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The Effect of Government Contracting with Faith-Based Health Care Providers in Malawi

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The effect of government contracting with faith-based health care providers in Malawi

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Abstract

We study the impact of contracting-out of maternal health care by the government of Malawi to providers from the Christian Health Association of Malawi (CHAM) in the form of Service Level Agreements (SLAs). Under a SLA, a CHAM facility provides agreed maternal and newborn services free-of-charge to patients, and is reimbursed on a fixed price per service. We merge data on health facilities in Malawi with pregnancy histories from the 2010 Malawi Demographic and Health Survey, and exploit the staggered implementation of SLAs across facilities. Using difference-in-differences, we estimate the differential effects on pregnancy- related health care utilisation to mothers residing near and far from facilities with a SLA over time. Our findings show that SLAs reduced home births and increased skilled deliveries at CHAM hospitals. We observe greater provision of prenatal care services at CHAM health centres but no overall increase in the number of prenatal care visits. We find evidence of a reduction in certain components of prenatal care.

JEL Code: I110, I120, I150, I180, L240, L300, L330.
Keywords: Healthcare, Least Developed Country, Contracting Out, Nonprofit.

1. Introduction

Faith based health care providers (FBHCPs) have a long tradition of offering a large proportion of health care services in Africa and provide between 30% and 70% of all health care in Sub-Saharan Africa. FBHCPs are especially prevalent in remote and rural areas. They are often perceived to offer higher quality of care compared to government facilities and are likely to have more altruistic management and health care staff (Olivier and Wodon 2014; Serra et al. 2011; Reinikka and Svensson 2010). However, FBHCPs often charge user fees which may constitute a barrier to health care utilisation amongst rural and deprived populations (Watson et al. 2016).

To address this inequity, governments in a number of countries in Africa have integrated FBHCPs into their public health systems by making payments or resources available in return for facilities supporting public health sector goals and priorities, for example as in removing user-fees (Olivier et al. 2015; Whyle and Olivier 2017). Whilst contracting for the provision of health care with FBHCPs may have substantial effects on health care utilisation and population health, the contractual arrangements are often substantially constrained, relying on trust and religious values and lacking enforceability mechanisms (Whyle and Olivier 2017; Boulenger and Criel 2012; Boulenger et al. 2009). It is, therefore, an empirical question as to whether contracting with FBHCPs delivers real benefits. Removing user charges intuitively increases demand for services but some of this may simply be a diversion from government facilities, and whether that demand is met depends on whether FBHCPs invest in the capacity to treat more patients.

There is very limited large-scale empirical evidence on the impact of contracting out of health care services to non-governmental health care providers in developing countries. Despite the fact that faith based providers constitute the second largest (or the largest) type of health providers in most countries in Sub-Saharan Africa, even fewer studies explicitly investigate the effect of contracting out of health care to FBHCPs (Whyle and Olivier 2017).

The focus of this paper is on government contracting with FBHCPs in Malawi. While public health care is free of charge in Malawi, user fee charging FBHCPs dominate the provision of health care in rural areas. In 2002, the government drafted a Memorandum of Understanding (MoU) with the Christian Health Association of Malawi (CHAM) which is an umbrella organisation for all FBHCPs in the country. The MoU initiated the implementation of Service Level Agreements (SLAs) which began to be rolled out in 2006. These SLAs stipulate that a CHAM facility is liable to provide certain services free of charge and will be reimbursed by the district health office.

We exploit the staggered process of implementation of the SLAs since 2006, and use a difference-in-differences strategy to estimate its effects. Using household survey data, we analyse the effect of SLAs on maternity health care utilisation and child health outcomes, for households residing near facilities which implemented SLAs, compared to households who were not impacted by the policy. Pregnancy histories with information on if (and if so where) a pregnant woman sought maternal health care, before and after the introduction of SLAs, are derived from the 2010 Malawi Demographic and Health Survey. We link each DHS village to all facilities within a radius of 8 km, including information on whether a given CHAM facility implemented a SLA.

Our findings reveal that SLAs reduced home births and increased skilled deliveries at CHAM hospitals, largely due to the impact of the policy on higher order birth deliveries. We find mixed effects on the provision of prenatal care. Overall, prenatal care is not increased but CHAM health centres delivered

more prenatal care visits. Other prenatal services, for example access to antimalarial medication and urine testing, were reduced, whilst iron supplementation was increased. We do not find any effects of SLAs on child survival.

The effects of the policy vary across different groups of women. Muslim women benefited less, in terms of increases in pregnancy related services following adoption of a SLA. Women residing near hospitals and facilities with tarmac road experienced a higher utilisation of certain pregnancy related services.

Our study is complementary to a previous evaluation of SLAs by Manthalu et al. (2016). Manthalu et al. (2016) are not able to analyse the population wide effects as they do not observe health care utilisation at facilities other than CHAM. Moreover, that study relies upon CHAM facility reported numbers which may be subject to reporting bias (Tambulasi 2014). The analysis presented here exploits the reports of health care users themselves and extensively controls for case-mix variation utilising survey data.

This study further contributes to two main strands of literature. First, it provides evidence regarding the impact of a nationwide health financing reform, using large scale household survey data from a developing country. Previous studies have often used small-scale and time limited randomised control trials (see discussions in Miller and Babiarz (2013) and Chalkley et al. (2016)).

Second, it adds to the literature on fee exemption on the utilisation of health care and subsequent effects on health outcomes in low- and middle-income countries (LMIC). The results from such studies are mixed (Dzakpasu et al. 2014). Studies which rely on quasi-experimental methods do not find that the removal of user fees increases health care utilisation or improves health outcomes, see Mohanan et al. (2014) and Lépine et al. (2018). In contrast, we find that user fee removal, combined with financial reforms at not-for-profit FBHCPs, increases the utilisation of such providers and reduces unskilled home births.

This paper is organised as follows; the health care sector and contractual arrangements with CHAM in Malawi are described in Section 2. We set out a theoretical framework in Section 3. Data are described in Section 4 and the empirical approach is specified in Section 5. Results for the descriptive statistics and the regression analysis are presented in Section 6 and 7, respectively. Concluding remarks are in Section 8.

2. Institutional Context

The majority of all health care in Malawi is publicly funded and provided free of charge but FBHCPs dominate the provision of health care in rural and remote areas. CHAM is an umbrella organisation for all Christian FBHCPs in the country. CHAM consists of 182 facilities and medical training schools of which 171 are health care facilities providing health care at the basic primary, secondary and tertiary levels. CHAM facilities are found in all districts (except Mwanza) and serve a catchment population of around 37% of the total Malawian population and deliver up to 75% of health services in rural and hard-to-reach areas (Christian Health Association of Malawi 2016). CHAM facilities charge fees and therefore constitute a potential barrier to equitable access to health care in Malawi.

CHAM facilities have become more reliant of government support over time as potential out of pocket expenditure of patients has been declining. In order to increase the access to health care among rural and remote populations, the Ministry of Health (henceforth *ministry*) signed a MoU with CHAM in 2002. The MoU stipulated that the Government of Malawi (henceforth, *government*) would pay salaries, leave grants, pension scheme contributions and any other allowances for staff working in CHAM facilities. The MoU formalised the continuation of government support as it has been subsidising CHAM salaries since 1964 (Christian Health Association of Malawi 2016).

The MoU led to the introduction of SLAs, which are established at the district level to cater to specific service delivery areas (Christian Health Association of Malawi 2016). A SLA is a formal agreement between the government, represented by a District or City Council, and a CHAM health facility. The first set of SLAs was signed in 2006. These provided for an agreed package of health services, free of charge to users, and reimbursed on a pre-defined fixed price per service. Each district health office could decide whether to contract out health care services with CHAM in their areas. The process starts with a needs assessment followed by a negotiation with the CHAM facility about services included and their prices (Christian Health Association of Malawi 2016; Christian Health Association of Malawi and The Government of Malawi 2016). The district health office intended to reimburse 70% of the estimated costs of the services, leaving the health facilities to absolve the remaining 30% (Christian Health Association of Malawi 2016). Overhead costs are included (primarily electricity and water), building and equipment maintenance, bed linen and cleaning materials, as well as costs of locums and short term contracts and staff house maintenance (Carlson and Zanardi 2014). The contract is for renewal on an annual basis (Manthalu et al. 2016). The signing of a SLA is communicated to the population by a publicity campaign channeled through village leaders(Manthalu et al. 2016; Manthalu 2019).[1]

The detailed practical arrangements need to be abstracted from in order to understand the potential impact of the adoption of SLA. From the perspective of remuneration contracts, a SLA introduces additional payments for treating certain types of patients, whilst requiring that those patients are not charged a co-payment. There may, in addition, be adjustments to the financial resources that had previously been transferred to a facility under a MoU.

Our empirical study seeks to understand the impact of the adoption of SLAs upon the number of patients treated and the treatment they receive. There are both supply- and demand-side effects to consider, and these effects can be expected to interact. Therefore, to guide the interpretation of the empirical analysis,

[1] The spread of information occurred very fast although the formalities of the campaigns are not well documented (Manthalu 2019).

a model is constructed to establish the pathways through which SLAs can be expected to have these effects. That model is set out next.

3. Theoretical Framework

The following model captures a number of salient features of the movement towards SLAs. First, it allows for a SLA to have an impact on both the decisions of facilities and the patients that use them. For facilities, it allows choice of *capacity* and the *intensity* of treatment to offer. Capacity will be reflected in the number of patients treated, and intensity will affect the number of consultations and procedures that are carried out. For patients it allows for a decision of whether to present for treatment. In common with much of the literature in health economics, it is assumed that potential patients have very limited information regarding the treatment they will be offered and, for simplicity, patients' decisions are assumed to be determined only by the cost of treatment and not the anticipated intensity of that treatment. These decisions interact, however, in that a greater volume of patients will affect a facility's decisions in regard to capacity and the intensity of treatment to offer.

3.1. Patients

It is assumed that patients will present themselves to be treated at a facility according to the extent of the co-payment. Denoting by N the number of patients arriving at the facility and by p the amount of the co-payment then by assumption $N = D(p)$ with the function $D(.)$ decreasing in its argument. If choosing not to be treated at one facility, patients may either forgo treatment or proceed to another facility with a lower (or zero) co-payment.

Further channels of effect arise if patients choose whether to consider a facility according to the likelihood with which they will be treated, affected by that facilities capacity, or their expectation of the treatment intensity they will receive, but these effects are not considered here.

3.2. Facilities

A health care facility needs to establish capacity, k to treat patients. The facility is assumed to treat all patients for which it has capacity, and the number of patients arriving to be treated is given by N. This suggests that the number of patients treated, can be characterised as an increasing function of both k and N and is denoted $n(k, N)$. For all patients, the facility decides upon the intensity of treatment q. Treatment intensity will be reflected in the number and type of treatments or consultations that a patient receives.

The facility receives resources with value $\alpha v(k)$ with the function v assumed to be increasing in capacity and where α is a shift parameter that captures the extent to which the purchaser transfers resources. For each patient treated, the facility receives P from the purchaser and a co-payment p from the patient.[2]

A facility is assumed to be altruistic in the sense of attaching a benefit to treating $n(k, N)$ patients with intensity q of $b(n(k, N), q)$ and chooses k and q to maximise

$$U(k, q) \equiv b(n(k, N), q) + (P + p)n(k, N) + \alpha v(k) - c(n(k, N), k, q), \tag{1}$$

[2] This captures the fact that under a SLA the facility receives additional resources according the services delivered to patients.

where $c(n(k,N),k,)$ is the cost of maintaining capacity k and of treating $n(k,N)$ patients with intensity q. The optimal choice of capacity and intensity will be dependent on *inter alia* the exogenous (to the facility) factors N, p, α and P.

3.3. Analysis

In the notation of the model, moving a facility on to a SLA is associated with p being reduced to zero; the introduction of a non-zero P and a possible change in α. The model suggests that all of these changes will impact in various ways on the facility's choice of capacity and intensity, and on patients choices of whether to be treated, with the latter also feeding back onto the facilities choice of capacity and intensity.

This implies that the impact of a change to a SLA is potentially complex. In economic terms, it affects a number of prices, each of which has an impact on decisions of both facilities and patients.

To disentangle these effects, it is assumed that the program described as maximising the expression in expression (1) by choice of k and q is concave and that all functions are differentiable to the required degree. Since the primary issue of interest is the impact of a SLA on the the number of treatments and observable proxies of intensity, it is useful to consider a standard comparative statics exercise in which a single parameter affecting choices is examined. Taking both patients and facilities, there are 3 endogenous variables k, q and N and three parameters that are influenced by the adoption of a SLA, p, P and α. Using the definition $N \equiv D(p)$ throughout reduces the model to two endogenous variables and the conditions characterising those can be written,

$$\begin{aligned} f(k,q,p,P,\alpha) \equiv U_q(p,P,\alpha) &= 0 \\ g(k,q,p,P,\alpha) \equiv U_k(p,P,\alpha) &= 0 \end{aligned} \tag{2}$$

where subscripts denote derivatives. The values of k and q satisfying equations 2 will depend on the exogenous parameters and are denoted $k^*(p,P,\alpha)$ and $q^*(p,P,\alpha)$. The effect of a small change in any parameter, z, on the endogenous variables can be determined from

$$\begin{bmatrix} \frac{dk^*}{dz} \\ \frac{dq^*}{dz} \end{bmatrix} = - \begin{bmatrix} f_k & f_q \\ g_k & g_q \end{bmatrix}^{-1} \begin{bmatrix} f_z \\ g_z \end{bmatrix} \tag{3}$$

It is not possible in general to unambiguously sign the effects of any of the exogenous variables on k and q. The intuition for this ambiguity is that whilst the direct impact of both P and α are relatively easy to determine, the relationship between k and q remains ambiguous, and the direct effect on either of these variables impacts on the other. The cross partial derivatives of the functions $c(.)$ and $b(.)$ may be positive or negative[3] and these cross derivatives determine the relationship between k and q. The effect of p is further complicated by its impact on the number of patients being treated – the demand effect – in addition to its role in the facility's objective function.

[3] The two choice variables may be either complements, if increasing one increases the marginal benefit of the other more than its marginal cost, or substitutes if the opposite is true

Hence, in the general specification of the model, the impact of a SLA is certainly ambiguous. A theoretical model alone cannot predict the direction of effect but does highlight that it may exert an influence on both the number of patients treated and the treatment they receive and that there is combination of supply- and demand-side forces at work.

Further simplification of the model is useful, so we consider henceforth treatment volumes to enter linearly into a facility's objective. In this case, costs and benefits are assumed to accrue on a per patient basis so that total benefits and costs are product of per patient values and treatment volumes and the facility's objective can be written;

$$U(k,q) \equiv n(k,N)[b(q) + (P+p) - c(k,q)] + \alpha v(k), \tag{4}$$

For this case the following comparative statics can be established;

$$\frac{dk^*}{d\alpha} \geq 0, \tag{5}$$

$$\frac{dk^*}{dP} \geq 0 \tag{6}$$

$$\frac{dk^*}{dp}0, \tag{7}$$

and

$$\frac{dq^*}{dp} = \frac{dq^*}{dP} = \frac{dq^*}{d\alpha} = 0. \tag{8}$$

The choice of treatment intensity is now independent of the parameters that are affected by adoption of a SLA *and* independent of the facility's capacity choice. This case therefore serves as a benchmark. If decisions regarding treatment intensity and capacity are decoupled, the model implies that a SLA will not affect treatment intensity.

However, the impact upon capacity of a SLA occurs through changes in all three parameters and, therefore, remains ambiguous for two reasons. First, because the removal of the patient co-payment implied by a SLA has both positive and negative effects. The positive effect through increasing the number of patients wanting to be treated increases the marginal benefit of extra capacity, but the negative effect is the reduction in the marginal benefit of carrying out extra treatments. If this latter effect is large enough and therefore not compensated for by the increase in P, the facility might desire to reduce capacity, in which subscripts denote derivatives. Second, it is not clear from the specification of SLAs whether the parameter α increases or decreases. The latter seems more likely, in which case, the effect is counter to an incentve to increase capacity.

Hence, even a simplified version of the model indicates the importance of empirical investigation. In general, rational decision making on the part of facilities could result in SLAs implying either expansion or reduction in the number of patients treated the latter of which would be contrary to the intention of the policy. Furthermore, changes in volume may be accompanied by either expansion or contraction in the intensity of treatment offered, although in the simplest case these effects are not to be expected.

Just as the theory informs empirical investigation, empirical estimates provide guidance regarding the most relevant version of the model. This issue will be revisited in the light of the empirical analysis considered next.

4. Data

The 2010 Malawi Demographic Health Survey (MDHS) is our primary data set. It is representative for households with at least one eligible woman aged 15-49 at the village level. The survey contains a rich variety of information, including household background characteristics, female reproductive histories, maternal and child health care utilisation, and anthropometric status. Eligible women report the date of birth of all their children, including children who have died postnatally. Women are also asked about health care use related to pregnancies during the past 5 years prior to the survey. As the SLAs primarily cover maternity and neonatal health services, we make use of the pregnancy related health care utilisation for births to rural women between 2005-2010. Due to lack of information on previous residence, we restrict the sample to women who did not relocate since 2005.

The MDHS also provides GIS coordinates for the centroid of each sampled village which we use to measure the spatial access to nearby health facilities at baseline. We use data on all health facilities in Malawi in 2005 deposited by the United Nations Office for the Coordination of Humanitarian Affairs Regional Office for Southern Africa.[4] The data reports the exact location of all 523 facilities. In addition, it also provides information on the type of health care facility, services provided, ownership (CHAM, Government, NGO or private for profit) and to what type of road the facility is connected to. As SLA's primarily cover pregnancy related services, we restrict the analysis to the 391 facilities which have a maternity department and/or provide maternity services.

We merge the facility data with information on SLA status during 2006-2010. SLA information per facility is retrieved from the health management information system. The health management information system is a centrally managed database that stores data collected from all government and CHAM health care facilities in Malawi. This data comprises of information on the date of SLA implementation, scope of SLA services, contract renewal and average SLA bill. From the total of 138 CHAM facilities which offered maternity services in 2005, we have information on the year and month of implementation of SLAs for 61 CHAM facilities.

We identify the access to facilities with a SLA in terms of a spatial boundary. The distance to a facility is likely to have a large impact on the demand for health care, as formal health facilities are scarce in rural areas (Wong et al. 2017). We use QGIS to link each 2010 MDHS village centroid to all health care facilities providing maternity services within a 8 km radius. We have chosen 8 km as this was the Government of Malawi's definition of the maximum accessible distance to formal health care at the time of our study (Ministry of Health 2011). It is advised to measure access in terms of boundaries rather than identifying the seemingly closest facility due to the random displacement of DHS village coordinates (Burgert et al. 2013). The true latitudes and longitudes of the village centroids are displaced by 0-5 kilometers and 1% of geocoordinates are displaced up to 10 kilometers for rural areas (Burgert et al. 2013).[5]

[4] We do not have data on health facilities in Malawi in 2010. Nonetheless, the increase from 523 health facilities in 2005 to approximately 600 in 2011 cannot be deemed substantial and is mostly driven by a growth in non-CHAM private providers (Mueller et al. 2011).

[5] Urban locations are displaced 0-2 kilometers. However, urban areas are not included in our analysis due to the vast majority of CHAM facilities being found in rural areas. The displacement process consists of first choosing a random direction between 0 and 360 degrees and then a random distance within the pre-defined distance which gives a new latitude and longitude for the village. Lastly, the new location is checked to make sure it falls within designated administrative boundaries (Perez-Heydrich et al. 2013).

The SLAs were implemented to increase formal health care use at CHAM facilities for households who could not access free public health care facilities. Therefore, we further restrict the analysis to households with only one health facility within 8 km, irrespective of ownership. This leaves us with a sample of women who the policy intended to target and who are more likely to benefit from the policy compared to women who have more choice of nearby maternal health facilities. Over 55% of the rural households in the 2010 DHS have access to only one facility within 8 km. This leaves our final sample with 53 CHAM facilities with information on SLA implementation by year and month.

5. Econometric Specification

Our basic specification is a difference-in-differences model shown in Equation 5. We compare health care utilisation and health outcomes for births with exposure to SLA at any nearby CHAM facility compared to earlier births in villages with future exposure to the policy and to births in villages that never got access to SLA by 2010.

$$H_{ivt} = \alpha_0 + \delta_v + \gamma_t + \beta^{\text{DD}}\text{SLA}_{vt} + \theta X_{ivt} + \mu_{ivt}$$

H_{ivt} represents various outcomes related to the delivery of a live child and services accessed during the birth or pregnancy of child i, in village v born or conceived in year t. We investigate the effects of the policy on the probability of giving birth at home, at a CHAM or public facility, type of assistance at birth and child health outcomes. In addition we analyse the effect on services utilised during pregnancy, such as the number of prenatal care visits, the use of CHAM and government prenatal care services and the demand for particular services, tests or medicines.

The inclusion of village fixed effects, δ, deal with the issue that the implementation of SLAs could potentially be correlated with pre-existing village level characteristics. Fixed effects for year of birth, γ, also partial out nationwide variation across years. SLA is a dummy variable taking value 1 if a birth occurred at least one month after the month of implementation of SLA at the facility within 8 km of one's village, and 0 otherwise. The parameter of interest, β, is thus identified from variation within villages and across birth or conception years. Similarly, when we estimate the effect on services used during pregnancy, SLA is a dummy variable taking value 1 if the child was conceived after the implementation of SLA at the nearby facility, and 0 otherwise.[6]

The vector X denotes the set of control variables. The following birth level covariates are controlled for; multiple birth status, year of birth/conception, month of birth/conception. The interaction between year and month of birth/conception is included to partial out any nationwide year specific seasonal variation. Additionally, we control for the following variables in our baseline specifications; mother's current age, ethnicity, religion, household wealth quintile and the mother's age at first birth. As we only have information on contemporaneous characteristics in 2010, we restrict the set of household and mother level covariates to characteristics which are likely to be time-invariant.[7] Due to heterogeneity across health facilities and the risk of non-random policy implementation with respect to facility attributes, our baseline specifications control for separate trends by the type of facility (hospital versus health centre) and accessibility (tarmac road versus other road).

While the inclusion of village level fixed effects controls for time-invariant heterogeneity, one of the main threats to the validity of the methodology is the existence of time-varying unobserved covariates that are correlated with both SLA implementation and related health care utilisation and health outcomes. For example, local shocks to the economy or the health care system may affect both the decision to implement SLA and health care utilisation from FBHCPs. In our second specification we, therefore,

[6] We calculate conception month-year by subtracting 9 months from the birth month-year.

[7] The wealth index is a composite measure of a household's cumulative living standard. It is calculated using information of a household's ownership of assets. We deem the effect of co-payment removal for maternal and neonatal care to be negligible for the accumulation of household assets.

include region-by-year fixed effects. As many health and public policies often are implemented at the district level, we include district specific trends in the third specification.

In order to exploit the variation in maternity and neonatal health care utilisation across births to a given mother, our final and preferred specification includes mother fixed effects. Therefore, we restrict the analytical sample to women with more than one birth in the past 5 years and estimate all specifications using this sample. In addition to consistency across specification samples, this restricted analytical sample rules out that the overall results are driven by compositional changes to the sample of mothers.

We cluster our standard errors on the village level to account for inter-village error correlation across all specifications. As we make use of self-reported pregnancy histories spanning over a 5 year period, our data is at risk of containing reporting bias. Assuming that the potential measurement error is classical, i.e. not correlated with the assigned treatment or control status, at worst the presence of measurement error would underestimate the results due to attenuation bias.

6. Descriptive Statistics

6.1. Facility data

The facility sample consists of 185 facilities located within an 8 km radius of the sampled 2010 MDHS villages. These facilities also constitute the only facility available within the given boundary. The majority of all facilities are health centres and 15% are hospitals, see Table 12 in the Appendix. Government owned facilities make up 73% of the sample and CHAM owns the remaining share. On average, each facility has a catchment population of 25,376 and only 19% of all facilities can be accessed by a tarmac road. 13% (48%) of all facilities (CHAM facilities) in our sample implemented a SLA by 2010.[8] Figure 1 depicts the roll out of the policy over time and reveals that the majority of facilities signed a SLA in 2006. The implementation rate appears to have slowed down over time and none of the villages in our sample received access to SLA after 2008.

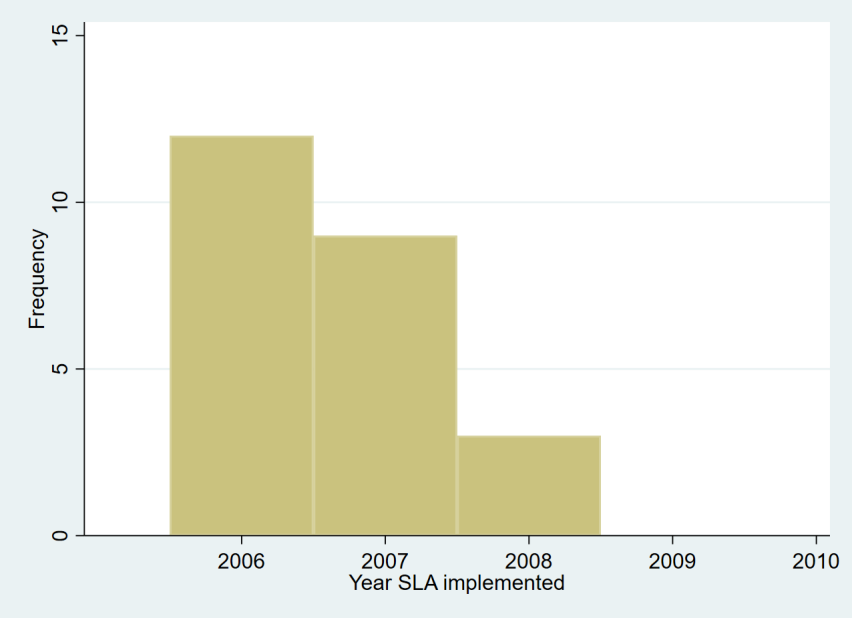

Figure 1: Year of SLA implementation across CHAM facilities for the analytical sample, 2006-2010.

We inspect the details of the policy for the CHAM facilities in our analytical sample which implemented SLA by 2010. The majority of all SLAs, 79%, relate to maternal and neonatal health services only. The second most common service package additionally offers free services to children under 5 years. 4% of SLAs extend free health services to children under 14 years or to the full Essential Health Package. We observe that the average monthly bill is 454,543 MWK and that the outstanding cumulative bill is 505,545 MWK. We also note that 38% of all facilities with a SLA renewed their contract, while most facilities did not renew their SLA contracts. There is therefore a risk that SLAs were not enforced during the full duration of the policy.

[8] The descriptive statistics for the analytical sample are similar the sample of all facilities within 8 km of the 2010 MDHS villages apart from the catchment population, see Appendix A.1.

Table 1: SLA summary statistics

	Mean	SD
Essential Health Package	0.04	0.20
Maternal and Neonatal Health	0.79	0.41
Maternal, Neonatal and Child Health (under 14)	0.04	0.20
Maternal, Neonatal and Child Health (under 15)	0.13	0.34
Average monthly bill	454542.90	508,908.37
Outstanding bill (cumulative)	505,545.13	1208241.52
Fee for service	0.96	0.20
SLA renewed	0.38	0.49
Observations	24	

Next, we investigate the differences between facilities which implemented SLA by 2010 to facilities which did not. From Table 2 we observe that hospitals are more likely to have implemented SLAs. Although the means for the size of the catchment population and the facility being connected to a tarmac road differ by SLA status, we do not find statistically significant differences between the two groups.[9] The selection into the policy highlights the importance of controlling for facility characteristic-specific trend.

Table 2: Differences in facilities with and without SLA

	No SLA		SLA		No SLA - SLA	
	Mean	SD	Mean	SD	Difference	t-statistic
Hospital	0.12	0.33	0.29	0.46	-0.17	(-1.70)
Health Centre	0.84	0.36	0.71	0.46	0.14	(1.38)
Catchment Population	25154.66	36756.37	26863.00	24090.35	-1708.34	(-0.30)
Tarmac Road	0.17	0.38	0.33	0.48	-0.16	(-1.55)
Observations	161		24			

To assess whether the treatment and control groups are systematically different, we turn to our analytical sample from the 2010 MDHS. We inspect the differences in time-invariant characteristics of the 2010 MDHS households and child characteristics which are unlikely to be affected by the SLA policy, by ever having received access to SLA within 8 km by 2010. Table 3 shows that the treatment and control samples are relatively similar with respect to most characteristics. This makes us less worried that our econometric strategy will pick up treatment effects which can be attributed to differences in both observed and unobserved covariates, or to a differential trend in these characteristics.

[9] This pattern of selection is also observed when restricting the descriptive analysis to CHAM facilities only, see Table 13 in the Appendix.

Table 3: Differences across characteristics of households with and without SLA

	No SLA		SLA		No SLA - SLA	
	Mean	SD	Mean	SD	Difference	t-statistic
Household is poor	0.48	0.50	0.48	0.50	-0.00	(-0.01)
Mother's age	28.91	6.01	29.29	5.95	-0.38	(-0.90)
Chewa ethnic group	0.31	0.46	0.26	0.44	0.05	(1.58)
Muslim	0.15	0.36	0.17	0.38	-0.03	(-0.94)
Household has bike	0.52	0.50	0.57	0.50	-0.05	(-1.44)
Mother's age at first birth	18.43	2.61	18.59	2.25	-0.15	(-0.93)
Non Mover	0.63	0.48	0.63	0.48	-0.00	(-0.10)
Child's year of birth	2007.55	1.58	2007.45	1.52	0.09	(0.85)
Birth Order	4.01	2.25	3.93	2.20	0.09	(0.56)
Observations	1451		229			

While our econometric strategy relies on both the variation in SLA implementation across facilities and over time, the majority of our treatment variation stems from the spatial variation in SLA access. The identification strategy therefore assumes that treatment and control households would follow a similar trajectory in the outcomes of interest if the SLA policy had not been implemented. We check this assumption by plotting the trends in the outcome variables prior to the SLA adoption for villages which got access to SLA by 2010 compared to control villages. From Table 2 and Table 3 in the Appendix we fail to infer that the two groups followed differential trajectories prior to SLA implementation.

7. Results

7.1. Place of delivery

We use Equation 5 to estimate the impact of SLAs on the probability of giving birth at home, at a CHAM facility or at a government facility. The regression results are presented in Table 4. We note that the policy had a consistent negative effect on the risk of giving birth at home throughout all specifications in columns 1 - 4. The coefficients on the SLA estimates are statistically significant in the baseline specification (column 1), after including region-year fixed effects (column 2) and when mother fixed effects are added (column 4). Controlling for district level trends increases the standard error and reduces the DiD estimate leading to a p-value of 0.108 (column 3). Including mother fixed effects in the fourth column in Table 4 doubles the magnitude of the coefficient of interest and suggests that SLAs reduced the risk of home births by 12 percentage points.

The policy increased the uptake of child delivery services at CHAM facilities. Our preferred specification, which includes mother fixed effects shows that SLAs increased the probability of a CHAM birth with 12 percentage points. The effect size is large and corresponds to 87% of the sample average. From columns 9 - 12 in Table 4 we note that the access to the policy does not coincide with changes in the demand for birth delivery services at government facilities.

Table 4: Effects of SLA on place of delivery

	(1) Home birth	(2) Home birth	(3) Home birth	(4) Home birth	(5) CHAM birth	(6) CHAM birth	(7) CHAM birth	(8) CHAM birth	(9) Public facility birth	(10) Public facility birth	(11) Public facility birth	(12) Public facility birth
SLA (birth)	-0.057*	-0.060*	-0.059*	-0.118***	0.068	0.069	0.039	0.085*	-0.004	-0.003	0.027	0.012
	(0.030)	(0.031)	(0.034)	(0.036)	(0.050)	(0.051)	(0.059)	(0.046)	(0.058)	(0.060)	(0.071)	(0.055)
Age at first birth	0.003	0.003	0.004		-0.002	-0.002	-0.002		-0.004	-0.004	-0.005	
	(0.005)	(0.005)	(0.005)		(0.007)	(0.006)	(0.007)		(0.007)	(0.007)	(0.007)	
Mother's age	-0.004	-0.004	-0.004		0.006	0.005	0.005		0.001	0.001	0.002	
	(0.003)	(0.003)	(0.003)		(0.004)	(0.004)	(0.004)		(0.005)	(0.005)	(0.006)	
Wealth quintile: Poorer	-0.026	-0.026	-0.027		0.003	0.001	0.001		0.012	0.013	0.012	
	(0.025)	(0.025)	(0.025)		(0.027)	(0.027)	(0.027)		(0.039)	(0.039)	(0.039)	
Wealth quintile: Middle	-0.041*	-0.041*	-0.040*		0.008	0.006	0.005		0.034	0.036	0.034	
	(0.023)	(0.023)	(0.023)		(0.036)	(0.036)	(0.037)		(0.043)	(0.043)	(0.044)	
Wealth quintile: Richer	-0.053**	-0.054**	-0.055**		0.003	0.002	0.002		0.050	0.051	0.053	
	(0.022)	(0.022)	(0.023)		(0.035)	(0.035)	(0.035)		(0.041)	(0.041)	(0.042)	
Wealth quintile: Richest	-0.064*	-0.065*	-0.070*		-0.033	-0.033	-0.030		0.116**	0.116**	0.119**	
	(0.036)	(0.035)	(0.037)		(0.044)	(0.044)	(0.044)		(0.051)	(0.051)	(0.052)	
Region-year fixed effects												
District level trends												
Mother fixed effects												
Constant	17.449	16.344	1.061	0.076***	30.126	29.300	30.955	21.780	-50.012**	-48.625**	-34.853	-12.213
	(14.947)	(15.071)	(16.576)	(0.003)	(18.503)	(18.769)	(24.036)	(16.765)	(22.342)	(22.761)	(29.371)	(26.662)
Observations	1680	1680	1680	1680	1680	1680	1680	1680	1680	1680	1680	1680
R^2	0.393	0.397	0.410	0.785	0.617	0.619	0.623	0.907	0.536	0.537	0.544	0.861

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of birth, month of birth, year of birth interacted with month of birth, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

Next, we investigate whether the impact of SLAs vary across different types of CHAM health care facilities. From Table 5 we note a positive and consistent effect on the likelihood of a woman giving birth at a CHAM hospital following the access to SLA, see columns 1 - 4. The policy increased CHAM hospital deliveries by 5.5 percentage points after controlling for mother fixed effects. The estimate points to a substantial increase as the sample average for CHAM hospital deliveries is 8.6%. The estimates on CHAM health centres are small and statistically insignificant. Although the effects on public hospital deliveries are positive, they are statistically insignificant and relatively small compared to the sample mean of 26.3%. Therefore, we can be confident that the reduction in home births following the access to SLA is due to an increased demand for CHAM hospital deliveries.

Table 5: Effects on type of facility where mother gave birth

	(1) CHAM Hospital	(2) CHAM Hospital	(3) CHAM Hospital	(4) CHAM Hospital	(5) CHAM Health Centre	(6) CHAM Health Centre	(7) CHAM Health Centre	(8) CHAM Health Centre	(9) Public Hospital	(10) Public Hospital	(11) Public Hospital	(12) Public Hospital	(13) Public Health Centre	(14) Public Health Centre	(15) Public Health Centre	(16) Public Health Centre
SLA (birth)	0.065**	0.069**	0.052*	0.055**	0.004	0.000	-0.014	0.030	0.026	0.017	0.033	0.049	-0.024	-0.014	0.001	-0.036
	(0.030)	(0.030)	(0.028)	(0.028)	(0.045)	(0.045)	(0.055)	(0.034)	(0.043)	(0.043)	(0.051)	(0.056)	(0.048)	(0.048)	(0.064)	(0.053)
Age at first birth	-0.002	-0.002	-0.002		0.000	0.001	0.001		0.009	0.009	0.007		-0.012	-0.012	-0.011	
	(0.004)	(0.004)	(0.004)		(0.006)	(0.006)	(0.006)		(0.008)	(0.008)	(0.008)		(0.009)	(0.009)	(0.009)	
Mother's age	0.001	0.001	0.001		0.004	0.004	0.004		-0.004	-0.004	-0.003		0.005	0.005	0.005	
	(0.003)	(0.003)	(0.003)		(0.004)	(0.004)	(0.004)		(0.006)	(0.006)	(0.006)		(0.006)	(0.006)	(0.006)	
Wealth quintile: Poorer	0.012	0.009	0.010		-0.009	-0.008	-0.008		0.059	0.057	0.063		-0.055	-0.052	-0.059	
	(0.022)	(0.022)	(0.022)		(0.027)	(0.026)	(0.027)		(0.042)	(0.043)	(0.043)		(0.044)	(0.045)	(0.044)	
Wealth quintile: Middle	0.013	0.011	0.011		-0.005	-0.004	-0.006		0.032	0.032	0.036		-0.004	-0.003	-0.008	
	(0.023)	(0.023)	(0.023)		(0.033)	(0.033)	(0.035)		(0.044)	(0.044)	(0.044)		(0.049)	(0.048)	(0.049)	
Wealth quintile: Richer	-0.007	-0.010	-0.007		0.010	0.011	0.009		0.087*	0.084*	0.085*		-0.030	-0.027	-0.026	
	(0.025)	(0.025)	(0.025)		(0.030)	(0.030)	(0.031)		(0.046)	(0.046)	(0.046)		(0.046)	(0.046)	(0.047)	
Wealth quintile: Richest	-0.046	-0.047	-0.047		0.013	0.014	0.016		0.098	0.093	0.094		0.016	0.021	0.021	
	(0.036)	(0.036)	(0.036)		(0.044)	(0.044)	(0.044)		(0.064)	(0.065)	(0.065)		(0.064)	(0.065)	(0.066)	
Region-year fixed effects																
District level trends																
Mother fixed effects																
Constant	1.571	0.142	-1.352	6.692	28.555**	29.158**	32.307**	15.088	8.041	5.041	-16.402	-31.331	-56.771**	-52.789*	-18.607	16.918
	(17.537)	(17.497)	(23.220)	(13.409)	(11.370)	(11.736)	(16.157)	(9.144)	(26.943)	(26.797)	(31.255)	(28.209)	(27.217)	(27.182)	(34.310)	(27.879)
Observations	1680	1680	1680	1680	1680	1680	1680	1680	1680	1680	1680	1680	1680	1680	1680	1680
R^2	0.564	0.568	0.570	0.886	0.532	0.535	0.540	0.930	0.565	0.568	0.573	0.871	0.557	0.559	0.564	0.893

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of birth, month of birth, year of birth interacted with month of birth, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

7.2. Assistance at birth

Facility births are often thought to be synonymous with skilled birth assistance. However, SLAs could have unintentionally increased unskilled facility deliveries due to the large increase in patients seeking care at CHAM facilities. Therefore, we investigate the effects on the skill level of the person who assisted the birth. We define skilled birth assistance as a binary variable which takes value 1 if a doctor, nurse or midwife attended the delivery. The variable takes value 0 if a patient attendant, a traditional birth attendant (TBA) or anyone else assisted the delivery. TBAs have, in general, little formal education and are often self taught. The large reliance on TBAs in developing countries is often believed to be a contributing factor to high maternal and child mortality, see Godlonton and Okeke (2016). Therefore, we also analyse the impact on TBAs separately, and on the second largest category of unskilled birth assistance - assistance by a family member, friend or someone else.

We note that SLAs raised the use of skilled birth assistance, see columns 1 - 4 in Table 6. In similarity with previous estimates, the coefficient remains stable across specifications 1 - 3, but the standard error increases when district-specific trends are included, and the inclusion of mother fixed effects doubles the size of the coefficient of interest. After controlling for mother fixed effects, the estimate suggests that SLAs increased the probability of skilled birth attendance by 13.7 percentage points. This corresponds to an increase of 15.5% of the sample mean. Although, we observe negative effects on the use of TBAs, the coefficients are not statistically significant, see columns 5 - 8. On the other hand, we can be more confident in that the policy reduced unskilled assistance by friends, family members or other people, see columns 9 - 12 in Table 6.

Table 6: Effects of SLA on assistance at delivery

	(1) Skilled health worker	(2) Skilled health worker	(3) Skilled health worker	(4) Skilled health worker	(5) TBA	(6) TBA	(7) TBA	(8) TBA	(9) Friend/Family	(10) Friend/Family	(11) Friend/Family	(12) Friend/Family
SLA (birth)	0.069*	0.069*	0.067	0.137***	-0.023	-0.023	-0.007	-0.047	-0.043**	-0.046**	-0.051**	-0.070**
	(0.040)	(0.041)	(0.048)	(0.040)	(0.026)	(0.026)	(0.030)	(0.032)	(0.019)	(0.018)	(0.023)	(0.028)
Age at first birth	0.001	0.001	0.000		0.006*	0.006	0.007*		-0.001	-0.001	-0.001	
	(0.006)	(0.006)	(0.006)		(0.004)	(0.004)	(0.004)		(0.004)	(0.004)	(0.004)	
Mother's age	0.003	0.003	0.003		-0.006*	-0.005*	-0.006*		0.000	0.000	0.000	
	(0.005)	(0.005)	(0.005)		(0.003)	(0.003)	(0.003)		(0.002)	(0.002)	(0.003)	
Wealth quintile: Poorer	0.002	0.001	0.001		-0.039*	-0.038	-0.040*		0.008	0.007	0.008	
	(0.030)	(0.031)	(0.030)		(0.023)	(0.024)	(0.023)		(0.013)	(0.013)	(0.013)	
Wealth quintile: Middle	0.049*	0.048*	0.046		-0.041*	-0.039*	-0.040*		0.002	0.000	0.001	
	(0.028)	(0.029)	(0.028)		(0.021)	(0.022)	(0.022)		(0.013)	(0.013)	(0.013)	
Wealth quintile: Richer	0.019	0.019	0.023		-0.065***	-0.063***	-0.066***		0.010	0.006	0.009	
	(0.035)	(0.035)	(0.036)		(0.020)	(0.020)	(0.020)		(0.015)	(0.015)	(0.016)	
Wealth quintile: Richest	0.093**	0.093**	0.102**		-0.056*	-0.054*	-0.058*		-0.002	-0.004	-0.004	
	(0.042)	(0.042)	(0.043)		(0.033)	(0.033)	(0.034)		(0.024)	(0.024)	(0.024)	
Region-year fixed effects												
District level trends												
Mother fixed effects												
Constant	-7.054	-6.269	7.569	25.244	22.566	22.859	19.380	2.759	6.109	4.928	3.115	4.594
	(16.495)	(16.628)	(23.151)	(22.734)	(14.297)	(14.163)	(17.964)	(18.085)	(5.945)	(6.249)	(8.304)	(10.135)
Observations	1677	1677	1677	1676	1677	1677	1677	1676	1677	1677	1677	1676
R^2	0.368	0.370	0.384	0.777	0.399	0.401	0.412	0.767	0.293	0.304	0.305	0.730

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of birth, month of birth, year of birth interacted with month of birth, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

7.3. Prenatal services

Next, we define the treatment timing to coincide with the month of conception. We follow Equation 5, but control for year of conception and define the time-varying fixed effects and trends at the year of conception.[10] The 2010 MDHS only collects information on prenatal care services related to the mothers' latest live birth within the past 5 years. We are, therefore, unable to account for mother level fixed effects in the next set of estimations. We keep the same analytical sample of women who had more than one birth in the past 5 years for consistency with the previous birth level estimations.

The regression results of SLAs on the number of prenatal visits and the type of facility where the woman sought prenatal care, are presented in Table 7. First, we note that our sample size have reduced to around 700 observations. Despite the loss in sample size, we find that SLAs increased the likelihood of obtaining prenatal care at CHAM health centres by up to 50.4 percentage points, see columns 7 - 9. The policy also reduced prenatal care utilisation at public hospitals by up to 65.4 percentage points, see columns 10 - 12. The shift from government to CHAM providers explains why we do not find an impact on the overall number of prenatal visits, see columns 1 - 3 in Table 7. Moreover, SLAs are associated with a reduced probability of a nurse or a midwife providing prenatal care, see Table 15 in the Appendix. From the same table, we note an increased likelihood of lower skilled health workers performing prenatal care, but these estimates never approach statistical significance.

[10] We do not control for the calculated month of conception due to the added uncertainty in the timing of the prenatal care utilisation.

Table 7: Effect of SLA on prenatal care

	(1) Prenatal visits	(2) Prenatal visits	(3) Prenatal visits	(4) CHAM Hospital	(5) CHAM Hospital	(6) CHAM Hospital	(7) CHAM Health Centre	(8) CHAM Health Centre	(9) CHAM Health Centre	(10) Public Hospital	(11) Public Hospital	(12) Public Hospital	(13) Public Health Centre	(14) Public Health Centre	(15) Public Health Centre
SLA (conception)	-0.537	-0.340	-0.017	0.038	0.126	0.079	0.441***	0.468***	0.504**	-0.608***	-0.530***	-0.654**	0.077*	0.034	-0.031
	(0.423)	(0.373)	(0.532)	(0.057)	(0.133)	(0.096)	(0.090)	(0.126)	(0.198)	(0.131)	(0.118)	(0.277)	(0.045)	(0.047)	(0.087)
Age at first birth	0.023	0.024	0.033	0.002	0.002	0.002	-0.010	-0.011*	-0.011*	0.011	0.010	0.013	-0.003	-0.003	-0.003*
	(0.029)	(0.028)	(0.029)	(0.003)	(0.003)	(0.003)	(0.006)	(0.006)	(0.007)	(0.007)	(0.008)	(0.008)	(0.002)	(0.002)	(0.002)
Mother's age	0.003	0.006	-0.009	-0.002	-0.002	-0.003	0.012***	0.013***	0.014***	-0.002	-0.002	-0.003	0.001	0.001	0.001
	(0.027)	(0.027)	(0.027)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.005)	(0.006)	(0.006)	(0.007)	(0.002)	(0.002)	(0.002)
Wealth quintile: Poorer	0.020	0.051	0.061	0.021	0.017	0.022	-0.013	-0.014	-0.003	0.076**	0.073*	0.060	0.016	0.019	0.013
	(0.148)	(0.142)	(0.142)	(0.027)	(0.026)	(0.025)	(0.032)	(0.031)	(0.030)	(0.037)	(0.037)	(0.037)	(0.018)	(0.018)	(0.019)
Wealth quintile: Middle	0.313**	0.275**	0.337**	0.006	0.007	0.013	0.007	0.004	0.014	0.067*	0.067	0.051	-0.003	-0.004	-0.006
	(0.133)	(0.133)	(0.150)	(0.022)	(0.021)	(0.024)	(0.031)	(0.030)	(0.034)	(0.041)	(0.041)	(0.044)	(0.012)	(0.012)	(0.016)
Wealth quintile: Richer	-0.044	-0.054	0.008	0.013	0.014	0.013	0.008	0.005	0.013	0.062*	0.059*	0.045	0.022	0.021	0.018
	(0.163)	(0.162)	(0.174)	(0.026)	(0.025)	(0.026)	(0.032)	(0.031)	(0.036)	(0.035)	(0.035)	(0.039)	(0.015)	(0.015)	(0.016)
Wealth quintile: Richest	0.356	0.303	0.375	-0.053*	-0.057*	-0.047	-0.035	-0.040	-0.027	0.102*	0.086	0.088	0.011	0.011	0.006
	(0.219)	(0.210)	(0.229)	(0.031)	(0.032)	(0.034)	(0.050)	(0.050)	(0.053)	(0.055)	(0.057)	(0.061)	(0.019)	(0.019)	(0.018)
Constant	-112.171	2.865***	-65.177	-2.139	-3.545	-4.797	-15.013	-14.949	-13.600	-38.331**	-32.414*	-41.178*	12.895	15.014	15.603
	(76.457)	(0.634)	(67.501)	(8.394)	(8.580)	(11.731)	(12.447)	(12.277)	(16.538)	(18.646)	(18.449)	(23.115)	(8.566)	(9.334)	(9.955)
Region-year fixed effects															
District level trends															
Observations	723	723	723	717	717	717	717	717	717	717	717	717	717	717	717
R^2	0.450	0.450	0.492	0.655	0.665	0.674	0.528	0.535	0.547	0.687	0.693	0.701	0.424	0.432	0.452

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of conception, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

We analyse the effects of SLAs on the access to various components of prenatal care which might be indicative of the policy's impact on the intensity of the health service delivery. Table 16 presents the regression results for the effects on the probability of being weighed or having a blood- or urine sample tested. SLAs appear to have reduced the administration of urine tests during pregnancy, see columns 7 - 9. Urine tests are costly to provide in comparison to other components of prenatal care, as they should be performed on multiple occasions. On the other hand, we did not find a consistent statistically significant impact on the administration of blood tests which should also be conducted multiple times. A potential explanation could be that capacity for blood testing may benefit from a strong commitment to HIV testing or measurement of anaemia during prenatal care (Benova et al. 2018; Betràn et al. 2018). Negative effects are also observed on the probability of having taken the antimalarial Fansidar, but no effects are found on iron supplementation or the number of received tetanus shots during pregnancy, see Table 17 in the Appendix.

In sum, although SLAs did not raise the average number of prenatal care visits, the policy shifted the demand from public hospitals to CHAM health centres. We also observe that the policy had a negative effect on the access to certain components of health services during pregnancy.

7.4. Child health outcomes and postnatal health care utilisation

Ex-ante, one would not know whether the policy succeeded in reaching its goal of improving population health given that we find positive effects on the uptake of delivery services but mixed effects on prenatal care services.[11] Therefore, we investigate whether the policy impacted observable child health outcomes. We analyse the effect of SLA access from birth on first day mortality which potentially serves as an indicator for the quality of the delivery services. Additionally, we estimate the impact on neonatal (first month mortality) and infant mortality (1 year). We do not find that the policy had any effects on child survival, see Table 18 in the Appendix.

In addition, we analyse the effect of SLAs by conception on birth weight while controlling for whether birth weight has been reported from a card or from the mother's recall. Birth weight has been shown to be affected by the intensity and quality of prenatal care, see Villar et al. (2001), Wehby et al. (2009) and Habibov and Fan (2011).[12] From column 16 in Table 19 we observe that the policy reduced birth weight by 208.907 g which corresponds to 6% of the sample mean. The reductions in some prenatal care services and any differences stemming from the shift in accessing prenatal care from public hospitals to CHAM health centres following the implementation of SLAs could be explain the negative impact on birth weight.

We switch the treatment timing to coincide with birth and estimate the effect on early postnatal health care investments. The analytical sample decreases to 229 observations when we estimate the effect on the likelihood of obtaining a postnatal health check-up for the respondent's latest birth. Table 20 in the Appendix shows negative but insignificant effects on the probability of having a postnatal health check-up. The analysis benefits from more observations on vaccination status as immunisation related queries are

[11] We are unable to estimate the impact on maternal mortality due to the unknown residence status of the 2010 MDHS respondents' siblings who have passed away.

[12] Another potential explanation is that SLAs have delayed the timing of first prenatal care visit which has been shown to affect birth weight, see Smith Conway and Deb (2005) and Todd Jewell and Triunfo (2006). Unfortunately, we do not have a large enough sample size to investigate the effects of the policy on prenatal care timing.

asked for each child born in the last 5 years. As all SLA packages cover at least maternal and neonatal health services, we investigate the impact on the administration of immunisations at birth. Polio 0 and BCG immunisations should be given at birth according to the Malawian national vaccination schedule. We observe positive coefficients on the likelihood of a child receiving the Polio 0 vaccine but the estimate only reaches statistical significance after controlling for mother fixed effects, see column 7 in Table 20. On the other hand, the coefficients are negative but statistically insignificant on the administration of the BCG vaccine. Additionally, we do not find evidence of SLAs increasing the attachment to the formal health care system by raising the utilisation of future immunisations for children affected by SLAs by birth, see Tables 31 and 32 in the Appendix.

7.5. Effects on the full sample of births

The main results have been estimated using the sample of women with more than one birth within 5 years prior to the survey, as to increase consistency across the specifications after including mother fixed effects. Estimating the regressions on the full sample of births suggests that the effects of SLA are larger for women with multiple births compared to one birth, in the past 5 years. We find qualitatively similar estimates on the probability of giving birth at a CHAM hospital but the treatment effects on most other outcomes are smaller and not statistically significant, see Appendix B.

Previous studies such as Sonneveldt et al. (2013) have noted a trend toward lower utilisation of maternal health services as birth order increases in Malawi and other high fertility countries. It is thus plausible that higher parity births could have a higher capacity to benefit from SLAs compared to first births. Therefore, we investigate whether the treatment effect varies by birth order by interacting SLA with categorical variables capturing first, second, and third and higher order births.

SLAs increased CHAM births relatively more for the highest order birth category, see Table 33. Similarly, third and higher order births experienced a larger relative decline in government facility utilisation at birth following access to SLAs. We also observe positive coefficients on the interactions for higher order births on the use of CHAM hospital prenatal care services but the estimates do not reach statistical significance. On the other hand, we find negative interaction effects on prenatal care visits at public hospitals, see Table 34.

7.6. Heterogeneous Effects

Even though the policy aimed to increase maternal and neonatal health care utilisation for poorer households, we do not find heterogeneous treatment effects with respect to poverty status.[13] We further inspect heterogeneity by religious status and facility characteristics. Around 15% of our sample are Muslim and the rest are Christians. We interact the SLA dummy with a binary variable for being Muslim. From Table 8 we observe some evidence that Muslims reduced home births less compared to Christians following access to SLA. However, most specifications produce statistically insignificant coefficients and the coefficient decreases when mother fixed effects are included, see columns 1 - 4. We do observe negative and statistically significant interaction effects on the probability of giving birth at a CHAM hospital, see columns 5 - 8. This suggests that Muslim women benefited less from the policy. We also

[13] Results available upon requests.

note that access to SLAs increased the likelihood of skilled birth attendance more for Christians relative to Muslims, see Table 9. The signs of the interaction effects remain after the inclusion of mother fixed effects but the magnitude of the coefficients decreases and the estimates turn statistically insignificant.

Table 8: Heterogenous treatment effects: Religion

	(1) Home birth	(2) Home birth	(3) Home birth	(4) Home birth	(5) CHAM Hospital	(6) CHAM Hospital	(7) CHAM Hospital	(8) CHAM Hospital
SLA (birth)	-0.070**	-0.071**	-0.075**	-0.122***	0.080**	0.084**	0.068**	0.073**
	(0.033)	(0.033)	(0.036)	(0.042)	(0.034)	(0.034)	(0.031)	(0.033)
SLA (birth) × Muslim	0.064	0.063	0.083*	0.025	-0.079**	-0.083**	-0.087*	-0.091**
	(0.041)	(0.041)	(0.049)	(0.059)	(0.040)	(0.041)	(0.044)	(0.036)
Age at first birth	0.003	0.003	0.004		-0.002	-0.002	-0.002	
	(0.005)	(0.005)	(0.005)		(0.004)	(0.004)	(0.004)	
Mother's age	-0.004	-0.004	-0.005		0.002	0.001	0.001	
	(0.003)	(0.003)	(0.003)		(0.003)	(0.003)	(0.003)	
Wealth quintile: Poorer	-0.027	-0.027	-0.028		0.013	0.010	0.011	
	(0.025)	(0.026)	(0.025)		(0.022)	(0.022)	(0.022)	
Wealth quintile: Middle	-0.042*	-0.042*	-0.041*		0.014	0.012	0.012	
	(0.023)	(0.023)	(0.023)		(0.024)	(0.023)	(0.024)	
Wealth quintile: Richer	-0.053**	-0.054**	-0.055**		-0.007	-0.010	-0.007	
	(0.022)	(0.022)	(0.023)		(0.025)	(0.025)	(0.025)	
Wealth quintile: Richest	-0.063*	-0.065*	-0.069*		-0.047	-0.047	-0.048	
	(0.036)	(0.035)	(0.038)		(0.036)	(0.036)	(0.036)	
Region-year fixed effects								
District level trends								
Mother fixed effects								
Constant	18.522	17.417	2.105	0.076***	0.243	-1.275	-2.439	6.138
	(15.036)	(15.179)	(16.723)	(0.003)	(17.558)	(17.535)	(23.297)	(13.341)
Observations	1680	1680	1680	1680	1680	1680	1680	1680
R^2	0.393	0.398	0.411	0.785	0.564	0.569	0.570	0.887

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of birth, month of birth, year of birth interacted with month of birth, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

Table 9: Heterogenous treatment effects: Religion

	(1) Skilled health worker	(2) Skilled health worker	(3) Skilled health worker	(4) Skilled health worker	(5) Patient attendant	(6) Patient attendant	(7) Patient attendant	(8) Patient attendant	(9) TBA	(10) TBA	(11) TBA	(12) TBA
SLA (birth)	0.098**	0.097**	0.107**	0.150***	-0.025	-0.021	-0.033	-0.047**	-0.035	-0.036	-0.023	-0.048
	(0.043)	(0.044)	(0.048)	(0.044)	(0.032)	(0.036)	(0.031)	(0.023)	(0.029)	(0.029)	(0.031)	(0.038)
SLA (birth) × Muslim	-0.151***	-0.152***	-0.213***	-0.069	0.088***	0.087***	0.138***	0.093	0.066*	0.067*	0.087**	0.007
	(0.053)	(0.053)	(0.066)	(0.082)	(0.034)	(0.033)	(0.043)	(0.058)	(0.035)	(0.035)	(0.042)	(0.046)
Age at first birth	0.001	0.001	0.000		-0.005	-0.004	-0.005		0.006*	0.006	0.007*	
	(0.006)	(0.006)	(0.006)		(0.004)	(0.004)	(0.004)		(0.004)	(0.004)	(0.004)	
Mother's age	0.003	0.003	0.004		0.001	0.001	0.001		-0.006*	-0.006*	-0.006*	
	(0.005)	(0.005)	(0.005)		(0.004)	(0.004)	(0.004)		(0.003)	(0.003)	(0.003)	
Wealth quintile: Poorer	0.005	0.003	0.004		0.016	0.017	0.016		-0.040*	-0.039	-0.041*	
	(0.030)	(0.031)	(0.030)		(0.015)	(0.015)	(0.016)		(0.023)	(0.024)	(0.023)	
Wealth quintile: Middle	0.051*	0.050*	0.049*		-0.012	-0.012	-0.011		-0.042**	-0.040*	-0.041*	
	(0.028)	(0.028)	(0.028)		(0.014)	(0.015)	(0.014)		(0.021)	(0.022)	(0.022)	
Wealth quintile: Richer	0.019	0.019	0.023		0.032	0.031	0.029		-0.065***	-0.063***	-0.066***	
	(0.035)	(0.035)	(0.035)		(0.025)	(0.025)	(0.025)		(0.020)	(0.020)	(0.020)	
Wealth quintile: Richest	0.092**	0.092**	0.100**		-0.017	-0.016	-0.019		-0.055*	-0.054*	-0.058*	
	(0.042)	(0.042)	(0.043)		(0.023)	(0.023)	(0.023)		(0.033)	(0.033)	(0.034)	
Region-year fixed effects												
District level trends												
Mother fixed effects												
Constant	-9.582	-8.876	4.904	24.821	-13.026	-13.496	-13.706	-17.004	23.666	24.007*	20.472	2.802
	(16.655)	(16.841)	(23.597)	(22.827)	(8.319)	(8.562)	(15.324)	(16.108)	(14.472)	(14.361)	(18.076)	(18.162)
Observations	1677	1677	1677	1676	1677	1677	1677	1676	1677	1677	1677	1676
R^2	0.370	0.371	0.386	0.777	0.393	0.400	0.406	0.826	0.399	0.402	0.413	0.767

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of birth, month of birth, year of birth interacted with month of birth, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

The treatment effect on most outcomes do not vary by whether the facility is a hospital compared to a health centre or whether the facility is connected to a tarmac road. We find some evidence for that the treatment effect on skilled delivery is larger for those living near hospitals relative to health centres, see columns 1 - 4 in Table 10. Moreover, we find that mothers whose closest facilities are connected to a tarmac road went on more prenatal care visits following SLA implementation compared to those residing close to facilities without good road access.

Table 10: Heterogenous treatment effects - facility characteristics

	(1) Skilled health worker	(2) Skilled health worker	(3) Skilled health worker	(4) Skilled health worker	(5) Number of prenatal visits	(6) Number of prenatal visits	(7) Number of prenatal visits
SLA (birth)	0.027	0.028	0.014	0.096**			
	(0.043)	(0.045)	(0.057)	(0.044)			
SLA (birth) × hospital	0.126*	0.122	0.172**	0.141*			
	(0.076)	(0.077)	(0.082)	(0.081)			
SLA (conception)					-0.693	-0.804	-0.608
					(0.673)	(0.736)	(0.953)
SLA (conception) × Tarmac road					2.517***	2.172**	3.190**
					(0.819)	(1.058)	(1.434)
Age at first birth	0.001	0.000	0.000		0.040	0.032	0.041
	(0.006)	(0.006)	(0.006)		(0.029)	(0.029)	(0.030)
Mother's age	0.003	0.003	0.003		-0.021	-0.018	-0.026
	(0.005)	(0.005)	(0.005)		(0.025)	(0.025)	(0.026)
Wealth quintile: Poorer	0.003	0.002	0.002		0.116	0.106	0.082
	(0.030)	(0.030)	(0.030)		(0.145)	(0.145)	(0.151)
Wealth quintile: Middle	0.051*	0.050*	0.048*		0.209	0.188	0.177
	(0.028)	(0.028)	(0.029)		(0.142)	(0.143)	(0.153)
Wealth quintile: Richer	0.020	0.020	0.023		-0.015	-0.056	-0.061
	(0.035)	(0.035)	(0.036)		(0.154)	(0.159)	(0.164)
Wealth quintile: Richest	0.095**	0.095**	0.104**		0.300	0.280	0.231
	(0.041)	(0.042)	(0.044)		(0.209)	(0.206)	(0.222)
Region-year fixed effects							
District level trends							
Mother fixed effects							
Constant	0.757***	0.763***	0.772***	0.867***	3.105***	3.228***	3.259***
	(0.117)	(0.118)	(0.117)	(0.004)	(0.605)	(0.602)	(0.649)
Observations	1677	1677	1677	1676	718	717	718
R^2	0.369	0.370	0.385	0.776	0.487	0.496	0.529

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of birth, month of birth, year of birth interacted with month of birth, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. $^{*}\ p < .10$, $^{**}\ p < .05$, $^{***}\ p < .01$

8. Conclusion

This paper has investigated the impact of contracting-out of health care services to faith based providers in Malawi. We use difference-in-differences to analyse the effects of Service Level Agreements (SLAs) on maternal health care utilisation using pregnancy histories from the 2010 Malawi Demographic and Health Survey. SLAs are characterised by fee-for-service and user fee removal with respect to maternal and neonatal health care services among faith based providers. We estimate the differential impact following the staggered roll-out of SLAs for populations residing near and far from facilities. Our analysis also benefits from observations of multiple births to a given mother which allows for the inclusion of mother fixed effects.

The main findings point to SLAs reducing home births and increasing skilled birth deliveries at CHAM hospitals. The treatment effects appear to be driven by high order births. Even though SLAs cover essential prenatal health care services, no effects are found on the overall demand for prenatal visits. On the other hand, we find that SLAs increased the demand for prenatal care at CHAM health centres and reduced prenatal care visits at government hospitals. The policy reduced access to certain components of prenatal services, such as urine sample testing and the administration of antimalarial medicine. This could explain why we do not find positive effects on child health outcomes at birth and why we find some evidence for a reduction in birth weight. Muslim mothers appear to have benefited less from access to SLA compared to Christian mothers. The policy was also more effective if it was implemented at a hospital or any facility with improved road access.

This paper is one of the first to evaluate the population wide effects of contracting-out of health care to faith based providers in a low-income country. The findings from this study are of importance for the majority of countries in Sub-Saharan Africa, as faith based providers dominate the delivery of health care in rural areas and are becoming incorporated into many national health systems.

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A. Appendix

A.1. Facility Data

In this subsection we describe the summary statistics of the facility level data for all facilities located within 8 km of the 2010 MDHS villages. The summary statistics are shown in Table 11. Around two thirds of all facilities are publicly owned and the rest are owned by CHAM. Health Centres consitute the majority of the facilities and 15% of the facilities are hospitals. The average catchment population per facility is around 31 468. 21% of the facilities can be accessed by tarmac road.

Table 11: Descriptive Statistics of all facilities within 8 km of 2010 MDHS villages

	Mean	SD
Public Facility	0.68	0.47
CHAM	0.31	0.46
Hospital	0.15	0.36
Health Centre	0.78	0.41
Catchment Population	31468.40	130726.26
Tarmac Road	0.21	0.41
Observations	384	

A.2. Facility data on analytical sample

Table 12: Facility summary statistics

	Mean	SD
Hospital	0.15	0.35
Health Centre	0.83	0.38
Catchment Population	25376.29	35322.57
Tarmac Road	0.19	0.40
Public Facility	0.73	0.45
CHAM	0.27	0.45
Facility has SLA	0.13	0.34
Observations	185	

Table 13: Descriptive statistics for CHAM facilities in the analytical sample by SLA status

	(1)		(2)		(3)	
	No SLA		SLA		No SLA - SLA	
	Mean	SD	Mean	SD	Difference	t-statistic
Hospital	0.04	0.20	0.29	0.46	-0.25*	(-2.48)
Health Centre	0.88	0.33	0.71	0.46	0.18	(1.54)
Catchment Population	12457.08	10821.57	26863.00	24090.35	-14405.92*	(-2.69)
Tarmac Road	0.08	0.27	0.33	0.48	-0.26*	(-2.29)
Observations	26		24		50	

From Table 14 we observe that facilities which implemented SLA during the policy's first year of implementation, were more likely to be hospitals and have more than double the average catchment population. They are also more likely to be accessed by a tarmac road.

Table 14: Descriptive statistics for CHAM facilities by timing of SLA implementation

	(1) SLA after 2006		(2) SLA implemented in 2006		(3) Difference	
	Mean	SD	Mean	SD	SLA after 2006-SLA in 2006	t-statistic
Hospital	0.17	0.39	0.42	0.51	-0.25	(-1.34)
Health Centre	0.83	0.39	0.58	0.51	0.25	(1.34)
Catchment Population	15489.50	12713.13	38236.50	27741.54	-22747.00*	(-2.58)
Tarmac Road	0.25	0.45	0.42	0.51	-0.17	(-0.84)
Observations	12		12		24	

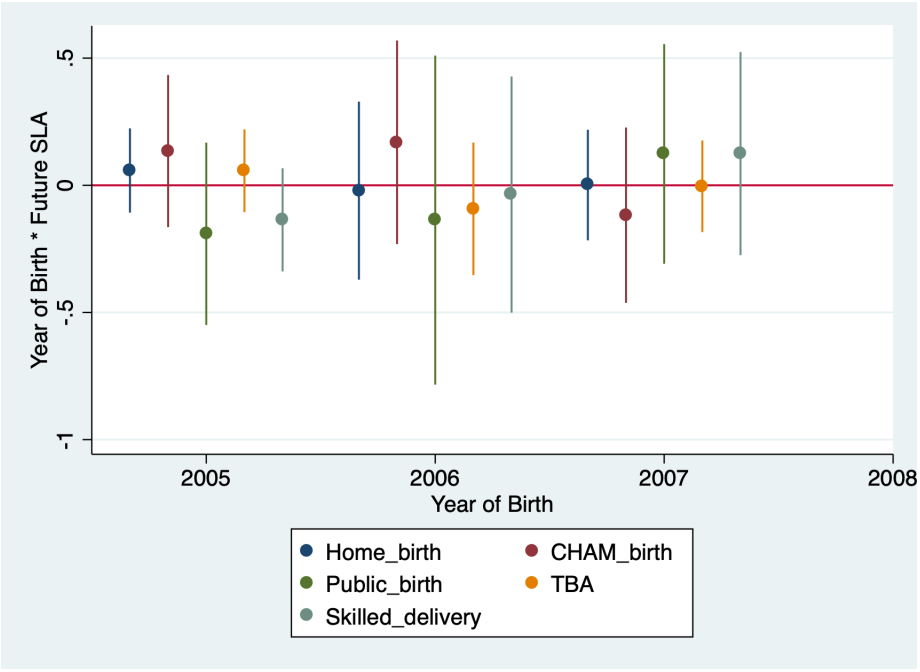

Figure 2: Parallel trends: Delivery services

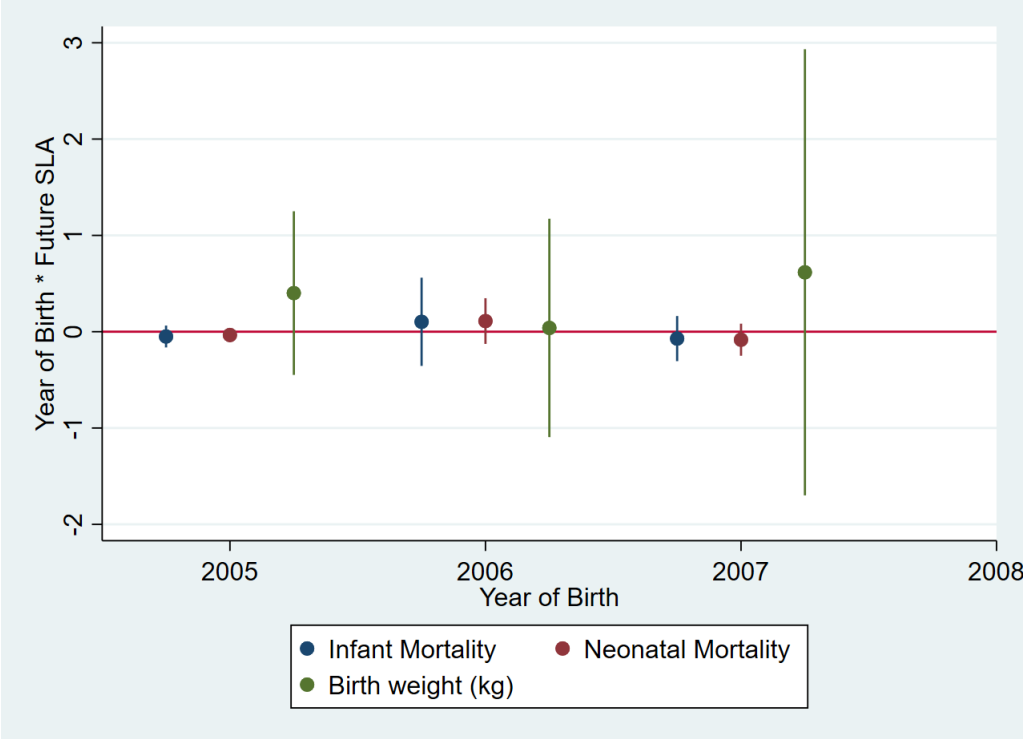

Figure 3: Parallel trends: Child health

A.3. Main analysis

Table 15: Effect on individual performing prenatal care

	(1) Doctor / Clinical Officer	(2) Doctor / Clinical Officer	(3) Doctor / Clinical Officer	(4) Nurse / Midwife	(5) Nurse / Midwife	(6) Nurse / Midwife	(7) Patient Attendant	(8) Patient Attendant	(9) Patient Attendant	(10) TBA	(11) TBA	(12) TBA
SLA (conception)	-0.045	-0.104	0.076	-0.298***	-0.320**	-0.419***	-0.027	0.023	0.075	0.021	0.007	0.024
	(0.058)	(0.078)	(0.137)	(0.107)	(0.136)	(0.158)	(0.059)	(0.112)	(0.129)	(0.022)	(0.017)	(0.034)
Age at first birth	0.002	0.001	0.004	0.004	0.005	0.002	-0.003	-0.004	-0.000	0.000	0.000	0.001
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)	(0.006)	(0.006)	(0.006)	(0.002)	(0.002)	(0.002)
Mother's age	-0.006	-0.005	-0.009	-0.007	-0.007	-0.005	0.001	0.001	-0.002	-0.001	-0.001	-0.001
	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.004)	(0.005)	(0.005)	(0.001)	(0.001)	(0.001)
Wealth quintile: Poorer	-0.006	-0.010	-0.002	0.027	0.028	0.031	-0.033	-0.035	-0.040	0.002	0.003	0.002
	(0.037)	(0.037)	(0.039)	(0.039)	(0.039)	(0.041)	(0.035)	(0.035)	(0.038)	(0.009)	(0.009)	(0.009)
Wealth quintile: Middle	0.014	0.012	0.016	0.018	0.014	0.024	-0.079**	-0.080**	-0.093**	0.012	0.013	0.014
	(0.047)	(0.047)	(0.052)	(0.052)	(0.052)	(0.057)	(0.038)	(0.039)	(0.042)	(0.010)	(0.010)	(0.010)
Wealth quintile: Richer	0.047	0.043	0.041	0.045	0.044	0.048	-0.031	-0.030	-0.028	0.010	0.008	0.012
	(0.053)	(0.054)	(0.057)	(0.052)	(0.054)	(0.057)	(0.032)	(0.033)	(0.035)	(0.011)	(0.012)	(0.012)
Wealth quintile: Richest	0.056	0.056	0.047	-0.016	-0.024	-0.020	-0.113**	-0.115**	-0.115**	0.009	0.010	0.007
	(0.064)	(0.064)	(0.066)	(0.068)	(0.070)	(0.075)	(0.045)	(0.049)	(0.052)	(0.007)	(0.007)	(0.009)
Constant	3.520	3.366	-7.010	-10.648	-6.576	-2.048	-12.829	-15.860	-36.746**	-9.728	-9.597	-21.550*
	(13.577)	(15.038)	(14.291)	(13.386)	(14.137)	(18.662)	(12.094)	(13.259)	(18.322)	(6.050)	(7.003)	(11.436)
Region-year fixed effects												
District level trends												
Mother fixed effects												
Constant	3.520	3.366	-7.010	-10.648	-6.576	-2.048	-12.829	-15.860	-36.746**	-9.728	-9.597	-21.550*
	(13.577)	(15.038)	(14.291)	(13.386)	(14.137)	(18.662)	(12.094)	(13.259)	(18.322)	(6.050)	(7.003)	(11.436)
Observations	723	723	723	723	723	723	723	723	723	723	723	723
R^2	0.428	0.436	0.456	0.391	0.394	0.413	0.315	0.320	0.344	0.312	0.324	0.337

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of birth, month of birth, year of birth interacted with month of birth, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

Table 16: Effect of SLA on prenatal care services

	(1) Weighed	(2) Weighed	(3) Weighed	(4) Blood Sample	(5) Blood Sample	(6) Blood Sample	(7) Urine Sample	(8) Urine Sample	(9) Urine Sample
SLA (conception)	-0.070	-0.009	-0.041	-0.171	-0.136	-0.489**	-1.158***	-0.984***	-1.209***
	(0.058)	(0.084)	(0.057)	(0.142)	(0.184)	(0.225)	(0.193)	(0.260)	(0.228)
Age at first birth	-0.002	-0.002	-0.002	0.002	0.002	0.001	-0.004	-0.005	-0.001
	(0.003)	(0.003)	(0.002)	(0.009)	(0.009)	(0.010)	(0.011)	(0.011)	(0.011)
Mother's age	-0.000	-0.000	0.002	-0.007	-0.006	-0.006	0.010	0.011	0.006
	(0.003)	(0.003)	(0.003)	(0.006)	(0.006)	(0.007)	(0.008)	(0.008)	(0.009)
Wealth quintile: Poorer	-0.015	-0.016	-0.022	0.061	0.060	0.063	0.074	0.068	0.073
	(0.017)	(0.018)	(0.017)	(0.042)	(0.043)	(0.044)	(0.050)	(0.051)	(0.052)
Wealth quintile: Middle	-0.016	-0.016	-0.022	-0.001	-0.004	-0.013	0.032	0.030	0.020
	(0.015)	(0.016)	(0.017)	(0.051)	(0.051)	(0.051)	(0.049)	(0.050)	(0.050)
Wealth quintile: Richer	0.002	0.005	0.008	0.037	0.035	0.028	0.053	0.051	0.040
	(0.011)	(0.013)	(0.011)	(0.050)	(0.050)	(0.051)	(0.056)	(0.056)	(0.056)
Wealth quintile: Richest	-0.019	-0.019	-0.031	0.028	0.021	0.009	0.052	0.040	0.039
	(0.024)	(0.024)	(0.025)	(0.060)	(0.062)	(0.065)	(0.072)	(0.074)	(0.074)
Region-year fixed effects									
District level trends									
Constant	3.822	3.054	17.082**	-8.421	-6.859	12.316	-11.362	-11.777	10.276
	(6.929)	(7.749)	(8.071)	(16.980)	(18.115)	(20.639)	(18.775)	(19.391)	(27.357)
Observations	716	715	716	715	714	715	716	715	716
R^2	0.379	0.384	0.451	0.416	0.420	0.460	0.489	0.496	0.523

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: v
illage level fixed effects, year of birth, month of birth, year of birth interacted with month of birth, twin status, birth order, mother's age at first birth,
mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

Table 17: Effect of SLA on services accessed during pregnancy

	(1) Fansidar	(2) Fansidar	(3) Fansidar	(4) Iron Suppl	(5) Iron Suppl	(6) Iron Suppl	(7) Number of tetanus shots	(8) Number of tetanus shots	(9) Number of tetanus shots
SLA (conception)	-0.787***	-0.742***	-0.849***	0.179	0.103	0.227	-0.725	-0.938	-1.092
	(0.187)	(0.214)	(0.171)	(0.283)	(0.313)	(0.273)	(0.602)	(0.602)	(0.821)
Age at first birth	0.003	0.004	0.004	-0.002	-0.003	-0.001	-0.032	-0.037	-0.046
	(0.007)	(0.007)	(0.007)	(0.005)	(0.005)	(0.006)	(0.033)	(0.034)	(0.037)
Mother's age	0.002	0.001	0.003	0.004	0.004	0.003	0.010	0.011	0.018
	(0.007)	(0.007)	(0.007)	(0.005)	(0.005)	(0.005)	(0.027)	(0.027)	(0.029)
Wealth quintile: Poorer	0.024	0.023	0.016	0.028	0.029	0.029	-0.012	-0.024	0.014
	(0.035)	(0.034)	(0.035)	(0.032)	(0.031)	(0.035)	(0.168)	(0.170)	(0.174)
Wealth quintile: Middle	0.042	0.041	0.039	-0.035	-0.035	-0.033	-0.352**	-0.365**	-0.317
	(0.035)	(0.034)	(0.035)	(0.033)	(0.032)	(0.033)	(0.175)	(0.179)	(0.193)
Wealth quintile: Richer	0.001	0.003	-0.003	0.047	0.040	0.055	-0.054	-0.064	-0.025
	(0.039)	(0.039)	(0.038)	(0.035)	(0.035)	(0.037)	(0.189)	(0.188)	(0.211)
Wealth quintile: Richest	0.025	0.021	0.016	0.039	0.043	0.047	-0.373	-0.306	-0.329
	(0.048)	(0.048)	(0.049)	(0.053)	(0.054)	(0.053)	(0.229)	(0.225)	(0.246)
Region-year fixed effects									
District level trends									
Constant	1.860	0.663	0.921***	7.585	7.100	2.559	-95.289	-145.234**	-130.880
	(12.007)	(12.206)	(0.133)	(16.016)	(17.400)	(26.978)	(69.315)	(65.400)	(86.626)
Observations	723	723	723	723	723	723	718	718	718
R^2	0.346	0.356	0.399	0.391	0.400	0.417	0.446	0.454	0.469

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of birth, month of birth, year of birth interacted with month of birth, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

A.4. Child outcomes

Table 18: Effects on child outcomes

	(1) First day mortality	(2) First day mortality	(3) First day mortality	(4) First day mortality	(5) Neonatal Mortality	(6) Neonatal Mortality	(7) Neonatal Mortality	(8) Neonatal Mortality	(9) Infant mortality	(10) Infant mortality	(11) Infant mortality	(12) Infant mortality	(13) Birth weight	(14) Birth weight	(15) Birth weight	(16) Birth weight
SLA (birth)	-0.005	-0.007	-0.002	-0.011	-0.018	-0.022	-0.012	-0.032	-0.032	-0.042	-0.018	-0.011	-142.427	-129.294	-179.336	-208.807*
	(0.015)	(0.015)	(0.011)	(0.010)	(0.030)	(0.030)	(0.027)	(0.031)	(0.032)	(0.033)	(0.032)	(0.033)	(118.251)	(118.670)	(125.625)	(120.083)
Age at first birth	0.002	0.001	0.002		0.003	0.003	0.003		0.001	0.001	0.001		-0.451	0.871	-1.430	
	(0.002)	(0.002)	(0.002)		(0.004)	(0.003)	(0.004)		(0.004)	(0.004)	(0.004)		(17.035)	(16.999)	(17.340)	
Mother's age	0.001	0.001	0.001		-0.000	-0.000	-0.000		0.002	0.002	0.002		-20.583	-20.813	-19.835	
	(0.001)	(0.001)	(0.001)		(0.003)	(0.003)	(0.003)		(0.003)	(0.003)	(0.004)		(15.870)	(15.909)	(16.249)	
Wealth quintile: Poorer	0.004	0.003	0.002		0.011	0.008	0.009		0.013	0.011	0.010		71.045	76.679	66.163	
	(0.007)	(0.007)	(0.007)		(0.011)	(0.011)	(0.012)		(0.019)	(0.020)	(0.020)		(81.750)	(83.650)	(83.482)	
Wealth quintile: Middle	0.012	0.012	0.010		0.019	0.017	0.015		0.026	0.027	0.022		27.237	24.648	20.601	
	(0.008)	(0.008)	(0.008)		(0.013)	(0.013)	(0.012)		(0.020)	(0.021)	(0.021)		(76.189)	(77.891)	(76.279)	
Wealth quintile: Richer	0.002	0.001	-0.001		0.024	0.022	0.021		0.021	0.019	0.016		80.069	77.962	64.410	
	(0.007)	(0.007)	(0.007)		(0.015)	(0.015)	(0.014)		(0.023)	(0.023)	(0.023)		(83.628)	(83.465)	(85.418)	
Wealth quintile: Richest	0.023*	0.023*	0.022		0.028	0.026	0.025		0.028	0.026	0.022		172.714*	178.162*	154.974	
	(0.014)	(0.014)	(0.014)		(0.022)	(0.022)	(0.023)		(0.032)	(0.033)	(0.033)		(100.620)	(99.969)	(102.317)	
Region-year fixed effects																
District level trends																
Mother fixed effects																
Constant	-5.526	-5.753	-1.113	-14.446**	-7.121	-7.693	2.827	-17.150	3.283	2.618	11.621	-21.953	16724.098	23004.954	-12482.773	46740.119
	(6.721)	(6.679)	(7.516)	(6.851)	(10.319)	(10.855)	(13.853)	(10.495)	(15.421)	(16.052)	(18.698)	(16.730)	(47929.460)	(48661.394)	(58235.750)	(54867.411)
Observations	1680	1680	1680	1680	1668	1668	1668	1657	1680	1680	1680	1680	1680	1680	1680	1680
R^2	0.199	0.205	0.217	0.486	0.282	0.293	0.302	0.620	0.246	0.258	0.260	0.559	0.357	0.362	0.369	0.745

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of birth, month of birth, year of birth interacted with month of birth, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

Table 19: Effect on child outcomes given SLA treatment from conception

	(1) First day mortality	(2) First day mortality	(3) First day mortality	(4) First day mortality	(5) Neonatal Mortality	(6) Neonatal Mortality	(7) Neonatal Mortality	(8) Neonatal Mortality	(9) Infant mortality	(10) Infant mortality	(11) Infant mortality	(12) Infant mortality	(13) Birth weight	(14) Birth weight	(15) Birth weight	(16) Birth weight
SLA (conception)	-0.006	-0.009	-0.005	-0.010	-0.001	-0.005	0.004	-0.009	-0.027	-0.038	-0.011	-0.022	-171.532	-156.273	-212.024	-237.099**
	(0.016)	(0.016)	(0.011)	(0.010)	(0.023)	(0.023)	(0.018)	(0.023)	(0.035)	(0.035)	(0.034)	(0.036)	(122.205)	(122.812)	(130.501)	(113.634)
Age at first birth	0.002	0.002	0.002		0.004	0.004	0.004		0.002	0.002	0.003		-3.640	-2.368	-4.568	
	(0.002)	(0.002)	(0.002)		(0.003)	(0.003)	(0.003)		(0.004)	(0.004)	(0.004)		(16.650)	(16.604)	(16.923)	
Mother's age	0.000	0.000	0.000		-0.001	-0.001	-0.001		0.002	0.001	0.001		-19.489	-19.631	-18.655	
	(0.001)	(0.001)	(0.001)		(0.003)	(0.003)	(0.003)		(0.003)	(0.003)	(0.003)		(15.447)	(15.453)	(15.800)	
Wealth quintile: Poorer	0.005	0.004	0.003		0.012	0.009	0.010		0.014	0.012	0.010		72.591	77.853	67.841	
	(0.007)	(0.007)	(0.007)		(0.011)	(0.011)	(0.012)		(0.019)	(0.020)	(0.020)		(82.690)	(84.466)	(84.309)	
Wealth quintile: Middle	0.009	0.009	0.007		0.016	0.014	0.011		0.016	0.017	0.011		36.753	34.851	31.282	
	(0.008)	(0.008)	(0.007)		(0.013)	(0.013)	(0.012)		(0.020)	(0.021)	(0.021)		(78.956)	(80.877)	(78.975)	
Wealth quintile: Richer	0.001	0.001	-0.002		0.023	0.022	0.020		0.019	0.017	0.013		80.297	77.698	65.184	
	(0.007)	(0.007)	(0.007)		(0.015)	(0.015)	(0.015)		(0.024)	(0.023)	(0.023)		(84.194)	(84.001)	(85.749)	
Wealth quintile: Richest	0.022	0.022	0.020		0.026	0.024	0.023		0.027	0.024	0.020		162.046	169.419	143.563	
	(0.014)	(0.014)	(0.014)		(0.023)	(0.023)	(0.024)		(0.033)	(0.033)	(0.034)		(104.425)	(103.669)	(106.195)	
Region-year fixed effects																
District level trends																
Mother fixed effects																
Constant	-6.633	-6.629	-1.994	-16.286**	-9.091	-9.567	0.007	-20.871*	-0.406	-1.676	7.018	-24.369	16410.927	24504.029	-11165.306	46223.221
	(7.220)	(7.197)	(8.306)	(7.711)	(10.433)	(11.133)	(13.952)	(10.989)	(15.622)	(16.295)	(19.204)	(18.210)	(50020.450)	(50836.879)	(58710.349)	(59378.093)
Observations	1650	1650	1650	1633	1638	1638	1638	1610	1650	1650	1650	1633	1650	1650	1650	1633
R^2	0.200	0.206	0.219	0.478	0.296	0.308	0.317	0.629	0.255	0.267	0.269	0.562	0.357	0.362	0.370	0.746

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of conception, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

Table 20: Effects on postnatal outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Postnatal health check	Postnatal health check	Postnatal health check	Polio 0	Polio 0	Polio 0	Polio 0	BCG	BCG	BCG	BCG
SLA (birth)	-0.899	-0.410	-0.277	0.064	0.075	0.054	0.137*	-0.064	-0.046	-0.051	-0.034
	(0.674)	(0.762)	(0.954)	(0.060)	(0.058)	(0.067)	(0.075)	(0.068)	(0.067)	(0.070)	(0.080)
Age at first birth	0.006	0.017	-0.013	0.013	0.012	0.012		0.017**	0.016*	0.015*	
	(0.027)	(0.029)	(0.029)	(0.010)	(0.010)	(0.011)		(0.008)	(0.008)	(0.008)	
Mother's age	0.012	-0.001	0.018	-0.009	-0.009	-0.009		-0.012*	-0.011*	-0.012*	
	(0.021)	(0.022)	(0.021)	(0.008)	(0.009)	(0.009)		(0.007)	(0.007)	(0.007)	
Wealth quintile: Poorer	-0.091	-0.155	-0.025	0.078*	0.078*	0.082**		0.039	0.042	0.039	
	(0.119)	(0.128)	(0.161)	(0.041)	(0.041)	(0.041)		(0.046)	(0.046)	(0.046)	
Wealth quintile: Middle	-0.083	-0.211	0.000	0.031	0.030	0.035		0.020	0.020	0.022	
	(0.168)	(0.176)	(0.225)	(0.046)	(0.046)	(0.046)		(0.046)	(0.046)	(0.046)	
Wealth quintile: Richer	-0.123	-0.183	-0.044	0.062	0.064	0.064		0.023	0.020	0.019	
	(0.155)	(0.157)	(0.208)	(0.047)	(0.047)	(0.048)		(0.046)	(0.046)	(0.047)	
Wealth quintile: Richest	-0.128	-0.114	0.243	-0.025	-0.024	-0.018		-0.058	-0.060	-0.057	
	(0.215)	(0.189)	(0.258)	(0.064)	(0.063)	(0.067)		(0.069)	(0.068)	(0.071)	
Region-year fixed effects											
District level trends											
Mother fixed effects											
Constant	151.265***	155.382***	261.404**	0.350*	0.361*	0.369*	0.360***	0.635***	0.640***	0.650***	0.588***
	(54.678)	(57.724)	(105.368)	(0.203)	(0.205)	(0.207)	(0.007)	(0.165)	(0.167)	(0.170)	(0.007)
Observations	229	229	229	1680	1680	1680	1680	1680	1680	1680	1680
R^2	0.686	0.729	0.776	0.332	0.342	0.352	0.696	0.353	0.368	0.382	0.681

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year year of birth, month of birth, year of birth interacted with month of birth, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

B. Results for the full sample of mothers

Table 21: Effects of SLA on place of delivery - full sample of mothers

	(1) Home birth	(2) Home birth	(3) Home birth	(4) CHAM birth	(5) CHAM birth	(6) CHAM birth	(7) Public facility birth	(8) Public facility birth	(9) Public facility birth
SLA (birth)	-0.026	-0.028	-0.034	0.043	0.044	0.023	0.009	0.009	0.033
	(0.020)	(0.020)	(0.021)	(0.044)	(0.044)	(0.044)	(0.046)	(0.047)	(0.048)
Age at first birth	0.000	0.000	0.001	-0.000	-0.000	-0.000	-0.000	-0.000	-0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
Wealth quintile: Poorer	-0.021	-0.021	-0.021	0.009	0.010	0.010	0.002	0.001	0.001
	(0.014)	(0.014)	(0.014)	(0.015)	(0.015)	(0.015)	(0.019)	(0.019)	(0.019)
Wealth quintile: Middle	-0.023	-0.022	-0.023	0.020	0.021	0.020	-0.001	-0.001	0.001
	(0.014)	(0.014)	(0.014)	(0.017)	(0.017)	(0.017)	(0.022)	(0.022)	(0.022)
Wealth quintile: Richer	-0.047***	-0.048***	-0.047***	0.033*	0.034*	0.033*	0.007	0.007	0.008
	(0.014)	(0.014)	(0.014)	(0.019)	(0.019)	(0.019)	(0.023)	(0.023)	(0.023)
Wealth quintile: Richest	-0.059***	-0.059***	-0.059***	0.037	0.038	0.041	0.020	0.019	0.018
	(0.017)	(0.017)	(0.017)	(0.026)	(0.026)	(0.026)	(0.029)	(0.029)	(0.030)
Constant	0.705	1.396	10.988	40.913**	40.287**	48.642**	-39.626**	-39.671**	-48.552**
	(10.695)	(10.797)	(13.385)	(18.586)	(18.615)	(21.695)	(18.870)	(19.122)	(24.029)
Observations	3635	3635	3635	3635	3635	3635	3635	3635	3635
R^2	0.216	0.219	0.224	0.478	0.479	0.484	0.402	0.403	0.408

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of birth, month of birth, year of birth interacted with month of birth, status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

Table 22: Effects on type of facility where the mother gave birth - full sample of mothers

	(1) CHAM Hospital	(2) CHAM Hospital	(3) CHAM Hospital	(4) CHAM Health Centre	(5) CHAM Health Centre	(6) CHAM Health Centre	(7) Public Hospital	(8) Public Hospital	(9) Public Hospital	(10) Public Health Centre	(11) Public Health Centre	(12) Public Health Centre
SLA (birth)	0.056*	0.057*	0.051	-0.013	-0.013	-0.028	0.056	0.055	0.058	-0.043	-0.040	-0.022
	(0.033)	(0.033)	(0.032)	(0.038)	(0.038)	(0.039)	(0.041)	(0.041)	(0.045)	(0.043)	(0.043)	(0.048)
Age at first birth	-0.003	-0.003	-0.003	0.003	0.003	0.003	0.002	0.002	0.002	-0.001	-0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)
Mother's age	0.003	0.003	0.003	-0.000	-0.000	-0.000	0.001	0.000	0.001	-0.003	-0.003	-0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
Wealth quintile: Poorer	0.005	0.006	0.005	0.004	0.005	0.004	0.023	0.021	0.023	-0.023	-0.022	-0.023
	(0.012)	(0.012)	(0.011)	(0.013)	(0.013)	(0.013)	(0.022)	(0.022)	(0.022)	(0.023)	(0.023)	(0.023)
Wealth quintile: Middle	-0.003	-0.003	-0.002	0.023*	0.023*	0.023*	0.010	0.009	0.008	-0.010	-0.009	-0.007
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.021)	(0.021)	(0.022)	(0.025)	(0.025)	(0.025)
Wealth quintile: Richer	0.015	0.015	0.014	0.018	0.019	0.019	0.023	0.022	0.021	-0.009	-0.008	-0.007
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.022)	(0.022)	(0.022)	(0.024)	(0.024)	(0.025)
Wealth quintile: Richest	0.014	0.015	0.015	0.023	0.024	0.026	0.059*	0.057*	0.053*	-0.033	-0.031	-0.030
	(0.022)	(0.022)	(0.021)	(0.020)	(0.020)	(0.020)	(0.030)	(0.030)	(0.031)	(0.035)	(0.035)	(0.036)
Region-year fixed effects												
District level trends												
Constant	17.248	16.626	17.644	23.665**	23.661**	30.997**	-13.736	-14.249	-24.077	-22.635	-22.220	-23.923
	(17.348)	(17.579)	(19.438)	(10.622)	(10.691)	(13.602)	(21.999)	(22.041)	(23.371)	(20.919)	(20.939)	(26.519)
Observations	3635	3635	3635	3635	3635	3635	3635	3635	3635	3635	3635	3635
R^2	0.453	0.454	0.457	0.376	0.377	0.382	0.407	0.409	0.414	0.416	0.417	0.420

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year year of birth, month of birth, year of birth interacted with month of birth, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

Table 23: Effects of SLA on assistance at delivery - full sample of mothers

	(1) Skilled health worker	(2) Skilled health worker	(3) Skilled health worker	(4) TBA	(5) TBA	(6) TBA	(7) Friend/Family	(8) Friend/Family	(9) Friend/Family
SLA (birth)	0.044	0.048	0.046	-0.010	-0.009	-0.011	-0.024*	-0.026**	-0.024*
	(0.029)	(0.029)	(0.033)	(0.017)	(0.018)	(0.019)	(0.013)	(0.012)	(0.013)
Age at first birth	0.001	0.001	0.000	0.002	0.002	0.002	-0.001	-0.001	-0.001
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Mother's age	0.001	0.001	0.002	-0.003	-0.003	-0.003*	0.000	0.000	0.000
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Wealth quintile: Poorer	0.018	0.018	0.018	-0.022*	-0.022*	-0.022*	0.001	0.001	0.001
	(0.018)	(0.018)	(0.018)	(0.013)	(0.013)	(0.013)	(0.007)	(0.007)	(0.007)
Wealth quintile: Middle	0.015	0.015	0.015	-0.022*	-0.021	-0.022*	0.001	0.001	0.001
	(0.017)	(0.017)	(0.018)	(0.013)	(0.013)	(0.013)	(0.007)	(0.007)	(0.007)
Wealth quintile: Richer	0.035*	0.036*	0.035*	-0.052***	-0.052***	-0.052***	0.007	0.006	0.007
	(0.019)	(0.020)	(0.020)	(0.012)	(0.012)	(0.012)	(0.007)	(0.007)	(0.007)
Wealth quintile: Richest	0.037	0.038	0.038	-0.057***	-0.057***	-0.057***	0.008	0.007	0.007
	(0.023)	(0.023)	(0.024)	(0.017)	(0.017)	(0.017)	(0.010)	(0.009)	(0.009)
Region-year fixed effects									
District level trends									
Constant	10.596	10.217	-0.952	1.897	2.043	14.567	-0.185	0.251	-1.492
	(13.310)	(13.216)	(18.837)	(9.044)	(9.202)	(13.665)	(5.089)	(5.161)	(5.732)
Observations	3631	3631	3631	3631	3631	3631	3631	3631	3631
R^2	0.189	0.191	0.196	0.225	0.226	0.231	0.135	0.140	0.143

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of birth, month of birth, year of birth interacted with month of birth, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

Table 24: Effects on child outcomes - full sample of mothers

	(1) First day mortality	(2) First day mortality	(3) First day mortality	(4) Neonatal Mortality	(5) Neonatal Mortality	(6) Neonatal Mortality	(7) Infant mortality	(8) Infant mortality	(9) Infant mortality	(10) Birth weight	(11) Birth weight	(12) Birth weight
SLA (birth)	-0.005	-0.005	-0.006	-0.016	-0.016	-0.014	-0.017	-0.019	-0.017	-36.039	-49.624	-11.167
	(0.008)	(0.008)	(0.007)	(0.013)	(0.014)	(0.013)	(0.018)	(0.017)	(0.017)	(79.542)	(80.091)	(80.370)
Age at first birth	0.000	0.000	0.000	0.001	0.000	0.001	0.002	0.002	0.002	3.670	3.902	3.559
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(8.496)	(8.576)	(8.568)
Mother's age	-0.000	-0.000	-0.000	-0.000	-0.000	-0.001	-0.001	-0.001	-0.001	-6.033	-6.296	-6.240
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(6.072)	(6.109)	(6.111)
Wealth quintile: Poorer	0.000	0.000	0.000	0.003	0.001	0.003	0.015	0.013	0.015	139.345***	141.928***	133.706***
	(0.004)	(0.004)	(0.004)	(0.006)	(0.006)	(0.006)	(0.010)	(0.010)	(0.010)	(47.898)	(48.026)	(48.055)
Wealth quintile: Middle	0.005	0.005	0.004	0.007	0.007	0.006	0.019*	0.019*	0.018*	39.846	40.363	36.794
	(0.004)	(0.004)	(0.004)	(0.007)	(0.007)	(0.007)	(0.010)	(0.010)	(0.010)	(41.069)	(41.100)	(41.012)
Wealth quintile: Richer	-0.003	-0.003	-0.003	0.002	0.002	0.002	0.013	0.012	0.012	114.026**	115.077**	109.030**
	(0.004)	(0.004)	(0.004)	(0.007)	(0.007)	(0.007)	(0.012)	(0.012)	(0.012)	(45.715)	(45.772)	(45.906)
Wealth quintile: Richest	0.004	0.004	0.004	-0.004	-0.005	-0.005	-0.001	-0.002	-0.003	120.041**	120.881**	112.242**
	(0.006)	(0.006)	(0.006)	(0.010)	(0.010)	(0.009)	(0.015)	(0.015)	(0.015)	(52.680)	(52.563)	(53.779)
Region-year fixed effects												
District level trends												
Mother fixed effects												
Constant	-1.082	-0.975	3.856	8.730	8.527	14.500	15.590	14.955	21.656*	67079.562*	65451.097*	27614.921
	(5.114)	(5.187)	(6.928)	(8.041)	(8.043)	(10.019)	(9.780)	(9.800)	(11.736)	(35777.903)	(35713.695)	(42428.601)
Observations	3635	3635	3635	3610	3610	3610	3635	3635	3635	3635	3635	3635
R^2	0.106	0.109	0.118	0.156	0.162	0.174	0.141	0.146	0.153	0.209	0.210	0.214

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year year of birth, month of birth, year of birth interacted with month of birth, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

Table 25: Effects on child outcomes - full sample of mothers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	First day mortality	First day mortality	First day mortality	Neonatal Mortality	Neonatal Mortality	Neonatal Mortality	Birth weight	Birth weight	Birth weight
SLA (conception)	-0.006	-0.007	-0.007	-0.013	-0.014	-0.007	-90.427	-95.830	-57.665
	(0.008)	(0.007)	(0.007)	(0.012)	(0.012)	(0.011)	(85.678)	(86.626)	(92.235)
Age at first birth	0.001	0.001	0.001	0.002	0.002	0.002	-7.898	-8.165	-8.372
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(8.756)	(8.767)	(8.836)
Mother's age	-0.001	-0.001	-0.000	-0.002	-0.002	-0.002	3.701	3.739	4.117
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(6.340)	(6.362)	(6.419)
Wealth quintile: Poorer	0.000	0.000	0.000	0.003	0.002	0.004	139.264***	138.574***	136.174***
	(0.004)	(0.004)	(0.004)	(0.006)	(0.006)	(0.006)	(49.995)	(49.812)	(50.332)
Wealth quintile: Middle	0.004	0.004	0.004	0.008	0.008	0.007	20.347	21.982	19.734
	(0.004)	(0.004)	(0.004)	(0.007)	(0.007)	(0.007)	(43.041)	(42.920)	(43.183)
Wealth quintile: Richer	-0.003	-0.002	-0.003	0.003	0.003	0.003	108.006**	108.694**	104.579**
	(0.004)	(0.004)	(0.004)	(0.007)	(0.007)	(0.007)	(47.242)	(46.602)	(47.835)
Wealth quintile: Richest	0.004	0.004	0.004	-0.004	-0.004	-0.005	117.411**	116.837**	112.848**
	(0.006)	(0.006)	(0.006)	(0.010)	(0.010)	(0.010)	(54.600)	(54.772)	(55.788)
Region-year fixed effects									
District level trends									
Constant	-0.155	-0.151	-1.740	-3.261	-3.293	-5.195*	-6321.049	-6782.967	4923.444
	(1.476)	(1.481)	(1.805)	(2.477)	(2.451)	(2.845)	(10914.607)	(10918.876)	(12931.257)
Observations	3564	3564	3564	3539	3539	3539	3564	3564	3564
R^2	0.099	0.104	0.116	0.136	0.139	0.161	0.177	0.179	0.181

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of conception, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

Table 26: Effect of SLA on prenatal care

	(1) Prenatal visits	(2) Prenatal visits	(3) Prenatal visits	(4) CHAM Hospital	(5) CHAM Hospital	(6) CHAM Hospital	(7) CHAM Health Centre	(8) CHAM Health Centre	(9) CHAM Health Centre	(10) Public Hospital	(11) Public Hospital	(12) Public Hospital	(13) Public Health Centre	(14) Public Health Centre	(15) Public Health Centre
SLA (conception)	0.202	0.162	0.162	-0.015	-0.014	-0.013	0.145***	0.156***	0.134***	-0.002	-0.005	0.016	-0.010	-0.010	0.001
	(0.240)	(0.236)	(0.231)	(0.055)	(0.055)	(0.054)	(0.053)	(0.053)	(0.051)	(0.050)	(0.050)	(0.054)	(0.010)	(0.010)	(0.010)
Age at first birth	-0.001	-0.001	0.001	-0.000	-0.000	-0.000	-0.001	-0.001	-0.001	0.006*	0.006*	0.006*	-0.002**	-0.002**	-0.002**
	(0.014)	(0.014)	(0.014)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.001)	(0.001)	(0.001)
Mother's age	0.023**	0.023**	0.021*	0.001	0.001	0.001	0.000	0.000	-0.000	-0.000	-0.000	-0.000	0.000	0.000	0.001
	(0.011)	(0.011)	(0.011)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Wealth quintile: Poorer	0.112	0.113	0.118*	0.019	0.020	0.020	-0.015	-0.015	-0.015	0.037*	0.037*	0.039*	0.002	0.002	0.002
	(0.070)	(0.070)	(0.071)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.021)	(0.021)	(0.022)	(0.006)	(0.006)	(0.006)
Wealth quintile: Middle	0.145*	0.153**	0.151**	0.007	0.008	0.009	0.009	0.008	0.010	0.025	0.024	0.027	0.000	-0.000	0.001
	(0.075)	(0.075)	(0.074)	(0.011)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.017)	(0.017)	(0.017)	(0.006)	(0.006)	(0.006)
Wealth quintile: Richer	0.148*	0.149*	0.170**	0.019	0.019	0.021	0.004	0.005	0.007	-0.001	0.000	-0.001	-0.004	-0.005	-0.005
	(0.077)	(0.077)	(0.079)	(0.013)	(0.013)	(0.013)	(0.014)	(0.015)	(0.015)	(0.018)	(0.018)	(0.018)	(0.007)	(0.007)	(0.007)
Wealth quintile: Richest	0.358***	0.364***	0.395***	0.056**	0.056**	0.059**	-0.006	-0.007	-0.002	0.041	0.040	0.040	-0.006	-0.006	-0.006
	(0.113)	(0.113)	(0.111)	(0.024)	(0.024)	(0.025)	(0.020)	(0.020)	(0.020)	(0.026)	(0.027)	(0.027)	(0.010)	(0.009)	(0.010)
Region-year fixed effects															
District level trends															
Constant	4.638	2.644***	-23.979	-4.149	-3.608	-4.996	-6.554	-6.270	-7.976	-2.977	-2.024	-3.107	4.074**	4.184**	4.191**
	(24.699)	(0.247)	(29.385)	(4.365)	(4.402)	(5.034)	(4.829)	(4.667)	(5.684)	(6.366)	(6.422)	(6.748)	(1.848)	(1.903)	(1.969)
Observations	2534	2534	2534	2516	2516	2516	2516	2516	2516	2516	2516	2516	2516	2516	2516
R^2	0.211	0.216	0.225	0.512	0.515	0.517	0.442	0.445	0.451	0.557	0.559	0.562	0.266	0.270	0.273

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of conception, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

Table 27: Effect on type of health worker performing prenatal care

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Doctor / Clinical Officer	Doctor / Clinical Officer	Doctor / Clinical Officer	Nurse / Midwife	Nurse / Midwife	Nurse / Midwife	Patient Attendant	Patient Attendant	Patient Attendant	TBA	TBA	TBA
SLA (conception)	-0.057	-0.059	-0.055	0.034	0.029	0.027	-0.020	-0.016	-0.026	0.016	0.018*	0.013
	(0.061)	(0.059)	(0.062)	(0.047)	(0.046)	(0.049)	(0.044)	(0.045)	(0.048)	(0.010)	(0.010)	(0.012)
Age at first birth	0.001	0.001	0.001	-0.001	-0.001	-0.001	-0.000	0.000	0.000	-0.000	-0.000	-0.000
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Mother's age	-0.003	-0.003	-0.004	-0.001	-0.001	-0.000	0.000	0.000	0.000	-0.000	-0.000	-0.000
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Wealth quintile: Poorer	0.015	0.014	0.015	-0.013	-0.012	-0.012	0.002	0.003	0.003	0.005	0.005	0.005
	(0.019)	(0.018)	(0.019)	(0.018)	(0.018)	(0.018)	(0.013)	(0.013)	(0.014)	(0.008)	(0.008)	(0.008)
Wealth quintile: Middle	0.001	-0.003	0.003	0.009	0.012	0.008	0.002	0.003	0.001	0.005	0.004	0.004
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.020)	(0.014)	(0.014)	(0.014)	(0.004)	(0.004)	(0.004)
Wealth quintile: Richer	0.018	0.017	0.016	-0.004	-0.003	-0.002	-0.003	-0.003	-0.003	-0.003	-0.003	-0.001
	(0.021)	(0.021)	(0.021)	(0.019)	(0.020)	(0.020)	(0.013)	(0.013)	(0.013)	(0.005)	(0.005)	(0.005)
Wealth quintile: Richest	0.031	0.031	0.033	-0.048*	-0.048*	-0.049*	-0.002	-0.002	-0.002	0.002	0.002	0.002
	(0.027)	(0.027)	(0.028)	(0.028)	(0.028)	(0.028)	(0.018)	(0.018)	(0.019)	(0.004)	(0.004)	(0.004)
Region-year fixed effects												
District level trends												
Mother fixed effects												
Constant	6.012	5.005	10.190	1.175	2.296	2.189	2.846	2.909	3.356	-3.478**	-3.166**	-5.308*
	(6.370)	(6.175)	(7.870)	(6.033)	(5.991)	(7.845)	(5.182)	(5.207)	(6.655)	(1.642)	(1.552)	(2.810)
Observations	2534	2534	2534	2534	2534	2534	2534	2534	2534	2534	2534	2534
R^2	0.212	0.218	0.221	0.215	0.220	0.224	0.189	0.191	0.194	0.188	0.196	0.203

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of conception, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

Table 28: Effect of SLA on prenatal care services

	(1) Weighed	(2) Weighed	(3) Weighed	(4) Blood Sample	(5) Blood Sample	(6) Blood Sample	(7) Urine Sample	(8) Urine Sample	(9) Urine Sample
SLA (conception)	-0.009	-0.008	-0.014	-0.087	-0.089	-0.095	-0.130	-0.120	-0.134
	(0.015)	(0.016)	(0.017)	(0.073)	(0.075)	(0.073)	(0.083)	(0.084)	(0.083)
Age at first birth	0.001	0.000	0.000	0.007*	0.007*	0.007*	0.005	0.005	0.005
	(0.001)	(0.001)	(0.001)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)
Mother's age	-0.000	-0.000	-0.000	-0.001	-0.001	-0.001	0.004	0.003	0.003
	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
Wealth quintile: Poorer	-0.015*	-0.015**	-0.015*	-0.003	-0.002	-0.000	-0.029	-0.028	-0.024
	(0.008)	(0.008)	(0.008)	(0.022)	(0.021)	(0.021)	(0.025)	(0.025)	(0.026)
Wealth quintile: Middle	-0.008	-0.008	-0.009	-0.009	-0.007	-0.007	-0.045**	-0.043*	-0.041*
	(0.008)	(0.008)	(0.008)	(0.024)	(0.023)	(0.023)	(0.022)	(0.023)	(0.022)
Wealth quintile: Richer	-0.008	-0.007	-0.009	-0.013	-0.013	-0.016	-0.031	-0.029	-0.031
	(0.008)	(0.008)	(0.008)	(0.024)	(0.023)	(0.024)	(0.028)	(0.027)	(0.028)
Wealth quintile: Richest	-0.002	-0.002	-0.003	-0.018	-0.018	-0.009	0.040	0.039	0.046
	(0.013)	(0.013)	(0.013)	(0.029)	(0.030)	(0.030)	(0.033)	(0.033)	(0.033)
Region-year fixed effects									
District level trends									
Constant	0.051	-0.057	1.890	15.683**	15.831**	4.490	10.109	10.696	12.297
	(2.409)	(2.426)	(2.517)	(6.522)	(6.378)	(7.977)	(8.019)	(7.954)	(8.502)
Observations	2526	2526	2526	2524	2524	2524	2526	2526	2526
R^2	0.198	0.203	0.211	0.251	0.253	0.273	0.273	0.277	0.285

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of conception, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

Table 29: Services accessed during pregnancy

	(1) Fansidar	(2) Fansidar	(3) Fansidar	(4) Iron Suppl	(5) Iron Suppl	(6) Iron Suppl	(7) Number of tetanus shots	(8) Number of tetanus shots	(9) Number of tetanus shots
SLA (conception)	-0.049	-0.046	-0.065	0.007	0.002	0.009	-0.183	-0.182	-0.184
	(0.045)	(0.045)	(0.047)	(0.043)	(0.044)	(0.048)	(0.177)	(0.179)	(0.192)
Age at first birth	-0.000	-0.000	-0.000	-0.002	-0.002	-0.002	-0.010	-0.011	-0.011
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.013)	(0.013)	(0.013)
Mother's age	0.003	0.003	0.003	0.002	0.002	0.002	0.012	0.012	0.011
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.010)	(0.010)	(0.010)
Wealth quintile: Poorer	0.029*	0.030*	0.030*	-0.004	-0.002	-0.004	0.026	0.024	0.036
	(0.017)	(0.017)	(0.017)	(0.014)	(0.014)	(0.014)	(0.083)	(0.082)	(0.085)
Wealth quintile: Middle	0.054***	0.055***	0.055***	-0.006	-0.003	-0.004	-0.172**	-0.177**	-0.160**
	(0.018)	(0.018)	(0.019)	(0.017)	(0.017)	(0.017)	(0.079)	(0.079)	(0.080)
Wealth quintile: Richer	0.023	0.024	0.026	-0.001	-0.003	-0.000	-0.039	-0.039	-0.032
	(0.019)	(0.019)	(0.020)	(0.016)	(0.016)	(0.017)	(0.084)	(0.084)	(0.087)
Wealth quintile: Richest	0.056***	0.055***	0.053***	-0.015	-0.015	-0.011	-0.258**	-0.258**	-0.244**
	(0.019)	(0.019)	(0.019)	(0.024)	(0.024)	(0.024)	(0.106)	(0.105)	(0.108)
Region-year fixed effects									
District level trends									
Constant	11.332**	11.860***	0.816***	3.373	3.365	-0.482	-42.931*	-45.053*	-49.465*
	(4.485)	(4.461)	(0.056)	(4.215)	(4.174)	(5.104)	(24.892)	(24.972)	(28.287)
Observations	2528	2528	2528	2534	2534	2534	2518	2518	2518
R^2	0.198	0.200	0.207	0.197	0.203	0.205	0.231	0.234	0.236

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of conception, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

Table 30: Effects on postnatal outcomes

	(1) Postnatal health check	(2) Postnatal health check	(3) Postnatal health check	(4) Polio 0	(5) Polio 0	(6) Polio 0	(7) Polio 0	(8) BCG	(9) BCG	(10) BCG	(11) BCG
SLA (birth)	0.162*	0.171*	0.204***	0.130***	0.133***	0.122***	0.120	-0.015	-0.013	-0.023	-0.062
	(0.092)	(0.089)	(0.079)	(0.042)	(0.040)	(0.046)	(0.075)	(0.052)	(0.049)	(0.050)	(0.078)
Age at first birth	0.006	0.006	0.008	0.004	0.004	0.003		0.007	0.007*	0.007	
	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)		(0.004)	(0.004)	(0.004)	
Mother's age	-0.001	-0.002	-0.003	0.001	0.001	0.001		0.000	-0.000	0.001	
	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)		(0.003)	(0.003)	(0.003)	
Wealth quintile: Poorer	-0.012	-0.013	-0.011	0.042*	0.045*	0.045*		0.046*	0.050**	0.047*	
	(0.035)	(0.036)	(0.035)	(0.024)	(0.024)	(0.025)		(0.024)	(0.024)	(0.025)	
Wealth quintile: Middle	-0.007	-0.003	-0.018	0.051*	0.050*	0.054**		0.065***	0.064**	0.070***	
	(0.036)	(0.036)	(0.036)	(0.027)	(0.027)	(0.027)		(0.025)	(0.025)	(0.025)	
Wealth quintile: Richer	-0.007	-0.008	-0.014	0.060**	0.063**	0.061**		0.054**	0.056**	0.057**	
	(0.036)	(0.036)	(0.038)	(0.027)	(0.027)	(0.027)		(0.027)	(0.026)	(0.027)	
Wealth quintile: Richest	0.071	0.067	0.043	0.085**	0.085**	0.091**		0.057	0.058*	0.059*	
	(0.049)	(0.048)	(0.052)	(0.035)	(0.036)	(0.035)		(0.035)	(0.035)	(0.035)	
Region-year fixed effects											
District level trends											
Mother fixed effects											
Constant	-0.602	-4.439	0.509	-2.372	-1.760	-7.446	-12.579	-0.522	0.206	-6.852	-7.634
	(11.993)	(11.915)	(12.749)	(6.937)	(6.498)	(7.791)	(11.278)	(7.791)	(7.110)	(8.187)	(12.350)
Observations	1195	1195	1195	3635	3635	3635	1680	3635	3635	3635	1680
R^2	0.345	0.354	0.377	0.212	0.221	0.224	0.698	0.242	0.253	0.259	0.688

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of birth, month of birth, year of birth interacted with month of birth, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

Table 31: Effects on polio vaccination status

	(1) Polio 1	(2) Polio 1	(3) Polio 1	(4) Polio 1	(5) Polio 2	(6) Polio 2	(7) Polio 2	(8) Polio 2	(9) Polio 3	(10) Polio 3	(11) Polio 3	(12) Polio 3
SLA (birth)	-0.019	-0.021	-0.043	-0.112	-0.026	-0.027	-0.047	-0.104	-0.022	-0.025	-0.029	-0.107
	(0.045)	(0.045)	(0.050)	(0.081)	(0.049)	(0.049)	(0.054)	(0.082)	(0.049)	(0.051)	(0.052)	(0.087)
Age at first birth	0.008*	0.009*	0.008*		0.008*	0.009*	0.008*		0.009*	0.009**	0.008*	
	(0.004)	(0.005)	(0.005)		(0.005)	(0.005)	(0.005)		(0.005)	(0.005)	(0.005)	
Mother's age	-0.001	-0.001	-0.001		-0.002	-0.003	-0.002		-0.001	-0.001	-0.000	
	(0.003)	(0.003)	(0.003)		(0.004)	(0.004)	(0.004)		(0.004)	(0.004)	(0.004)	
Wealth quintile: Poorer	0.042*	0.045*	0.044*		0.052**	0.056**	0.055**		0.053**	0.056**	0.054**	
	(0.024)	(0.024)	(0.024)		(0.024)	(0.024)	(0.024)		(0.022)	(0.022)	(0.022)	
Wealth quintile: Middle	0.048*	0.047*	0.052**		0.058**	0.057**	0.061**		0.071***	0.072***	0.077***	
	(0.025)	(0.025)	(0.025)		(0.025)	(0.025)	(0.024)		(0.024)	(0.024)	(0.023)	
Wealth quintile: Richer	0.040	0.041	0.042		0.060**	0.060**	0.062**		0.065**	0.065**	0.068***	
	(0.026)	(0.026)	(0.026)		(0.026)	(0.026)	(0.026)		(0.026)	(0.026)	(0.026)	
Wealth quintile: Richest	0.066*	0.067*	0.068*		0.068*	0.068*	0.070**		0.072**	0.073**	0.074**	
	(0.035)	(0.035)	(0.035)		(0.035)	(0.035)	(0.035)		(0.033)	(0.033)	(0.034)	
Region-year fixed effects												
District level trends												
Mother fixed effects												
Constant	-1.146	-0.532	-10.515	-10.238	-2.477	-1.984	-11.794	-9.719	0.405***	0.412***	0.395***	-8.131
	(7.588)	(7.189)	(7.650)	(12.136)	(7.751)	(7.428)	(7.740)	(11.948)	(0.079)	(0.080)	(0.079)	(11.951)
Observations	3635	3635	3635	1680	3635	3635	3635	1680	3635	3635	3635	1680
R^2	0.252	0.259	0.270	0.674	0.265	0.271	0.279	0.687	0.276	0.282	0.289	0.676

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of birth, month of birth, year of birth interacted with month of birth, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

Table 32: Effects on DPT and measles vaccination status

	(1) DPT 1	(2) DPT 1	(3) DPT 1	(4) DPT 1	(5) DPT 2	(6) DPT 2	(7) DPT 2	(8) DPT 2	(9) DPT 3	(10) DPT 3	(11) DPT 3	(12) DPT 3	(13) Measles	(14) Measles	(15) Measles	(16) Measles
SLA (birth)	-0.027	-0.025	-0.047	-0.106	-0.024	-0.024	-0.044	-0.126	-0.029	-0.027	-0.039	-0.094	0.001	0.002	-0.008	-0.070
	(0.045)	(0.047)	(0.051)	(0.082)	(0.046)	(0.046)	(0.050)	(0.081)	(0.050)	(0.050)	(0.054)	(0.081)	(0.043)	(0.045)	(0.048)	(0.092)
Age at first birth	0.007	0.007	0.007		0.008*	0.008*	0.008		0.009**	0.009**	0.008*		0.008**	0.008**	0.008*	
	(0.005)	(0.005)	(0.005)		(0.005)	(0.005)	(0.005)		(0.004)	(0.004)	(0.004)		(0.004)	(0.004)	(0.004)	
Mother's age	0.000	-0.000	0.000		-0.001	-0.002	-0.001		-0.001	-0.001	0.000		-0.001	-0.001	-0.001	
	(0.003)	(0.003)	(0.004)		(0.003)	(0.003)	(0.003)		(0.004)	(0.004)	(0.003)		(0.003)	(0.003)	(0.003)	
Wealth quintile: Poorer	0.041*	0.045*	0.044*		0.048**	0.050**	0.050**		0.060***	0.064***	0.063***		0.066***	0.070***	0.067***	
	(0.023)	(0.023)	(0.024)		(0.023)	(0.023)	(0.023)		(0.023)	(0.023)	(0.023)		(0.023)	(0.023)	(0.023)	
Wealth quintile: Middle	0.050**	0.050**	0.054**		0.056**	0.055**	0.059**		0.068***	0.069***	0.074***		0.070***	0.072***	0.074***	
	(0.025)	(0.025)	(0.025)		(0.025)	(0.025)	(0.024)		(0.024)	(0.024)	(0.024)		(0.024)	(0.024)	(0.024)	
Wealth quintile: Richer	0.042	0.043	0.044		0.052**	0.052**	0.054**		0.057**	0.057**	0.060**		0.070***	0.070***	0.073***	
	(0.027)	(0.027)	(0.027)		(0.026)	(0.026)	(0.026)		(0.026)	(0.025)	(0.025)		(0.026)	(0.025)	(0.025)	
Wealth quintile: Richest	0.062*	0.063*	0.062*		0.067**	0.067**	0.068**		0.079**	0.081**	0.081**		0.056*	0.057*	0.056*	
	(0.035)	(0.035)	(0.035)		(0.034)	(0.034)	(0.034)		(0.033)	(0.033)	(0.033)		(0.033)	(0.033)	(0.033)	
Region-year fixed effects																
District level trends																
Mother fixed effects																
Constant	-0.255	0.351	-9.668	-6.212	0.290	0.751	-7.891	-8.415	1.180	1.488	-7.496	-2.678	-1.294	-0.785	-13.020*	-7.960
	(7.612)	(7.154)	(7.419)	(11.408)	(7.234)	(6.984)	(7.456)	(11.362)	(7.801)	(7.408)	(8.353)	(11.660)	(7.252)	(6.741)	(7.765)	(12.269)
Observations	3635	3635	3635	1680	3635	3635	3635	1680	3635	3635	3635	1680	3635	3635	3635	1680
R^2	0.248	0.256	0.266	0.685	0.271	0.276	0.285	0.680	0.277	0.283	0.292	0.680	0.333	0.340	0.347	0.707

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of birth, month of birth, year of birth interacted with month of birth, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$.

B.1. Heterogenous treatment effects: Parity

Table 33: Effects of SLA on place of delivery

	(1) Home birth	(2) Home birth	(3) Home birth	(4) CHAM birth	(5) CHAM birth	(6) CHAM birth	(7) Public facility birth	(8) Public facility birth	(9) Public facility birth
SLA (birth)	-0.009	-0.012	-0.015	-0.071	-0.068	-0.085	0.129*	0.127*	0.145**
	(0.022)	(0.023)	(0.024)	(0.069)	(0.069)	(0.067)	(0.072)	(0.073)	(0.073)
Birth order: 2	0.013	0.012	0.014	0.009	0.010	0.012	-0.027	-0.027	-0.032
	(0.013)	(0.013)	(0.013)	(0.017)	(0.017)	(0.017)	(0.022)	(0.022)	(0.022)
Birth order: 3 or higher	0.039**	0.039**	0.040**	0.004	0.004	0.006	-0.044	-0.043	-0.045
	(0.016)	(0.016)	(0.016)	(0.023)	(0.023)	(0.023)	(0.027)	(0.027)	(0.028)
SLA (birth) $\times$ Birth order: 2	-0.005	-0.002	-0.009	0.036	0.032	0.032	-0.077	-0.076	-0.067
	(0.028)	(0.029)	(0.029)	(0.082)	(0.083)	(0.083)	(0.087)	(0.087)	(0.088)
SLA (birth) $\times$ Birth order: 3 or higher	-0.021	-0.020	-0.020	0.154**	0.150**	0.148**	-0.154**	-0.152**	-0.149**
	(0.019)	(0.019)	(0.020)	(0.066)	(0.067)	(0.067)	(0.071)	(0.071)	(0.072)
Region-year fixed effects									
District level trends									
Constant	0.188	0.901	9.875	40.669**	39.944**	46.646**	-39.294**	-39.283**	-45.787*
	(10.503)	(10.603)	(13.078)	(18.041)	(18.019)	(21.226)	(18.463)	(18.702)	(23.799)
Observations	3635	3635	3635	3635	3635	3635	3635	3635	3635
R^2	0.214	0.217	0.222	0.478	0.480	0.484	0.401	0.402	0.407

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of conception, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$

Table 34: Effect of SLA on prenatal care

	(1) Prenatal visits	(2) Prenatal visits	(3) Prenatal visits	(4) CHAM Hospital	(5) CHAM Hospital	(6) CHAM Hospital	(7) CHAM Health Centre	(8) CHAM Health Centre	(9) CHAM Health Centre	(10) Public hospital	(11) Public hospital	(12) Public hospital	(13) Public HC	(14) Public HC	(15) Public HC
SLA (conception)	0.158	0.143	0.149	-0.080	-0.079	-0.079	0.182***	0.191***	0.178***	0.104	0.097	0.118	-0.023*	-0.024**	-0.012
	(0.340)	(0.337)	(0.338)	(0.073)	(0.073)	(0.073)	(0.051)	(0.052)	(0.054)	(0.078)	(0.078)	(0.077)	(0.012)	(0.012)	(0.014)
Birth order: 2	-0.221**	-0.209**	-0.205**	0.009	0.009	0.009	-0.002	-0.003	-0.000	0.048*	0.048*	0.043	-0.014	-0.015	-0.015
	(0.101)	(0.101)	(0.102)	(0.013)	(0.014)	(0.014)	(0.016)	(0.016)	(0.016)	(0.027)	(0.027)	(0.027)	(0.013)	(0.013)	(0.014)
Birth order: 3 or higher	-0.206*	-0.190*	-0.199*	-0.009	-0.009	-0.011	-0.004	-0.008	-0.006	0.027	0.026	0.026	-0.019	-0.020*	-0.019
	(0.111)	(0.113)	(0.113)	(0.013)	(0.013)	(0.013)	(0.017)	(0.017)	(0.017)	(0.025)	(0.026)	(0.025)	(0.012)	(0.012)	(0.012)
SLA (conception) $\times$ Birth order: 2	0.018	0.001	-0.009	0.087	0.090	0.083	-0.117	-0.119	-0.130	-0.193**	-0.190**	-0.195**	0.008	0.010	0.008
	(0.360)	(0.362)	(0.371)	(0.091)	(0.092)	(0.092)	(0.086)	(0.086)	(0.086)	(0.095)	(0.096)	(0.098)	(0.015)	(0.015)	(0.016)
SLA (conception) $\times$ Birth order: 3 or higher	-0.074	-0.096	-0.091	0.065	0.067	0.065	-0.025	-0.025	-0.029	-0.092	-0.085	-0.092	0.017	0.019	0.018
	(0.286)	(0.286)	(0.293)	(0.061)	(0.061)	(0.062)	(0.047)	(0.047)	(0.048)	(0.066)	(0.067)	(0.069)	(0.016)	(0.015)	(0.016)
Region-year fixed effects															
District level trends															
Constant	-7.316	-3.925	-36.545	-2.620	-2.069	-4.560	-6.289	-6.149	-7.995	-3.322	-2.392	-4.637	4.311**	4.242**	5.132**
	(25.324)	(25.977)	(31.027)	(4.354)	(4.358)	(4.948)	(4.806)	(4.698)	(5.598)	(6.468)	(6.433)	(6.871)	(1.979)	(2.017)	(2.178)
Observations	2535	2535	2535	2535	2535	2535	2535	2535	2535	2535	2535	2535	2535	2535	2535
R^2	0.217	0.222	0.232	0.521	0.523	0.525	0.454	0.458	0.462	0.563	0.565	0.569	0.282	0.286	0.290

Robust standard errors clustered on village are shown in parentheses. The following controls are included in all specifications: village level fixed effects, year of conception, twin status, birth order, mother's age at first birth, mother's current age, ethnicity, religion, household wealth quintile, hospital-specific trends and tarmac road specific trends. * $p < .10$, ** $p < .05$, *** $p < .01$