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Governance and the effectiveness of public health subsidies: Evidence from Ghana, Kenya and Uganda*

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Abstract

Distributing subsidized health products through existing health infrastructure could substantially and cost-effectively improve health in sub-Saharan Africa. There is, however, widespread concern that poor governance – in particular, limited health worker accountability – seriously undermines the effectiveness of subsidy programs. We audit targeted bednet distribution programs to quantify the extent of agency problems. We find that around 80% of the eligible receive the subsidy as intended, and up to 15% of subsidies are leaked to ineligible people. Supplementing the program with simple financial or monitoring incentives for health workers does not improve performance further and is thus not cost-effective in this context.

Keywords

leakage; extortion; shirking; motivation

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1 Introduction

Free or highly-subsidized distribution is often advocated as a necessary strategy for rapidly increasing coverage of essential health products in rural areas of poor countries. There is widespread concern in the policy community, however, that agency issues and corruption in the health sector will compromise the success of these programs (UNDP, 2011). To implement subsidy programs, government agencies and other major players must be able to identify eligible beneficiaries and effectively deliver products to them, typically using existing health infrastructure.[1] Yet many public service providers are paid a fixed wage and are hard to fire, and thus may have little direct incentive to refrain from corruption or to exert the effort needed to effectively deliver services or products (World Bank, 2004).

These concerns are bolstered by existing evidence regarding agency issues in other types of public programs in developing countries. Anecdotal and survey evidence suggests that corruption is endemic (see Svensson 2005 for a review of the survey evidence). Several quantitative studies document alarming levels of health worker absence (among others, see Chaudhury et al.2006; Chaudhury and Hammer2004; and Muralidharan et al. 2011).[2] Others show very high levels of mistargeting for non-health-related subsidy programs such as the Indian public distribution system (PDS) food subsidy.[3] Recent interventions to improve accountability, such as performance incentives or increased monitoring, have been shown to have large effects on health care quality in Rwanda (Gertler and Vermeersch 2013) and Uganda (Björkman and Svensson 2009).

Despite the high levels of policy concern, however, there are still relatively few reliable estimates of the magnitude of agency costs, and there is considerable heterogeneity in the existing estimates (Olken and Pande 2012). Moreover, much of the existing literature focuses on corruption in procurement, fiscal transfers, and food subsidies. There has been little prior research evaluating whether local government workers effectively implement public distribution systems for health products, where the estimated returns to the subsidized products are often high enough that, as long as a sufficient level of coverage can be achieved, zero leakage is not required in order to justify the cost of implementing the subsidy. In this paper, we examine the effectiveness of public distribution for targeted subsidies for one such preventative health product in three countries in sub-Saharan Africa. We document that, while agency issues do exist, they are not as extensive as might be thought given some of the findings from studies of government programs in other settings. We then evaluate whether supplementing the program with simple governance interventions can mitigate the remaining agency problems and further improve performance.

[1]The existing health infrastructure is normally used since it is viewed as having the potential to be the most cost-effective distribution method. This is particularly true for products for which medical diagnosis is necessary to identify eligibility (for example, ARVs or anti-malarials), but substantial cost-savings have also been documented for other products, like bed nets, where diagnosis is not required (De Allegri et al., 2010).

[2]These examples focus on nurses and other health workers, since they are the ones commonly doing distribution of the type we study. However, other work has documented poor performances of doctors as well (see Das, Hammer and Leonard 2008 and Das and Hammer 2014 for reviews).

[3]For example, Niehaus et al. (2013) show that 48% of households are misclassified for the PDS food subsidy in Karnataka, India, with 70% of ineligibles tagged as eligible and 13% of eligibles tagged as ineligible. Small bribes are also common, with 75% of households reporting paying prices above the statuatory fee, and the mean bribe amount roughly USD 0.20.

Our setting is a subsidy program recommended by the World Health Organization (WHO) that provides free bed nets to those most vulnerable to malaria – pregnant women and their unborn children – through antenatal care clinics. There are three main ways that health workers may undermine this type of subsidy program. First, they may demand under-the-counter payments from eligible clients – *extortion*. Second, they may provide the product to ineligible people – *leakage*. Third, health workers may slack off, for example by failing to attend work or monitoring inventories to prevent stockouts – *shirking*.

These three types of agency problems can reduce social welfare. With extortion, part of the government subsidy is captured by the health worker, for whom the marginal utility of cash is likely lower than for the eligible individual. If demand is price-sensitive and health workers are unable to price discriminate, extortion will also lower the share of eligible women who receive the product. Leakage reduces social welfare and leads to inefficiency (from a public health perspective) if ineligible individuals who obtain leaked subsidized products have lower health returns from them than the eligible. Shirking can reduce social welfare by reducing coverage rates among the eligible.

A key measurement challenge in these types of settings is that agents who engage in such petty corruption typically do not readily report doing so. To overcome this, we devised a suite of measures that include audits on health center registers, back-check surveys with prenatal clients, and decoy visits to communities and health centers. Together, these measures generate a comprehensive picture of the performance of health workers. Our study takes place in three countries, Ghana, Kenya, and Uganda, which vary in national level corruption. Out of 178 countries in the 2012 Transparency International Corruption Index (where the least corrupt country is Denmark at rank 1, and Somalia, Afghanistan and North Korea tie for last place), Ghana ranks 64th, Uganda 130th, and Kenya 139th. At the time of data collection, both the Kenya and Uganda governments were implementing free bed net distribution schemes for pregnant women enrolling for prenatal care. In Ghana, there was no such government program, but we set one up, and so could randomize several features of program governance.

Our primary finding is that health worker performance, while not perfect, is higher than might be expected ex ante. Despite major contextual differences across countries, results are similar across study sites, suggesting a substantial degree of external validity. We find that 70–90% of eligible subsidy recipients received the subsidy at the clinic. Extortion appears to be rare, as only 1.4% of eligible subsidy recipients were asked to pay bribes. Comparing administrative records of bed net deliveries with our coverage estimates, we estimate an upper bound on the leakage rate at clinics of 15% in Ghana. Leakage to outsiders, however, appears to be low: health workers turned down more than 95% of the net requests received from “mystery clients” (ineligible men from outside the village making decoy visits). While our study does not directly measure leakage higher in the distribution chain (e.g before subsidized products reach health facilities), we perform back of the envelope calculations for the public distribution programs in Kenya and Uganda by comparing observed population coverage rates in our study areas to publicly available data on the total number of nets distributed by these programs, and estimate that total leakage in these two countries is smaller than the 15% upper bound estimated for Ghana.

The relatively high level of performance we observe suggest limited scope for add-on features to improve performance further. Consistent with this, in the Ghana program, where we could randomize a number of features, including audit threats, bonus pay, stock size and vouchers, we observe only minor differences between schemes. The fact that none of these simple tweaks further improved provider behavior suggests that the remaining barriers to perfect implementation may be prohibitively costly to lift, and as such, bare-bone free distribution through existing systems may be the most cost-effective approach.

A consideration in interpreting our findings is that the willingness to pay for ITNs in rural Africa is modest: in 2007, only 25% of households in rural Kenya were willing to pay more than $2 for a $7-bednet (Dupas, 2014). Even though there is little scope to demand large bribes in this setting, there remains ample room for health workers to extort small amounts of money from the ineligible. The finding that they do not suggests that health workers face some costs of deviating from distribution protocols. In the final section of the paper, we present survey evidence that health workers in all three countries appear positively selected in terms of other-regarding preferences, have a higher level of intrinsic job motivation, and feel more accountable than workers in other professions, three factors that each raise the cost of corrupt behavior. We also present data suggesting that the health workers in our sample performed well on other tasks unrelated to the bed net distribution program, which could also reflect positive selection. This suggestive evidence relates to the recent experimental literature about selection into public service (Dal Bo, Finan and Rossi2013; Ashraf et al. 2015).

The remainder of the paper is organized as follows. Section 2 presents the study design. Section 3 presents performance results from the three audit studies and discusses their implication for the cost-effectiveness of free distribution schemes. Section 4 presents the experimental results from Ghana. Section 5 discusses potential explanations for the findings, and Section 6 concludes.

2 Study design

2.1 Study Sites and Timeline

Our sample consists of 168 rural health facilities (72 in Ghana, 48 in Kenya and 48 in Uganda). We chose these three countries as follows. First, we picked Ghana as our experimental site since it did not have a bed net distribution program and therefore it was possible for the research team to implement one with randomized variation in program features. Second, and *after* observing relatively high performance in Ghana, we picked Kenya and Uganda because they both had government-led bed net distribution programs through prenatal clinics, are among the countries perceived as most corrupt according to Transparency International (TI), and because, as we shared our initial Ghana results, we received anecdotal reports that leakage was high in both these countries. We thus chose two additional countries where the *prior* was that leakage would likely be on the high side, hence likely providing estimates from the top end of the distribution for the costs of corrupt behavior on the part of health workers. Ghana, ranking much better on the TI corruption index, was perceived as providing an estimate from the bottom end of the distribution.[4]

In each country, health facilities were selected for inclusion based on a census conducted of all of the public and private health facilities in a given region/province.[5] Primary inclusion criteria for health centers in the study were: (1) having an antenatal care clinic (ANC); and (2) being rural or semi-rural.[6] Our final sample spans 21 districts in Ghana, 10 districts in Kenya, and 6 districts in Uganda.

Table 1, Panel A presents some statistics from Demographic and Health Surveys on coverage with insecticide-treated bed nets (ITNs) in each of the three countries. While these surveys were not concurrent with our data collection (the DHS in Ghana was conducted a few months before our study, but the DHS in Kenya and Uganda were separated from data collection by several years), they are likely indicative. The DHS data suggest that large numbers of people do not have nets: between 17 and 47% of households had no net, and 58 to 78% did not have enough to cover all household members.

Table 1, Panel B presents baseline characteristics for the 168 health centers in the study. The average health clinic has been operating for 16 years and 85% of clinics are public. Clinics enroll 28 new ANC patients every month on average, and receive 63 revisits by existing ANC patients. The average clinic has 2.9 health workers (trained nurses and/or midwives) in charge of ANC patients. Only 13% are located within 10 kilometers of a store selling bed nets, suggesting bed nets are not widely available outside subsidized distribution schemes.

The data collection in Ghana took place between October 2011 and April 2012. At the time, there were no bed net distribution schemes, through ANC clinics or otherwise, but the Ministry of Health had done some limited distributions of bed nets through ANC clinics in the past so health workers were somewhat accustomed to this type of scheme.

In Kenya and Uganda, data collection took place between May and September 2013. Since 2009, national policy in Kenya is that all pregnant women are provided a free long-lasting insecticide treated net (LLIN) at their first antenatal care visit. In Uganda, such distribution is not yet a national policy, but free distribution did occur through both public and private facilities in parts of the country, including our study area, starting in 2012 and ending in October 2013.

2.2 Ghana set-up

The 72 health facilities in the Ghana sample were invited to participate in an NGO program called SALI (“Saving Lives”). The program mimicked those ongoing in Kenya and Uganda, and consisted of distributing free Long Lasting Insecticide-Treated Nets (LLINs) to pregnant women during routine ANC visits. The program was approved by the Ghana Health Service and was implemented by ANC clinic staff (most of them midwives or nurses). We hired and

[4]According to the 2013 World Malaria Report, 34 of 44 countries with ongoing malaria transmission in sub-Saharan Africa had an ITN distribution program through antenatal clinics in place as of 2012.
[5]We sampled one of 10 regions in Ghana, one of 8 provinces in Kenya, and one of 4 regions in Uganda.
[6]The Ghana sample had the following additional criteria: (3) having no other healthcare facilities within a 2 km radius, no hospitals within a 5 km radius, and not more than one other ANC within a 5 km radius; (4) having no free bed net distribution program currently in place (very few clinics had this); (5) having at least two stores within a 2 km radius willing to participate in the voucher scheme (only 6% of clinics were excluded by this criterion); and, (6) being accessible for net deliveries (less than 2% were inaccessible).

trained SALI staff, whose job was to roll out the distribution program – namely, to visit health facilities to introduce the program, deliver bales of nets and train health workers on the eligibility criteria for the free net and on record-keeping. The SALI staff was completely unaware that an evaluation of the SALI program would be implemented, as were the health workers.[7]

The program was rolled out into the 72 clinics over a 7-week period, from mid-October to early December 2011. The distribution program was announced as a continuous scheme, with health centers (or shops when applicable) given instructions on how to get a new delivery of LLINs before their stock ran out. In practice, the program stopped abruptly in all study health centers in mid-March 2012 when the Ghana Health Service rolled out a separate (unannounced) free distribution scheme for LLINs. Given this, health centers in our sample were exposed to the SALI program for up to 150 days, with an average of 109 days. The effects we identify in Ghana are thus specific to a relatively new program, in contrast to our results in Uganda and Kenya which are from longer-lasting programs.

Prior to rolling out the program, we grouped the 72 clinics into 6 strata with comparable average characteristics (size, remoteness, and proximity to district borders). Within each stratum, we randomly assigned clinics into either of two distribution mechanisms: 48 health centers were assigned to “direct distribution” (as in the Kenya and Uganda government programs), and 24 health centers to a “voucher scheme” wherein the health workers would distribute vouchers that could then be redeemed for a free LLIN at a local store. Since most health centers did not have any store selling bed nets in their vicinity, we stocked one or two local stores (located within two kilometers of the health center) with LLINs and instructed shopkeepers to give one free LLIN to anyone who came in with a voucher from the local clinic and a corresponding ANC registration card. We overlaid randomized governance features of the program onto this basic split between direct distribution and vouchers. Those are described in section 4.

2.3 Data

In all three countries, we collected data through two completely independent teams unaware of each other’s existence. The first is a team of “mystery clients” (undercover enumerators) asked to do decoy visits to health centers and their surrounding communities. The second is a team of regular surveyors, who administered surveys to ANC clients, health workers, and other professionals. In Ghana, we also have administrative data from the SALI staff (itself completely independent from the two data collection teams), which kept program implementation records and also asked health centers to keep a log of program beneficiaries.

2.3.1 Decoy visits—We sent undercover enumerators to local communities, who were trained to perform two types of decoy visits:

1. *“Mystery Client” visits*: To measure how well health workers respected the targeting rule, we arranged to have undercover enumerators visit clinics (and

[7]As such, the protocol involved deception of research subjects (health workers). As per IRB requirements, health workers were “debriefed” on the true intent of the research study in the Fall 2013, after the study had been completed.

stores, in the case of the voucher treatment) to try to obtain a subsidized net. To make this measure clearly interpretable as an estimate of the percent of requests by ineligibles yielding nets, we chose to employ only men as mystery clients (since they are clearly ineligible for the program). After concluding the interaction and once out of sight, mystery clients recorded the details of their encounter with the health workers, including whether they were asked to pay a bribe. To minimize possible suspicion among health workers, mystery clients dressed casually and never visited the same health center twice. They were not asked to follow a specific script. Both the order in which mystery clients visited a health center and the timing (across and within days) were randomized.[8]

In Ghana, we paid the mystery clients 5 GHC (about $3, roughly half the retail price) for any bed net they were able to bring back from such decoy visits (in addition to a salary of $15 per day). We scheduled 10 mystery visits per health center spread over the study period. This led to an average of 0.6 mystery visits per health center per week. In Kenya and Uganda, because the bed nets distributed were from the government programs rather than our own NGO program, we did not incentivize enumerators to pay bribes for bed nets. We scheduled 3 mystery visits per health center over the course of two months.

2. *Informal community interviews*: In all three countries, enumerators spoke with a convenience sample of community members about whether bed nets were available in the area and, if so, where, at what price, what the eligibility criteria were, whether they thought an ineligible person would be able to obtain a net, and whether they themselves had received a net at the health center.[9] To elicit truthful answers, surveyors posed as visitors and did not introduce themselves as enumerators in Ghana and Kenya. In Uganda, we were unable to obtain an IRB waiver to conduct these visits undercover so they were conducted by the regular survey team described below in Section 2.3.2. Again, no enumerator performed this activity in the same area twice. We polled around 18 community members per health center in each of the three countries.

   An important point to note when interpreting this set of results is that all mystery clients were from areas outside the study area (so that local communities would not realize the true intent of the decoy visits). If leakage is lower to men than to ineligible women, if health workers behave differently with strangers than with local community members, or if local community members under-report leakage to strangers, the estimates will be a lower bound on the percent of requests by ineligibles that yield nets.

2.3.2 Regular survey data—We use three types of regular survey data.

[8]To ensure that mystery clients actually visited clinics, we randomly selected 5% of mystery client visits to be backchecked. An auditor would be posted at the clinic and check whether the mystery shopper indeed came.

[9]During each visit, the mystery clients were instructed to speak with three individuals at the local market, as well as three households in their homes. The questions about whether the community members themselves had obtained nets were only asked in Uganda and Kenya.

1. *ANC Client Back-checking surveys:* To verify whether eligible women actually reeceived nets at their prenatal visits, we hired regular teams of enumerators to survey ANC clients at their homes. We sampled the ANC clients to be surveyed as follows. In all three countries, health workers keep registers of the women who come in for antenatal visits. These ANC registers include a record of each visit, as well as some rudimentary contact information (typically just the woman's name and the area she is from). In each facility, this register was used to randomly sample 20 pregnant women who had visited the facility for antenatal care in the previous 4 months.[10] The survey team attempted to visit these women at their homes and administer a short survey about their experience at the ANC clinic, their bed net ownership and usage, including whether they received a bed net from the local health center and at what price. A subset of them were also asked to play a dictator game (so that we have a basis of comparison for the health workers, see below). The survey team tracked 92% of women in Ghana, but only 71% in Kenya and 66% in Uganda. The rest could not be traced, typically because ANC registers contain almost no information on clients' addresses and therefore tracing women from outer villages was particularly difficult. The higher attrition rate in Kenya and Uganda likely reflects the fact that the samples in these two countries included semi-urban health centers, which have wider catchment areas. In the analysis, in one specification we assume those that could not be tracked did not receive a net, providing a lower bound on coverage.[11]

2. *Surveys of Health Workers:* Health workers involved with prenatal clients (on average, 3.1 per clinic) were sampled for a survey that measured demographics, other-regarding preferences (including a dictator game), intrinsic motivation, and other personality traits. This survey was administered by our regular surveyor teams and took place after all other data collection was complete, since being surveyed on intrinsic motivation and altruism could temporarily affect on-the-job performance. We were not able to survey all health workers involved with prenatal clients due to official leaves, or because some health workers were too busy for a survey or simply absent. We successfully interviewed 89% of health workers in Ghana, 74% in Kenya and 70% in Uganda. In Kenya and Uganda, we also recorded attendance of ANC health workers, by conducting one (unannounced) spot check per clinic.

3. *Surveys of Other Professionals*: To assess how pro-social, intrinsic, and extrinsic job motivation differ between health workers and other people, our regular survey teams also conducted the same survey used with health workers with non-health workers, in particular, teachers, as well as (in Ghana and Uganda only) shopkeepers and microfinance agents.

[10]These data are used to estimate coverage and extortion. See Appendix A for a discussion of the potential threats associated with this sampling strategy and why we do not believe they are problematic in this case.

[11]In Uganda and Ghana, 7% of the interviews were conducted with proxies because the sampled respondent was unavailable at the time of interview; in Kenya, 1% of interviews were conducted with proxies.

2.3.3 Ghana administrative data—Since we set up the distribution scheme ourselves in Ghana, we have administrative data on bed net deliveries at each facility (timing and quantities delivered). Health workers also kept logs in which they were asked to record basic information (name, prenatal card number and address) for each person to whom they gave a bed net or voucher. The survey team attempted to visit all of the individuals appearing on the logs at their homes and administer the same survey administered to ANC clients. Surveyors successfully reached 94% of the individuals sampled. We use these data to estimate the share of nets unaccounted for and leakage rate.

3 Performance Results From Three Countries

We first examine the performance of the standard program (bed net distribution at clinics). For this we exclude the 24 health centers in Ghana with a voucher scheme, keeping 48 health centers from each country studied. We present the overall mean as well as country-specific means for each outcome, and the p-values for tests of equality between countries.

3.1 Do the Eligible Receive the Full Subsidy?

We first consider the effectiveness of the bed net subsidy programs in reaching intended beneficiaries. The results are presented in Table 2. Our interviews with women randomly sampled from the ANC registers reveal that 76% of intended beneficiaries received a net at their first prenatal visit as per program protocols (Table 2, column 1), and 80% received one at some point (column 3).[12] When we exclude clinics with reported stockouts over the sample period, the share of the eligible population receiving the subsidized net at their first prenatal care visit reaches 81% (column 2). Only 1% of women were asked to pay something in exchange for the net.

There is some meaningful heterogeneity across countries. Coverage is significantly higher in Kenya (90%, column 2) than in the other two countries (Ghana - 77%; Uganda - 69%). When asked why they did not receive a bed net, 9% of Ugandan women (20% of those who ventured an explanation) mentioned that it was because they already had a net or were rich enough to afford one, suggesting that health workers might have been targeting the subsidized nets to those needing them the most. Request for payment is also significantly higher in Uganda, although the absolute level (3%) is still low.

Errors of exclusion or efficient targeting?—In Table 3, we present some descriptive evidence on whether incomplete coverage likely represents errors of exclusion (truly poor women who should have received a net) or health workers targeting needs to people they view as most needy. We investigate whether, *within clinic*, prenatal clients which have a higher socio-economic status (proxied by education), and thus are more likely to be able to afford a net on their own, are less likely to receive a free net. We find suggestive but weak evidence that more educated women were less likely to get nets – an additional year of

[12]These estimates exclude any ANC registrants who were sampled from the registers but we were unable to track. A lower bound approach would be to assume all of the registrants who we were unable to track and interview did not receive nets – note that we believe this is too conservative since the likelihood of tracking was based on factors that were plausibly orthogonal to likelihood of net receipt (facilities have no incentive to over-report ANC clients in their registers). This approach would yield a 64% coverage rate for Kenya, 71% for Ghana, and 46% for Uganda.

education is associated with a 0.7 percentage point reduction in the likelihood of receiving a net at the first visit (Table 3, panel A, column 1). This implies that a woman at the 75th percentile in the distribution of years of education (7.5 years) is 3.1 percentage points (13%) less likely to receive a free net at her first visit than a woman at the 25th percentile (3 years). Targeting appears more pronounced in Ghana (col. 2) and Uganda (col. 4) than in Kenya (col. 3), where the coverage rate was closer to 100%.[13]

3.2 Leakage to the Ineligible

Success rates of Mystery Client requests—Table 4 shows the results of the decoy health center visits by our "mystery clients" trying to obtain nets for which they were ineligible, and for the community interviews. We first note that on 20.5% of the visits in Kenya and Uganda, the clinic was actually out of stock (we know this from independent visits made by the survey team – see column 1). Stockouts were not measured independently in Ghana, but mystery client reports suggest it was rarer (4.6%, column 2). We thus focus on non-stockout visits to make meaningful comparisons across countries, but we note that the stockout number used in Ghana is likely an upper bound, since health workers could have told ineligibles asking for nets that the clinic was out of stock as a way to gently deny their requests.

Once stockouts are excluded, only 4.7% of mystery client attempts were successful (Table 4, column 3). This varied from 11% in Uganda to 8.7% in Kenya to only 2.2% in Ghana. All of the nets leaked to mystery clients in Kenya and Uganda were given out for free (column 4), which is not surprising since the mystery clients in these two countries were not incentivized to pay for the (government sponsored) nets. What is more surprising is that while mystery clients in Ghana had a higher reservation price – recall that we paid them $3 per (NGO sponsored) net they successfully acquired from health centers – they were less successful at obtaining nets than their counterparts in Kenya and Uganda. Only 1.3% obtained a net by bribing; and only 0.9% got a net for free. Requests for payments, shown in column 5, were rarer in Kenya (3.6%) and Uganda (1.1%) than Ghana (5.1%). However, the average amount requested in Ghana was very high (more than the full price of the net, even after bargaining had happened – column 6), and actual transactions occurred after only a quarter of the payment requests, possibly suggesting that some health workers may have been asking for a high price as a way to get rid of the visitor.

The informal interviews mystery clients conducted with randomly sampled community members (columns 8–10 of Table 4) also suggest modest levels of leakage. About 10% of community members thought a male (and so obviously ineligible) client could get a net from the local facility. When asked if they themselves had acquired a net, less than 4 percent of men said they had (note that some of these may have been received legitimately while taking a pregnant wife or child under five to the facility).

[13]Outcomes from the first visit are likely more reflective of health worker targeting than outcomes across all visits (for example, more-educated people who did not get nets might return to the clinic specifically for a net). The results across all visits, shown in Panel B of Table 3, are consistent but somewhat weaker, indicating that there is some "correction" at visit 2.

Errors of inclusion or efficient targeting?—In Table 5, we provide suggestive evidence that leakage is consistent with health workers bending the targeting rule for the public good. In particular, we test whether health workers are more likely to leak nets to mystery clients whose "narrative" made them appear like they had a higher return to bed net usage, for example because they had a pregnant wife or vulnerable child. This analysis is limited by several factors, notably that the mystery clients' narratives were not randomly assigned and so could be endogenous to the interaction or correlated with other mystery client characteristics, such as their power of persuasion, and also that the narratives were only stories and so obviously not truly tied to need. In addition, there were systematic cross-country differences in the strategies used, so that the regressors in Table 5 vary across countries.[14]

That said, the results in Table 5 are consistent with benevolent leakage to children: mystery clients who mentioned a child were significantly more likely to obtain a free net. Mentioning a pregnant wife was not effective, often because health workers responded by asking the mystery client to bring his wife to the next visit.[15]

Total Local Leakage Rate (Ghana only)—We estimate an upper bound on the leakage rate using the administrative records of bed net deliveries to health centers, as well as the records on beneficiaries kept by health centers, which we audited. We can do this exercise only in Ghana, the only country for which we have information on the total number of nets supplied in each clinic (we have this data since we implemented the program ourselves through the SALI team; despite our best efforts, it was not possible to obtain detailed governmental records of bed net deliveries to individual health centers in Kenya and Uganda). Combining all of the available information for Ghana, we estimate an upper bound for the percent of bed nets unaccounted for as follows: we compare N, the number of nets delivered by the program to the facility, to N_e, the estimated number of nets that reached an eligible person.[16] To estimate N_e, we use the log of beneficiaries kept by health workers at the request of the SALI program, and subtract invalid entries. All duplicate entries were considered invalid. Among non-duplicate entries, we estimate the share of invalid entries using the data from our random audits of the logs. Audited entries were considered invalid if the person named in the entry could not be found (6.4% of entries), was found and not eligible (1.5% of entries), or had not received a net (2.7% of entries). This estimate is an upper bound since some of those not found or not recorded in the administrative ledger may have been legitimate program beneficiaries.[17]

Figure 1A shows the distribution across the clinics of the estimated (upper bound) number of bed nets unaccounted for, while Figure 1B shows the distribution of the estimated share. The

[14]In Ghana, mystery clients almost always said that the net would be for personal use (a few of them mentioned a pregnant wife), while in Uganda and Kenya, some mystery clients mentioned a sick child at home, though in Kenya they only did so if asked by health workers could forget to record eligible clients who received nets, which would cause us to overestimate leakage.

[15]Of course, since these narratives are only cheap talk, these results are not necessarily indicative of improved targeting.

[16]Data is only available for 47 of the 48 direct distribution clinics because, for one clinic, the survey team lost the surveys for respondents sampled from the SALI ledger, and so we cannot compute the "percentage of valid entries" for that clinic.

[17]We exclude audits where the person was found, eligible, and surveyed, but where the data about whether the person received a net is missing (most missing data are in surveys conducted with proxies, so these missing entries are often because the proxy did not know whether the respondent had received a net or not). If we assume instead that none of the respondents with missing data received nets (a very conservative assumption), the total leakage rate would increase to 16.8%.

average estimated leakage rate is 14.7%. The median number of bed nets unaccounted for is 20 and the 75th percentile is 37 nets.[18]

Leakage Across the Entire Delivery Chain—What about leakage higher up in the chain? We do a simple accounting exercise to estimate the total rate of leakage in the Uganda and Kenya programs, for which aggregate supply data is available online. The nets procured for distribution in a given area must be equal to the number of nets received by eligibles plus the number of nets leaked (unaccounted for). The exercise suggests that leakage across the full distribution chain is relatively low, roughly 7% in Kenya and lower in Uganda. See Appendix B for details.

3.3 Cost-Effectiveness Implications

Our administrative records from Ghana suggest a conservative upper bound on leakage at the facility level of around 15%. Leakage higher up in the chain is minimal, according to the estimates from Kenya and Uganda. Our upper bound estimate is comparable to the lower bound of 18% found by Olken (2005) for leakage of food in a food relief program in Indonesia, and on par with recent evidence on the allocation of government transfer benefits in Indonesia (Alatas et al. 2013).

Because bednets are highly effective at reducing mortality in high-malaria areas, this modest leakage rate of 15% does not much affect cost effectiveness. Assuming no positive health impacts from leakage (so counting leakage as a pure deadweight loss – a strong assumption), 15% leakage implies an increase in the price per bed net delivered to an eligible person by $0.15/(1-0.15)=18\%$ with no change in total health benefits. Cohen and Dupas (2010, Table IX) estimate that an investment of $200–$662 in bednets would save one expected child life (depending on assumptions); this would increase modestly to $236–$781 with 15% leakage, which remains orders of magnitude below the cost-effectiveness threshold of approximately $20,000 per life saved ($241 per disability-adjusted life year saved times 80 years) suggested by the 1993 World Development Report (World Bank, 1993). Nevertheless, leakage of 15% is certainly not inconsequential, especially if there is a binding government budget constraint, since 15% of the eligible population will not receive nets. What's more, the funds sunk in leaked nets have an opportunity cost. For every 1,000 six-dollar bed nets fully subsidized, 15% leakage means $900 could have been given as a cash transfer to a household. Experimental evidence from Kenya suggests that every $1000 in cash transfer to households yield a $270 increase in earnings and a $330 increase in nutrition spending, as well as large positive effects on psychological well being (Haushofer and Shapiro, 2016).

[18]The number of unaccounted-for nets can be negative either as a result of sampling error in the estimate of the percent valid entries (so we may underestimate the number of valid entries), or errors in the records kept by the SALI program on the number of nets they delivered (though we think this is unlikely). In any case it is reassuring that only three clinics have negative values, and the value is never less than −15 nets. The one clinic with −15 nets is likely due to sampling error, since 100% of the respondents sampled from the SALI ledger in that clinic were found, were eligible, and had received nets.

4 The Ghana Experiment

Our results show that health worker performance does not threaten the viability of public distribution systems. Yet it's not perfect – are there ways of further improving performance? We explore this possibility in this section, using our experimental results in Ghana.

4.1 Experimental design

In Ghana, where we implemented the program, we were able to randomly vary four aspects of the program (see Figure A1):

Direct vs. voucher distribution—In the direct treatment, health workers had the nets on site to distribute; in the voucher treatment, health workers gave out vouchers which were redeemable at a local shop. The voucher could reduce extortion and leakage because people are less willing to pay a bribe for a voucher than for the product itself, and could reduce shirking because the effort cost of handing out a voucher should be lower than a net (since vouchers are small and can be kept conveniently in the visitation room, and so take less effort to hand over than larger nets which must be retrieved from a storage room). This is a standard argument given by voucher proponents (Sexton, 2011).

Staff monitoring (Audit vs. No Audit)—Half of the clinics were randomly selected for an "audit treatment," which was rolled out in January 2012 (recall that the program began in October 2011). Health workers were informed that the NGO implementing the program would perform audits, starting within the next month. How the audits would be performed was not disclosed, but health centers were warned that the program would be shut down if the audits revealed that either leakage or extortion had occurred after the audit announcement. Olken (2007) finds that top-down audits reduce corruption among local officials granting road-construction contracts, but bottom-up monitoring does not. In our context, misconduct by frontline providers is likely observable by the local community since the targeting rule is based on pregnancy status, so the scope for bottom-up monitoring is higher and the need for top-down audits might be lower.

Pay (Compensation vs. No Compensation)—In clinics with direct distribution, where health workers had greater responsibility, we randomly varied whether health workers received compensation for implementing the program. The compensation was a fixed monthly fee of 100 Ghana cedis (US$60, corresponding to approximately 17% of the median monthly salary of a nurse or midwife or 25% of the median monthly salary of any healthworker) paid via direct deposit into health workers' bank accounts. Increasing existing health workers' compensation can reduce corruption through gift exchange, or if pro-social motivation, intrinsic job motivation, or effort have positive income elasticities.[19]

[19]There is some evidence that higher public wages are correlated with lower corruption, but most of the evidence is cross-sectional (Van Rijckeghem and Weder,2001; Rauch and Evans,2000; Di Tella and Schargrodsky 2003). A closely related paper is de Ree et al. (2016), who show that an unconditional salary increase among teachers in India had no effect on performance. There are a number of papers on performance pay for public service providers (Muralidharan and Sundararaman2011; Gertler and Vermeersch2013; Glewwe et al.2010; Khan, Khwaja and Olken 2016). Ashraf et al. (2014) is particularly related, in that the authors find that extrinsic as well as intrinsic rewards motivate health promoters, and that these effects are largest for the most pro-social workers.

Scarcity (Small vs. Large Delivery)—Finally, within direct distribution clinics, we randomly varied whether the stock of LLINs delivered to the health center at the onset of the program was high or low. Since clinics were instructed to call the SALI program officer to restock the nets whenever they would run out, this variation in the level of the initial stock should have limited effect unless it affects the salience of the "budget constraint." Increasing the (perceived) tightness of the budget constraint can reduce leakage if health workers believe that eligibles have higher returns (as they should under most targeting rules).

4.2 Experimental results

We present the experimental results in Table 6. Because the audit threat was rolled out midway through the program, we use a difference-in-differences specification to determine the effects of audits, comparing the results before and after the time when audit threats were rolled, between clinics that were audited and clinics that were not. Specifically, we regress the outcome of patient i at health center c in period t on a vector of health center level controls (specifically: randomization strata fixed effects, baseline ANC attendance, and ANC staff size), and treatment dummies, and a dummy equal to 1 if t is the post-audit period, interacted with a dummy for being in the audit treatment. We cluster the standard errors at the health center level.[20], [21]

Likely owing to the fact that performance levels are high to start with, we see no effect of the experimental treatments, except for the voucher scheme. While the voucher did not affect extortion among eligibles, it actually lowered eligible coverage (in contrast to our hypothesis that it would improve coverage).[22] We also find that mystery clients were 3.1% more likely to obtain a program net in voucher clinics than in direct clinics, a large increase relative to the base level of 2% in direct clinics (although only significant at the 10% level). However, when we look at the total local leakage rate estimated using administrative records, it was over 50% lower in voucher clinics than direct clinics, perhaps suggesting that the decrease in awareness/demand outweighed the increase in leakage conditional on solicitation.

There are two potential explanations for lower performance (in terms of coverage of the eligible) in the voucher clinics. The first is awareness: the percentage of community members who were aware of the nets program was 8.5 percentage points lower (off of a base of 72 percentage points) in the areas surrounding voucher clinics relative to direct clinics. This is intuitive: vouchers, which can fit in a pocket, have lower visibility than bulky bed nets. Coverage might be lower because women did not know about the program, and leakage may have been higher because there was less community monitoring of health worker.

[20]The treatments were assigned in cross-cutting fashion. We are powered to look at main effects (e.g., payment vs no-payment) but not interactions (e.g., payment in audit clinics vs no-payment in audit clinics).

[21]Columns (2)–(5) of Table A1 test for balance across our experimental groups in Ghana, both in terms of baseline characteristics (Panel A) and program implementation details (Panel B). We regress each dependent variable on a dummy variable for being assigned to the voucher treatment, audit treatment, pay treatment, and large stock treatment. Columns (2)–(5) present coefficients and standard errors from these regressions. None of the differences are significant at the 5% level.

[22]Because vouchers add an extra step to the process (pregnant women have to go to the store to redeem the voucher), incomplete redemption could also increase the coverage gap between voucher and direct clinics. In our sample, however, redemption rates are very high (over 95%).

The second potential explanation for the voucher scheme's lower performance is its impact on the intrinsic job motivation of health workers. Qualitative evidence provided by the SALI program staff suggests that the voucher scheme lowered health worker autonomy and morale, since health workers felt like they were not trusted. In fact, 2 out of 24 voucher clinics refused to implement the program at all, while 0 of the 48 direct distribution clinics refused.

5 Discussion: Why is corruption low in these contexts?

In this section, we explore possible explanations for the relatively high performance levels observed. We first discuss the specificity of the program considered, then examine characteristics of health workers.

5.1 Specificity of the program considered

Easily verifiable targeting rule—Bednets are relatively bulky and durable products. This may limit the scope for corruption by impeding the ability of health workers to have plausible deniability. This differentiates our context from a number of other subsidy programs that focus on perishables, such as food or agricultural inputs, where verifying delivery is more difficult since the product may not be physically present at the time of verification (e.g. if it was eaten or planted). The difficulty of verifying the receipient is even greater in cash schemes such as the NREGS scheme in India (Niehaus and Sukhtankar 2013).

Lack of high turnover retail market—Much of the leakage that happens in other contexts is not via agents directly interacting with ineligibles, but via diversion to the open market where higher prices can be obtained for the product. Such leakage is more efficient as it requires fewer corrupt transactions per dollar earned (e.g. selling one bale of 100 nets to one trusted wholesaler vs. asking bribes from 100 clients) and hence may be less detectable. Our estimate of leakage rates suggest that bales of nets rarely disappeared from health centers' warehouses, but diversion may be more common in other settings with more active open markets.

Low financial gains to corruption—Willingness to pay for bednets is modest in rural Africa: in 2007, only 25% of households in rural Kenya were willing to pay more than $2 for a $7-bednet (Dupas, 2014). Similar levels have been seen in Uganda (Hoffmann 2009) and Madagascar (Comfort and Krezanoski, 2017). Are our findings of low corruption driven by the fact that financial gains to corruption in this domain are low? Even though there is little scope to demand large bribes in a setting with low willingness to pay, there remains ample room for health workers to extort small amounts of money from the ineligible. In other contexts, public employees demand bribes even at a low level – for example, a contemporaneous study by Foltz and Opoku-Agyemang (2014) finds that policemen in Ghana allow only 19% of trucks to pass roadblocks without taking a bribe, and the most frequent bribe amount paid is 1 Ghanaian Cedi (around 60 US cents) – an amount that 75% of rural Kenyan households are willing to pay for an ITN (Dupas, 2014). In fact, based on the demand curve estimated in Dupas (2014), the profit-maximizing price a monopolist

health worker would want to charge ineligibles in Kenya is $1.6 (in 2009 USD), a price 34% of households are willing to pay. They could also extort the eligible: based on the demand among pregnant women observed in Cohen and Dupas (2010), a health worker would maximize profit from the eligible by charging them 30 US cents (in 2009 USD). Evidently, these sums of money are not enough for health workers to accept bribes. Indeed, even when our mystery clients had a high willingness to pay, health workers still turned down the vast majority of their net requests. This suggests that health workers face some costs of deviating from distribution protocols.

Would performance be worse on more highly valued products? While answering this question comprehensively is outside the scope of this study, for two of the countries, Kenya and Uganda, we have household survey data on a curative product, for which willingness-to-pay tends to be higher than prevention – specifically, we asked whether children who presented with malaria received the recommended Artemisinin-based Combination Therapy (ACT) drugs as they should. Table 7, columns 6 and 7, show the results. We find a coverage rate of 92%, even higher than for the nets.[23] However, we find some evidence that extortion for this product is more frequent: though the drugs should be free at public facilities, 14% of mothers report having had to pay for the drugs – a number much higher than the 2% we find for nets, although still substantially lower than the 75% found by Niehaus et al. (2013) for food subsidies or 81% found by Foltz and Opoku-Agyemang (2014) for trucks. One caveat is that people may have confused payments for ACTs with other ancillary fees (e.g., lab tests) associated with malaria visits, an often-cited issue complicating the study of informal payments for drugs and other health services (Lewis,2007; Stepurko et al., 2010). But, health workers may also be more likely to request payments for drugs than for bed nets. Nonetheless, these potential bribe requests did not threaten the near-universal coverage rate, perhaps because health workers could price discriminate, suggesting that even with highly-valued products, public distribution can be effective. Interestingly, we observe a positive correlation between payment requests for ACTs and bribe requests from mystery clients (correlation of 0.3, significant at the 5% level) at the health facility level.

Low healthworker effort required—There is also relatively little effort required in handing over a net; perhaps coverage would be lower with other products where more effort (e.g., training or instructions) is needed. Although we do not have data on this, we can shed some light by examining data on health worker performance on the other tasks that they undertake for their jobs, shown in Table 7, where more effort may be required. Data from the ANC patient interviews show that nurses spent an average of 18 minutes with each patient. Nurses conducted palpation (the key prenatal check that nurses are supposed to perform) for 96% of the clients, and this is comparable across countries (col 2). Average wait time for a checkup is about one hour on average. ANC staff members also seem to engage in good record-keeping, with 96% of the key identifier fields filled in the registers (col 8).[24]

In Kenya and Uganda, we also asked about additional services that should be performed during ANC visits: 84% of women received intermittent preventive treatment for malaria

[23]We exclude non-government clinics from these statistics since ACTs are not supposed to be free at these facilities.
[24]The “key fields” are name, registration date, ANC card #, address, # children, and gestational age at registration.

(IPT, col 4) and 73% received iron tablets (col 5). These figures are broadly similar to the coverage rates from bed net distribution. Finally, data we gathered on attendance in Kenya and Uganda suggests that low effort at the extensive margin also does not compromise health worker performance (see Appendix C).

Although not dispositive, the results suggest that the health workers' high performance is not limited to net distribution. We next provide suggestive evidence on why this might be the case.

5.2 Motivation of Health Workers

Corruption should decrease with motivation, either intrinsic, pro-social or extrinsic. In this section, we use survey data to document that health workers appear positively selected in terms of pro-social motivation compared to other professionals, and that they also exhibit higher levels of job-specific intrinsic and extrinsic motivation.

Tables 8 and 9 present results from surveys administered to health workers and other professionals. In Panel A, we present country-level averages of various motivation measures among health workers. In Panel B, we regress the measures on dummies for profession (i.e., teacher, shopkeer, or MFI worker, with health workers the omitted category), controlling for country fixed effects, age, and gender.

Pro-social Motivation and Selection into Health Work—The majority of health workers say that they receive personal satisfaction from helping people and do not expect anything in return (Table 8, Panel A). Within country, health workers appear substantially more prosocially motivated than the other professionals we surveyed (Table 8, Panel B).

Besides survey responses, which can be subject to social desirability bias, we have an incentivized measure of other-regarding preferences from a dictator game. We gave players an envelope with ten bills and told them that the money they left in the envelope would be delivered to a randomly-selected community member living in their community.[25] Interestingly, the share left in the envelope by health workers is identical across all three countries (26–27%), and not far from the level found by Brocke, Lange and Leonard (2015) among (richer) urban clinicians in Tanzania (35%). It is also just below the levels observed among nursing students in Kenya, South Africa and Thailand (Smith et al., 2013). More detailed results in Figure A2 show that health workers in Kenya and Uganda tend to leave more than other professionals (with the one exception of MFI employees in Uganda, who are more generous than Uganda health workers): pooling the other professionals together, health workers in Kenya (Uganda) gave 60% (22%) more than workers in other professions, with both differences significant at the 5% level. In Ghana, however, health workers give less.[26]

[25]The total amount of the 10 bills was about $6 in Ghana and Kenya, and about $4 in Uganda. To avoid social pressure effects, the respondent was told that the surveyors would not open the envelope themselves.

[26]In Ghana, the dictator games were played in 2012 with health workers and ANC clients, and in 2014 with the other professionals. Given an inflation rate of approximately 9% over this time period, the two rounds of dictator games are not directly comparable because the stakes differed (though the evidence on this is mixed, see Andersen et al. (2011) for evidence that stakes may matter in the ultimatum game).

Columns 5–6 show monthly pay and years of education. Health workers are highly educated and comparatively highly paid, with an average income of $250/month and 15 years of education on average. Health workers make considerably more than other professions, and are more educated than all but teachers.

Intrinsic Job Motivation—Columns 1–5 of Table 9 indicate that the majority of health workers see their jobs as benefiting society, believe their work is appreciated, and have high levels of job satisfaction. On all these measures the differences with other professions are significant. The experimental result that providing financial compensation to health workers for implementing the Ghana program had no effect on performance is consistent with health workers being sufficiently motivated without it. The relatively poor performance we observed under the voucher scheme in Ghana, which undermined health workers autonomy, is also consistent with an important role for intrinsic motivation.

Extrinsic Motivation—Table 9, columns 6 to 8, show that health workers are also highly extrinsically motivated. They generally report high levels of job insecurity, with the majority of health workers "strongly disagreeing" with the statement that "health worker jobs are very secure" (column 6).[27] Health workers' perceived level of job security is significantly lower than that of teachers. This may be because performance is easily observable – the tasks health workers do are fairly standard– or because health workers feel very closely monitored by the Ministry of Health, though relatively less so in Uganda, where they also performed relatively worse overall (Table 9, column 7). Health workers also report higher levels of monitoring than other professions. The fact that health workers believe they are accountable could explain the experimental finding that the threat of top-down audits was ineffective at increasing performance in Ghana: health workers may have expected there to be an audit even before the threats were made.

6 Conclusion

Increasing coverage of life-saving health products in rural sub-Saharan Africa requires distribution at heavily subsidized prices, and the most cost-effective way to do this is through existing health systems. Whether government health workers can do this effectively is an open question. Will they respect the eligibility rule? Will they demand bribes? Will they even bother to implement the program? We shed some light on these questions by auditing government distribution schemes in Kenya and Uganda, and implementing and auditing a program in Ghana. A key contribution is measuring performance, extortion and leakage in various unobtrusive ways (e.g., "mystery client" visits).

We find that distribution programs administered through existing health centers perform better than conventionally believed. Across the three countries, 80% of eligible women received the subsidy, only 1% of eligible women were asked to pay bribes, and at most 15% of local subsidies leaked to ineligible people, most often for free, and more often when

[27]Surveys we conducted with head nurses in Kenya and Uganda revealed that around 10% knew at least one health worker who had lost her job due to poor performance. In Ghana, no head nurses reported knowing someone who had lost their job, but they argued it did not mean misconduct would go unpunished. In equilibrium, the threat of job loss may be enough to deter misconduct.

ineligibles mentioned having a needy child. While the limited level of leakage could come from a lack of demand from the ineligible, in Ghana we experimentally "tempted" health workers by sending ineligible men with a high willingness to pay for the subsidized product, and we found that very few of them were successful at obtaining it from healthworkers.

While our data comes from only three countries, the programs we consider were implemented by different institutions (the government in Kenya and Uganda, vs. an NGO in Ghana) and audited at very different points in their implementation (after more than a year in Kenya and Uganda, vs. in the first few months in Ghana), suggesting that our results may be representative of similar programs in other contexts.

The relatively high pass-through we observe of the subsidy to its intended beneficiaries goes against the growing conventional wisdom that service provision in developing countries is universally poor. In fact, permissions to conduct this study were difficult to obtain, because of what was perceived as its highly sensitive nature. Anyone we discussed our study design with *ex ante* expected us to observe poor performance levels, in particular much higher nonbenevolent leakage. Why are our results different from expectations? One consideration is that we consider a targeting rule that is very easy to verify, and so makes it harder to hide leakage. A second consideration is that service quality varies from country to country and so far service provision has only been studied rigorously in a small subset of countries, mostly outside of sub-Saharan Africa, and with a strong focus on South Asia. What's more, absenteeism is typically considered to be a good proxy for performance (the Chaudhury et al. 2006 study exclusively measured absenteeism), and while this may be an important metric in contexts where health centers are small enough that absenteeism of one worker means the health center is closed (as in Banerjee, Duflo and Glennerster 2008) or for services that require scarce expertise (as in Goldstein et al. 2013), absenteeism may not have direct consequences on service in more common contexts.

Appendix

A Discussion of ANC survey sampling strategy

As described in the text, respondents were sampled for our ANC client surveys from the ANC registers. These data were used to estimate extortion and leakage. From the point of view of our estimation, there are two potential threats associated with this sampling strategy: (a) some women who truly visited the ANC may not have been listed on the register; (b) some "fake" ANC clients were listed to boost the numbers and justify a smaller number of nets left in inventory. If those who are not listed are those who are not given a net or are asked for bribes, then (a) would lead us to overestimate coverage and/or underestimate extortion. Our visits to ANC clients (and, in particular, the percentage of clients not found) allow us to estimate an upper bound on (b). That said, we consider it very unlikely that health workers in any of the three countries modified how they fill ANC registers in response to the bed net distribution programs, especially since (1) they likely did not expect anyone to use the ANC registers for audit purposes since they were asked to keep alternate records of bed net recipients, (2) the registers are formatted with one registrant per row (so all revisits are recorded on the initial row) which makes them very difficult to use for

monitoring how many nets the clinic should have distributed (i.e., the number of eligible clients who visited in a given timeframe). As such, our prenatal client survey sample is likely a representative sample of the population of prenatal clients.

Table A1

Ghana experimental sample: Summary statistics on participating health centers and balance check

		Coeff. Estimate (s.e) on Treatment Dummy:			
	Sample Mean (Std. Dev.)	**Voucher**	**Audit Threat**	**Small Delivery**	**Health worker Payment**
Panel A: Baseline Characteristics of Health Centers					
# of monthly ANC new registrants[a]	25.73 (20.24)	−0.45 (6.33)	2.56 (4.79)	−1.49 (6.26)	−1.79 (6.26)
# of monthly ANC follow-up visits	90.22 (77.32)	11.67 (24.51)	11.01 (19.41)	1.56 (22.05)	10.40 (22.05)
# of midwives and nurses for ANC	2.01 (1.20)	−0.06 (0.43)	−0.42 (0.29)	−0.29 (0.35)	−0.37 (0.35)
Facility conducts outreach ANC activities	0.23 (0.42)	−0.05 (0.14)	0.00 (0.11)	−0.05 (0.13)	−0.12 (0.13)
Years since facility is operating	17.25 (13.69)	−3.81 (4.49)	−0.43 (3.43)	−1.12 (4.32)	−2.69 (4.35)
Facility is a CHPS compound[b]	0.25 (0.43)	0.02 (0.12)	0.06 (0.11)	−0.12 (0.13)	0.04 (0.13)
Public facility	0.06 (0.23)	−0.02 (0.06)	0.00 (0.05)	0.13 (0.070) *	0.13 (0.070) *
Has a maternity ward	0.85 (0.36)	−0.02 (0.12)	−0.08 (0.09)	−0.04 (0.10)	−0.04 (0.10)
# of other ANC facilities within 10 km radius	2.08 (2.91)	−0.27 (1.10)	−0.50 (0.70)	0.96 (0.90)	−0.21 (0.90)
Has distributed nets in the past	0.07 (0.26)	−0.08 (0.08)	0.03 (0.06)	0.00 (0.08)	−0.08 (0.08)
Accessible during the rainy season	0.81 (0.40)	−0.08 (0.13)	0.11 (0.09)	0.00 (0.11)	0.00 (0.11)
Distance (in km) from region capital	86.29 (49.43)	−1.54 (16.72)	8.49 (12.77)	−10.62 (14.34)	−6.80 (14.34)
Nets available for sale within 10km	0.10 (0.30)	−0.02 (0.11)	−0.03 (0.07)	0.04 (0.09)	0.04 (0.09)
Health worker privately sells nets at facility	0.04 (0.20)	0.06 (0.06)	0.03 (0.05)	0.04 (0.04)	0.04 (0.04)
ANC client Dictator Game: Amount given (out of 10 GHC)	1.91 (1.48)	−0.24 (0.49)	0.05 (0.37)	0.34 (0.42)	−0.16 (0.42)
Panel B: Program Implementation Details					
Phase-in Rank (1 to 6)	3.50 (1.71)	0.40 (0.54)	−0.06 (0.41)	−0.62 (0.51)	0.54 (0.51)

		Coeff. Estimate (s.e) on Treatment Dummy:			
	Sample Mean (Std. Dev.)	**Voucher**	**Audit Threat**	**Small Delivery**	**Health worker Payment**
Initial stock of nets delivered	184.03 (146.24)	2.08 (34.13)	12.50 (32.48)	−129.17 (43.800)***	8.33 (43.80)
Total # of staff who attended training	4.59 (2.16)	−0.58 (0.81)	−0.73 (0.52)	0.21 (0.63)	0.20 (0.63)
Share of ANC staff trained on SALI program	0.81 (0.28)	−0.16 (0.080)**	−0.05 (0.07)	0.17 (0.080)**	−0.02 (0.08)
In-Charge present for training	0.68 (0.47)	−0.10 (0.13)	0.08 (0.11)	0.13 (0.14)	−0.29 (0.140)**
Duration of program (days)	109.06 (22.39)	−8.73 (7.80)	−0.89 (5.74)	2.96 (4.23)	3.04 (4.23)
Number of Health Facilities with Treatment	Total N=72	24	24	24	24

Notes: Each row corresponds to one OLS regression. Standard errors in brackets.

***,**,* indicate significance at 1, 5 and 10% levels.

[a] ANC stands for Antenatal Care.

[b] CHPS stands for Community and Health Planning Services, these are community-based services in remote areas.

Table A2

Correlations between performance measures and absenteeism

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Data Source:	**Backcheck surveys with random subset of ANC Clients**			**Community Interviews**	**"Mystery Client" visits**			
Dependent Variable:	**Got net/ voucher at first visit to clinic**	**Got net/ voucher at any visit to clinic**	**Payment requested for net (conditional on offer)**	**Respondent thinks that (male) surveyor could get a net at a health center**	**Payment requested for net**	**Acquired program net**	**High potential opportunity to acquire net**	**Clinic stocked out**
Healthworker characteristics								
Share absent	0.0015 [0.091]	0.00028 [0.088]	−0.006 [0.008]	−0.03 [0.03]	−0.025 [0.023]	0.0041 [0.063]	0.025 [0.12]	−0.023 [0.16]
Clinic characteristics								
Above-median ANC registrants	−0.033 [0.039]	−0.026 [0.035]	0.008 [0.008]	0.03 [0.02]	−0.0087 [0.014]	−0.046** [0.018]	−0.026 [0.028]	0.026 [0.032]
Clinic accessible in the rainy season	0.019 [0.079]	0.012 [0.078]	0.0008 [0.006]	0.01 [0.03]	0.015 [0.024]	0.0064 [0.021]	0.054* [0.028]	−0.02 [0.045]
Total number of staff working in ANC	0.0048 [0.0052]	0.0071 [0.0043]	0.0002 [0.0006]	−0.002 [0.003]	−0.0052** [0.0024]	−0.002 [0.0019]	−0.0066 [0.0042]	−0.0053 [0.0046]
Private facility	−0.46*** [0.16]	−0.51*** [0.16]	0.004 [0.008]	0.04 [0.05]	−0.04 [0.037]	−0.054*** [0.019]	−0.066 [0.042]	0.11*** [0.036]
NGO facility	−0.19** [0.079]	−0.17** [0.076]	0.07** [0.03]	0.06* [0.03]	−0.018 [0.021]	−0.036 [0.042]	−0.014 [0.079]	0.12 [0.11]
Observations	2028	2028	1549	2559	765	766	762	766
R-squared	0.078	0.082	0.034	0.01	0.016	0.035	0.086	0.124
Dep. Var. Mean	0.76	0.8	0.01	0.1	0.041	0.043	0.14	0.13

Each column is a separate regression, with controls for country fixed effects, the experimental treatments, and whether the healthworkers had the "honesty test" as a part of their dictator game. Columns (1) and (2) also control for whether there were any stockouts in those clinics, as measured by the attendance checking team in Uganda and Kenya (there is no control in Ghana where stockouts were determined by healthworker effort). Standard errors clustered at the level of the health facility in brackets.

***, **, * indicates significance at 1, 5 and 10 percent. Ghana sample includes only facilities sampled for direct distribution.

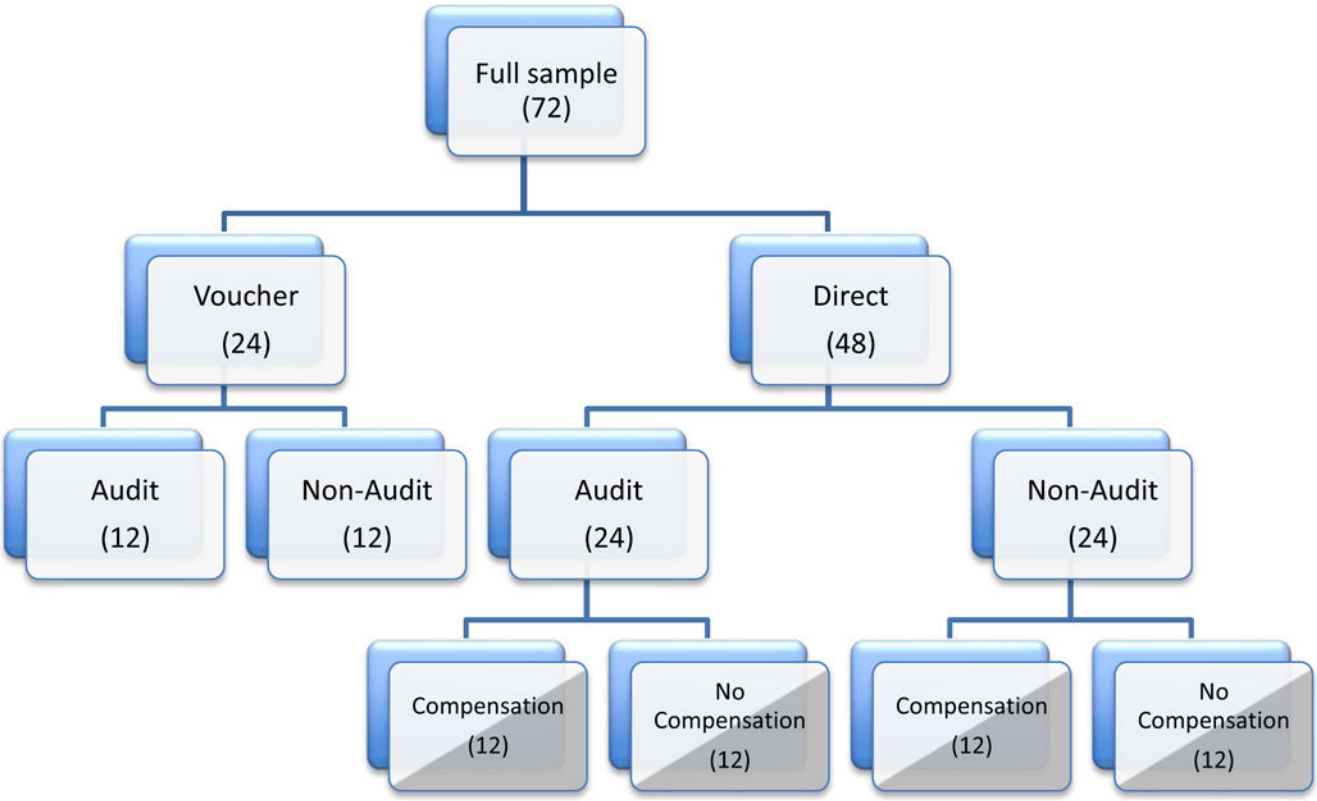

Figure A1. Ghana experimental design

Notes: Sample size numbers are given in terms of number of clinics. Gray shading means split 50/50 between small and large delivery.

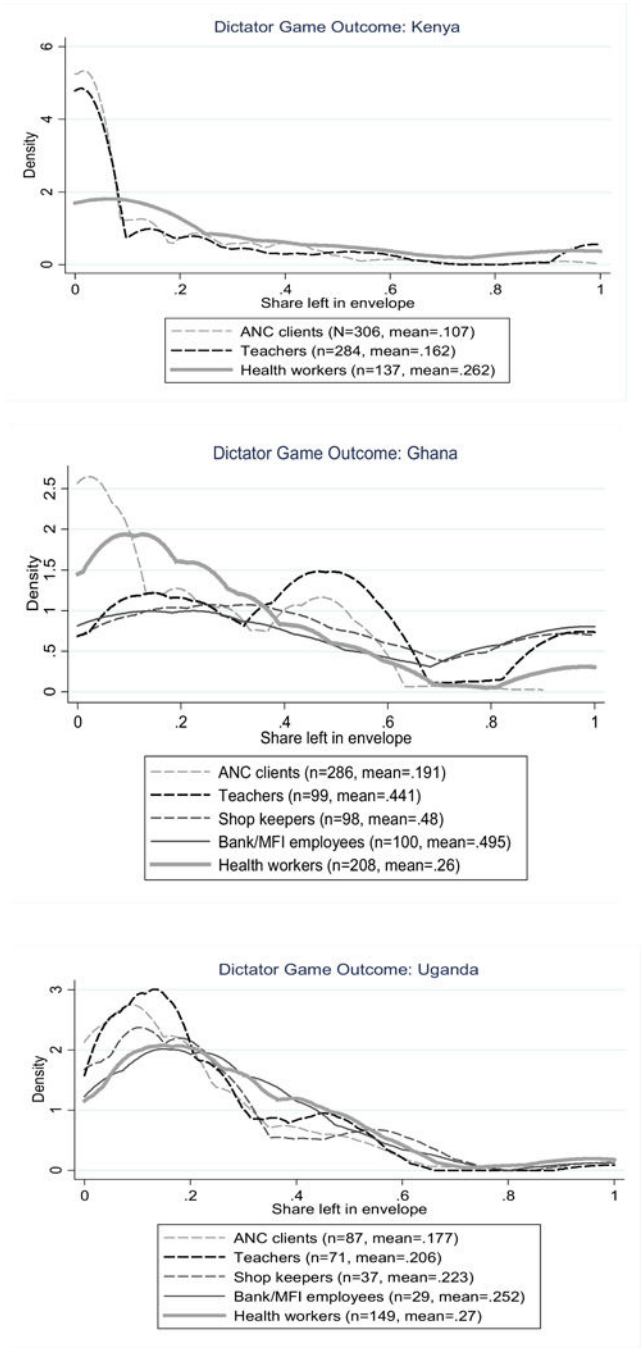

Figure A2. Other-regarding preferences of health workers compared to others

Notes: The dictator game allowed the participant to leave as much money as they wanted, anonymously, for a community member out of an envelope with 10 bills.

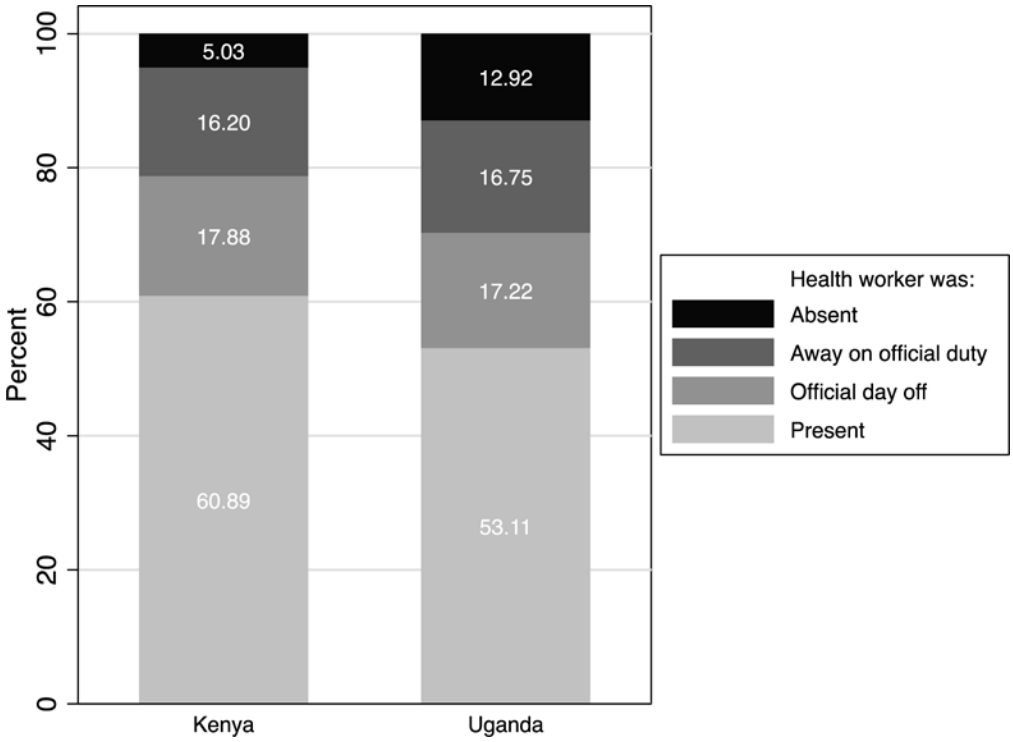

Figure A3. Health worker attendance data

Notes: Individual-level data from one unannounced spot check. Kenya: 188 health workers from 48 facilities. Uganda: 214 health workers from 48 facilities. No unannounced spot check were performed in Ghana.

B Calculation of Leakage Across the Delivery Chain

This section presents the details for the simple accounting exercise to estimate the total rate of leakage in the Uganda and Kenya programs. The nets procured for distribution must be equal to the number of nets received by eligibles plus the number of nets leaked (unaccounted for).

In Kenya, 2,800,000 free ITNs were procured for the year 2013, to be distributed to an estimated eligible population of 2,837,475 eligible pregnant women and children under the age of one.[28] This implies a maximum potential coverage rate of 98%. Our observed coverage rate of 91% among pregnant women therefore suggests minimal leakage (the rate would be 7% if our study area were representative of Kenya as a whole, though this is unlikely to be exactly correct). This is lower than the 15% upper bound for local leakage in Ghana.

In Uganda, the program we audited reports distributing a total of 268,804 bed nets to 34 districts for the October 2012 to September 2013 period. The total estimated ANC population over that period is 493,631.[29] Thus the program delivered enough bed nets to

[28]See http://www.pmi.gov/docs/default-source/default-document-library/malaria-operationalplans/fy12/kenya_mop_fy12.pdf?sfvrsn=6, Table 4 on p. 18, accessed August 26 2014

cover 55% of eligible pregnant women. Our estimated coverage rate is higher than that, at 66%. This could be because the districts we studied received more bednets per pregnant woman than average (perhaps because our study area is centrally located), or because women who registered for ANC for the first time during the program were more likely to receive nets than women who visited the ANC but had already registered.

The number of nets procured in both countries is thus very similar to our estimate of the number of nets received by eligibles. While this accounting exercise is not definitive (since our coverage estimates come from a single region in each country, while the supply figures are national), we took this evidence as strongly suggestive that leakage higher up is limited.

If the region we study was favored by the government and received more nets per capita than others, our calculations would be underestimating leakage, as seems to be the case in Uganda. This is less of a concern in Kenya where the study took place in Western Province, which overwhelmingly favored the loser in the presidential elections of both 2007 and 2012. A second caveat is that our 48 facilities per country fall under the jurisdiction of only 10 districts in Kenya and 6 districts in Uganda; therefore our delivery chain leakage estimates reflect the performance of only 16 agencies.

C Healthworker Attendance

In the Kenya and Uganda samples, we conducted unnanounced attendance spot checks. Figure A3 shows the results of unannounced attendance spot checks conducted at each clinic in the Kenya and Uganda samples. Of the health workers who were officially supposed to be on duty, 8% (=.05/(.05+.61)) were absent in Kenya and 20% (=.13/(.13+.53)) in Uganda.

Note that the “away on official duty” and “official day off” categories that we exclude may include absenteeism disguised as official days off. Chaudhury et al. (2006) excludes workers who are not on duty (which would correspond most closely to our “official day off” category) from their absence calculations, but count as absent those away on official duty (less than 4% of health workers on duty in their case, much lower than the 19% (16/82) we observe); if we tabulate the results that way, it would mean absence rates of 26% in Kenya (=.21/(1−.18)) and 36% in Uganda, relatively similar to the 35% rate found across countries and 38% rate found in Uganda by Chaudhury et al. (2006).[30]

Perhaps more important than the individual-level attendance results are the results on clinic closure, since clinics in this setting are large enough that health workers can load-share and so absenteeism may not compromise performance: clinics were closed for fewer than 1% of mystery client visits (Table 9, col 9). Also suggestive that attendance may not directly impact service quality is the fact that we do not find a correlation between attendance and any of our other performance measures (see Table A2).

[29]See http://www.usaid.gov/sites/default/files/documents/1860/SMP_Year_5_Annual_Report-Final_Oct2012-Sep2013.pdf, p. 9, accessed August 26 2014.

[30]These attendance rates differ from the survey compliance rates for the healthworker survey for several reasons: first, 33% of the healthworkers who were present during the surveyors’ first visit were not interviewed because they were too busy or because surveyors ran out of time; second, some health workers were off duty or away on official leave; and third, surveyors returned to most clinics on multiple dates to increase completion rates. The first two would cause compliance rates to underestimate attendance rates; the third would cause them to overestimate.

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Highlights

- We quantify the incidence of extortion and leakage in bed net distribution programs through health facilities
- We find relatively high level of performance among health workers
- 80% of the eligible receive the subsidy as intended
- No more than 15% of subsidies are leaked to ineligible people

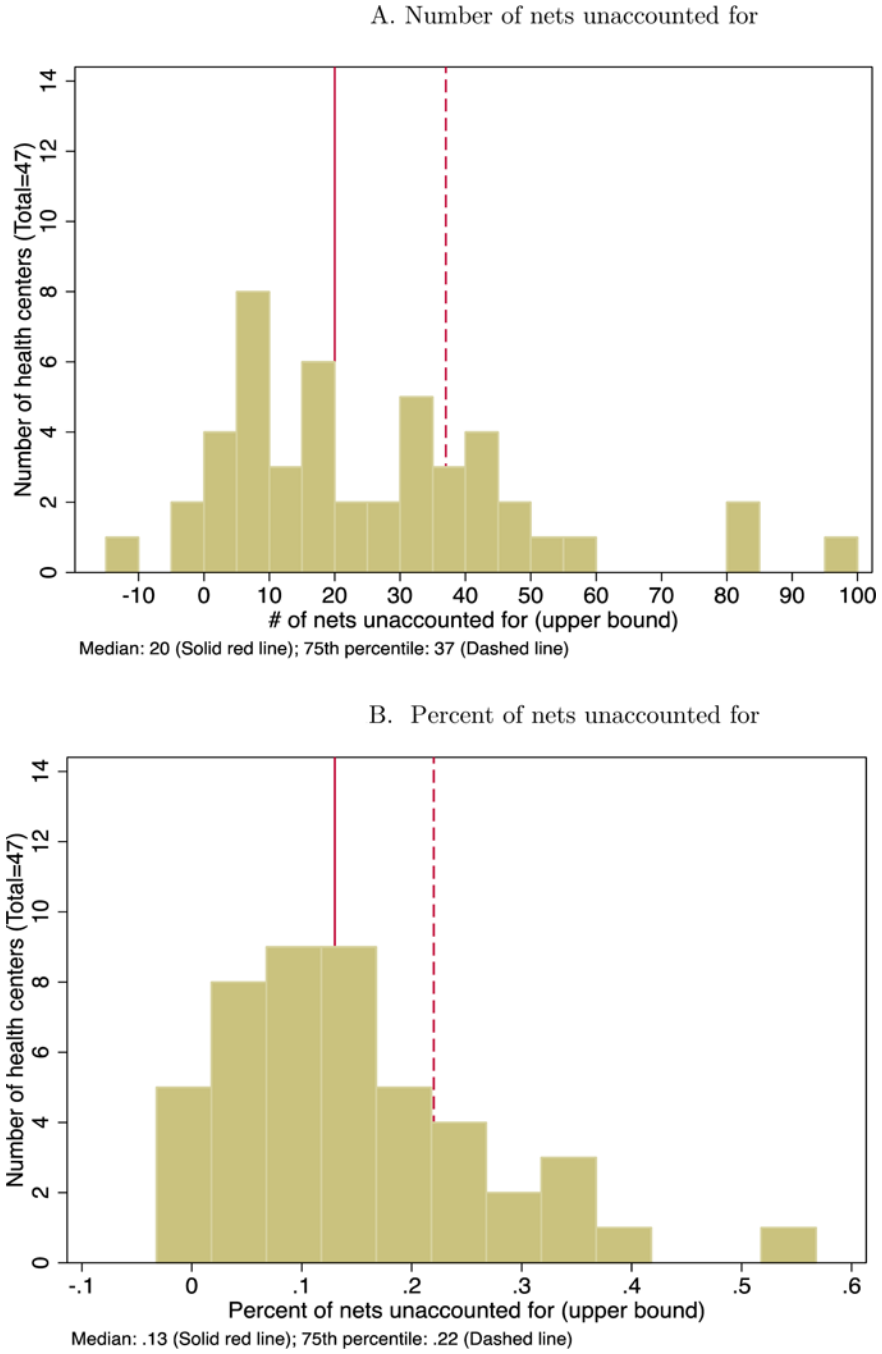

Figure 1. Clinic-level Estimate of the Number of Program Bed Nets Unaccounated for (Ghana only)

Note: Based on 47 health facilities with direct distribution (all in Ghana). For each facility, the estimated number of program nets unaccounted for is the difference between the total number of nets delivered to the facility and the estimated number of "valid" (eligible) beneficiaries listed in the program ledgers. The prevalance of invalid ledger entries was established through audits of randomly selected listed beneficiaries. These audit surveys

were misplaced by the survey team for one facility that is why we have only 47 and not 48 observations.

Table 1

Baseline bed net coverage in study areas, and Characteristics of health facilities in the sample

Panel A. Bed net coverage[a]	**Ghana**	**Kenya**	**Uganda**
DHS Survey year	2011	2010/2014	2011
Average household size	4.3	4.4/n.a.	4.9
Share of households with at least one insecticide-treated net (ITN)	0.53	0.48/0.83	0.60
Average number ITNs per household	0.80	0.80/1.80	1.30
Percentage of households with at least one ITN for every two persons who stayed in the household last night[b]	0.22	n.a./0.417	0.33

Panel B. Study Facility characteristics	***Sample Mean [Std. Dev.] for:***			
	Full Sample	**Ghana**	**Kenya**	**Uganda**
Survey year		2011	2013	2013
Years since facility is operating	16.01 [15.86]	17.25 [13.74]	13.96 [16.86]	16.30 [17.67]
Public facility	0.85 [0.36]	0.90 [0.30]	1.00 [0.00]	0.60 [0.49]
# of monthly ANC new registrants[c]	27.99 [20.06]	25.73 [20.31]	29.64 [19.31]	29.75 [20.50]
# of monthly ANC follow-up visits	63.06 [61.25]	90.22 [77.59]	49.40 [36.44]	35.98 [29.23]
# of midwives and nurses for ANC	2.93 [2.28]	2.01 [1.20]	4.15 [3.31]	3.08 [1.58]
Facility conducts outreach ANC activities	0.49 [0.50]	0.23 [0.42]	0.92 [0.28]	0.46 [0.50]
Nets available for sale within 10km	0.13 [0.34]	0.10 [0.30]	0.10 [0.31]	0.21 [0.41]
Has a maternity ward	0.82 [0.39]	0.85 [0.36]	0.96 [0.20]	0.63 [0.49]
Accessible during the rainy season	0.89 [0.32]	0.81 [0.40]	0.94 [0.24]	0.96 [0.20]
Health worker privately sells nets at facility	0.02 [0.13]	0.04 [0.20]	0.00 [0.00]	0.00 [0.00]
Number of Health Facilities	168	72	48	48

Notes: For Ghana sample, includes all health facilities/communities, whether sampled for direct or indirect (voucher) distribution.

[a] Source: Demographic and Health Surveys. For each country, we show the average for the region included in our study.

[b] This is the DHS definition for universal coverage

[c] ANC stands for antenatal care

Table 2

Coverage and extortion among eligibles

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Data Source:	**Backcheck surveys with random subset of ANC Clients**						
					If not offered net:		
	Received net at first ANC visit	***If no stockouts*[a]*:* Received net at first ANC visit**	**Received net at some ANC visit**	***If offered net at some visit:* Was requested to pay**	**Thinks reason is stockout**	**Does not know why**	**Thinks reason is already has one**
Overall Mean	0.76	0.81	0.80	0.01	0.25	0.50	0.07
Ghana	0.74	0.77	0.79	0.01	0.11	0.63	0.04
Kenya	0.90	0.90	0.91	0.01	0.66	0.17	0.06
Uganda	0.63	0.69	0.66	0.03	0.25	0.49	0.09
Observations	2,028	1,495	2,028	1,605	473	473	473
P-value for equality of means:							
Ghana = Kenya	0.00***	0.00***	0.00***	0.72	0.00***	0.00***	0.69
Ghana = Uganda	0.03**	0.16	0.01***	0.04**	0.01***	0.03**	0.08*
Kenya = Uganda	0.00***	0.00***	0.00***	0.02**	0.00***	0.00***	0.54

Notes: There are 144 health facilities in the sample (48 per country). Ghana sample: Only includes facilities sampled for direct distribution.

[a]Clinics with no stockouts during the sampled time period identified using data from attendance checks in Uganda and Kenya, and from mystery client visits from Ghana.

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Table 3

Non-coverage among eligibles: Errors of Exclusion or Efficient Targeting?

	(1)	(2)	(3)	(4)	(5)
Data Source:	**Backcheck surveys with random subset of ANC Clients**				
	All	**Ghana**	**Kenya**	**Uganda**	**All countries - ANC visits in month preceding stockout only**
Panel A. Dependent Variable: Received net - visit 1					
Years of education	−0.0068** [0.0030]	−0.0083* [0.0044]	−0.0026 [0.0034]	−0.0065 [0.0065]	−0.0155 [0.0178]
Health facility Fixed effects	X	X	X	X	X
Observations	2,028	771	671	586	131
R-Squared	0.357	0.274	0.369	0.349	0.686
Dep. Var. Mean	0.762	0.744	0.903	0.625	0.542
Panel B. Dependent Variable: Received net - any visit					
Years of education	−0.0046* [0.0028]	−0.0039 [0.0040]	−0.0022 [0.0037]	−0.0066 [0.0063]	−0.0099 [0.0151]
Health facility Fixed effects	X	X	X	X	X
Observations	2,028	771	671	586	131
R-Squared	0.361	0.285	0.390	0.364	0.711
Dep. Var. Mean	0.796	0.794	0.914	0.664	0.588

Notes: Standard errors in brackets, clustered at the level of the health facility. Ghana sample: Only includes facilities sampled for direct distribution. Regressions have month fixed effects to control for potential stockouts, and include controls for registrant age and parity. The mean number of years of education among clients surveyed is 5 (4.2 in Ghana, 4.6 in Kenya and 6.9 in Uganda, which adopted free primary education much earlier). Across all countries (column 1), the gap between the 25th and the 75th percentile in terms of years of education is 4.5 years.

Table 4

Leakage to ineligibles: Evidence from mystery client visits and community interviews

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Data Source:	**"Mystery client" (MC) visits**							**Community Interviews**		
			If clinic had nets in stock[b]			**If Payment requested:**				
	Clinic out of stock during visit (as measured through other data sources)[a]	**MC told that the clinic is out of stock**	**Acquired program net**	**Acquired program net for free**	**Payment requested for net**	**Initial amount requested as percent of full price[c]**	**Final amount requested as percent of full price[c]**	**Respondent thinks that (male) surveyor could get a net at a health center**	**Ineligible young man received net (lower bound)[d]**	**Ineligible young man received net (upper bound)[e]**
Overall Mean	0.205	0.134	0.0467	0.0378	0.0424	0.902	0.745	0.0993	0.00699	0.0381
Ghana		0.046	0.022	0.009	0.051	1.070	0.882	0.092		
Kenya	0.042	0.090	0.087	0.087	0.036	0.121	0.097	0.093	0.025	0.069
Uganda	0.368	0.472	0.110	0.110	0.011	0.323	0.323	0.113	0.000	0.007
Observations	288	766	685	687	684	27	27	2,559	143	289
P-value for equality of means:										
Ghana = Kenya		0.19	0.03**	0.01***	0.51	0.00***	0.00***	0.98		
Ghana = Uganda		0.00***	0.01***	0.00***	0.01**	0.02**	0.17	0.31		
Kenya = Uganda	0.15	0.00***	0.59	0.59	0.24	0.52	0.60	0.35	0.31	0.00***

Notes: Missing coefficients mean that outcome not collected in that country. There are 144 health facilities in the sample (48 per country). Ghana sample: Only includes facilities sampled for direct distribution.

[a] Stockout data collected during attendance spot checks done by the research team in Kenya and Uganda.

[b] Conditional on there not being a stockout (calculated from attendance spot check data for Kenya and Uganda, and from MC reports in Ghana). Upper bound in Ghana since health workers could have told mystery clients they were stocked out to get rid of them.

[c] Full price calculated as the wholesale price converted to local currency using exchange rate during the middle of the ANC registration times.

[d] Lower bound because set to missing when he received net but someone in the household was pregnant or under 5

[e] Upper bound because includes people who got a net but were in a household that may have been eligible (was reported to have a pregnant woman or child under 5). Only upper bound if assume percent of eligibles that get nets weakly higher than percent of ineligibles.

Table 5

Leakage: Errors of Inclusion or Efficient targeting?

	(1)	(2)	(3)	(4)
Data Source:	**Mystery Client visits**			
Dependent Variable:	**Received free net**			
	All	**Ghana**	**Kenya**	**Uganda**
Requested for pregnant woman	0.012 [0.023]	0.011 [0.014]	0.023 [0.14]	
Requested for child	0.18*** [0.045]			0.19** [0.089]
If asked, said that had child	0.11** [0.047]		0.11 [0.075]	
MC signaled that educated	0.0077 [0.016]	0.0077 [0.0090]		
Healthworker female	−0.012 [0.022]	−0.012 [0.013]		
Health facility Fixed effects	X	X	X	X
Observations	683	455	137	91
R-Squared	0.402	0.114	0.466	0.375
Mean of the Dependent Variable	0.0378	0.009	0.087	0.110

Notes: The first three regressors are mutually exclusive indicator variables reflecting the strategy used by the mystery client when seeking a bed net from the healthworker. The choice of strategy was left to the mystery clients, and, possibly owing to differences in training, there were systematic cross-country differences in the strategies they used, hence the regressors vary across countries in columns 2–4. Standard errors in brackets, clustered at the level of the health facility. There are 144 facilities in the sample (for Ghana sample: Direct distribution clinics only).

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Table 6

Ghana: experimental results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Data Source:	**Backcheck surveys with random subset of ANC Clients**			**Surveys with Program Log beneficiaries**	**Community**	**Interviews**	**"Mystery Client" visits**				**Administrative data estimate**
Dependent Variable:	**Received net/ voucher at first ANC visit**	**Received net/ voucher at some ANC visit**	***If offered net at some visit:* Was requested to pay**	**Listed beneficiary ineligible**	**Respondent thinks that (male) surveyor could get a net at a health center**	**Respondent aware of net distribution program**	**Payment requested for net**	**Acquired program net**	**Acquired program net for free**	**Clinic stocked out**	**Total local leakage rate**
Effect of:											
Voucher	−0.178 ** [0.072]	−0.195 *** [0.069]	−0.002 [0.009]	0.013 [0.012]	−0.067 *** [0.025]	−0.085 ** [0.034]	0.035 [0.026]	0.031 * [0.018]	0.007 [0.008]	0.073 ** [0.030]	−0.084 * [0.043]
Audit	0.033 [0.056]	0.069 [0.054]	0.017 [0.013]	−0.032 ** [0.014]	−0.060 [0.042]	0.008 [0.066]	0.003 [0.031]	0.010 [0.025]	−0.012 [0.013]	0.010 [0.040]	−0.027 [0.029]
Small delivery	0.007 [0.059]	0.006 [0.055]	−0.009 [0.007]	0.001 [0.012]	0.061 *** [0.021]	0.038 [0.035]	−0.015 [0.022]	−0.015 [0.012]	−0.011 [0.007]	0.020 [0.021]	0.015 [0.034]
Health worker payment	−0.061 [0.061]	−0.056 [0.058]	−0.003 [0.007]	0.010 [0.012]	−0.009 [0.021]	−0.002 [0.035]	0.010 [0.021]	0.002 [0.012]	0.002 [0.007]	0.005 [0.020]	−0.002 [0.035]
Later program period	−0.079 * [0.041]	−0.120 *** [0.041]	−0.021 ** [0.010]	0.003 [0.008]	0.058 * [0.029]	−0.024 [0.052]	−0.046 * [0.025]	−0.036 * [0.019]	0.001 [0.011]	−0.001 [0.031]	
Observations	1,158	1,158	815	1,229	1,322	1,322	717	717	720	718	71
R-Squared	0.094	0.108	0.023	0.027	0.030	0.025	0.028	0.029	0.029	0.060	0.241
Dep. Var. Mean in direct distribution facilities	0.744	0.794	0.00873	0.0144	0.0916	0.716	0.0503	0.0209	0.00833	0.0460	0.147

Notes: There are 72 health facilities in the sample, all in Ghana. Each column corresponds to an OLS regression with randomization strata fixed effects and two health-center level controls: baseline ANC attendance and ANC staff size. Standard errors clustered at the health facility level.

***, **, * indicates significance at 1, 5 and 10 percent. "Effect of Audit" is the difference in differences coefficient, so the coefficient on AuditXLater program period, where "later program period" is the period after the initial audit threat in audit clinics, or after the audit threats were conducted at nearby clinics for non-audit clinics; all regressions also control for the main effect of audits.

Table 7

Performance beyond net distribution

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Data Source:	**Backcheck surveys with random subset of ANC Clients**							**ANC Register Audit**	**Mystery Client visits**
Dependent Variable:	**Avg. minutes spent with nurse during ANC checkup**	**Palpated by nurse during ANC visit**	**Average wait time for checkup**	**Received IPT during ANC visit**	**Received iron tablets during ANC visit**	**Got free ACT drugs last time brought child for malaria treatment[a]**	**Was charged fee for ACT last time brought child for malaria treatment[a]**	**% of key fields filled in[b]**	**Clinic closed during first visit attempt**
Overall Mean	17.91	0.960	63.70	0.835	0.730	0.780	0.144	0.964	0.00595
Ghana	12.294	0.937	57.900	N/A	N/A	N/A	N/A	0.963	0.006
Kenya	25.249	0.985	72.374	0.932	0.660	0.777	0.158	0.965	0.000
Uganda	20.956	0.977	65.741	0.732	0.803	0.789	0.100	0.964	0.014
Observations	2,283	2,310	2,246	1,180	1,183	382	382	2,617	1,008
P-value for equality of means:									
Ghana = Kenya	0.00***	0.00***	0.03**	N/A	N/A	N/A	N/A	0.84	0.04**
Ghana = Uganda	0.00***	0.00***	0.32	N/A	N/A	N/A	N/A	0.94	0.41
Kenya = Uganda	0.01***	0.31	0.41	0.00***	0.00***	0.82	0.16	0.87	0.15

Notes: Standard errors for regressions clustered at clinic level. There are respondents from 168 health facilities in the sample (Ghana sample includes all facilities, including those sampled for indirect distribution via vouchers). Results are identical when the voucher facilities are excluded. Columns 4–7: these questions were only asked in Kenya and Uganda.

[a]Excludes non-government clinics because ACT drugs only supposed to be free in government clinics.

[b]Key fields are name, reg date, ANC card #, address, # children, and gestational age at registration.

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Table 8

Pro-social Motivation and Selection into Health Work

	(1)	(2)	(3)	(4)	(5)	(6)
	Pro-Social Motivation				Job Characteristics	
	Survey response on a scale from 1 (don't agree) to 5 (strongly agree) to the statement:					
	Helping people brings personal satisfaction	If you help someone, they should do you a favor in return	It is important to do good things for my community	My family comes first, my work second	Monthly pay[a]	Years of education
Panel A. Country-level averages across health workers						
Ghana	4.848 [0.0481]	1.463 [0.109]	4.939 [0.0288]	3.331 [0.105]	235.8 [13.99]	14.02 [0.228]
Kenya	4.898 [0.0501]	1.321 [0.105]	5 [0]	3.265 [0.129]	387.7 [16.28]	15.87 [0.0630]
Uganda	4.631 [0.0482]	2.403 [0.135]	4.785 [0.0316]	3.295 [0.136]	141.2 [7.149]	15.67 [0.127]
Observations	450	450	449	444	412	449
P-value for equality of means:						
Ghana = Kenya	0.47	0.35	0.04**	0.69	0.00***	0.00***
Ghana = Uganda	0.00***	0.00***	0.00***	0.83	0.00***	0.00***
Kenya = Uganda	0.00***	0.00***	0.00***	0.87	0.00***	0.17
Overall Mean	4.791	1.731	4.906	3.300	250.7	15.13
Panel B. Comparisons with other professions (omitted category: health workers)						
Teacher	−0.282*** [0.0563]	0.473*** [0.103]	−0.114*** [0.0330]	0.238** [0.102]	−33.10** [12.95]	0.309*** [0.116]
Shop owner	−0.347*** [0.0801]	1.261*** [0.145]	−1.608*** [0.136]	0.963*** [0.130]	−106.1*** [17.90]	−5.985*** [0.457]
Microfinance agent	−0.324*** [0.0769]	0.961*** [0.146]	−0.163*** [0.0525]	0.708*** [0.123]	−155.4*** [12.71]	−1.908*** [0.209]
Observations	1,136	1,138	1,134	1,127	1,094	1,172

Notes: Panel A: Data from surveys with health workers only. Ghana sample only includes workers from facilities sampled for direct distribution. Panel B: Data from surveys with health workers, shopkeepers, teachers and MFI agents. Regressions control for country fixed effects. Cols (5) and (6) of panel B also control for worker gender and age.

*** p<0.01,

** p<0.05,

* p<0.1.

[a]Winsorized at 99th percentile. Converted to USD using the exchange rate at the time the survey was taken, except for the other profession salaries (i.e., non-healthworker salaries) in Ghana: since healthworkers in Ghana were surveyed two years before the other professions (2012 vs 2014), the other profession salaries were first converted to 2012 Ghana cedis using inflation rates, then converted to USD using exchange rates at the time the healthworker surveys were conducted.

Table 9

Intrinsic and Extrinsic Job Motivation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Survey response on a scale from 1 (don't agree) to 5 (strongly agree) to the statement:							
	Intrinsic Job Motivation					Extrinsic Motivation		
	As a [*profession*], I have the responsibility to be a role model in my community	This [*work place*] plays a very important role in this community	I am very satisfied with my job	People in remote areas do not have enough appreciation for [*profession*]	[*Profession*] should be paid more	[*Profession*] jobs are very secure – even if a worker does a bad job they won't be fired	This [facility/ school] is closely monitored by the Ministry of [Health/ Education]	This [facility/ school] is closely monitored by local NGOs
Panel A. Country-level averages across health workers								
Ghana	4.909 [0.0334]	4.896 [0.0378]	4.341 [0.125]	3.135 [0.133]	4.710 [0.0734]	1.288 [0.0726]	4.834 [0.0609]	2.276 [0.154]
Kenya	4.912 [0.0643]	4.971 [0.0291]	4.081 [0.133]	2.378 [0.163]	4.657 [0.0930]	1.241 [0.0760]	4.912 [0.0646]	3.504 [0.165]
Uganda	4.879 [0.0304]	4.866 [0.0303]	3.831 [0.0979]	3.087 [0.113]	4.691 [0.0491]	1.523 [0.0652]	4.365 [0.0960]	4.007 [0.0932]
Observations	450	449	448	447	448	449	448	446
P-value for equality of means:								
Ghana = Kenya	0.96	0.12	0.15	0.00***	0.66	0.65	0.38	0.00***
Ghana = Uganda	0.52	0.54	0.00***	0.78	0.83	0.02**	0.00***	0.00***
Kenya = Uganda	0.64	0.01**	0.13	0.00***	0.74	0.01***	0.00***	0.01***
Overall Mean	4.900	4.909	4.094	2.890	4.688	1.352	4.703	3.220
Panel B. Comparisons with other professions (omitted category: health workers)								
Teacher	−0.0120 [0.0383]	−0.152*** [0.0346]	−0.447*** [0.106]	0.499*** [0.121]	−0.0756 [0.0646]	0.443*** [0.0763]	−0.382*** [0.0642]	−0.152 [0.122]
Shop owner	−0.524*** [0.0797]	−1.008*** [0.111]	−0.139 [0.114]	0.458*** [0.150]	−0.782*** [0.105]	N/A	N/A	N/A
Microfinance	−0.524*** [0.0719]	−0.330*** [0.0571]	−1.026*** [0.146]	0.0481 [0.144]	−0.168** [0.0759]	0.0823 [0.110]	N/A	N/A
Observations	1,138	1,133	1,134	1,126	1,131	997	870	867

Notes: Panel A: Data comes from surveys with health workers at 144 health facilities. Ghana sample only includes workers from facilities sampled for direct distribution. Panel B: Data from surveys with health workers, shopkeepers, teachers and MFI agents. Each column is a separate regression, with controls for country fixed effects. Standard errors in brackets.

*** p<0.01,

** p<0.05,

* p<0.1.