_t) &= \max_{s_t, l_t} u(s_t, 0, l_t) + \beta \mathbb{E}_z[V_{t+1}(z_{t+1})] \quad \text{for } t = 0, 1 \\ V_2(z_2) &= \max_{s_2, l_2} u(s_2, 0, l_2) \end{aligned} \tag{3}$$

subject to $s_t + l_t = 1 - \psi z_t, \quad s_t, l_t \in [0, 1]$ and the conditions in (2) Time allocated in $t = 2$ has no intertemporal implications, and so choices are determined by the FOC setting the marginal rate of substitution between schooling and socializing equal to the shadow cost of time. Time allocated to school and socializing are then just shares of the total time available at $t = 2$:

$$\begin{aligned} s_2^*(z_2) &= \omega_s(1 - \psi z_2) \\ l_2^*(z_2) &= \omega_l(1 - \psi z_2), \end{aligned} \tag{4}$$

where the shares are functions of the underlying taste parameters: $\omega_s = \frac{{\alpha_s}^\sigma}{{\alpha_s}^\sigma + {\alpha_l}^\sigma}$, $\omega_l = 1 - \omega_s$. Similar considerations hold for pregnant girls/those with children ($z_t = 1$). Given this is an absorbing state, current choices have no intertemporal value and so the time allocations are:

$$\begin{aligned} s_t^*(1) &= \omega_s(1 - \psi), \\ l_t^*(1) &= \omega_l(1 - \psi). \end{aligned} \tag{5}$$

In contrast, for non-pregnant girls ($z_t = 0$), time allocated to schooling in $t = 0, 1$ generates flow utility and by displacing time socializing – that includes spending time with men – reduces the likelihood of becoming pregnant and facing a tighter time constraint in the next period. The FOC at $t = 0, 1$ makes this intertemporal effect clear:

$$\frac{\partial u}{\partial s_t} + \beta\pi[V_{t+1}(0) - V_{t+1}(1)] = \frac{\partial u}{\partial l_t}, \qquad t = 0, 1. \tag{6}$$

In this benchmark scenario, the time allocated to schooling and socializing can be summarized through the following policy functions for $z_t = 0, 1$:

$$\begin{aligned} &s_0^*(0) > s_1^*(0) > s_2^*(0) = \omega_s, \quad l_0^*(0) < l_1^*(0) < l_2^*(0) = \omega_l \\ &s_t(1) = \omega_s(1 - \psi)_s \qquad\qquad\quad l_t(1) = \omega_l(1 - \psi). \end{aligned} \tag{7}$$

Intuitively, the model predicts that absent the Ebola epidemic and ELA clubs, young women's time

allocation to schooling decreases steadily over time, and drops permanently once they transition to motherhood. The first implication maps closely to the cross sectional fall in enrolment rates by age shown in Figure 3, and the second maps closely to the importance of pregnancy as a reason for dropout at baseline shown in Figure 4.

4.3 Endline: The Ebola Epidemic and ELA Clubs

We now develop the model allowing for the epidemic in period $t = 1$ and the provision of ELA clubs. For expositional ease, we focus on the time allocation choice of girls without a child at the onset of the epidemic ($z_1 = 0$), that is true for 88% of our sample aged 12-17 at baseline.[19]

School closures during the epidemic imply $s_1 = 0$. To see how this can persistently impact time in school, we first note that during the epidemic ($t = 1$), in control villages girls can only reallocate their time towards socializing, while in treated villages, another alternative is to spend time at ELA clubs. With $T \in \{0, 1\}$ representing treatment assignment, the constraint $c_t \in [0, T]$ captures the availability of ELA clubs. A girl's time allocation problem can thus be rewritten as:

$$\begin{aligned} V_1(0) &= \max_{c_1, l_1} u(0, c_1, l_1) + \beta \mathbb{E}_z[V_2(z_2)] \\ V_2(z_2) &= \max_{s_2, c_2, l_2} u(s_2, c_2, l_2) \end{aligned} \tag{8}$$

subject to: (i) $c_1 + l_1 = 1$; (ii) $s_2 + c_2 + l_2 = 1 - \psi z_2$; (iii) $s_2, l_1, l_2 \in [0, 1]$; $c_1, c_2 \in [0, T]$. Demand for safe spaces is driven both by the contemporaneous utility gains from attending ELA clubs, and the intertemporal value of displacing time with men and thus reducing the likelihood of pregnancy. The FOC for the time spent in clubs during the epidemic makes this clear:

$$\frac{\partial u}{\partial c_1} + \beta\pi[V_{t+1}(0) - V_{t+1}(1)] = \frac{\partial u}{\partial l_1}. \tag{9}$$

We solve this to derive the demand for schooling post-epidemic as a function of treatment assignment, where we use capital letters to denote expected demand, and expectations are taken over the distribution of the state variable:

$$\begin{aligned} \text{Treatment:} \quad & S_2^T = \mathbb{E}_z[s_2^*(z_2)|T = 1] = \omega_s^T(1 - \rho(1 - C_1^T)) \\ \text{Control:} \quad & S_2^C = \mathbb{E}_z[s_2^*(z_2)|T = 0] = \omega_s(1 - \rho), \end{aligned} \tag{10}$$

where $\omega_s = \frac{\alpha_s^\sigma}{\alpha_s^\sigma + \alpha_l^\sigma} \geq \omega_s^T = \frac{\alpha_s^\sigma}{\alpha_s^\sigma + \alpha_c^\sigma + \alpha_l^\sigma}$ and $\rho = \pi\psi$ is the pregnancy risk young girls face.

[19] As $z_t = 1$ is an absorbing state, the time allocation choices of those who have had a child exhibit no dynamics and will not therefore qualitatively impact the results.

4.3.1 Treatment Effect of ELA Clubs on Schooling

The treatment effect on time in school post-epidemic is:

$$TE = S_2^T - S_2^C = -(1-\rho)(\omega_s - \omega_s^T) + \rho C_1^T \omega_s^T.$$

The first term is the *contemporaneous* channel, where the share of time allocated to school falls because safe spaces are a further substitute for schooling ($\alpha_c > 0$). The second term is the *intertemporal* channel where the use of safe spaces during the epidemic (C_1^T) reduces the likelihood of becoming pregnant, relaxing the post-epidemic time constraint and so increasing time in school ($\alpha_s > 0$). These move the treatment effect on post-epidemic schooling in opposite directions.[20]

Pregnancy risk ρ matters for time in school in both treatment and control villages, but to different extents. If the epidemic differentially shocks the degree of risk girls face, we have that:

$$\frac{dTE}{d\rho} = \left(C_1^T + \rho \frac{\partial C_1^T}{\partial \rho} \right) \omega_s^T + (\omega_s - \omega_s^T) \geq 0.$$

Hence the treatment effect on schooling increases in pregnancy risk ρ (we see this from the FOC and the fact that $\rho = \psi\pi$ implies C_1^T is increasing in ρ). Therefore, while the sign of treatment effects of ELA clubs on time in school is *a priori* ambiguous, it increases in pregnancy risk. This is a key prediction we take to the data.

4.3.2 Other Considerations

The model features driving the results are: (i) safe spaces substitute time from schooling and socializing ($\alpha_c > 0$), (ii) the likelihood of becoming pregnant is increasing in the amount of time spent socializing ($\mathbb{P}[z_{t+1} = 1 | l_t, z_t = 0] = \pi l_t$); (iii) pregnancy has a time cost in future periods ($\psi > 0$). While the model could accommodate additional features, these three simple assumptions are sufficient to highlight a key result: the sign of treatment effects of ELA clubs on schooling post-epidemic is *a priori* undetermined, but these effects will be increasing in pregnancy risk. The remaining assumptions are standard or serve expositional purposes.[21]

[20] The treatment effect can be signed in the extreme cases of either there is no risk of pregnancy ($\pi = 0$) or no time cost associated with having children ($\psi = 0$). Then $TE = -(\omega_s - \omega_s^T) < 0$, as clubs only act as a substitute for schooling.

[21] For example, the model emphasizes the consumption value of each activity, embodied in the α taste parameters. However, schooling might also be considered an investment into human capital generating future returns. The same might also be true for attending ELA clubs given their provision of life skills and vocational training. While we have not modelled labor markets, these investment returns would effectively just change (α_s, α_c) parameters, but the fundamental trade-offs captured in the model remain. We return to these issues below in the empirical analysis.

5 Model to Data and the Research Design

5.1 Mapping the Model to Data

To map the model to data we need to construct a village-level measure of the pregnancy risk young girls face during the epidemic, $\rho = \pi\psi$. This is *not* the same as the health risk of Ebola, but it is naturally correlated to the incidence of Ebola. We construct ρ_{vd} using information from the village leader survey administered between June and October 2015, where respondents were asked to recall monthly information from July 2014 on whether the local primary health unit (PHU) was closed, disrupted, and an overall PHU functioning score. They were also asked about whether the nearest secondary school opened on time (many openings were delayed from April 2015 but all schools would have re-opened by the time of our endline survey). These components relate directly to increases in pregnancy risk for young girls and women because: (i) PHU closures reduce access to contraceptives; (ii) prolonged school closures increase the period over which girls are at risk from unwanted sexual abuse or demands from men.

PHUs and secondary schools serve multiple villages over a wide radius and so the functioning of PHUs and schools during the crisis is unlikely to be impacted by the presence of ELA clubs in treated villages, that constitute a small share of all villages in our four districts (and of course, the control villages also constitute only a small share of all villages in our setting, so the vast majority of villages covered by the same PHUs and schools are not in our evaluation sample).[22]

We combine these components into an index following Anderson [2008]. Table 3 shows descriptive evidence on each component and the overall pregnancy risk index. Each component varies across villages, with there being substantial variation within and between districts (Column 2). Panel C shows the constructed index, that by definition is standardized with mean zero and standard deviation one. We define a village pregnancy risk dummy equal to one if the index is above its 75th percentile, and zero otherwise. We refer to these as high and low risk villages, where 17% of villages are so defined to be high pregnancy risk locations for young girls.[23]

Figure 5 shows the regional variation in our risk index, contrasting it with geographic variation in Ebola cases. The central map in Figure 5 shows WHO measured caseloads across the 14 districts

[22] PHUs comprise three tiers: community health posts (CHPs) community health centres (CHCs), and, maternal and child health posts (MCHPs). The lowest tier PHU facility typically serves a population of up to 5,000 within a 3-mile radius covering 10 to 20 villages. In our evaluation sample, the average distance to the nearest PHU is 1.55 miles. Similarly, 83% of villages have no secondary school in them and the distance to the nearest one (conditional on not being in the village) is 4.91 miles.

[23] To get a sense of what this classification means, low risk villages never have their PHU ever closed, 18% have PHU disruptions, and their average PHU functioning score is 94. In contrast, 82% of high risk villages have their PHU ever closed, all of them have the PHU ever disrupted and the PHU functioning score is 67. In low risk locations, 88% of secondary schools opened on time, while this falls to 62% in high risk locations.

(official data on cases is unavailable at a finer level). The districts with the highest Ebola caseloads are Port Loko (close to, but not including the capital, Freetown), and Kailahun (where the initial outbreak occurred). The outer district maps in Figure 5 show how the risk index varies over villages, by treatment and control. Within each district, there are both high and low pregnancy risk villages. A variance decomposition of the index reveals that within district variation accounts for the majority (70%) of the overall variation.

To demonstrate that ρ_{vd} measures localized variation in the nature of pregnancy risk for girls, Panel A of Figure A4 shows within district partial correlations between the index and a host of village level covariates. We find no significant correlations with nearly all these other village characteristics, although richer villages are associated with greater risk. All these village covariates – including the village PPI score – are conditioned on throughout.

Panel B of Figure A4 shows within district partial correlations between the index and historic measures of health services or knowledge, measured at the Chiefdom level using DHS2013 data or the 2007 National Public Survey. The risk index is also uncorrelated to these past health related behaviors, health outcomes, access to health facilities, and state capacity in health. We later present a robustness check that shows the documented heterogeneous effects of ELA clubs on learning are specifically related to village-level pregnancy risk ρ_{vd}, and not other village characteristics such as village poverty.

Of course our quantitative results will be sensitive to the exact construction of ρ_{vd}. We show our core results are qualitatively robust to: (i) exploiting the continuous measure of pregnancy risk to show the intensity of treatment effects the model highlights ($\frac{dTE}{d\rho}$); (ii) defining pregnancy risk to be within-district.

5.2 Research Design and Identifying Assumptions

Following the simple intuition of the model that the impact ELA clubs have on schooling varies with pregnancy risk, we adopt a 2×2 research design, where one dimension is the random assignment of villages to ELA, $T \in \{0, 1\}$ and the second is the quasi-random assignment of villages to high and low pregnancy risk ρ during the Ebola epidemic. For outcome y for individual i in village v in district d we estimate the following ANCOVA specification:

$$y_{ivd} = \alpha y_{i0} + \beta_1 T_{vd} + \beta_2 \rho_{vd} + \beta_3 \left(T_{vd} \times \rho_{vd}\right) + \gamma_0 X_{ivd} + \gamma_1 X_{vd} + \lambda_d + u_{ivd}, \tag{11}$$

where y_{i0} is the outcome at baseline (whenever available), T_{vd} is a treatment dummy, ρ_{vd} is a dummy equal to one if village v is where girls experience a greater increase in pregnancy risk

because of the epidemic. X_{ivd} and X_{vd} are characteristics of i and her village v, λ_d are district fixed effects (the randomization strata), and u_{ivd} is an error term.[24]

The Appendix shows the robustness of our core findings to: (i) using randomization inference to test the null of no treatment effects; (ii) adjusting for multiple hypothesis testing; (iii) only controlling for district fixed effects.

The parameters of interest are: (i) $\widehat{\beta}_1$, the treatment effect of ELA clubs in low pregnancy risk villages; (ii) $\widehat{\beta}_1 + \widehat{\beta}_3$: the treatment effect of ELA in high pregnancy risk villages; (iii) $\widehat{\beta}_2$: the impact of residing in a high pregnancy risk control village relative to a low pregnancy risk control village. We need five assumptions to hold for this design to yield causal impacts.

First, that ELA clubs are randomly assignment. Tables 1 and 2 already showed balance on observables. Second, we require independence of ρ and T. To investigate this we regress the pregnancy risk index on the treatment dummy. Column 3 in Table 3 shows these partial correlations: none are statistically different from zero. This result continues to hold when: (i) we also condition on village characteristics (Column 4); (ii) we allow the treatment dummy to interact with distances from key facilities (Column 5); (iii) we allow for model selection using an Elastic Net penalized regression (Column 6). As shown in the final row in Panel C, all results continue to hold when we use the pregnancy risk dummy.

Third, we require there to be no selection bias due to the non-random incidence of high pregnancy risk. To investigate the possibility beyond what was shown in Figure A4, Tables A4 and A5 compare characteristics of villages and young women between high and low risk locations. On both sets of characteristics, the samples are well balanced. As suggested in Figure 5, the within district variation in pregnancy risk is as good as random.

Fourth, we require the extent of program implementation to not vary with pregnancy risk. The key aspect of ELA clubs is that they are open and so provide a safe space for girls, and spend time away from men. This shows the share of clubs ever opened or continuously opened. Figure A5 shows ELA club functioning, by pregnancy risk. In both high and low risk villages, at least 60% of clubs are open, by December 2014 – close to the peak of the epidemic – over 90% of clubs are open in both high and low risk villages.[25]

Finally, we need to be able to rule out a standard selection on gains concern arising from

[24] The village controls include those shown in Panel A of Table 1. Individual controls (measured at baseline) are age, the household poverty score, household size and whether the girl is illiterate.

[25] Of course, there are differences in program components delivered (in the relevant treatment arms). We generally see that life skills training was offered to a greater extent in high risk villages. Vocational training appears to have been first rolled out in low risk villages, but once quarantines were lifted, high risk villages caught up. These differences are less important give the key role that ELA clubs play is in terms of providing a safe space, and moreover, by the time of the endline survey, all relevant program components have been delivered for over a year in all villages.

the fact that the returns to ELA might differ across pregnancy risk. On variation in participant characteristics, Table A6 compares characteristics of ELA participants by pregnancy risk. We find no evidence of differential selection into ELA across risk intensities. Participants across high and low risk villages do not differ in relationship or marital status, whether they experience intimate partner violence (and so might be prevented from attending ELA clubs), the various measures of empowerment, human capital and engagement in economic activities at baseline.

6 Results: Young Girls

6.1 Time Use

We first examine time use across wing broad activities: ELA club attendance, learning, working (income generating activities), household chores and socializing. Learning corresponds to all education-related activities except ELA (formal schooling, other vocational training, church-based schools). To account for interlinked time allocations across activities, we estimate a SUR model allowing error terms to be clustered by village. All estimates include zeroes and so are interpreted as the total effects margin. Figure 6A summarizes the results where each activity shows the parameters of interest: (i) $\widehat{\beta}_2$ (red): the pregnancy risk effect, namely the impact of residing in a risk control village relative to a low risk control village; (ii) $\widehat{\beta}_1 + \widehat{\beta}_3$ (dark blue): the treatment effect of the availability of ELA clubs in high risk villages; (iii) $\widehat{\beta}_1$ (light blue): the treatment effect of the availability of ELA clubs in low risk villages. We show the 90% confidence interval for each estimate. Columns 1 to 5 in Table 4 shows the corresponding SURE results. At the foot of the table we report the p-value on the null that $\beta_3 = 0$, so establishing whether the the provision of ELA club safe spaces has a differential impact by pregnancy risk ($\frac{dTE}{d\rho}$).

The first category of time use shown in Figure 6A is time spent at ELA clubs. In all villages, young girls devote around 3hrs/week at ELA clubs. This is a plausible magnitude and in line with the earlier results on participation. Consistent with there being no selection on gains for young girls, the time spent at ELA clubs is the same in low and high risk villages ($p = .528$).

The remaining Columns show stark impacts on time allocation of resider in a high pregnancy risk village: moving from a low to a high risk control village is associated with a significant decline in time spent learning. The magnitude of this is 12.2hrs/wk, corresponding to 25% of the baseline mean in low risk control villages. This time is reallocated towards work/income generation (that increases by 6.07hrs/wk, or 40%), and household chores (that increases by 5.62hrs/wk, or 13%).

The availability of ELA clubs largely reverses this time reallocation related to high pregnancy risk: ELA offsets this by 9.84hrs/wk (or 81% of the effect of higher pregnancy risk). This time

comes from reduced exposure of young girls to time spent on household chores by 4.68hrs/wk.

Hence, in high risk villages time spent learning and at ELA clubs move together post-pandemic – both increase. In the language of the model, the intertemporal effect of ELA clubs outweighs the contemporaneous effect in villages with high pregnancy risk during the epidemic. Consistent with the model, the results in Table 6 show the opposite is true in low risk villages: in those villages the evidence suggests the availability of ELA clubs further reduces time spent learning in formal institutions post-epidemic, by 3.03hrs/wk (or 25% of the effect of higher pregnancy risk).

Could these results be picking up some other village characteristic unrelated to pregnancy risk? Table A7 shows the documented heterogeneous effects of ELA clubs on time spent learning are specifically related to our measure of village-level pregnancy risk ρ_{vd}, and not other village characteristics. More precisely, Column 1 repeats our baseline results on time spent learning using the village level pregnancy index. Columns 2 to 4 then shows heterogeneous effects of ELA by village poverty, where each Column uses an alternative threshold to divide villages into high/low poverty. We find no evidence that ELA clubs have differential effects on time spent learning in richer and poorer villages. The remaining Columns show equally weak heterogeneous impacts of the availability of ELA clubs on time spent learning across by village infrastructure, or distance from infrastructures outside the village. In short, the evidence suggests that village level pregnancy risk is the key village characteristic driving heterogeneous impacts of ELA clubs.

The last category of time use shown in Figure 6A relates to time spent socializing. Here we see that in all villages, time spent socializing significantly decreases. Some of this will be reallocated to ELA clubs (where girls can safely meet others) but we next explore whether this reallocation of young girls time also allows them to substitute time away from men, and ultimately increases their agency over their bodies.

6.2 Socializing and Time Spent with Men

We split time spent socializing into that spent with men (where the survey question refers precisely to time with men they are sexually active with), with friends, alone, and in group activities (such as volunteering/church). Throughout, this last category might serve as a partial euphemism for secret societies, that cannot be asked about directly. We estimate (11) across forms of social activity using a SUR specification. Figure 6B summarizes the results, Columns 6 to 9 in Table 4 show the underlying regression results.

We see dramatic changes for how young women in control villages spend time socializing: central to this is changes in time spent with men. In high risk control villages, young girls are significantly more exposed to men for sexual relations: post-epidemic the time spent with men

increases by 1.27hrs/wk, a 50% increase over the baseline mean. The presence of ELA clubs helps to largely offset this increased exposure to men. They do so significantly in all villages, with the magnitude being greater in high risk villages ($p = .012$). These offsetting effects are 1.86hrs/wk (.60hrs/wk) in high (low) risk villages. These findings reinforce the notion that ELA clubs provide a safe space that provide an alternative to where young women spending time with men with whom they are sexually active, and this is more so for girls in high risk villages.

The remaining categories of socializing show that: (i) increased pregnancy risk in control villages has no impact on other forms of socializing except spending time with men; (ii) in both high and low risk villages, the availability of ELA clubs reduce time young girls spend with friends, alone, and in group activities (volunteering/church). Of course, as Figure 6A showed, these time reductions are partly offset by time spent with other young girls at ELA clubs instead.

6.3 Sexual Activity and Teen Pregnancy

How do all these reallocations of time translate into post-epidemic outcomes related to sexual activity and pregnancy? Column 1 of Table 5 shows impacts on the frequency of unprotected sex (combining self-reports on the frequency of sexual intercourse with contraceptive use).[26] This rises with our measure of higher pregnancy risk in control villages. However, this impact on unprotected sex is mostly offset in high risk villages where young girls have ELA clubs available to them.

From the perspective of lifetime welfare, the key outcome for girls is teen pregnancy. On the frequency of pregnancies *between* baseline and endline, Column 2 shows that residing in a high risk village is associated with a 10.5pp increase in the likelihood of becoming pregnant by endline. Hence the epidemic speeds up transitions into childbearing for teenagers in exactly those locations where health service provision has collapsed, and dangers during childbirth to girls are likely to be even more severe than pre-epidemic.

Column 3 shows the increase in teen pregnancy is driven by out-of-wedlock pregnancies: absent ELA clubs, these rise by 7pp in high risk control villages relative to low risk villages. However, this impact on out-of-wedlock births is completely reversed in high villages in which young girls have the safe space of ELA clubs are available.

[26] Around 25% of girls report being in a relationship at baseline. Hence changes over time on these margins reflect both the consequences of newly formed relationships, as well as changes in behavior over the crisis for intact relationships. Results from the long term follow-up survey discussed below, shed more light on the changing characteristics of partners these girls end up in relationships with.

6.4 School Enrolment

We now complete the causal chain linking temporary school closures during the epidemic to longer term impacts on the schooling of young girls, an effect exacerbated by the policy that 'visibly pregnant girls' could not re-enrol even once schools re-opened. Column 4 of Table 5 confirms this link: we see that moving from a low to a high risk control village is associated with a dramatic fall in school enrollment rates of 17pp. To reiterate, this fall is measured well after the country is declared Ebola free and schools have reopened. Columns 5 and 6 shed light on the kinds of economic activity these girls engage in instead: they do not combine school and work but there is a significant rise in exclusively engaging in work by 19pp. In short, absent ELA clubs, the epidemic significantly accelerates the school-to-work transition for young girls.[27]

ELA clubs dramatically counter the school-to-work transition for young women in high risk villages. In villages randomly assigned an ELA club, the fall in enrolment post-epidemic is halved, to 8pp. Indeed, the magnitude of the fall in out-of-wedlock pregnancies (7.5pp) closely matches the rise in school enrolment (8.5pp) in high risk villages with an ELA clubs available. The reason why ELA clubs help girls re-enrol post-crisis in high risk villages is that these safe spaces help them avoid spending time with men, avoid out-of-wedlock births, and thus they are not barred from re-enrolling in school post-epidemic. This is all in line with the earlier results on time spent learning. In the language of the model, the intertemporal effect of ELA clubs outweighs the contemporaneous effect in villages with high pregnancy risk during the epidemic.

In treated high risk villages, we observe a lower likelihood that young girls transition exclusively into work post-epidemic. Moreover, in those villages the availability of ELA clubs also enables young girls to combine school and work post-epidemic (Column 6) – by 9.7pp.

Consistent with the earlier results on time spent learning, we find that in low risk villages, the availability of ELA clubs further reduces school enrolment by 5.2pp. In these villages the evidence suggests ELA clubs substitute for schools post-epidemic so that the contemporaneous effect dominates the intertemporal effect.

For all outcomes related to enrolment, working or combining the two, the impact of ELA clubs significantly differs for high and low risk villages ($\widehat{\beta}_3 \neq 0$ in each case, $p = .020$, .052, and .020).

[27] The movement into income generation for younger girls is driven by their engagement into self-employment. This is not surprising, given that most women are engaged in self-employment activities pre-crisis [Casey *et al.* 2016], and wage employment opportunities were severely curtailed during the crisis.

6.5 Other Outcomes and Robustness

The Appendix presents results on other outcomes and robustness checks. First, we examine whether in high risk villages ELA clubs raise the relative returns to school attendance because they provide complementary skills through their intervention components. As Table A8 shows, the pattern of impacts on literacy and numeracy skills – by pregnancy risk, the provision of ELA clubs and their interaction – follow exactly the patterns found for school enrolment. In contrast, we find weak statistical evidence that ELA specific skills – such as those related to entrepreneurial confidence or financial literacy – are impacted. This narrows the interpretation of ELA clubs impacting the economic lives of young women over the course of the Ebola epidemic because they offer a safe space to young girls.[28]

Second, we saw earlier that the availability of ELA clubs are cause young girls to reallocate time spent with friends or engaged in social activities. This was so irrespective of the pregnancy risk girls faced during the epidemic. The reduction in time spent with other can have one of two interpretations. Girls might be substituting this with spent at ELA clubs, or there might be an overall weakening of social ties between girls that persists post-crisis. Given the different implications of each, we examine this further by exploiting a network survey module fielded at baseline and endline. This asked respondents about the number (and identity) of ties to other girls in the village along four dimensions: friendship, for business (income generation), who intimate topics are discussed with, and for credit/finance. Table A9 shows the provision of ELA clubs curbs any loss in young girl's social ties along multiple dimensions in high risk villages.[29] Such maintenance of social structures has both micro and macro implications in the long run [Fogli and Veldkamp 2019]. These findings add to a nascent literature on how development interventions impact the structure of networks [Heβ *et al.* 2020].

Third, we examine whether ELA clubs help organize and coordinate actions to control the epidemic. Table A10 examines impacts on reported cases of Ebola. We elicited information about whether any Ebola cases had occurred in the household, extended family or friendship network. We generally find negative point estimates of ELA clubs in low and high pregnancy risk villages, but there are only significant declines in reported Ebola cases by younger girls among their extended family network (by 4.5pp or 30%) and friendship networks (by 5.0pp or 28%).[30]

[28] These skills measures are constructed are constructed from various self-reported abilities. These are then aggregated and rescaled to range from 0 to 1, with the latter indicating more advanced proficiency. Entrepreneurial Confidence is an index that measures respondents' self-reported ability to: run a business, identify business opportunities, obtain credit, save and invest, manage financial accounts, bargain prices, manage employees and search for jobs. Financial Literacy is assessed through eight simple problems relating to market prices, interest rates, borrowing and budgeting. The number of correct answers is rescaled in an index ranging from 0 to 1.

[29] Given network ties are censored at zero, we estimate (11) using a Tobit model.

[30] These impacts are identified from the endline cross-section because only then did we ask respondents about

Finally, in the Appendix we examine the robustness of our core findings to: (i) using randomization inference to test the null of no treatment effects; (ii) adjusting for multiple hypothesis testing; (iii) only controlling for district fixed effects. We also show our core results are qualitatively robust to two alternative constructions of the pregnancy risk index: (i) exploiting the continuous measure of pregnancy risk to show the intensity of treatment effects the model highlights ($\frac{dTE}{d\rho}$); (ii) exploiting only within-district variation in pregnancy risk.

7 Extended Results

7.1 Older Girls and Women

We now examine a focused set of outcomes for older girls and women, that were aged 18-25 at baseline in 2014: while this cohort will be less impacted by school closures given their lower levels of enrolment at baseline (as Figure 3B showed), they will be relatively harder hit by the large and rapid loss of economic opportunities due to the epidemic. They are still subject to the same heightened exposure to men and pregnancy risks during the epidemic as younger girls, and can also gain from the protective safe spaces that ELA clubs provide.

Figure 7 summarizes time use impacts on this use for this older cohort. From Panel A we see that in all villages, this cohort devotes around 3hrs/week at ELA clubs, in line with the results for younger girls. Consistent with there being no selection on gains, the time spent at ELA clubs does not differ with village-level pregnancy risk ($p = .741$). The remaining bars in Panel A again show a pattern of protective effects of ELA in high risk villages: the program helps maintain time spent learning, and keeps older girls away from devoting time to household chores. Older girls in treated villages also spend less time socializing: this falls by 2.97 and 4.01hrs/wk in low (high) risk villages, corresponding to 10% (14%) reductions relative to the baseline mean.

Panel B breaks down ways in which they spend time socializing. As with the younger cohort, in control villages, heightened pregnancy risk is associated with spending more time with men. However, the availability of ELA clubs again provides an alternative time use: these offsetting effects are 1.65hrs/wk (1.32hrs/wk) in high (low) risk villages.

Table 6 next examines impacts on sexual activity and pregnancy. Linking directly to men's actions, Columns 1 and 2 examine the frequency of unwanted or transactional sex, as reported to have occurred in the past year. This covers the period of the epidemic so potentially capture

Ebola cases, and so we do not control for baseline outcomes. To improve precision, the sample is the same set of individuals tracked from baseline to endline used throughout, but we also add in respondents from the refresher sample collected at endline, who were resident in the village since before the outbreak. The results are near identical not using this second group.

changes that started to occur during the crisis.[31] In high risk villages with ELA clubs, older girls report significantly more unwanted sex and transactional sex. These are large increases: unwanted sex increases by 5.4pp, corresponding to 35% of the baseline mean; transactional sex increases also by exactly 5.4pp, corresponding to 115% of the baseline mean.

Columns 3 and 4 show that ELA prevents these behavioral changes translating into higher fertility because older girls increase their use of female controlled contraceptives. This impact of ELA is obviously reassuring in the short term, as delaying childbearing can help improve the lifetime welfare trajectory of women. It also shows that behavioral change among older girls is consistent with them taking on board some the life skills provided by ELA in high disruption locations and bargain over the use of contraceptives [Ashraf *et al.* 2014]. These changes in contraceptive use allow them to offset some of the risks from engaging in transactional sex.

7.2 Experimenter Demand Effects

An obvious concern is that responses might be driven in treated villages by experimenter demand effects. This interpretation does not easily fit the results because the treatment effects of ELA vary across: (i) age cohorts; (ii) epidemic-related pregnancy risk for different outcomes across cohorts. Following Dhar *et al.* [2020], we address the concern using data collected (in the long term follow up) on the Marlowe-Crowne social desirability scale, a 13-question survey module developed by social psychologists to measure an individual's propensity to give socially desirable answers [Crowne and Marlowe 1960]. We convert respondents' social desirability score (i.e., the count of very positive traits they say they have) into an index using the method set out in Anderson [2008], that accounts for the covariance structure in the underlying questions. A higher index signifies an individual that seeks more social approval.

Table A12 presents the results where we focus on outcomes most subject to social desirability bias: (i) time spent socializing with men (for both cohorts); (ii) the incidence of unwanted and transactional sex (for the older cohort). For each, we report our baseline specification including the Marlowe-Crown index (in the smaller sample tracked in the long term follow up), and how the results vary by those above/below the median of the social desirability index. We see that: (i) there is no significant relationship between the index and these outcomes; (ii) for time spent with men there also appears to be no interaction of this index with treatment for either cohort; (iii) for unwanted or transactional sex, it is young women that have a below median index – and so seek less social desirability – that have the larger increases in these outcomes in treated villages,

[31] When asking about transactional sex, we mention multiple forms of in-kind gifts that might be provided by partners, including help with school fees. This has long been argued to be part of transactional sexual arrangements in place for younger girls in this context [Bledsoe 1990].

suggesting if anything we might be underestimating changes in such outcomes among girls that seek to provide socially desirable answers to enumerators.

7.3 Interlinked Outcomes Across Cohorts

Drawing together findings across age cohorts, the common impact of ELA clubs to allow girls and young women to allocate time away from men. For the younger cohort aged 12-17, this leads to less unprotected sex, lower rates of out-of-wedlock fertility, that then map almost completely to higher rates of re-enrolment in school post-epidemic. For the older cohort however, the availability of ELA clubs in high risk villages leads to more transactional sex. As in Dupas and Robinson [2012] and many other crisis contexts, engagement in transactional sex by older girls might then represent a form of income generation in a time of aggregate crisis, when economic opportunities are curtailed and other coping mechanisms to smooth consumption are unavailable.[32]

A natural question is whether these impacts across cohorts are interlinked? This depends fundamentally on whether the types of men who would seek transactional sex with older women would first seek it with younger women (who would not report it as transactional). If not, the impacts are not interlinked, but could rather reflect that the results reflect increased entrepreneurial activity or an increase in risk-taking behavior among the older cohort in high risk villages.[33]

On the other hand, the alternative interpretation is that by protecting younger women in treated villages, a potential consequence is that men shift attention to older girls. This is compounded by the fact that economic opportunities for men collapse during the epidemic, so they have fewer work related activities to devote time towards. These forces can place upward pressure on the price of transactional sex in these villages. As Figure 4B showed, engagement of women in transactional sex occurs even pre-epidemic, and increases steadily with age. As the price of transactional sex rises, it becomes more profitable for older girls to engage in such behaviors.

Irrespective of the interlinkage across cohorts, two aspects related to the use of transactional sex in ELA villages are somewhat reassuring though. First, this behavior is matched by increased contraceptive use among the older cohort, that helps protect their reproductive health [Shah 2013]. Second, we find no evidence that younger women learn/imitate the behavior of older women in moving into transactional sex.[34]

[32] Entry into sex work has been argued to be a coping strategy for women in times of other economic crisis: such as post-WW2 in Germany, Italy and Japan [Bullough and Bullough 1987], during the 1930s depression in the US [Allen 2004] and in 1990s Russia [Atlani *et al.* 2000].

[33] Risk preferences can be impacted by aggregate shocks [Callen *et al.* 2014, Cameron and Shah 2015]. Much of this literature is consistent with the concept of risk vulnerability so shocks lead to *higher* levels of risk aversion, as individuals update beliefs over the background risk they face [Gollier and Pratt 1996].

[34] As Shah [2013] discusses, research shows that sex workers in low-income settings are paid substantial premia for non-condom sex [Rao *et al.* 2003, Gertler *et al.* 2005, Robinson and Yeh 2011], and this risk premium is best

7.4 Long Term Follow Up

Between June 2019 and January 2020 we conducted a long term follow up of our respondents, four years after the end of the Ebola epidemic. We use this examine whether the most important impacts documented persist as the macroeconomy is well on the path of recovery from the epidemic. In addition, the long term follow up gave us the opportunity to interview men for the first time. We selected partners of tracked respondents, and so shed light on whether the provision of ELA clubs, by protecting women during the epidemics, has consequent impacts on the characteristics of partners they form relationships with in the long run.

At the time of the long term follow up, ELA clubs were not offering any skills training, although in many cases they continued to exist as a club where girls and young women could spend time with each other. Second, among girls tracked to endline, we had funding to survey 71% of them in this long term follow up (3401 respondents). We managed to track 84% of this intended sample, corresponding to 2852 respondents. 92% of these respondents report being in a relationship, and we were able to survey 1368 partners. Hence for partner outcomes, to improve power we focus on the long term impacts of treatment without considering heterogeneity by village pregnancy risk during the epidemic.

7.4.1 Young Cohort

Table 7 shows the long term impacts on girls aged 12-17 at baseline, using a specification analogous to (11). We focus on time use, schooling and pregnancy outcomes. Remarkably, we find persistent impacts in control villages of pregnancy risk during the epidemic. Those in high risk villages spend almost 7hrs/wk less on learning activities. However, equally reassuring is the fact that the impacts of ELA clubs also persist in the long run: the ELA treatment effect in high risk villages increases time spent learning by 7.8hrs/wk, it decreases it for those in low risk villages, and the difference between these is significant ($p = .033$). To be clear, this cohort of girls are aged 17 to 22 in this long term follow up, so they are studying at the highest tiers of the formal education system (even withstanding a year of lost education because of school closures).

Table 7 shows the other persistent impacts of ELA clubs is young girls spending less time socializing (Column 2), where this is driven – five years later – by them spending less time with men, and less time in group activities (volunteering/church).

This all translates into persistent impacts on school and pregnancy related outcomes. In particular, those in high risk control villages have enrolment rates 11pp lower than those in low risk villages, and are almost 15pp more likely to have become pregnant since baseline. This

understood as a compensating differential for increased disease risk [Arunachalam and Shah 2008].

suggests pregnancies related to the Ebola epidemic do not represent mere changes in the timing of birth (*tempo* effects), at least over the window to the long term follow up.

The treatment effect of ELA clubs also persistently differs for girls in high and low risk villages: those in high risk villages have enrolment rates almost 14pp higher than those in low risk villages ($p = .034$), and their pregnancy rates are 13.4pp lower ($p = .074$).[35]

7.4.2 Older Cohort

Table 8 shows long term outcomes in 2019/20 for those aged 18-25 at baseline in 2014. We focus on the same outcomes related to risky behaviors and pregnancy shown earlier. In control villages, there are long run impacts on the likelihood of becoming pregnant of having been in high pregnancy risk village during the epidemic (11.2pp). As for younger girls, this suggests pregnancies related to the Ebola epidemic do not represent mere changes in the timing of birth.

We find that while there are no persistent changes in the frequency of unwanted sex, for those in treated villages that faced higher pregnancy risk during the epidemic, there is still a significantly higher incidence of transactional sex in 2019/20, and is remains significantly different between high and low risk villages ($p = .075$). However we continue to see that this does not lead to increased pregnancies, because of long lasting changes in female-controlled contraceptive use.[36]

7.4.3 Partners

A recurring them throughout has been the many disadvantages young girls and women faced in this context even pre-epidemic – either through severe gender inequalities in labor or health (Figure A1), deep rooted prejudices held against pregnant women (Table 1), or their young ages of marriage, teen pregnancy and being subject to intimate partner violence (Table 2).

In our original data collection we never planned to survey men, and our findings can only hint at how their behavior was impacted during the epidemic, when their economic opportunities disintegrated. Our findings hint at some male-driven outcomes changing over the crisis: most obviously the increase in pregnancies in high risk control villages, and the increase in unwanted and transactional sex among older girls in treated villages. The long term follow up gives an opportunity to survey men (partners of our respondents). Given sample sizes, we increase power

[35] To gauge whether this is plausible, we return to Figure 4A, and note that at baseline, 40% of 17 year olds were enrolled in school, and 11% of 18+ year olds were in school.

[36] Earlier work has shown the long run returns to vocational training in this content [Alfonsi *et al.* 2020]. For both cohorts we have thus also examined whether there are long run impacts on income generating activities: we find little robust evidence of such impacts on either the extensive or intensive margins. This is not altogether unsurprising given the evidence earlier documenting how such program components were severely curtailed during the epidemic, and so ELA clubs primarily served as safe spaces.

by focusing on estimating ITT effects of ELA clubs (not how they vary with pregnancy risk for women during the crisis). We do not control for baseline outcomes as these are unavailable.

Table 9 shows the characteristics of partners at the long run follow up, of both cohorts of girls and young women. On important dimensions, partners in treated villages have improved traits than those partnered to girls and young women in control villages: they are better educated and more averse to gender based violence. However, they are no different in terms of age or gender norms (for the younger cohort of girls), or might even be more conservative (for the older cohort). While only suggestive, these results hint at the matching process changing as a result of the availability of ELA clubs during the crisis, when women were most at risk. This might represent an additional marker of higher long run welfare for treated girls and young women.[37]

8 Discussion

Viruses are a major threat to human health: over the last century, more deaths have been caused by viruses than all armed conflict combined [Adda 2016]. Given the long run incidence of highly infectious diseases is determined by urbanization driving closer contact between human and animal populations, and rising global temperatures, we can expect them to remain a global threat for the foreseeable future. Understanding how such epidemic shocks impact the economic lives of the vulnerable is of fundamental importance. In the context of gender equality, hard-earned gains in women's empowerment can be quickly erased by aggregate economic shocks, and it is in times of greatest crises, that gender differentials in outcomes are most likely to open up [Duflo 2012] – an issue at the fore of policy discussions in all countries in the current pandemic. In this paper, given the nature of timing between our pre-planned evaluation of ELA, and the coincidental outbreak of Ebola just as our baseline survey was completing, our study presents a unique opportunity to understand the microeconomic mechanisms through which this kind of aggregate epidemic shock impacts the economic lives of young women. Our study provides three broad lessons for policy.

First, a key reason why school closures have persistent impacts on girls is because of the policy that pregnant girls cannot re-enrol back into school. Stigmatization and discrimination against pregnant girls remains a pervasive barrier to them resuming education throughout Sub Saharan Africa. Countries such as Uganda and Tanzania have such explicit restrictions in place, while others retain ambiguous policy statements on the issue [Birungi *et al.* 2015]. It is therefore hugely significant that as Sierra Leone was struck by its second major viral epidemic in five years, the

[37] We find no evidence of any softening of attitudes towards pregnant girls in the long run follow up among village elders. In a repeat community survey to village elders in 2019/20, we find a similar pattern of attitudes as we reported in Table 1: for example, 95% of them still agree that visibly pregnant girls are a bad influence, and that they should not be allowed back to school.

government announced it would overturn the law barring pregnant girls from going to school. We hope others follow suit.[38]

Second, beyond spending less time with men, we have throughout found robust evidence that ELA clubs also reduce the time that young girls and women spend engaged in social groups (volunteering/church). This applies equally to both cohorts and irrespective of the pregnancy risks faced during the epidemic. This might hint at the reduced role that *secret societies* play in the lives of young women with access to ELA clubs. This could be important because an important function of secret societies is to reinforce traditional norms and reproductive behaviors among younger girls. Understanding the coevolution of informal secret societies, formal schooling and development interventions remains a large open question for future research.

Third, it is natural to ask whether a similar program would be equally protective in another context and type of aggregate crisis. Preliminary analysis from an impact evaluation of the ELA program in South Sudan (also implemented by BRAC) suggests similar crisis-offsetting effects, even though the nature of the aggregate shock, conflict, is different, and the conflict occurred after a more sustained period of club implementation [Buehren *et al.* 2018]. Nonetheless, the analysis indicates that many of the pernicious effects of conflict on young women are offset by having participated in ELA clubs.

We end by reiterating the link to the current COVID-19 pandemic. While to date Sierra Leone has experienced fewer than 2000 cases and 100 deaths, the potential for the country to face another significant health and economic shock is real. The cohort of girls studied here are experiencing their second such health crisis: in our long term follow up, respondents were interviewed up until January 2020, when the country was on the road to recovery from Ebola, but on the eve of when it would be struck by COVID-19. Understanding the dynamics across these crisis for these young women remains at the top of our research agenda.

A Appendix

A.1 Attrition

Although geographic mobility is high in Sierra Leone, we do not have severe attrition even given the epidemic: 83% of our respondents were tracked from baseline to endline (4790). 81% (3865) of tracked respondents resided in the same village. For those originally in a treated village and

[38]The government of Sierra Leone had originally been challenged over the policy in a legal case brought to the Economic Community of West African States' Community Court of Justice: in December 2019 they ruled that the ban should be revoked. The case challenging the ban was brought by Sierra Leonean NGO (WAVES) in partnership with Equality Now and the Institute for Human Rights and Development in Africa.

then tracked to another, we can use the approximate date of their move to understand the extent to which they were exposed to ELA clubs. At least 60% of tracked movers have been partially exposed to ELA clubs in their original village. Finally, 922 (16%) of girls attrited out of the sample (only 12 were due to death).[39]

Table A3 presents correlates of attrition. Columns 1 and 2 show that treatment assignment, and exposure to high pregnancy risk do not separately predict attrition. Column 3 shows this continues to hold when controlling for both together, and their interaction. This also continues to hold when: (i) we additionally control for characteristics of girls, households and villages (Column 4); (ii) allow there to be differential attrition between treatment, pregnancy risk, and their interaction with baseline characteristics such as enrollment, employment, age and household poverty. The final Column of Table A3 presents correlates of attrition between endline and the long term follow up: we show that treatment assignment and pregnancy risk does not predict attrition, and nor does their interaction.[40]

A.2 Robustness

We examine the robustness of our core results for each age cohort: Table A10 shows the outcomes that are central to understand the impact of the Ebola shock on the economic lives of young women, and the mechanisms through which ELA clubs mitigate these impacts. The outcomes shown are weekly hours spent on learning activities for the younger cohort (Panel A), time spent with men for both cohorts (Panel B), out of wedlock pregnancies for the younger age cohort (Panel C), and the supply of transactional sex for the older age cohort (Panel D). For each parameter of interest, we show the baseline estimate as previously reported. We then consider the following robustness checks.

Randomization Inference, Multiple Hypothesis Testing, Controls First, we use randomization inference to test the null of no treatment effects, following the methods set out in Young [2019] and Heβ *et al.* [2020]. The resulting p-values are shown in braces in Table A11: we see that all of the 11 significant coefficients in the baseline specifications remain statistically significant at conventional levels once we account for randomization inference. This is reassuring and suggests our findings are not driven by outliers.

[39] Attriters were replaced by a refresher sample of 1415 girls surveyed only at endline. Around 44% of this sample resided in the same village at baseline and endline.

[40] Of course individual characteristics of girls jointly predict attrition (such as baseline economic activities engaged in, marital status and household size), but not differentially so in treated villages, in high risk villages, and villages with both (the F-statistics at the foot of each Column report this to be the case).

Second, given the large number of outcomes considered, some adjustment for multiple hypothesis testing can be considered. To be clear, the economic activities outcomes in Panel A sum to one by construction (so we are not measuring impacts on a latent outcome with alternative proxies), and the total effects time allocation results in Panel B are already estimated using a SUR model accounting for correlation across outcomes. The larger concern is that we have multiple ITT estimates in each specification: at the foot of each Column in Table A11 we thus also show the p-value on the F-test of the joint significance of the parameters of interest. In four out of five cases these remain highly significant.

To address multiple hypothesis testing in the most conservative way, we also report p-values computed using the step-down procedure of Romano and Wolf [2016] (based on $1,000$ bootstrap iterations). Five coefficients remain significant: moreover, for the ITT estimate of ELA in high pregnancy risk villages ($\widehat{\beta}_1 + \widehat{\beta}_3$), three of the five coefficients remain significant. This is to be expected given the factorial design estimated goes well beyond the original evaluation design.

We next address the concern that the number of treatment and control villages is relatively small, and the balancing tests in Tables 1 and 2 might not be especially powerful. Indeed, our baseline specification controlled for the village characteristics shown in Panel A of Table 1 to address any potential imbalance. Table A10 then shows how our results vary if we only control for district fixed effects (the randomization strata): of the 11 significant coefficients in the baseline specifications, 9 remain statistically significant.

Alternative Measures of Pregnancy Risk Our fourth set of checks examine alternative measures of pregnancy risk during the epidemic: (i) exploiting the continuous measure of pregnancy risk to show the intensity of treatment effects the model highlights ($\frac{dTE}{d\rho}$); (ii) exploiting only within-district variation in pregnancy risk.

Our baseline results exploited the dummy index measure of pregnancy risk, defined high risk villages to be at the 75th or higher percentiles of our overall pregnancy index (Table 3). The model highlights that time allocations are impacted continuously through pregnancy risk. To investigate this directly, we examine how the results vary using different thresholds of the risk index. Figure A6 shows the results, by age cohort and for two summary outcomes: (i) hrs/wk spent in productive activities of learning, income generation or ELA clubs (Panel A); (ii) hrs/week spent with men (Panel B). The omitted category are villages in the first six deciles of the disruption index. The impacts on time in learning activities and time spent with men both vary depending on the intensity of risk, where we show cutoffs at the 60th, 70th, 80th, 90th percentile of the index. Reassuringly, for both outcomes, we observe increasing impacts of pregnancy risk across deciles,

and increasingly offsetting impacts of the availability of ELA clubs, as the measured intensity of pregnancy risk varies.

To motivate a second approach to constructing the index of pregnancy risk, we note that the main measure used is defined in absolute terms, and so measures the highest risk villages in any of the four districts in our evaluation sample. As Figure 5 shows, this leads to most high risk villages being in Port Loko. For our research questions, it is the absolute level of pregnancy risk that matters. However, this raises the concern of whether the impacts of high versus low risk instead pick up something specific to Port Loko relative to other districts. To probe this further we redefine the high risk dummy to be district specific, so that villages in each district that lie in the highest quartile of the continuous pregnancy risk index are classified as high risk. This is the final row of results shown for outcomes in Table A11: of the 11 significant coefficients in the baseline specifications, 9 remain statistically significant at conventional levels once we consider high risk to be within-district rather than in absolute terms across the evaluation sample (with some point estimates being larger in absolute value than in the baseline specification).

References

[1] ADDA.J (2016) "Economic Activity and the Spread of Viral Diseases: Evidence from High Frequency Data," *Quarterly Journal of Economics* 131: 891-941.

[2] AGÜERO.J.M AND T.BELECHE (2017) "Health Shocks and Their Long-lasting Impact on Health Behaviors: Evidence from the 2009 H1N1 Pandemic in Mexico," *Journal of Health Economics* 54: 40-55.

[3] ALFONSI.L., O.BANDIERA, V.BASSI, R.BURGESS, I.RASUL, M.SULAIMAN AND A.VITALI (2020) "Tackling Youth Unemployment: Evidence from a Labor Market Experiment in Uganda," *Econometrica*, forthcoming.

[4] ALLEN.H (2004) "Prostitution," in R.S.McElvaine (ed.) *Encyclopedia of the Great Depression*, Vol.2., Macmillan Reference USA, New York.

[5] AMNESTY INTERNATIONAL (2015) Shamed and Blamed: Pregnant Girls' Rights at Risk in Sierra Leone,Amnesty International Publications, London.

[6] ANDERSON.M.L. (2008) "Multiple Inference and Gender Differences in the Effects of Early Intervention: A Reevaluation of the Abecedarian, Perry Preschool, and Early Training Projects," *Journal of the American Statistical Association* 103: 1481-95.

[7] ARCHIBONG.B AND F.ANNAN (2020) Schooling in Sickness and in Health: The Effects of Epidemic Disease on Gender Inequality, mimeo, Barnard College.

[8] ARUNACHALAM.R AND M.SHAH (2018) "Prostitutes and Brides?," *American Economic Review Papers & Proceedings* 98: 516-22.

[9] ASHRAF.N, E.FIELD AND J.LEE (2014) "Household Bargaining and Excess Fertility: An Experimental Study in Zambia," *American Economic Review* 104: 2210-37.

[10] ASHRAF.N, N.BAU, C.LOW AND K.MCGINN (2020) "Negotiating a Better Future: How Interpersonal Skills Facilitate Inter-Generational Investment," *Quarterly Journal of Economics* 135: 1095-151.

[11] ATLANI.L, M.CARAEL, J.BRUNET, T.FRASCA, AND N.CHAIKA (2000) "Social Change and HIV in the Former USSR: The Making of a New Epidemic," *Social Science & Medicine* 50: 1547-56.

[12] BAIRD.S.J, C.T.MCINTOSH AND B.OZLER (2011) "Cash or Condition: Evidence from a Cash Transfer Experiment," *Quarterly Journal of Economics* 126: 1709-53.

[13] BAIRD.S, E.CHIRWA, J.DE HOOP and B.OZLER (2014) Girl Power: Cash Transfers and Adolescent Welfare, Evidence from a Cluster-Randomized Experiment in Malawi, NBER Chapters, in *African Successes*: Human Capital, NBER.

[14] BANDIERA.O, N.BUEHREN, R.BURGESS, M.GOLDSTEIN, S.GULESCI AND M.SULAIMAN (2020) "Women's Empowerment in Action: Evidence from a Randomized Control Trial in Africa," *American Economic Journal: Applied Economics* 12: 210-59.

[15] BENNETT.D, C.F.CHIANG AND A.MALANI (2015) "Learning During a Crisis: The SARS Epidemic in Taiwan," *Journal of Development Economics* 112: 1-18.

[16] BIRUNGI.H ET AL. (2015) Education Sector Response to Early and Unintended Pregnancy: A Review of Country Experiences in Sub-Saharan Africa, STEP UP and UNESCO Research Report.

[17] BLEDSOE.C (1990) "School Fees and Marriage Process for Mende Girls in Sierra Leone," in *Beyond the Second Sex*, Sanday.P and R.Goodenough (eds.), University Pennsylvania Press.

[18] BOWLES.J, J.HJORT, T.MELVIN AND E.WERKER (2016) "Ebola, Jobs and Economic Activity in Liberia," *Journal of Epidemiology and Community Health* 70: 271-7.

[19] BUCHMANN.N, E.FIELD, R.GLENNERSTER, S.NAZNEEN, S.PIMKINA AND I.SEN (2018) Power vs Money: Alternative Approaches to Reducing Child Marriage in Bangladesh, a Randomized Control Trial, mimeo, Duke University.

[20] BUEHREN.N, S.CHAKRAVARTY, M.GOLDSTEIN, V.SLAVCHECSKA AND M.SULAIMAN (2018) Girls' Empowerment and Conflict: Evidence from South Sudan, mimeo World Bank.

[21] BULLOUGH.V AND B.BULLOUGH (1987) *Women and Prostitution: A Social History*, Prometheus Books, Buffalo.

[22] CALLEN.M, M.ISAQZADEH, J.D.LONG AND C.SPRENGER (2014) "Violence and Risk Preference: Experimental Evidence from Afghanistan," *American Economic Review* 104: 123-48.

[23] CAMERON.L AND M.SHAH (2015) "Risk-Taking Behavior in the Wake of Natural Disasters," *Journal of Human Resources* 50: 484-515.

[24] CASEY.K, R.GLENNERSTER AND T.SURI (2017) The Economic Impacts of Ebola on Firms in Sierra Leone, IGC Report F-39204-SLE-1.

[25] CHRISTENSEN.D, O.DUBE, J.HAUSHOFER, B.SIDDIQI AND M.VOORS (2020) Building Resilient Health Systems: Experimental Evidence from Sierra Leone and the 2014 Ebola Outbreak, mimeo, Chicago.

[26] CORNO.L, N.HILDEBRANDT AND A.VOENA (2019) "Age of Marriage, Weather Shocks, and the Direction of Marriage Payments," *Econometrica*, forthcoming.

[27] CROWNE.D AND D.MARLOWE (1960) "A New Scale of Social Desirability Independent of Psychopathology," *Journal of Consulting Psychology* 24: 349-54.

[28] DHAR.D, T.JAIN AND S.JAYACHANDRAN (2020) Reshaping Adolescents' Gender Attitudes: Evidence from a School-based Experiment in India, mimeo, Northwestern.

[29] DOEPKE.M, M.TERTILT AND A.VOENA (2012) "The Economics and Politics of Women's Rights," *Annual Review of Economics* 4: 339-72

[30] DUFLO.E (2012) "Women Empowerment and Economic Development," *Journal of Economic Literature* 50: 1051-79.

[31] DUFLO.E, P.DUPAS AND M.KREMER (2015) "Education, HIV, and Early Fertility: Experimental Evidence from Kenya," *American Economic Review* 105: 2757-97.

[32] DUPAS.P (2011) "Do Teenagers Respond to HIV Risk Information? Evidence for a Field Experiment in Kenya," *American Economic Journal: Applied Economics* 3: 1-34.

[33] DUPAS.P, AND J.ROBINSON (2012) "The (hidden) Costs of Political Instability: Evidence from Kenya's 2007 Election Crisis," *Journal of Development Economics* 99: 314-29.

[34] EDMONDS.E, B.FEIGENBERG AND J.LEIGHT (2020) Advancing the Agency of Adolescent Girls, NBER WP27513.

[35] EVANS.D.K, M.P.GOLDSTEIN AND A.POPOVA (2015) "Health-care Worker Mortality and the Legacy of the Ebola Epidemic," *Lancet Global Health* 3: e439-40.

[36] FERREIRA.F.H.G AND N.SCHADY (2009) Social Consequences of the Global Financial Crisis in Latin America : Some Preliminary, and Surprisingly Optimistic, Conjectures, World Bank Other Operational Studies 10957.

[37] FIELD.E AND A.AMBRUS (2008) "Early Marriage, Age of Menarche, and Female Schooling Attainment in Bangladesh," *Journal of Political Economy* 116: 881-930.

[38] FLUCKIGER.M, M.LUDWIG AND A.SINA ONDER (2019) "Ebola and State Legitimacy," *Economic Journal* 129: 2064-89.

[39] FOGLI.A AND L.VELDKAMP (2019) "Germs, Social Networks and Growth," *Review of Economic Studies*, forthcoming.

[40] GERTLER.P, M.SHAH AND S.M.BERTOZZI (2005) "Risky Business: The Market for Unprotected Commercial Sex," *Journal of Political Economy* 113: 518-50

[41] GLENNERSTER.R, T.SURI AND S.BHOGALE (2016) The Implications of the Ebola Outbreak on Markets, Traders, and Food Security in Sierra Leone, IGC Policy Brief.

[42] GOLLIER.C AND J.W.PRATT (1996) "Risk Vulnerability and the Tempering Effect of Background Risk," *Econometrica* 64: 1109-23.

[43] HES.S, D.JAIMOVICH AND M.SCHEUNDELN (2020) "Development Projects and Economic Networks: Lessons From Rural Gambia," *Review of Economic Studies*, forthcoming.

[44] HIMELEIN.K, M.TESTAVERDE, A.TURAY AND S.TURAY (2015) The Socio-economic Impacts of Ebola in Sierra Leone: Results from a High Frequency Cell Phone Survey (Round Three), Washington DC: The World Bank.

[45] HUTTNER.A ET AL. (2018) "Determinants of Antibody Persistence Across Doses and Continents after Single-dose rVSV-ZEBOV Vaccination for Ebola Virus Disease: An Observational Cohort Study," *Lancet Infectious Diseases* , April, DOI: https://doi.org/10.1016/S1473-3099(18)30165-8.

[46] JACOBY.H.G AND E.SKOUFIAS (1997) "Risk, Financial Markets, and Human Capital in a Developing Country," *Review of Economic Studies* 64: 311-35.

[47] JAYACHANDRAN.S (2015) "The Roots of Gender Inequality in Developing Countries," *Annual Review of Economics* 7: 63-88.

[48] JENSEN.R. (2012) "Do Labor Market Opportunities Affect Young Women's Work and Family Decisions? Experimental Evidence from India," *Quarterly Journal of Economics* 127: 753-92.

[49] LAUTHARTE JUNIOR.I AND I.RASUL (2020) The Anatomy of a Public Health Crisis: Household Responses Over the Course of the Zika Epidemic in Brazil, mimeo, UCL.

[50] MACCORMACK.C.P (1979) "Sande: The Public Face of a Secret Society," in *The New Religions of Africa*, B.Jules-Rosette (ed.), Praeger.

[51] MAFFIOLI.E (2020) The Political Economy of Health Epidemics: Evidence from the Ebola Outbreak, mimeo Michigan.

[52] MCORMACK-HALE.F (2018) "Secret Societies and Women's Access to Justice in Sierra Leone: Bridging the Formal and Informal Divide," *Stability: International Journal of Security & Development* 7: 1-17.

[53] RANGEL.M.A, J.NOBLES AND A.HAMOUDI (2020) "Brazil's Missing Infants: Zika Risk Changes Reproductive Behavior," forthcoming, *Demography.*

[54] RAO.V, I.GUPTA, M.LOKSHIN AND S.JANA (2003) "Sex Workers and the Cost of Safe Sex: The Compensating Differential for Condom Use Among Calcutta Prostitutes," *Journal of Development Economics* 71: 585-603.

[55] RASUL.I (2020) "The Economics of Viral Outbreaks," *American Economic Association P&P* 110: 265-68.

[56] ROBINSON.J AND E.YEH (2011) "Transactional Sex as a Response to Risk in Western Kenya," *American Economic Journal: Applied Economics* 3: 35-64.

[57] ROMANO.J.P AND M.WOLF (2016) "Efficient Computation of Adjusted p-values for Resampling-based Stepdown Multiple Testing," *Statistics & Probability Letters* 113C: 38-40.

[58] SHAH.M (2013) "Do Sex Workers Respond to Disease? Evidence from the Male Market for Sex," *American Economic Review: Papers & Proceedings* 103: 445-50.

[59] THOMAS.A, T.NKUZIMANA, A.PEREZ HOYOS, AND F.KAYIYAKIRE (2014) Impact of the West African Ebola Virus Disease Outbreak on Food Security, European Commission, Joint Research Centre.

[60] THOMAS.M.R, G.SMITH, F.H.G.FERREIRA, D.EVANS, M.MALISZEWSKA, M.ALISZEWSKA, M.CRUZ, K.HIMELEIN AND M.OVER (2015) The Economic Impact of Ebola on sub-Saharan Africa: Updated Estimates for 2015, Washington DC: World Bank.

[61] UNDP (2015) Socio-Economic Impact of Ebola Virus Disease in West African Countries: A Call for National and Regional Containment, Recovery and Prevention, UNDG, Western and Central Africa.

[62] UNICEF (2014) Sierra Leone Health Facilities Survey 2014: Assessing the Impact of the EVD Outbreak on Sierra Leone's Health System, Government of Sierra Leone Ministry of Health and Sanitation, Freetown.

[63] WORLD BANK (2011) *World Development Report 2012: Gender Equality and Development*, Washington DC: The World Bank.

[64] WORLD BANK (2014) *The Economic Impact of the 2014 Ebola Epidemic: Short and Medium Term Estimates for West Africa (English)*, Washington, DC: World Bank Group.

[65] YOUNG.A (2019) "Channelling Fisher: Randomization Tests and the Statistical Insignificance of Seemingly Significant Experimental Results," *Quarterly Journal of Economics* 134: 557-98.

Table 1: Village Characteristics

Means, robust standard errors from OLS regressions in parentheses
P-value of t-test of equality of means with relevant control group in braces

	Control	Treatment	Difference	Normalized Difference
	(1)	(2)	(3)	(4)
A. Baseline Balance on Village Characteristics				
Number of dwellings	167	108	{.362}	-.121
	[462]	[148]		
Number of sampled adolescent girls	28.6	28.4	{.943}	-.013
	[13.4]	[9.30]		
Poverty score (Mean across households)	.353	.346	{.394}	-.094
	[.055]	[.054]		
Distance from Freetown (miles)	52.8	52.6	{.291}	-.005
	[25.7]	[24.2]		
Distance from Kailahun (miles)	78.4	78.6	{.248}	.005
	[19.6]	[18.5]		
Distance from nearest PHU (miles)	1.89	1.86	{.940}	-.012
	[1.71]	[1.77]		
Distance from nearest secondary school (miles)	3.53	4.23	{.258}	.115
	[3.34]	[5.10]		
B. Village Leader Survey				
"Girls who are visibly pregnant have a bad influence on their non-pregnant peers" [=1 if strongly agree]	.960	.967	{.873}	.025
"Girls should be allowed to continue their education while pregnant" [=1 if strongly agree]	.120	.073	{.365}	-.111
Pregnant girls allowed to sit exams in the nearest secondary school	.239	.319	{.270}	.132
C. Policy Responses				
Village was quarantined	.060	.040	{.595}	-.065
Village visited by contact tracing team	.960	.933	{.455}	-.084
Received Relief from NGO	.780	.873	{.139}	.174
Village received food aid	.260	.213	{.504}	-.077
Village received school supplies (excl. BRAC)	.220	.207	{.818}	-.023

Notes: Data sources are the Village Census (Panel A), and the Village Leader Surveys (distance measures in Panel A, all outcomes in Panels B and C). Column 3 reports p-values from a test of equality of means carried out by OLS regression of each characteristic on a dummy for assignment to treatment. All regressions include strata (district) dummies and calculate robust standard errors. Normalized differences in Column 4 are computed following Imbens and Wooldridge [2009]. The Poverty Score (PPI) is calculated through scorecards: higher values indicate a lower probability that the household is poor. Distance from Freetown and Kailahun are computed from GPS data.

Table 2: Baseline Balance for Individual Characteristics

Means, clustered standard errors from OLS regressions in parentheses
P-value of t-test of equality of means with relevant control group in braces

	Control	Treatment	Difference	Normalized Difference
	(1)	(2)	(3)	(4)
A. Basic Characteristics				
Number of Adolescent Girls	1,198	3,592		
Age	17.7	17.5	{.412}	-.025
	[3.76]	[3.74]		
In any relationship	.596	.596	{.893}	-.000
Married	.283	.283	{.825}	.001
Age at marriage	16.1	16.4	{.378}	.060
	[2.82]	[2.87]		
Age of husband at marriage	31.0	31.8	{.095}	.078
	[6.88]	[7.42]		
Has Children	.492	.486	{.820}	-.007
If in relationship: experienced any form of intimate partner violence	.464	.486	{.491}	.032
Skills: Literacy [0-100]	22.6	22.0	{.689}	-.016
	[27.5]	[27.2]		
B. Time Use and Sexual Activity				
Sexually active	.747	.712	{.103}	-.056
If active: Age at sexual debut	14.7	14.6	{.348}	-.026
	[2.26]	[2.09]		
Leisure activity: Engaged in sexual activities with men (weekly hours)	5.08	5.14	{.705}	.009
	[5.33]	[5.46]		
If active: Uses contraceptive	.440	.422	{.390}	-.026
(any, excluding condoms)	[.497]	[.494]		
If active: Ever used condoms	.104	.095	{.375}	-.021
Unwanted sex over past year	.106	.101	{.739}	-.012
Transactional sex over past year	.041	.035	{.346}	.022

Notes: Column 3 reports p-values from a test of equality of means carried out by OLS regression of each characteristic on a dummy for assignment to treatment. Regressions include strata (district) dummies and standard errors are clustered at the village level. Column 4 reports normalized differences are computed following Imbens and Wooldridge [2009]. Intimate partner violence is defined as the threat or use of physical violence from the respondent's partner. Time allocation data was collected both at baseline and endline. Respondents were provided a set of 25 beads and a board with six circles representing: "Education", "IGA", "Leisure", "Household Chores", "Sleep" and "Other". The Education category includes schooling, vocational training and study time. "IGA" includes paid and unpaid work of any kind. Respondents were then asked to allocate beads into each circle in a way that represents time allocation in an average week. Data on leisure time allocation was collected in a similar way. The recorded categories for leisure are: "Friends", "Men", "Alone", "Church", "Volunteer" and "Other". The exact phrasing for the "Men" category is "With boys or men you have a sexual relationship with". Respondents were then asked to allocate beads into each circle in a way that represents time allocation in an average week. The data points were later converted into weekly hours using recorded total leisure time from the first exercise. Unwanted Sex is defined as, "Been involved in any sexual intercourse that you were not willing to do". Transactional Sex is defined as, "Receiving anything such as money, gifts, help with schoolwork or something else in exchange for sexual intercourse". Literacy is assessed based on respondent's ability to read simple things like labels on containers (basic), and reading comprehension and writing of complete sentence (advanced). The score representing respondent's proficiency with these tasks is then rescaled to range between 0 and 100.

Table 3: Pregnancy Risk Index

Standard deviations in brackets, standard errors in parentheses

	Mean	Between district variation (share of total)	Unconditional coeff on Treatment	Conditional coeff on Treatment	Conditional coeff on Treatment with distance interaction	Conditional coeff on Treatment with distance interaction and model selection
A. Health Policy Components	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
PHU Ever Closed	.140	.400	.001	-.000	.046	.076
	[.348]		(.049)	(.050)	(.075)	(.075)
PHU Ever Disrupted	.320	.371	.000	-.006	-.077	-.069
	[.468]		(.065)	(.065)	(.098)	(.096)
PHU Functioning Score	89.6	.445	-1.19	-1.02	-1.00	-.342
	[19.8]		(2.58)	(2.55)	(3.90)	(3.98)
B. School Policy Component						
Nearest Secondary School Re-Opened on Time	.825	.302	.085	.106	.072	.080
	[.381]		(.061)	(.059)	(.079)	(.081)
C. Index						
Pregnancy Index	0	.451	-.096	-.132	.094	.111
	[1]		(.132)	(.129)	(.235)	(.248)
Pregnancy Risk Dummy	.170	.429	-.039	-.042	-.013	.009
[=1 if index greater than 75th percentile]			(.050)	(.051)	(.103)	(.108)
N (villages)	200	200	200	200	200	200

Notes: All data comes from the Village Leaders Survey, collected in October 2015. The between group variation reported in Column 2 is computed through a one-way ANOVA analysis of the dependent variable across districts. For each measure of disruptions, Columns 3 through to 6 report estimated coefficients on assignment to treatment from regressions that use incrementally larger sets of village-level covariates. All regressions include district fixed effects and calculate robust standard errors. Column 3 reports the coefficient on ELA from a regression of the Ebola measure of interest on treatment assignment. The coefficient in Column 4 is obtained controlling for: number of dwellings, whether the village is a political stronghold (i.e. it is the residence of a chief), number of NGOs active pre-Ebola, average PPI score, share of Christians, distance from Freetown and distance from Kailahun (where the first Ebola case was recorded). In Column 5 distance from the nearest facility of interest (PHU in Panel A, Secondary School in Panel B, both in Panel C) and interaction between ELA assignment and these distances are added as regressors. None of the coefficients on the interaction between ELA and distance from each facility is statistically significant (not shown). Column 6 includes all regressors and interactions employed in Column 5, plus features selected by a penalized regression (Elastic Net) of the Policy index (dummy) on all village characteristics and their interactions. The Primary Health Unit functioning score is assessed on a monthly basis between July 2014 and September 2015, and later aggregated into an index ranging between 0 and 100. Secondary schools were considered as having re-opened on time if they were open in April 2015. The Pregnancy Risk Index is constructed following Anderson [2008]. It aggregates variables in Panel A and B, and assigns higher values to higher risk villages.

Table 4: Overall Time Use, and Time Spent Socializing

Sample: Girls aged 12-17 at baseline (2014)
Outcomes measured post-epidemic (2016)
SUR estimates, standard errors in parentheses

						Socializing (hours/week)			
	ELA Club	Learning	Working	Household Chores	Socializing	Men	Alone	Friends	Volunteer/ Church
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pregnancy Risk	-	-12.2***	6.07**	5.62***	1.76	1.27***	.641	.251	-.058
		(2.37)	(3.10)	(1.89)	(1.63)	(.444)	(.458)	(.430)	(.660)
ELA Treatment | High Pregnancy Risk	3.02***	9.84***	-2.35	-4.68**	-4.70***	-1.86***	-1.55***	-1.42***	-2.48***
	(.265)	(2.62)	(3.26)	(1.91)	(1.51)	(.452)	(.443)	(.403)	(.585)
ELA Treatment | Low Pregnancy Risk	3.19***	-3.03**	1.72	.480	-2.77***	-.602***	-1.11***	-1.11***	-2.43***
	(.157)	(1.30)	(1.20)	(.790)	(.810)	(.211)	(.233)	(.240)	(.334)
Difference Treatment Effects [β_3, p-value]	{.528}	{.000}	{.239}	{.012}	{.262}	{.012}	{.385}	{.507}	{.942}
Control Mean at BL | Low Pregnancy Risk	-	48.8	15.1	42.3	26.4	2.52	6.35	6.57	10.8
Observations	2,381	2,381	2,381	2,381	2,381	2,379	2,379	2,379	2,379

Outcomes: Time allocation data was collected by asking respondents to allocate a set of 25 beads on a board with 6 circles representing: "Learning Activities", "IGA", "socializing", "Household Chores", "Sleep" and "Other". The Learning category includes schooling, vocational training and study time. "IGA" includes paid and unpaid work of any kind. Respondent were then asked to allocate beads into each circle in a way that represents time allocation in an average day, and data points were later converted into weekly hours. A similar procedure was implemented to record allocation of socializing time across the following activities: "Friends", "Men", "Alone", "Church", "Volunteer" and "Other". The exact phrasing for the "Men" category is, "With boys or men you have a sexual relationship with.". Using the number of hours spent on total socializing time from the previous step, these allocations were later converted into weekly hours.

Notes: ***, ** and * denote significance at the 1%, 5%, and 10% levels. Control variables include: age, PPI score, household size, illiteracy, village size (nr of dwellings), village average PPI score, distances form key facilities (clinic, secondary school and market), a dummy equal to one if the village is a political stronghold (i.e. has a resident paramount and/or section chief), the number of NGOs active within the village before the Ebola outbreak (excluding BRAC), share of Christian households, distance from Freetown and distance from Kailahun. All specifications include dummies for the randomization strata (district) and errors are clustered at the unit of randomization (village).

Table 5: Sexual Activity, Pregnancy and School Enrolment

Sample: Girls aged 12-17 at baseline (2014)
Outcomes measured post-epidemic (2016)
OLS estimates, standard errors in parentheses, p-values in braces

	Sexual Activity and Pregnancy			Schooling and Work		
	Frequency of Unprotected Sex	Pregnant Since BL	Pregnant since BL, Out-of-Wedlock	In School Full Time	In School and Working	Only Working
	(1)	(2)	(3)	(4)	(5)	(6)
Pregnancy Risk	1.93***	.105***	.070*	-.167***	-.060	.188***
	(.624)	(.036)	(.039)	(.045)	(.042)	(.061)
ELA Treatment | High Pregnancy Risk	-1.48**	-.040	-.072*	.087*	.097**	-.129**
	(.677)	(.039)	(.038)	(.050)	(.037)	(.063)
ELA Treatment | Low Pregnancy Risk	.157	.006	-.010	-.051*	.009	.024
	(.328)	(.020)	(.016)	(.030)	(.027)	(.019)
Difference Treatment Effects [β_3, p-value]	{.027}	{.289}	{.135}	{.020}	{.052}	{.020}
Control Mean at BL | Low Pregnancy Risk	3.28	.115	.090	.520	.296	.080
Observations	1,412	2,384	2,384	2,384	2,384	2,384

Outcomes: Frequency of sex is measured over a 30 day period. Frequency of unprotected sex is defined as intercourse frequency for respondents that do not use any form of contraceptive, and equal to zero for those that do (to provide conservative estimates, respondents that ever use condoms are assumed to engage in protected sex). Pregnancy outcomes refer to conceptions that took place after August 2014, once baseline data collection was completed. Income Generating Activities (IGA) include both self-employment and wage labor.

Notes: ***, ** and * denote significance at the 1%, 5%, and 10% levels. The main results are estimated with an ANCOVA specification. Control variables include: age, PPI score, household size, illiteracy, village size (nr of dwellings), village average PPI score, distances form key facilities (clinic, secondary school and market), a dummy equal to one if the village is a political stronghold (i.e. has a resident paramount and/or section chief), the number of NGOs active within the village before the Ebola outbreak (excluding BRAC), share of Christian households, distance from Freetown and distance from Kailahun. Columns 2 through 6 control for also for baseline values of the relevant outcome variable. All specifications include dummies for the randomization strata (district) and errors are clustered at the unit of randomization (village).

Table 6: Sexual Activity and Pregnancy, Older Girls and Women

Sample: Girls aged 18-25 at baseline (2014)

Outcomes measured post-epidemic (2016)

OLS estimates, standard errors in parentheses, p-values in braces

	Unwanted Sex	Transactional Sex	Female Controlled Contraceptive Use	Pregnancy, since BL
	(1)	(2)	(3)	(4)
Pregnancy Risk	-.038	-.002	-.027	.017
	(.024)	(.018)	(.062)	(.049)
ELA Treatment | High Pregnancy Risk	.054**	.054***	.137**	-.047
	(.023)	(.020)	(.063)	(.048)
ELA Treatment | Low Pregnancy Risk	.004	.017	.034	.008
	(.013)	(.011)	(.030)	(.028)
Difference Treatment Effects [β_3, p-value]	{.063}	{.125}	{.150}	{.333}
Control Mean at BL | Low Pregnancy Risk	.154	.047	.468	.844
Observations	2,243	2,243	2,314	2,400

Outcomes: Unwanted Sex is defined as, "Been involved in any sexual intercourse that you were not willing to do". Transactional Sex is defined as, "Receiving anything such as money, gifts, help with school work or something else in exchange for sexual intercourse"**.** *Female Controlled Contraceptives* include: contraceptive pills, injections or implants, IUDs, vasectomy and female sterilization. Pregnancy outcomes refer to conceptions that took place after August 2014, once baseline data collection was completed.

Notes: ***, ** and * denote significance at the 1%, 5%, and 10% levels. . Columns (1) does not control for baseline outcome values, while all other specifications do. Control variables for all specifications include: age, PPI score, household size, illiteracy, village size (nr of dwellings), village average PPI score, distances form key facilities (clinic, secondary school and market), a dummy equal to one if the village is a political stronghold (i.e. has a resident paramount and/or section chief), the number of NGOs active within the village before the Ebola outbreak (excluding BRAC), share of Christian households, distance from Freetown and distance from Kailahun. All specifications include dummies for the randomization strata (district) and errors are clustered at the unit of randomization (village).

Table 7: Long Term Follow Up, Young Girls

Sample: Girls aged 12-17 at baseline (2014)
Outcomes measured post-epidemic (2019/20)
Standard errors in parentheses, p-values in braces

	Time Use (hours/week) *SUR*				Socializing (hours/week) *SUR*				Schooling and Pregnancy *OLS*	
	Learning	Socializing	Working	Chores	Men	Alone	Friends	Volunteer/ Church	Enrolment Only	Pregnancy, since BL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Pregnancy Risk	-6.80*	.248	4.72	3.28	.371	.547	-.665	.213	-.111*	.146**
	(3.58)	(1.41)	(2.05)	(2.98)	(.603)	(.522)	(.426)	(.685)	(.059)	(.073)
ELA Treatment | High Pregnancy Risk	7.81**	-4.36***	-4.13	-1.42	-1.14*	-1.56***	-.373	-1.34*	.093	-.083
	(3.49)	(1.49)	(3.07)	(2.92)	(.634)	(.447)	(.367)	(.768)	(.057)	(.068)
ELA Treatment | Low Pregnancy Risk	-1.07	-2.56	3.95*	-.470	-.895***	-.260	-.361	-.943*	-.045	.051
	(2.29)	(.968)	(2.05)	(1.58)	(.337)	(.317)	(.347)	(.492)	(.032)	(.033)
Difference Treatment Effects [β_3, p-value]	{.033}	{.321}	{.031}	{.779}	{.733}	{.018}	{.982}	{.661}	{.034}	{.074}
Control Mean at BL | Low Pregnancy Risk	48.8	26.4	15.1	42.3	2.52	6.35	6.57	10.8	.520	.115
Observations	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,294	1,294

Outcomes: Time allocation data was collected by asking respondents to allocate a set of 25 on a board with 6 circles representing: "Learning Activities", "IGA", "socializing", "Household Chores", "Sleep" and "Other". The Learning category includes schooling, vocational training and study time. "IGA" includes paid and unpaid work of any kind. Respondent were then asked to allocate beads into each circle in a way that represents time allocation in an average day, and data points were later converted into weekly hours. A similar procedure was implemented to record allocation of socializing time across the following activities: "Friends", "Men", "Alone", "Church", "Volunteer" and "Other". The exact phrasing for the "Men" category is, "With boys or men you have a sexual relationship with.". Using the number of hours spent on total leisure from the previous step, these allocations were later converted into weekly hours. Pregnancy outcomes refer to conceptions that took place after August 2014, once baseline data collection was completed.

Notes: ***, ** and * denote significance at the 1%, 5%, and 10% levels. The main results are estimated with an ANCOVA specification. Control variables include: age, PPI score, household size, village size (nr of dwellings), village average PPI score, distances form key facilities (clinic, secondary school and market), a dummy equal to one if the village is a political stronghold (i.e. has a resident paramount and/or section chief), the number of NGOs active within the village before the Ebola outbreak (excluding BRAC), share of Christian households, distance from Freetown and distance from Kailahun. All specifications include dummies for the randomization strata (district) and errors are clustered at the unit of randomization (village). All regressions include the baseline value of the outcome variables as a control.

Table 8: Long Term Follow Up, Young Women

Sample: Women aged 18-25 at baseline (2014)
Outcomes measured post-epidemic (2019/20)
OLS estimates, standard errors in parentheses, p-values in braces

	Unwanted Sex	Transactional Sex	Female Controlled Contraceptive Use	Pregnancy, since BL
	(1)	(2)	(3)	(4)
Pregnancy Risk	.013	-.046	-.198**	.112**
	(.048)	(.034)	(.077)	(.048)
ELA Treatment | High Pregnancy Risk	.028	.069*	.191***	-.045
	(.046)	(.036)	(.049)	(.049)
ELA Treatment | Low Pregnancy Risk	.025	-.014	-.031	.024
	(.025)	(.025)	(.039)	(.027)
Difference Treatment Effects [β_3, p-value]	{.945}	{.075}	{.007}	{.230}
Control Mean at BL | Low Pregnancy Risk	.154	.047	.468	.844
Observations	1423	1423	1,493	1,553

Outcomes: Unwanted Sex is defined as, "Been involved in any sexual intercourse that you were not willing to do". Transactional Sex is defined as, "Receiving anything such as money, gifts, help with school work or something else in exchange for sexual intercourse". Pregnancy outcomes refer to conceptions that took place after August 2014, once baseline data collection was completed. *Female Controlled Contraceptives* include: contraceptive pills, injections or implants, IUDs, vasectomy and female sterilization

Notes: ***, ** and * denote significance at the 1%, 5%, and 10% levels. The main results are estimated with an ANCOVA specification. Control variables include: age, PPI score, household size, village size (nr of dwellings), village average PPI score, distances form key facilities (clinic, secondary school and market), a dummy equal to one if the village is a political stronghold (i.e. has a resident paramount and/or section chief), the number of NGOs active within the village before the Ebola outbreak (excluding BRAC), share of Christian households, distance from Freetown and distance from Kailahun. All specifications include dummies for the randomization strata (district) and errors are clustered at the unit of randomization (village). All regressions include the baseline value of the outcome variables as a control.

Table 9: Partners, Long Term Follow Up

Outcomes measured post-epidemic in 2019/20

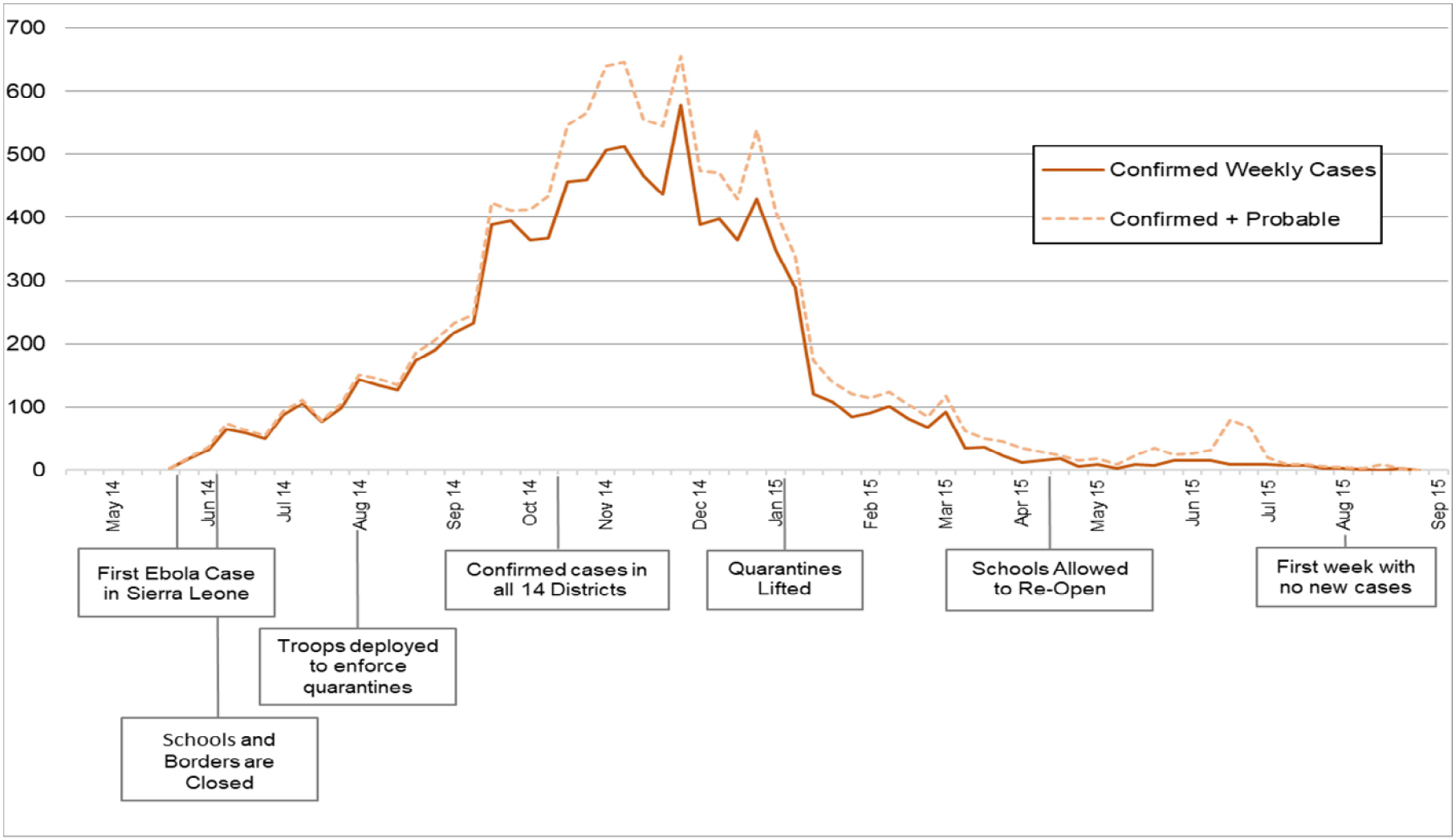
OLS estimates, standard errors in parentheses, p-values in braces

	Partners of Girls Aged 12-17 at Baseline				Partners of Women Aged 18-25 at Baseline			
	Age	Education Index	Gender Empowerment Index	Aversion to GBV	Age	Education Index	Gender Empowerment Index	Aversion to GBV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ELA Treatment Effect	-.942	.271**	-.019	.064***	-.147	.036*	.055	-.044**
	(1.02)	(.112)	(.029)	(.028)	(.729)	(.020)	(.080)	(.020)
Mean in Control	29.7	.243	.324	.778	35.5	.056	-.157	.334
Observations	494	492	496	488	871	872	871	872

Outcomes: All outcomes refer to the male partner. *The Partner Education Index* is an inverse-covariance weighted index (Anderson, 2008) of: whether the partner has ever attended school, whether the partner is currently in school, and whether he has completed high school. For the *Gender Empowerment Index*, respondents were asked whether men, women or both should be responsible for the following activities: earn money for the family; have a higher level of education; do washing, cleaning and cooking; fetch water if there is no water pump or tap; feeding and bathing children; help the children in their studies at home; look after ill persons. The index is the share of questions to which the answer was both/same. Therefore, higher values represent more egalitarian gender norms. Partners were also asked whether a husband is justified in hitting his wife in five scenarios. The *GBV Aversion Index* is the share of negative answers to these five IPV scenario. The scenarios are: "If she goes our without telling him?"; "If she neglects the children?", "If she argues with him?", "If she refuses to have sex with him?", "If she burns the food?".

Notes: ***, ** and * denote significance at the 1%, 5%, and 10% levels. All controls refer to the female partner. The main results are estimated with an ANCOVA specification. Control variables include: age, PPI score, household size, village size (nr of dwellings), village average PPI score, distances form key facilities (clinic, secondary school and market), a dummy equal to one if the village is a political stronghold (i.e. has a resident paramount and/or section chief), the number of NGOs active within the village before the Ebola outbreak (excluding BRAC), share of Christian households, distance from Freetown and distance from Kailahun. All specifications include dummies for the randomization strata (district) and errors are clustered at the unit of randomization (village).

Figure 1: Timeline of the Ebola Epidemic in Sierra Leone



Notes: Data retrieved from World Health Organization's Situation Reports (last update 11 May 2016). Confirmed cases refer to lab tested patients, while probable cases refer to cases diagnosed by clinical staff and but not tested.

Figure 2: Study Timeline

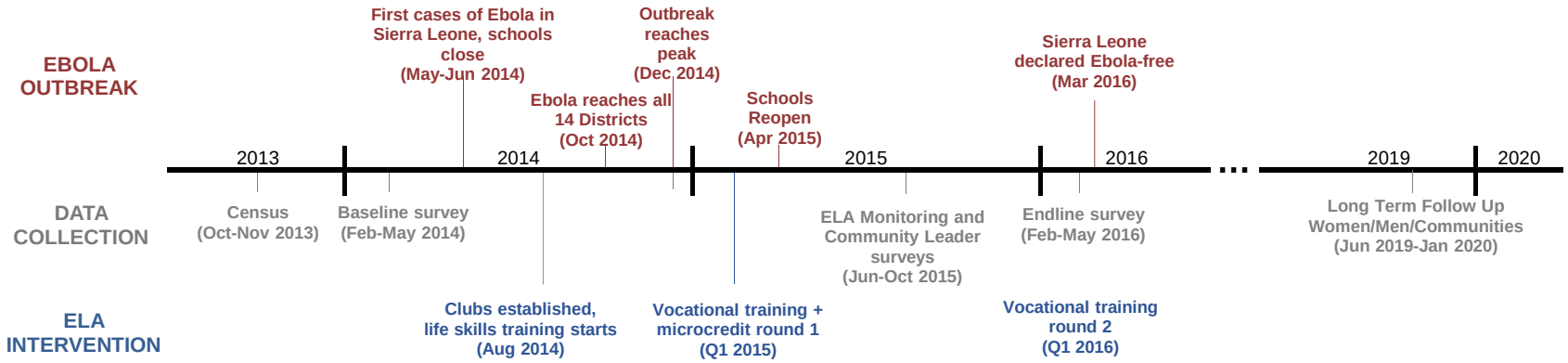
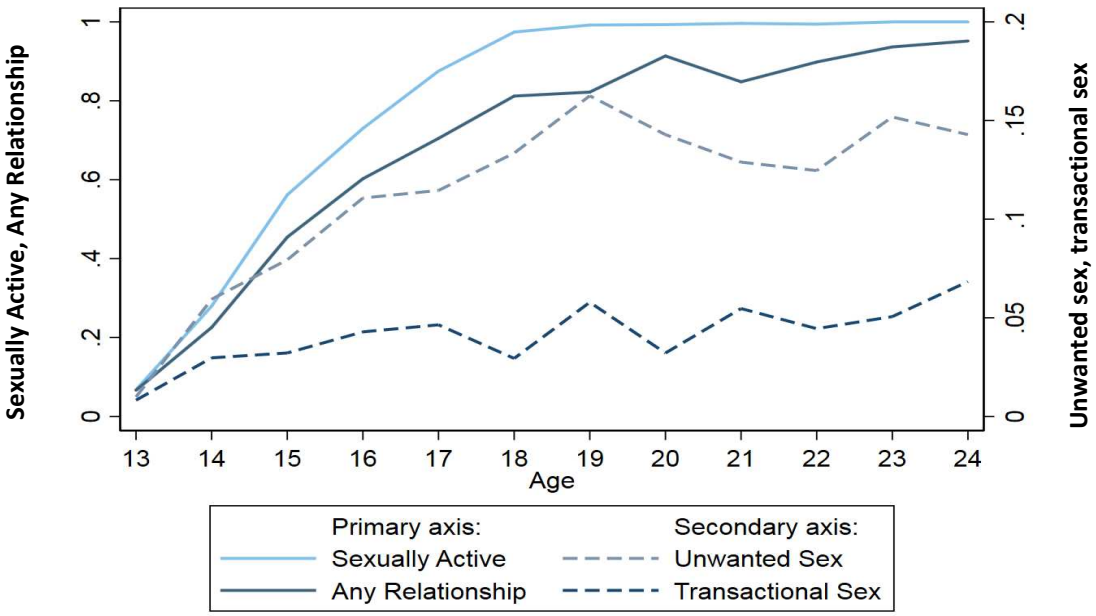
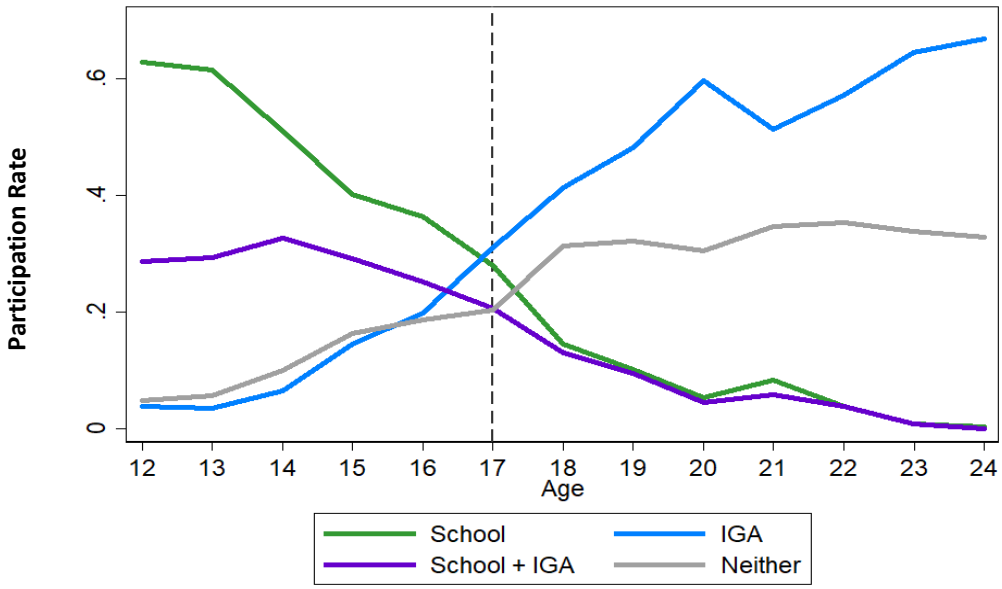


Figure 3: Age Profiles for Sexual Activity, School Enrolment and Other Economic Activities, Pre-Crisis

A. Sexual Activity



B. School Enrolment and Other Economic Activities

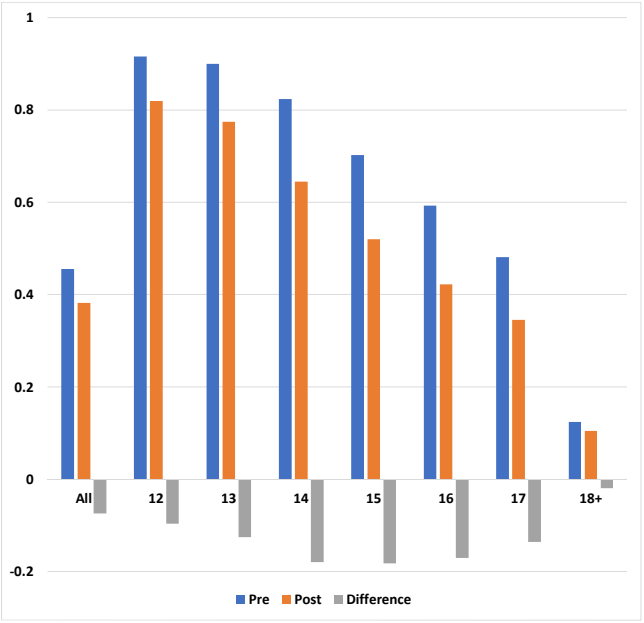


Notes: Panel A: Unwanted Sex is defined as, "Been involved in any sexual intercourse that you were not willing to do". Transactional Sex is defined as, "Receiving anything such as money, gifts, help with school work or something else in exchange for sexual intercourse". Both panels use the entire baseline sample of young women. Panel B: School refers to formal schooling and IGA refers to both wage employment and self-employment.

Figure 4: Schooling and Pregnancy Over the Course of the Epidemic

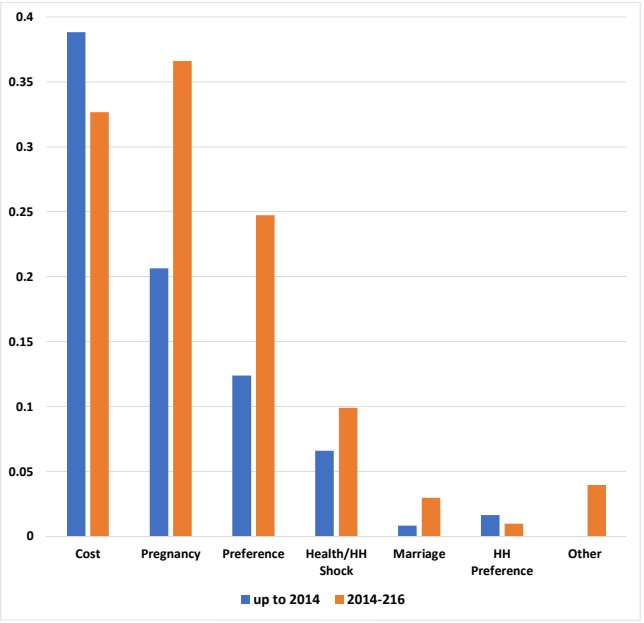
A. School Enrolment Rates by Age

Pre and Post-epidemic, Control Villages



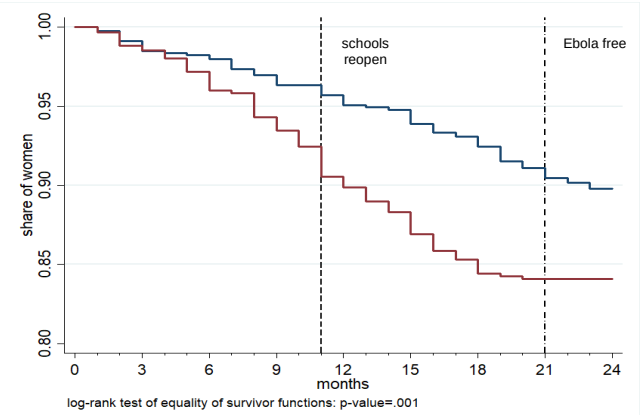
B. Reasons for School Dropout by Dropout Date

Girls Aged 12-17 at Baseline, Control Villages



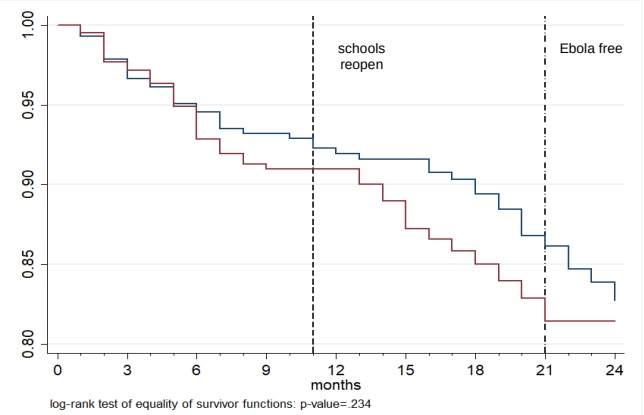
C. Time to Conception, First Pregnancy

Control Villages



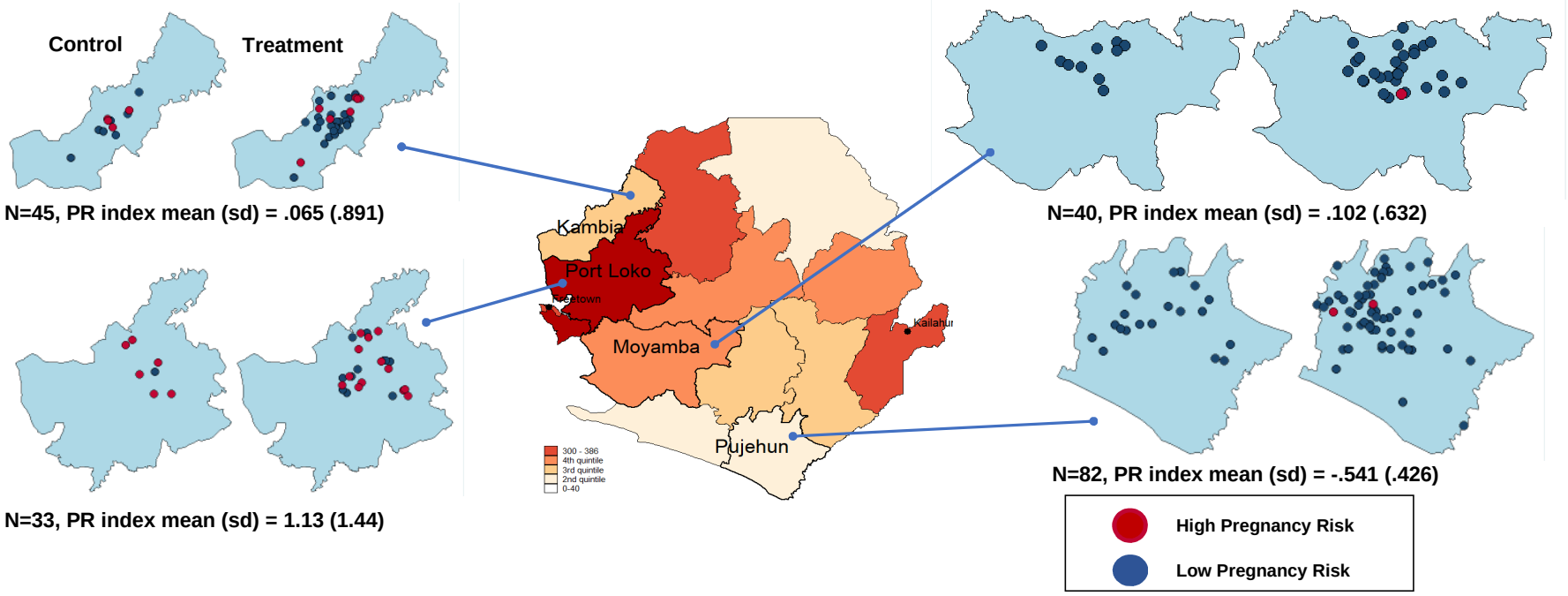
D. Time to Conception, Second Pregnancy

Control Villages



Notes: Panel A and B report averages for the sample tracked between BL and EL. Among the reasons for dropping out, the *Preference* category collects all those answers, categorical or qualitative, indicating that the respondent chose to leave school. Common answers in this category are "did not find it interesting" or "too difficult". The category *Health/HH Shock* includes all instances of non-financial shocks that affected respondents, such as sickness or family circumstances that forced the respondent out of schooling. The category *HH Preference* includes all those answers pointing to the decision of leaving school having been taken by the respondents' parents or guardians. Panel C and D depict Kaplan-Meyer survival functions. Panel C focuses on women aged 12-17 at the beginning of the stated periods (May '12 or May '14) who did not experience any pregnancy before. Respondents' pregnancy histories are used to generate a pseudo-panel with monthly observations, where each individual's *failure* variable switches to 1 from the month in which the young women becomes pregnant for the first time. Panel D repeats this analysis for young women who experienced at least one pregnancy before the stated periods (May '12 or May '14).

Figure 5: Pregnancy Risk (PR) for Young Girls and Women

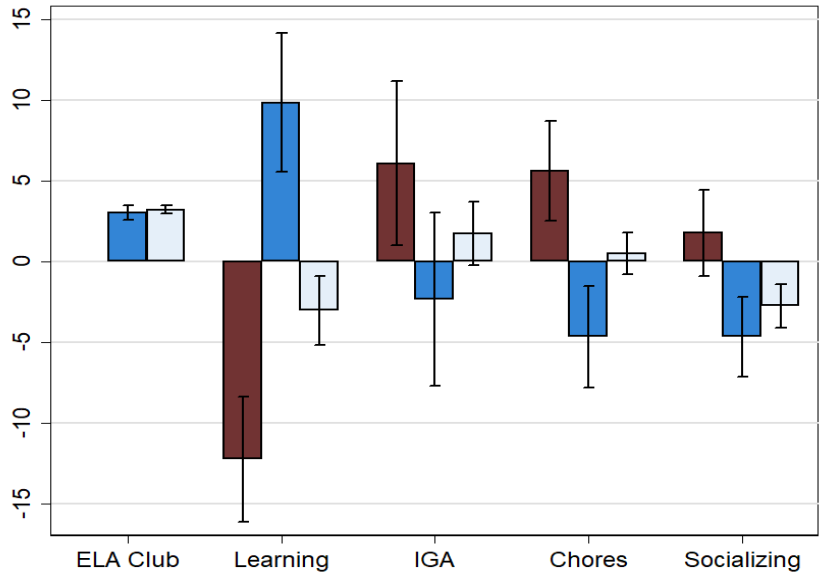


Notes: Data for the central map is retrieved from World Health Organization's Situation Reports (last updated 11 May 2016), showing confirmed and probable cases per 100,000. Confirmed cases refer to lab tested patients, while probable cases refer to cases diagnosed by clinical staff and but not tested. In the outer district maps, for each district, we show the number of sample villages, and the mean and standard deviation of the Ebola-related vulnerability index. The villages most exposed to Ebola-related pregnancy risk (in the top quartile of the index) are depicted in red.

Figure 6: Time Use at Endline, Girls Aged 12-17 at Baseline

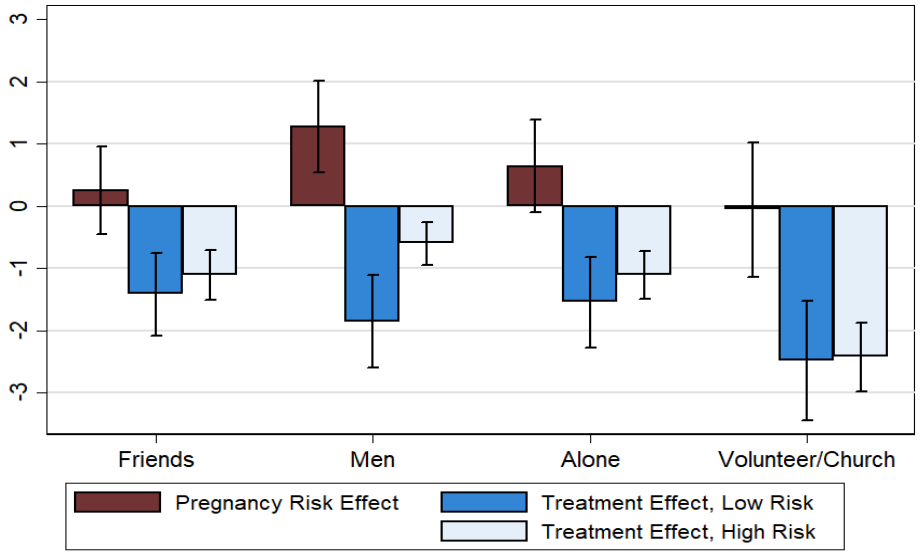
A: Overall Time Use

Weekly Hours, 90% Confidence Intervals



B: Time Spent Socializing

Weekly Hours, 90% Confidence Intervals

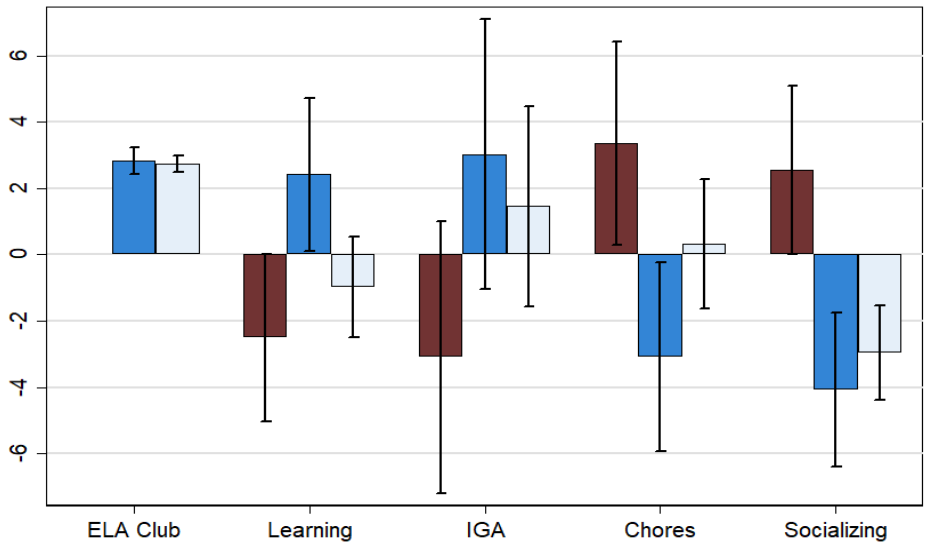


Outcomes: Time allocation data was collected by asking respondents to allocate a set of 25 beads on a board with 6 circles representing: "Learning Activities", "IGA", "socializing", "Household Chores", "Sleep" and "Other". The Learning category includes schooling, vocational training and study time. "IGA" includes paid and unpaid work of any kind. Respondent were then asked to allocate beads into each circle in a way that represents time allocation in an average day, and data points were later converted into weekly hours. A similar procedure was implemented to record allocation of socializing time across the following activities: "Friends", "Men", "Alone", "Church", "Volunteer" and "Other". The exact phrasing for the "Men" category is, "With boys or men you have a sexual relationship with.". Using the number of hours spent on total socializing time from the previous step, these allocations were later converted into weekly hours.

Notes: Bars represent estimated parameters from a system of SUR using all time use categories excluding "other". Control variables for all specifications include: age, PPI score, household size, illiteracy, village size (nr of dwellings), village average PPI score, distances form key facilities (clinic, secondary school and market), a dummy equal to one if the village is a political stronghold (i.e. has a resident paramount and/or section chief), the number of NGOs active within the village before the Ebola outbreak (excluding BRAC), share of Christian households, distance from Freetown and distance from Kailahun. All equations include baseline value of the outcome as independent variable, dummies for the randomization strata (district) and errors are clustered at the unit of randomization (village). Error bars represent 90% confidence intervals.

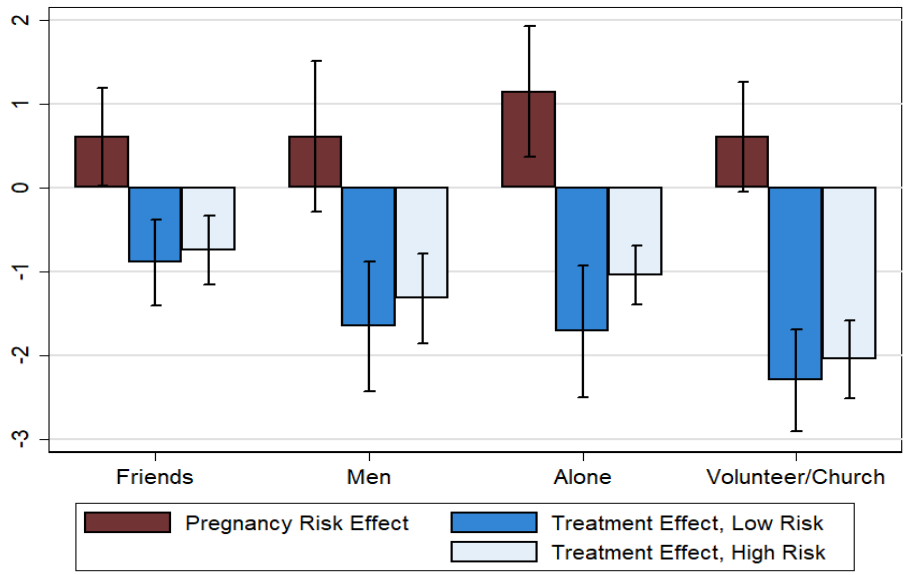
Figure 7: Time Use at Endline, Girls Aged 18-25 at Baseline

A: Overall Time Use



B: Time Spent Socializing

Weekly Hours, 90% Confidence Intervals



Outcomes: Time allocation data was collected by asking respondents to allocate a set of 25 beads on a board with 6 circles representing: "Learning Activities", "IGA", "socializing", "Household Chores", "Sleep" and "Other". The Learning category includes schooling, vocational training and study time. "IGA" includes paid and unpaid work of any kind. Respondent were then asked to allocate beads into each circle in a way that represents time allocation in an average day, and data points were later converted into weekly hours. A similar procedure was implemented to record allocation of socializing time across the following activities: "Friends", "Men", "Alone", "Church", "Volunteer" and "Other". The exact phrasing for the "Men" category is, "With boys or men you have a sexual relationship with.". Using the number of hours spent on total socializing time from the previous step, these allocations were later converted into weekly hours.

Notes: Bars represent estimated parameters from a system of SUR using all time use categories excluding "other". Control variables for all specifications include: age, PPI score, household size, illiteracy, village size (nr of dwellings), village average PPI score, distances form key facilities (clinic, secondary school and market), a dummy equal to one if the village is a political stronghold (i.e. has a resident paramount and/or section chief), the number of NGOs active within the village before the Ebola outbreak (excluding BRAC), share of Christian households, distance from Freetown and distance from Kailahun. All equations include baseline value of the outcome as independent variable, dummies for the randomization strata (district) and errors are clustered at the unit of randomization (village). Error bars represent 90% confidence intervals.

Table A1: ELA Life Skills Modules

Module 1 - Adolescence and Puberty
Topics: Adolescence, Hormones, Puberty, Body changes during puberty, Reproductive organs

Overall aims: Define adolescence and describe characteristics and body changes associated with it; understand issues typically associated with adolescence

Module 2 - Menstruation
Topics: Menstruation and menstrual cycle, Menarche and menopause, Hygiene during menstruation, Menstrual disorders

Overall aims: Define menstruation; discuss pain and changes during menstruation, and care of a woman's body; understand premenstrual syndrome

Module 3 - Family planning
Topics: Family planning, Fertility regulation, Contraceptive methods

Overall aims: Define family planning and the various methods of contraception; explain the value of fertility regulation and issues pertaining abortion; discuss the reasons for non-use of contraceptives

Module 4 - Sexually Transmitted Infections (STIs)
Overall aims: Discuss the effects of various STIs, how they are transmitted and how to prevent them

Module 5 - HIV/AIDS
Overall aims: Define HIV/AIDS and understand the difference, identify risky behaviour, discuss effects and prevention

Module 6 - (Teenage) pregnancy
Overall aims: Define (teenage) pregnancy, describe factors that can lead to teenage pregnancy and the associated problems, discuss prevention and ante-natal/maternal care

Module 7 - Gender & Marriage
Topics: Gender, Gender roles & gender inequality, (Early) marriage, Bride price

Overall aims: Understand the meaning of and issues with gender, gender roles, gender issues, bride price and early marriage

Module 8 - Rape
Overall aims: Define and understand rape, know how to report, identify risky situations and understand the consequences of rape

Module 9 - Leadership among adolescents
Topics: Leadership, Qualities of leaders, Behaviours of leaders

Overall aims: Define leadership and describe the qualities of a good leader, identify leaders in their community, discuss how one can become a good leader/mentor.

Module 10 - Adolescent responsibility to family and community
Overall aims: Define responsibility, family and community, describe adolescents' responsibility to their family and community

Table A2: Participation in ELA Clubs

Means, standard deviations in brackets
P-value of t-test of equality of means with control group in braces

	All			Age 12-17 at Baseline			Age 18-25 at Baseline		
	Control	Treatment	Difference	Control	Treatment	Difference	Control	Treatment	Difference
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A. Membership									
Number of potential ELA members per village	136.6	129.9	{.738}						
	[132.1]	[9.5]							
(Club Members) / (pop aged 12-25)		.307							
		[.175]							
B. Participation									
Have you ever heard about ELA clubs?	.272	.890	{.000}	.241	0.883	{.000}	.301	.897	{.000}
Have you ever participated in any ELA club activities?	.041	.708	{.000}	.041	.761	{.000}	.041	.657	{.000}
Have you ever participated in Life Skills training organized through the club?		.824			.832			.815	
Participated in Life Skills training at least weekly		.772			.804			.734	
Could recount at least 4 major topics (out of 8) that were covered in the Life Skills curriculum		.512			.488			.540	
Did you ever received training in financial literacy?		.247			.217			.281	
Have you ever participated in Vocational Training organized through the club?		.337			.319			.358	
Did you take a microfinance loan from BRAC?		.127			.088			.169	
Observations	1,197	3,592		590	1,796		608	1,796	

Notes: Data on potential ELA club members in each village is obtained from the village census administered prior to the intervention, while data on club membership was collected during the ELA Monitoring Survey in 2015. Equality of means is tested by OLS regression of the variable of interest on treatment assignment and district fixed effects, with standard errors clustered at the village level. Data on participation in financial literacy training, livelihood skills training and microfinance is conditional on being assigned to the treatment arm that offered those specific programs.

Table A3: Attrition

Dependent Variable = 1 if girl is tracked from baseline to endline
OLS estimates, standard errors in parentheses
P-values of joint-significance test in braces

	Baseline to Endline					Endline to Long Term Follow Up
	(1)	(2)	(3)	(4)	(5)	(6)
ELA Treatment	.007		.011	.001	.035	-.023
	(.016)		(.018)	(.018)	(.101)	(.023)
Pregnancy Risk		.024	.040	.029	.015	-.052
		(.023)	(.029)	(.029)	(.161)	(.040)
ELA Treatment x Pregnancy Risk			-.021	-.013	.014	.033
			(.032)	(.032)	(.190)	(.052)
Individual Controls	No	No	No	Yes	Yes	Yes
F-Test				{.000}	{.000}	{.000}
Village Controls	No	No	No	Yes	Yes	Yes
F-Test				{.065}	{.062}	{.000}
Interactions	No	No	No	No	Yes	No
F-Test					{.180}	
Mean of outcome variable			.829			.673
Adjusted R-squared	.004	.005	.005	.012	.018	.034
Observations	5,734	5,734	5,734	5,734	5,734	3,183

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. Data for Columns 1 through 5 is from the baseline survey, except PPI scores which were compiled during the village census prior to collection of the baseline survey. All regressions include dummies for randomization strata (district) and errors are clustered at the unit of randomization (village). Individual controls include: age, enrolment at baseline, employment, PPI score, marital status, household size. Village controls include: village size (nr of dwellings), distance from secondary school, distance from PHU, whether the village is a political stronghold, number of NGOs active, average PPI score, share of Christians, whether the village received food or school relief, distance from Freetown and from Kailahun. Interactions include: enrolment, employment, age and PPI score. In Column 6, the long term follow up aimed at tracking 71% of endline respondents. Tracking began from a random subsample of endline respondents, with resampling taking place in case respondents could not be tracked. Attrition analysis focuses on respondents that were part of the first draw, thus excluding resampled women. The results in Column 6 are from a regression analogous to Column 4.

Table A4 Balance by Pregnancy Risk

Means, clustered standard errors from OLS regressions in parentheses
P-value of t-test of equality of means with relevant control group in braces

	Low Risk (1)	High Risk (2)	Difference (3)
A. Village Characteristics			
Number of dwellings	135	60	{.191}
	[287]	[49.0]	
Poverty score (Mean across households)	.345	.359	{.035}
	[.053]	[.059]	
Number of pre-existing NGOs	3.08	2.44	{.252}
	[1.92]	[1.81]	
Distance from Freetown (miles)	56.6	33.5	{.271}
	[24.6]	[11.8]	
Distance from Kailahun (miles)	75.41	93.8	{.597}
	[18.5]	[10.9]	
Distance from nearest PHU (miles)	1.81	2.13	{.453}
	[1.70]	[1.96]	
Distance from nearest secondary school (miles)	4.32	2.77	{.578}
	[5.00]	[2.72]	
B. Village Leader Survey			
"Girls who are visibly pregnant have a bad influence on their non-pregnant peers" [=1 if strongly agree]	.970	.941	{.413}
"Girls should be allowed to continue their education while pregnant" [=1 if strongly agree]	.096	.029	{.045}
Pregnant girls allowed to sit exams in the nearest secondary school	28.3	37.9	{.938}
C. Policy Responses			
Village was quarantined	.030	.118	{.119}
Village visited by contact tracing team	.928	1	{.088}
Received Relief from NGO	.849	.853	{.103}
Village received food aid	.199	.353	{.986}
Village received school supplies (excl. BRAC)	.355	.500	{.690}
Received Relief from Government	.687	.706	{.140}

Notes: Data sources are the Village Census (Panel A), and the Village Leader Surveys (distance measures in Panel A, all outcomes in Panels B and C). Column 3 reports p-values from a test of equality of means carried out by OLS regression of each characteristic on a dummy for assignment to treatment. All regressions include strata (district) dummies and calculate robust standard errors. The Poverty Score (PPI) is calculated through scorecards and its value, ranging from 0 to 100, represents the likelihood of a household being below the poverty line. The number of pre-existing NGOs includes all organizations apart from BRAC. Distance from Freetown and Kailahun are computed from GPS data.

Table A5: Balance by Pregnancy Risk, Individual Characteristics

Means, clustered standard errors from OLS regressions in parentheses
P-value of t-test of equality of means with relevant control group in braces

	Low Risk (1)	High Risk (2)	Difference (3)
A. Basic Characteristics			
Number of Adolescent Girls	1,198	3,592	
Age	17.5	17.8	{.127}
	[3.74]	[3.80]	
In any relationship	.578	.681	{.313}
Married	.272	.339	{.505}
Age at marriage	16.3	16.2	{.973}
	[2.91]	[2.65]	
Age of husband at marriage	31.7	31.3	{.634}
	[7.46]	[6.68]	
Has Children	.486	.497	{.505}
If in relationship: Experienced any form of conjugal violence	.477	0.498	{.200}
B. Empowerment and Aspirations			
Empowerment Index [0-100]	17.1	15.2	{.776}
	[20.6]	[20.7]	
Sexually active	.715	.745	{.648}
If active: Age at sexual debut	14.6	14.6	{.061}
	[2.17]	[2.02]	
If active: Uses contraceptive	.434	.396	{.163}
(any, excluding condoms)	.496	.489	
If active: Ever used condoms	.100	.084	{.351}
Leisure activity: Men (weekly hours)	5.00	5.73	{.501}
	[5.43]	[5.36]	
Time use: Learning Activities (weekly hours)	29.2	24.0	{.058}
	[34.2]	[3.8]	
Unwanted sex over past year	.107	.0805	{.076}
Transactional sex over past year	.037	.036	{.944}
C. Human Capital and Economic Activities			
Skills: Literacy [0-100]	22.3	21.3	{.248}
	[27.5]	[26.2]	
Enrolled only	.295	.189	{.017}
Engaged in Income generating activity only	.326	.371	{.276}
Engaged in both	.159	.210	{.721}

Notes: Column 3 reports p-values from a test of equality of means carried out by OLS regression of each characteristic. Regressions include strata (district) dummies and standard errors are clustered at the village level. Intimate partner violence is defined as the threat or use of physical violence from the respondent's partner. For the Empowerment Index, respondents were asked whether men, women or both should be responsible for the following activities: earn money for the family; have a higher level of education; do washing, cleaning and cooking; fetch water if there is no water pump or tap; feeding and bathing children; help the children in their studies at home; look after ill persons. The index is the share of questions to which the answer was both/same. Therefore, higher values represent more egalitarian gender norms. Time allocation data was collected both at baseline and endline. Respondents were provided a set of 25 beads and a board with six circles representing: "Education", "IGA", "Leisure", "Household Chores", "Sleep" and "Other". The Education category includes schooling, vocational training and study time. "IGA" includes paid and unpaid work of any kind. Respondents were then asked to allocate beads into each circle in a way that represents time allocation in an average week. Data on leisure time allocation was collected in a similar way. The recorded categories for leisure are: "Friends", "Men", "Alone", "Church", "Volunteer" and "Other". The exact phrasing for the "Men" category is "With boys or men you have a sexual relationship with". Respondents were then asked to allocate beads into each circle in a way that represents time allocation in an average week. The data points were later converted into weekly hours using recorded total leisure time from the first exercise. Unwanted Sex is defined as, "Been involved in any sexual intercourse that you were not willing to do". Transactional Sex is defined as, "Receiving anything such as money, gifts, help with schoolwork or something else in exchange for sexual intercourse". Literacy is assessed based on respondent's ability to read simple things like labels on containers (basic), and reading comprehension and writing of complete sentence (advanced). The score representing respondent's proficiency with these tasks is then rescaled to range between 0 and 100.

Table A6: ELA Participants, by Pregnancy Risk

Means, clustered standard errors from OLS regressions in parentheses
P-value of t-test of equality of means with relevant control group in braces

	Low Risk (1)	High Risk (2)	Difference (3)
A. Basic Characteristics			
Age	17.3	17.2	{.594}
	[3.73]	[3.79]	
In any relationship	.565	.631	{.982}
Married	.268	.272	{.324}
Age at marriage	16.3	16.6	{.415}
	[2.82]	[2.64]	
Age of husband at marriage	31.82	31.29	{.553}
	[7.62]	[5.86]	
Has children	0.478	0.434	{.275}
If in relationship: Experienced any form of intimate partner violence	0.492	0.535	{.128}
B. Empowerment and Aspirations			
Gender Empowerment Index [0-100]	.175	.145	{.497}
	[.204]	[.209]	
Sexually active	.696	.671	{.364}
If active: Age at sexual debut	14.5	14.6	{.223}
	[2.21]	[1.84]	
If active: Uses contraceptive	.425	.408	{.383}
(any, excluding condoms)	[.495]	[.492]	
If active: Ever used condoms	.093	.098	{.584}
Leisure activity: Men (weekly hours)	4.89	5.20	{.380}
	[5.27]	[5.19]	
Time use: Learning Activities (weekly hours)	29.4	27.2	{.804}
	[34.2]	[30.1]	
Unwanted sex over past year	.121	.086	{.138}
Transactional sex over past year	.039	.043	{.941}
C. Human Capital and Economic Activities			
Skills: Literacy [0,1]	.209	.232	{.818}
	[.262]	[.254]	
Enrolled only	.289	.223	{.363}
Engaged in income generation only	.334	.325	{.606}
Engaged in both	.166	.240	{.152}

Notes: Column 3 reports p-values from a test of equality of means carried out by OLS regression of each characteristic. Regressions include strata (district) dummies and standard errors are clustered at the village level. Intimate partner violence is defined as the threat or use of physical violence from the respondent's partner. For the Empowerment Index, respondents were asked whether men, women or both should be responsible for the following activities: earn money for the family; have a higher level of education; do washing, cleaning and cooking; fetch water if there is no water pump or tap; feeding and bathing children; help the children in their studies at home; look after ill persons. The index is the share of questions to which the answer was both/same. Therefore, higher values represent more egalitarian gender norms. Time allocation data was collected both at baseline and endline. Respondents were provided a set of 25 beads and a board with six circles representing: "Education", "IGA", "Leisure", "Household Chores", "Sleep" and "Other". The Education category includes schooling, vocational training and study time. "IGA" includes paid and unpaid work of any kind. Respondents were then asked to allocate beads into each circle in a way that represents time allocation in an average week. Data on leisure time allocation was collected in a similar way. The recorded categories for leisure are: "Friends", "Men", "Alone", "Church", "Volunteer" and "Other". The exact phrasing for the "Men" category is "With boys or men you have a sexual relationship with". Respondents were then asked to allocate beads into each circle in a way that represents time allocation in an average week. The data points were later converted into weekly hours using recorded total leisure time from the first exercise. Unwanted Sex is defined as, "Been involved in any sexual intercourse that you were not willing to do". Transactional Sex is defined as, "Receiving anything such as money, gifts, help with schoolwork or something else in exchange for sexual intercourse". Literacy is assessed based on respondent's ability to read simple things like labels on containers (basic), and reading comprehension and writing of complete sentence (advanced). The score representing respondent's proficiency with these tasks is then rescaled to range between 0 and 100.

Table A7: Other Forms of Village Heterogeneity

Sample: Girls aged 12-17 at baseline (2014)
Outcomes measured post-epidemic (2016)
SUR estimates, standard errors in parentheses

	Time in Learning Activities (hrs/wk)							
Heterogeneity Dummy:	**Pregnancy Risk (main result)**	**Village Poverty**			**Village Infrastructure**		**Closeness to Infrastructure**	
	Top quartile	**Bottom Quartile**	**Above Median**	**Top Quartile**	**Above Median**	**Top Quartile**	**Above Median**	**Top Quartile**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Heterogeneity Dummy	-12.2***	-2.22	3.31	-.139	5.07**	3.17	-6.33***	-3.92*
	(2.37)	(2.90)	(2.28)	(2.80)	(2.30)	(3.04)	(2.14)	(2.18)
ELA Treatment | H Dummy==1	9.84***	-3.60	.106	.734	-3.69*	-2.22	1.74	.270
	(2.62)	(2.70)	(1.72)	(2.56)	(2.11)	(2.81)	(1.77)	(2.18)
ELA Treatment | H Dummy==0	-3.03**	.206	-.812	-1.42	1.36	-.237	-3.71*	-.947
	(1.30)	(1.45)	(1.87)	(1.50)	(1.64)	(1.42)	(1.90)	(1.57)
Difference Treatment Effects [β_3, p-value]	{.000}	{.222}	{.721}	{.470}	{.061}	{.530}	{.041}	{.663}
Control Mean at BL | H Dummy==0	48.8	51.2	47.2	48.1	48.6	48.3	53.6	51.8
Observations	2,381	2,381	2,381	2,381	2,381	2,381	2,381	2,381

Definitions: Time allocation data was collected by asking respondents to allocate a set of 25 beads on a board with 6 circles representing: "Learning Activities", "IGA", "Socializing", "Household Chores", "Sleep" and "Other". The Learning category includes schooling, vocational training and study time. "IGA" includes paid and unpaid work of any kind. Respondent were then asked to allocate beads into each circle in a way that represents time allocation in an average day, and data points were later converted into weekly hours. A similar procedure was implemented to record allocation of socializing time across the following activities: "Friends", "Men", "Alone", "Church", "Volunteer" and "Other". The exact phrasing for the "Men" category is, "With boys or men you have a sexual relationship with.". Using the number of hours spent on total socializing time from the previous step, these allocations were later converted into weekly hours. A Progress out of Poverty Index (PPI) was collected for each households in study villages during the census that took place before the baseline survey. This used to construct the *Village Poverty* measure. Data on village infrastructure was collected during the community leaders survey that took place in 2015. The types of infrastructure taken into consideration are: Constructed water well, Telecentre/charging station, Village barray, Market structure, Primary school, Secondary school, Vocational training center, Health center, Public toilet, Community bank, Mobile banking agent, Drying floor. For each type of infrastructure, data was collected on whether the village has one and, if not, how distant the closes facility of that type is. The former was used to construct a *Village Infrastructure Index*, the latter was used to construct an *Index of Closeness to Infrastructure (* imputing a distance of zero if the type of infrastructure is present within the village). Both indices are inverse-covariance weighted following Anderson (2008).

Notes: ***, ** and * denote significance at the 1%, 5%, and 10% levels. Control variables include: age, PPI score, household size, illiteracy, village size (nr of dwellings), village average PPI score, distances form key facilities (clinic, secondary school and market), a dummy equal to one if the village is a political stronghold (i.e. has a resident paramount and/or section chief), the number of NGOs active within the village before the Ebola outbreak (excluding BRAC), share of Christian households, distance from Freetown and distance from Kailahun. All specifications include dummies for the randomization strata (district) and errors are clustered at the unit of randomization (village).

Table A8: Skills

Sample: Girls aged 12-17 at baseline (2014)
Outcomes measured post-epidemic (2016)
OLS estimates, standard errors in parentheses, p-values in braces

	Literacy [0,1]	Numeracy [0,1]	Entrepreneurial Confidence [0,1]	Financial Literacy [0,1]
	(1)	(2)	(3)	(4)
Pregnancy Risk	-.120***	-.071***	.003	-.050*
	(.033)	(.025)	(.023)	(.030)
ELA Treatment | High Pregnancy Risk	.087***	.068***	.014	.047
	(.031)	(.024)	(.021)	(.030)
ELA Treatment | Low Pregnancy Risk	-.050**	-.020	.010	-.015
	(.021)	(.015)	(.014)	(.017)
Difference Treatment Effects [β_3, p-value]	{.000}	{.005}	{.854}	{.073}
Control Mean at BL | Low Pregnancy Risk	.246	.424	.642	.588
Observations	2,382	2,382	2,381	2,382

Outcomes: Literacy and Numeracy are self-reported abilities to perform: "Reading simple things like labels on containers"; "Reading comprehension, writing complete sentences or longer passages"; "Basic counting, simple addition/subtractions, and measurement"; "Working with fractions, multiplying and dividing, doing algebra or basic bookkeeping ". Answers to the skill self-assessments are then aggregated and rescaled in a measure that ranges from 0 to 1, with the latter indicating more advanced proficiency. Entrepreneurial Confidence is an index that measures respondents' self-reported ability to: run a business, identify business opportunities, obtain credit, save and invest, manage financial accounts, bargain prices, manage employees and search for jobs. Financial Literacy is assessed through 8 simple problems relating to market prices, interest rates, borrowing and budgeting. The number of correct answers is rescaled in an index ranging from 0 to 1.

Notes: ***, ** and * denote significance at the 1%, 5%, and 10% levels. The main results are estimated with an ANCOVA specification. Control variables include: age, PPI score, household size, illiteracy, village size (nr of dwellings), village average PPI score, distances form key facilities (clinic, secondary school and market), a dummy equal to one if the village is a political stronghold (i.e. has a resident paramount and/or section chief), the number of NGOs active within the village before the Ebola outbreak (excluding BRAC), share of Christian households, distance from Freetown and distance from Kailahun. All Columns control for also for baseline values of the relevant outcome variable. All specifications include dummies for the randomization strata (district) and errors are clustered at the unit of randomization (village).

Table A9: Social Networks

Sample: Girls aged 12-17 at baseline (2014)
Outcomes measured post-epidemic (2016)
SUR estimates, standard errors in parentheses

Number of ties to others of this type of relationship:	Friendship	Business	Talk About Intimate Topics	Credit/Finance
	(1)	(2)	(3)	(4)
Pregnancy Risk	-.210	-.093	.026	-.207
	(.163)	(.195)	(.208)	(.306)
ELA Treatment | High Pregnancy Risk	.337*	.459**	.199	.579*
	(.175)	(.189)	(.207)	(.312)
ELA Treatment | Low Pregnancy Risk	.169*	.104	.046	.048
	(.097)	(.129)	(.113)	(.142)
Difference Treatment Effects [β_3, p-value]	{.401}	{.131}	{.527}	{.122}
Control Mean at BL | Low Pregnancy Risk	2.17	.724	.803	.876
Observations	1,599	1,599	1,599	1,599

Outcomes: Network degrees of each type were computed from answers to the following questions: *Friends* "who are your closest friends?"; *Business* "If you want to talk about issues related to income-generating activities, for example concerning your employer, your business, agriculture, use of resources etc. whom do you talk to?"; *Intimate Topics* "Who do you talk to about intimate topics such as relationships with boys and men (husband, boyfriend, partner), gender-based violence, personal hygiene, etc.?"; *Credit/Finance* "Who do you talk to about issues related to finance and access to credit?". In order to help respondents with this task, they were provided with (or read out loud) a list of young women residing in their village, which were compiled as part of the censuses that took place before baseline and midline.

Notes: ***, ** and * denote significance at the 1%, 5%, and 10% levels. Control variables include: age, PPI score, household size, illiteracy, village size (nr of dwellings), village average PPI score, distances form key facilities (clinic, secondary school and market), a dummy equal to one if the village is a political stronghold (i.e. has a resident paramount and/or section chief), the number of NGOs active within the village before the Ebola outbreak (excluding BRAC), share of Christian households, distance from Freetown and distance from Kailahun. All specifications include dummies for the randomization strata (district) and errors are clustered at the unit of randomization (village).

Table A10: Ebola Cases

Outcomes measured post-epidemic (2016)

OLS estimates, standard errors in parentheses, p-values in braces

	Aged 12-17 at Baseline (2014)			Aged 18-25 at Baseline (2014)		
Any Ebola Case Within:	**Household**	**Family Network**	**Friends Network**	**Household**	**Family Network**	**Friends Network**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Pregnancy Risk	-.008	-.007	-.004	.004	.043	.055
	(.026)	(.071)	(.074)	(.023)	(.057)	(.061)
ELA Treatment | High Pregnancy Risk	.011	-.008	-.014	.006	-.018	-.025
	(.033)	(.075)	(.079)	(.029)	(.057)	(.063)
ELA Treatment | Low Pregnancy Risk	-.023	-.045*	-.050*	-.016	-.020	-.021
	(.014)	(.025)	(.028)	(.017)	(.032)	(.035)
Difference Treatment Effects [β_3, p-value]	{.365}	{.645}	{.675}	{.535}	{.978}	{.952}
Control Mean at BL | Low Pregnancy Risk	.034	.152	.178	.032	.144	.139
Observations	2,657	2,894	2,894	2,617	2,617	2,617

Outcomes: The sample includes those individuals tracked from Baseline to Endline plus respondents resampled at endline that have been residing in the same village since before the Ebola outbreak.

Notes: ***, ** and * denote significance at the 1%, 5%, and 10% levels. Control variables include: age, PPI score, household size, illiteracy, village size (nr of dwellings), village average PPI score, distances form key facilities (clinic, secondary school and market), a dummy equal to one if the village is a political stronghold (i.e. has a resident paramount and/or section chief), the number of NGOs active within the village before the Ebola outbreak (excluding BRAC), share of Christian households, distance from Freetown and distance from Kailahun. All specifications include dummies for the randomization strata (district) and errors are clustered at the unit of randomization (village).

Table A11: Robustness

Coefficient estimates , standard errors in parentheses, p-values in braces

	A. Learning Activities (hrs/week)	B. Time Spent with Men (hrs/week)		C. Out of Wedlock Pregnancy	D. Transactional Sex
Age Cohort:	**12-17**	**12-17**	**18-25**	**12-17**	**18-25**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Pregnancy Risk	-12.2***	1.27***	.620	.072*	-.002
	(2.35)	(.444)	(.551)	(.039)	(.018)
Baseline, RI	{.003}	{.037}	{.404}	{.064}	{.949}
Baseline, MHT	{.002}	{.108}	{.617}	{.349}	{.925}
No controls	-12.7***	.966	.529	.064	-.014
	(2.81)	(.595)	(532)	(.042)	(.017)
Baseline, within district pregnancy risk	-8.51**	2.01***	.032	.100	.000
	(3.42)	(.621)	(.546)	(.040)	(.022)
ELA Treatment | High Pregnancy Risk	9.69***	-1.86***	-1.68***	-.075**	.054***
	(2.61)	(.452)	(.475)	(.038)	(.021)
Baseline, RI	{.016}	{.003}	{.004}	{.043}	{.098}
Baseline, MHT	{.015}	{.007}	{.029}	{.793}	{.130}
No controls	8.72***	-1.59***	-1.75***	-.066*	.054**
	(3.02)	(.533)	(.466)	(.040)	(.022)
Baseline, within district pregnancy risk	7.46**	-2.59**	-1.32**	-.131***	.047**
	(3.41)	(.661)	(.530)	(.041)	(.023)
ELA Treatment | Low Pregnancy Risk	-2.96**	-.602***	-1.32***	-.010	.018
	(1.30)	(.211)	(.328)	(.017)	(.011)
Baseline, RI	{.062}	{.012}	{.000}	{.583}	{.151}
Baseline, MHT	{.201}	{.108}	{.007}	{.303}	{.449}
No controls	-4.12**	-.505*	-1.33***	.001	.014
	(1.72)	(.269)	(.326)	(.018)	(.011)
Baseline, within district pregnancy risk	-1.41	-.662***	-1.43***	-.010	.021**
	(1.41)	(.188)	(.306)	(.016)	(.011)
F-statistic [p-value], Baseline	{.000}	{.000}	{.000}	{.168}	{.022}
Observations	2,345	2,379	2,401	2,382	2,244

Outcomes: All outcomes measured at endline. Respondents were provided a set of 25 beads and a board with 6 circles representing: "Education", "IGA", "socializing", "Household Chores", "Sleep" and "Other". The Learning category includes schooling, vocational training and study time. The exact phrasing for the "Men" category is, "With boys or men you have a sexual relationship with". Transactional Sex is defined as, "Receiving anything such as money, gifts, help with school work or something else in exchange for sexual intercourse."

Notes: ***, ** and * denote significance at the 1%, 5%, and 10% levels. Control variables include: age, PPI score, household size, illiteracy, village size (nr of dwellings), village average PPI score, distances form key facilities (clinic, secondary school and market), a dummy equal to one if the village is a political stronghold (i.e. has a resident paramount and/or section chief), the number of NGOs active within the village before the Ebola outbreak (excluding BRAC), share of Christian households, distance from Freetown and distance from Kailahun. All specifications control for baseline values of the outcome, with Column 4 controlling for any pregnancy at baseline. All specifications include dummies for the randomization strata (district), and errors are clustered at the community level. Randomization Inference preformed by comparing the parameters from benchmark specifications to the estimated distribution of each parameter under the null hypothesis of ELA's ITT being zero ($\beta2=\beta3=0$). To estimate this distribution, treatment villages are randomly resampled with probability equal to the original treatment allocation, and parameters estimated using these placebo treatments (1,000 permutations). Reported p-values test the null hypothesis of the parameters being zero using this empirically estimated parameter distribution. P-values adjusted for multiple hypothesis testing are computed using the step-down procedure of Romano and Wolf [2016] (1,000 bootstrap iteration) . The *No Controls* rows include baseline outcome values as independent variables, district FE and standard errors are clustered at the village level. The last robustness check employs a different measures of pregnancy risk. This "within district" measure is a dummy equal to 1 if the village is in the top quartile of the distribution of the pregnancy risk index within each district. The F-test at the foot of each Column is reported for the null hypothesis of joint insignificance ($\beta1=\beta2=\beta3=0$).

Table A12: Social Desirability

Outcomes measured post-epidemic (2016)
In Columns 1 to 6, SUR estimates, standard errors in parentheses
In Columns 7 to 12, OLS estimates, standard errors in parentheses

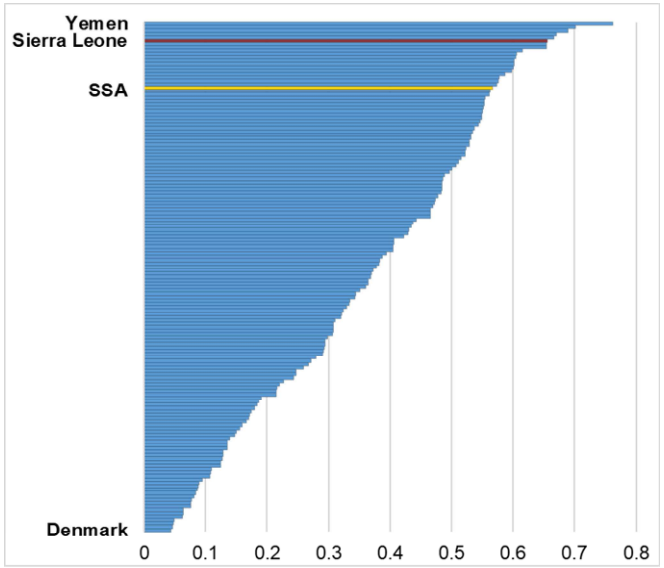
	Time Socializing with Men (hrs/wk) Girls Aged 12-17 at baseline			Time Socializing with Men (hrs/wk) Girls Aged 18-25 at baseline			Unwanted Sex Girls Aged 18-25 at baseline			Transactional Sex Girls Aged 18-25 at baseline		
	Marlowe-Crowne Index	Below Median	Above Median	Marlowe-Crowne Index	Below Median	Above Median	Marlowe-Crowne Index	Below Median	Above Median	Marlowe-Crowne Index	Below Median	Above Median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Pregnancy Risk	.611*	.317	.960*	.317	-.048	.739	-.016	-.054	.077	.021	.010	.046
	(.344)	(.407)	(.563)	(.341)	(.394)	(.501)	(.036)	(.049)	(.086)	(.023)	(.030)	(.050)
ELA Treatment | High Pregnancy Risk	-1.13***	-1.35***	-.877*	-1.40***	-1.70***	-1.14**	.064*	.113**	-.028	.055**	.069***	.035
	(.366)	(.465)	(.485)	(.387)	(.422)	(.491)	(.037)	(.049)	(.081)	(.027)	(.026)	(.057)
ELA Treatment | Low Pregnancy Risk	-1.04***	-1.26***	-.774**	-1.67***	-2.02***	-1.36	.001	-.003	.015	.017	.019	.018
	(.272)	(.405)	(.356)	(.319)	(.401)	(.370)	(.019)	(.032)	(.019)	(.012)	(.023)	(.017)
Marlowe-Crowne Index	.041			-.187*			-.009			.002		
	(.104)			(.108)			(.008)			(.006)		
Difference Treatment Effects [β_3, p-value]	{.297}	{.801}	{.825}	{.423}	{.383}	{.609}	{.125}	{.042}	{.611}	{.210}	{.176}	{.781}
Control Mean at BL | Low Pregnancy Risk	2.34	2.52	2.18	7.69	7.69	7.68	.158	.148	.166	.045	.037	.053
Observations	1,291	659	632	1,552	763	789	1,440	705	735	1,440	705	735

Outcomes: Time allocation data was collected by asking respondents to allocate a set of 25 beads on a board with 6 circles representing: "Learning Activities", "IGA", "Socializing", "Household Chores", "Sleep" and "Other". The Learning category includes schooling, vocational training and study time. "IGA" includes paid and unpaid work of any kind. Respondent were then asked to allocate beads into each circle in a way that represents time allocation in an average day, and data points were later converted into weekly hours. A similar procedure was implemented to record allocation of socializing time across the following activities: "Friends", "Men", "Alone", "Church", "Volunteer" and "Other". The exact phrasing for the "Men" category is, "With boys or men you have a sexual relationship with.". Using the number of hours spent on total socializing time from the previous step, these allocations were later converted into weekly hours. During the long-term follow-up in 2019, tracked respondents were administered 13 questions form the Marlowe-Crowne Social Desirability test. Answers from these questions where later aggregated in an a inverse-covariance weighted index (Anderson, 2008) of social desirability.

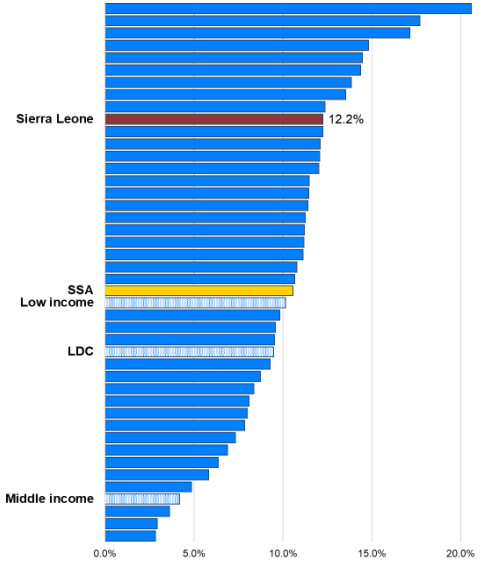
Notes: ***, ** and * denote significance at the 1%, 5%, and 10% levels. Control variables include: age, PPI score, household size, illiteracy, village size (nr of dwellings), village average PPI score, distances form key facilities (clinic, secondary school and market), a dummy equal to one if the village is a political stronghold (i.e. has a resident paramount and/or section chief), the number of NGOs active within the village before the Ebola outbreak (excluding BRAC), share of Christian households, distance from Freetown and distance from Kailahun. All specifications include dummies for the randomization strata (district) and errors are clustered at the unit of randomization (village).

Figure A1: Sierra Leoneon Context

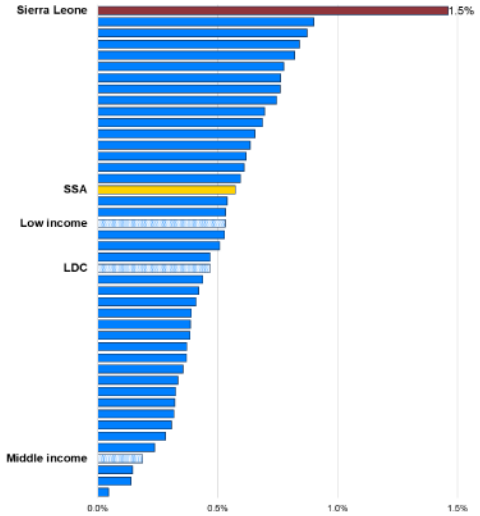
Panel A. Gender Inequality Index 2013



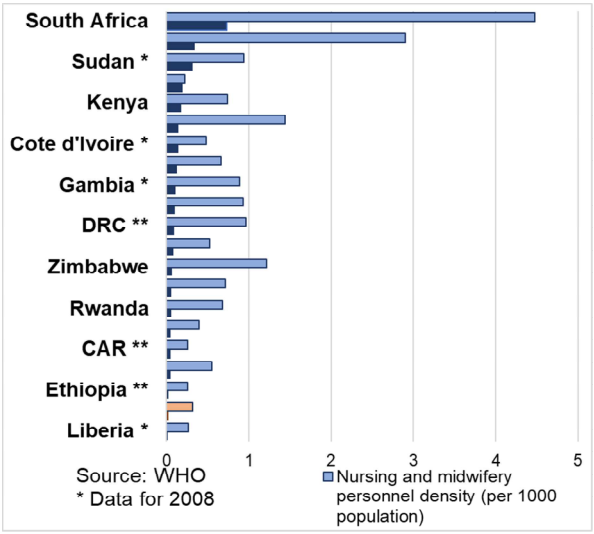
Panel B. Adolescent Fertility Rate, Ages 15-19, 2013 (%)



Panel C. Maternal Mortality Ratio, 2013 (%)



Panel D. Physicians and Nurses per 1,000 population



Notes

Panel A : Source: UNDP. The Gender Inequality Index aggregates information on: maternal mortality rates, adolescent fertility rates, education by gender, female held parliamentary seats, and inequality in labor market participation. The index ranges from 0 to 1, with a value of 0 indicating perfect equality.

Panel B : Source World Bank WDI

Panel C : Source World Bank WDI, modelled estimates of maternal mortality per 100 live births.

*Panel D : Source WHO, Brighter colored bars represent nurses and the darker bars represent doctors per 1,000 population. * Data for 2008, ** Data for 2009, the remaining data points are for 2010.*

Figure A2: Ebola in Sub Saharan Africa

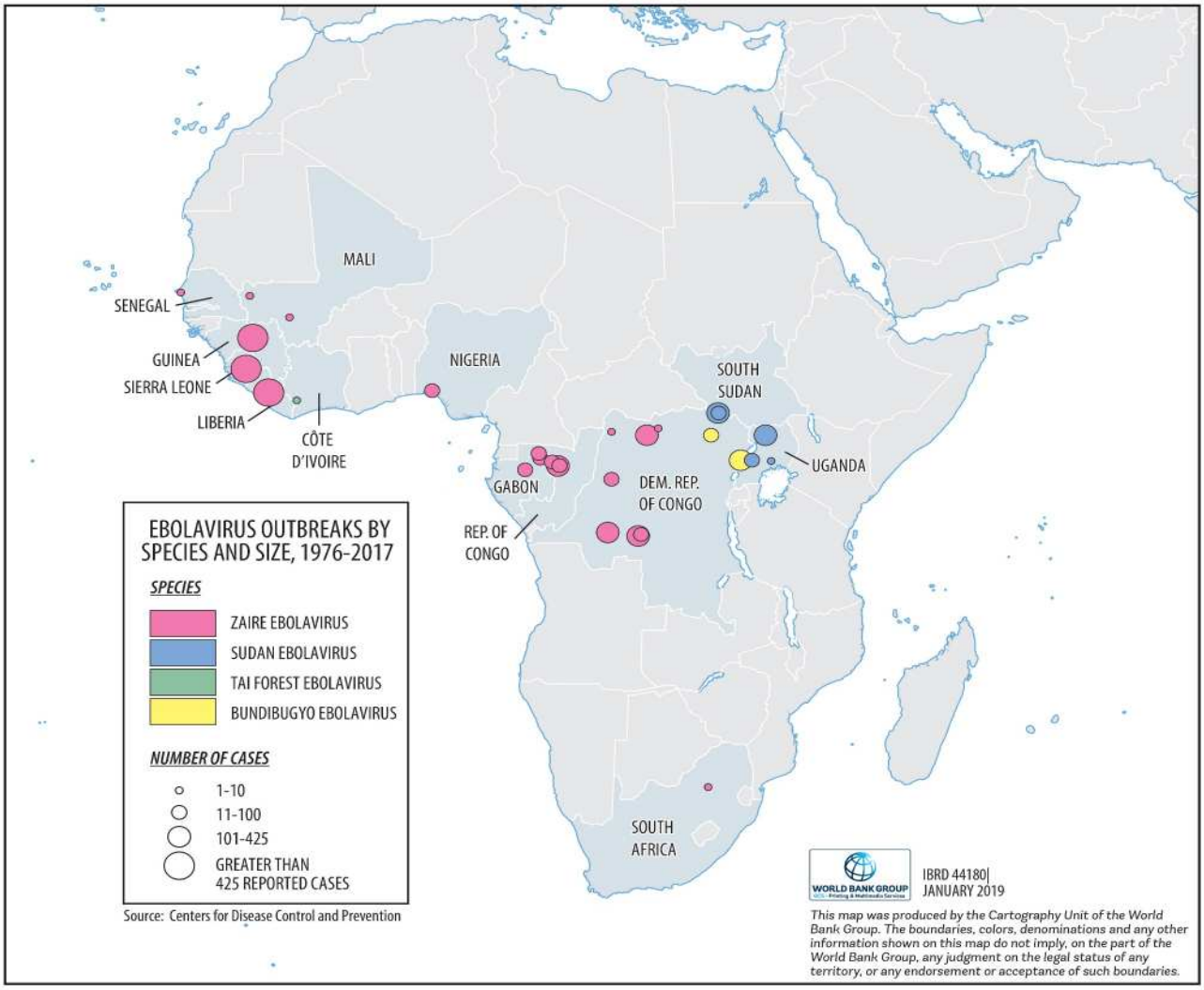
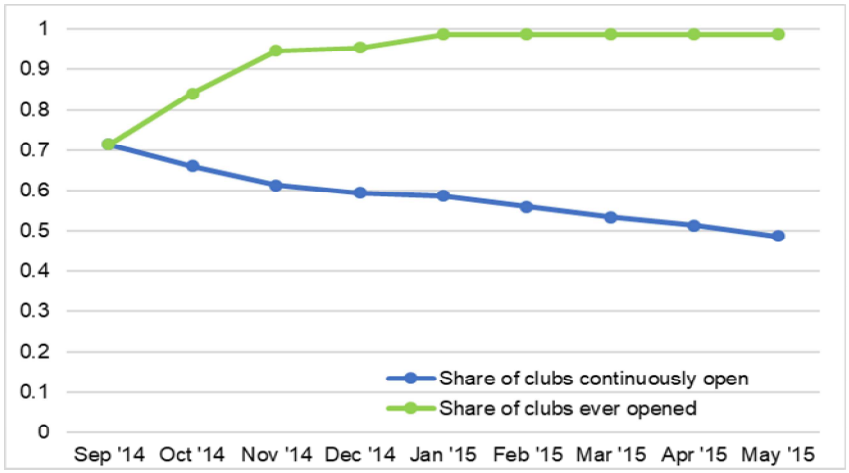
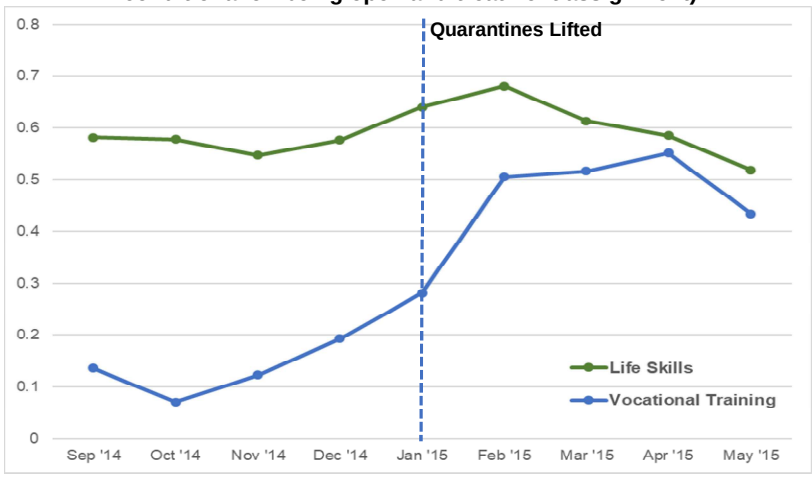


Figure A3: ELA Implementation

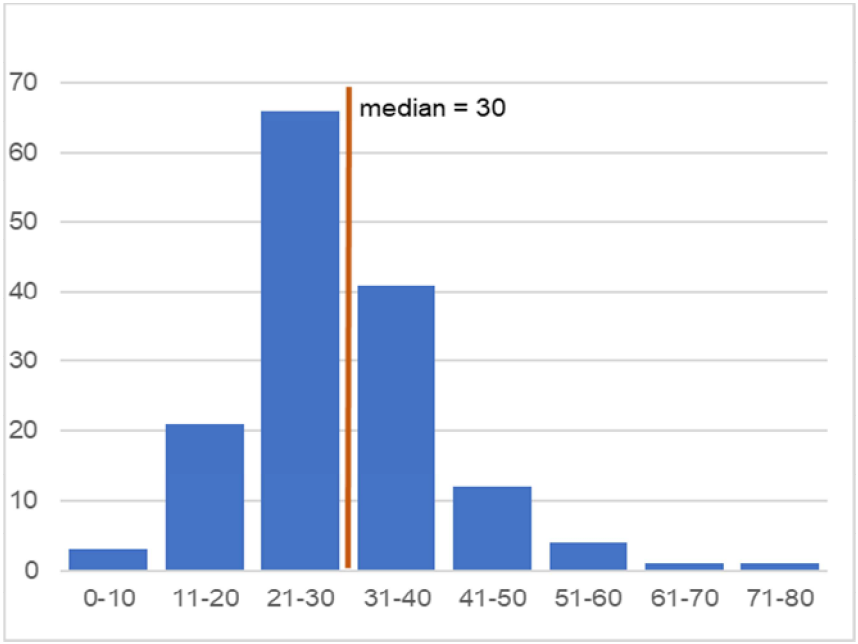
A. Share of ELA Clubs Continuously, Ever Open



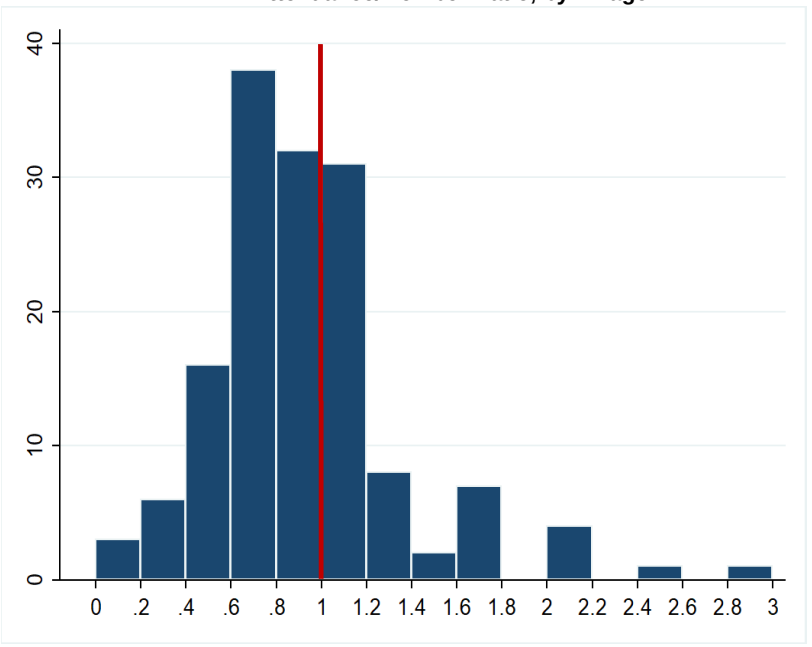
B. ELA Program Delivery (Share of clubs offering a particular service, conditional on being open and treatment assignment)



C. ELA Club Membership, by Village



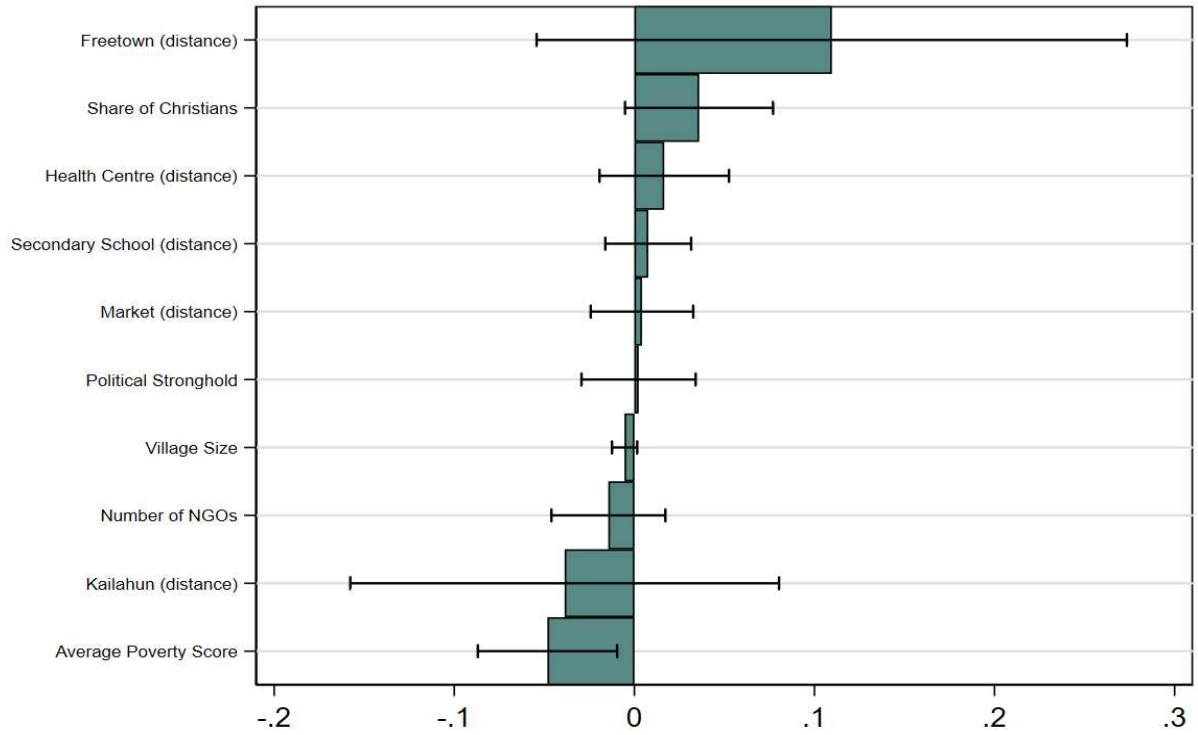
D. ELA Attendance/Member Ratio, by Village



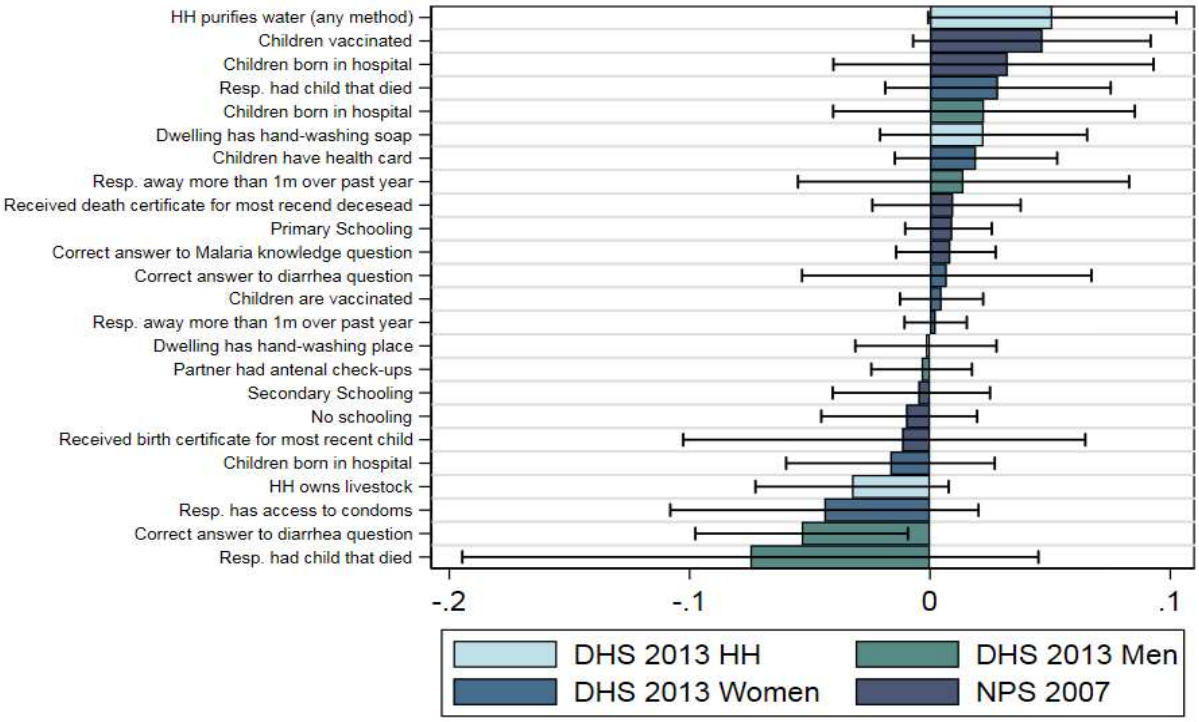
Notes: All panels report data from the ELA Club Monitoring Survey administered in June and July 2015 to club mentors. Panel C reports the number of girls in each village that registered as ELA members when the club first opened. In Panel D, attendance is measured at the time of the monitoring survey.

Figure A4: Ebola-Related Pregnancy Risk and Local Area Characteristics

A: Village Characteristics

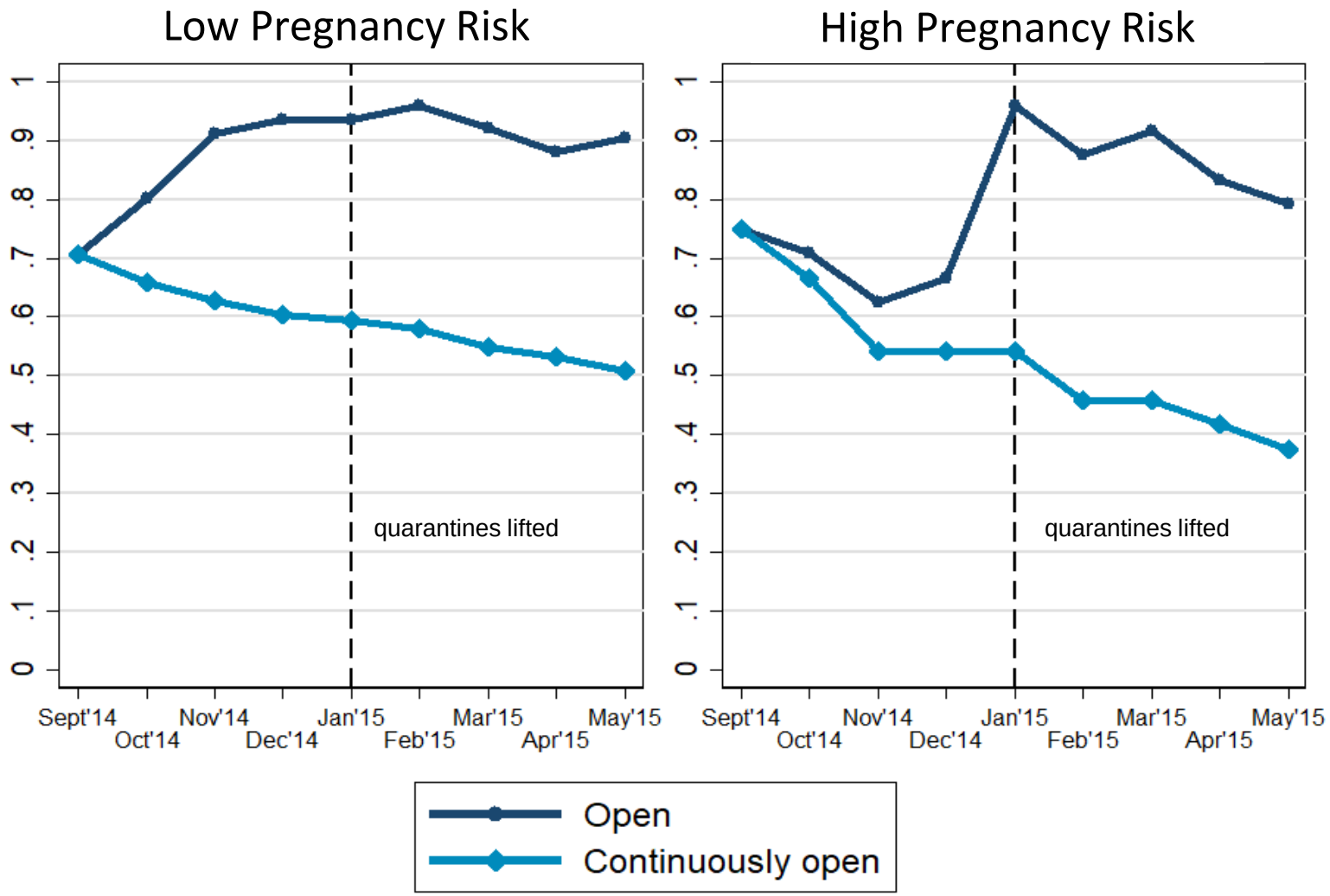


B: Chiefdom Characteristics



Note: Each partial correlation is estimated by regressing the village-level pregnancy risk dummy on each variable of interest, with district (strata) fixed effects and robust standard errors. Data from the 2013 Demographic and Health Survey, a nationally representative survey administered to 12,629 respondents, and from the 2007 National Public Service Survey, a nationally representative survey collected by the Decentralization Secretariat to monitor satisfaction with public service provision. The sample includes 6,300 households.

Figure A5: ELA Club Functioning, by Pregnancy Risk



Notes: Data from the ELA Club monitoring survey were collected in October 2015. In January 2015, quarantines were officially lifted by the Sierra Leonean Government.

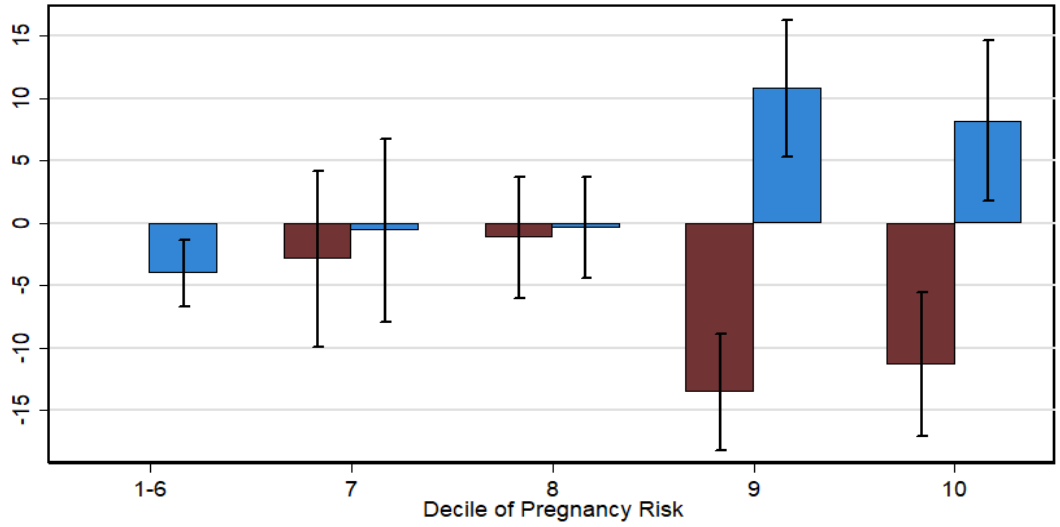
Figure A6: Impacts by Intensity of Pregnancy Risk

Girls Aged 12-17 at Baseline

A: Time Spent in Learning, Income Generation or ELA

Weekly Hours, 90% Confidence Interval

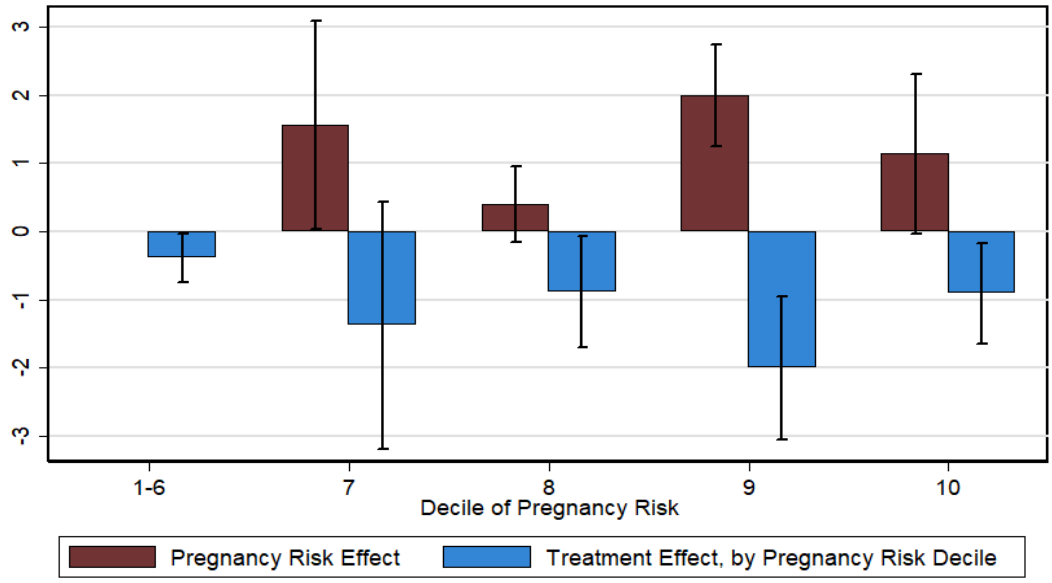
Reference Group: Bottom 60% of Disruptions' Distribution



Panel B: Time Spent with Men

Weekly Hours, 90% Confidence Interval

Reference Group: Bottom 60% of Disruptions' Distribution



Outcomes: Time allocation data was collected both at Baseline and Endline. Respondents were provided a set of 25 beads and a board with 6 circles representing: "Education", "IGA", "Socializing", "Household Chores", "Sleep" and "Other". The Education category includes schooling, vocational training and study time. "IGA" includes paid and unpaid work of any kind. Respondent were then asked to allocate beads into each circle in a way that represents time allocation in an average day. Socializing time allocation data was collected both at Baseline and Endline in a similar way. The categories recorded were: "Friends", "Men", "Alone", "Church", "Volunteer" and "Other". Respondents were then asked to allocate beads into each circle in a way that represents time allocation in an average week. The data points were later converted into weekly hours using recorded total socializing time form the first exercise.

Notes: Deciles of the distribution of Ebola-induced disruptions are on the X-axis. Error bars represent 90% confidence intervals. Bars represent coefficient estimates via SUR regression on all time use/socializing categories excluding "other". Control variables include: age, PPI score, household size, illiteracy, village size (nr of dwellings), village average PPI score, distances form key facilities (clinic, secondary school and market), a dummy equal to one if the village is a political stronghold (i.e. has a resident paramount and/or section chief), the number of NGOs active within the village before the Ebola outbreak (excluding BRAC), share of Christian households, distance from Freetown and distance from Kailahun. All specifications include dummies for the randomization strata (district) and errors are clustered at the unit of randomization (village). Error bars represent 90% confidence intervals.