DO-GOODERS AND GO-GETTERS: CAREER INCENTIVES, SELECTION, AND PERFORMANCE IN PUBLIC SERVICE DELIVERY

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Abstract

We study how career incentives affect who selects into public health jobs and, through selection, their performance while in service. We collaborate with the Government of Zambia to experimentally vary the salience of career incentives in a newly created health worker position when recruiting agents nationally. We find that making career incentives salient at the recruitment stage attracts health workers who are more effective at delivering health services, conducting 29% more household visits and twice as many community mobilization meetings. Administrative and survey data show an improvement in institutional deliveries, child visits, breastfeeding, immunizations, deworming and a 25% reduction in the share of underweight children in the treatment areas. While career incentives attract agents who differ on observables—they have higher skills and career ambitions—91% of the performance gap is due to unobservables. The results show that incentive design at the recruitment stage can have dramatic impacts on the performance of organizations.

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1 Introduction

The study of how individuals sort into jobs according to their preferences, skills, and the jobs' own attributes has a long tradition in economics (Roy, 1951). This sorting based on different job attributes, such as different incentive packages, gives organizations a powerful tool to attract the "right" employees. Whether high-powered incentives can attract agents who will perform well is, however, ambiguous. Incentive schemes that reward good performance should attract agents with the skills needed to perform well on incentivized tasks (Lazear, 2000). At the same time, high-powered incentives might crowd out other desirable traits, like pro-sociality, that lead to good performance on tasks that cannot be incentivized (for instance by sending a signal about the nature of the job, as in Bénabou and Tirole, 2003 and Deserranno, 2014). In general, while economists have made considerable progress in understanding how incentives affect workers' behavior once they are hired, much less is known about how different incentive schemes attract workers to organizations in the first place (Lazear and Oyer, 2012, Oyer and Schaefer, 2011).

In this paper, we test whether incentives, in the form of promotion prospects and career advancement, affect who self-selects into a public health job and, through selection, their performance while in service. We collaborate with the Government of Zambia to design and implement a nationwide field experiment that creates district-level exogenous variation in whether career incentives are offered to applicants for a new health worker position, the Community Health Assistant (CHA). This is a large recruitment drive that aims to substantially increase health staff numbers in targeted communities: recruiting agents who deliver health services effectively thus has important welfare implications.[1]

The key challenge in identifying the selection effect of incentives is that any incentive scheme that affects selection at the recruitment stage also affects effort once agents are hired. Our identification strategy relies on the fact that, since the CHA position is new, the potential for career advancement is unknown to potential applicants. This allows us to experimentally vary the salience of career incentives at the recruitment stage, while providing the same actual incentives to all agents once hired. The difference in performance between agents recruited with salient career incentives and those recruited without identifies the effect of career incentives on performance through selection.

Our analysis proceeds in three stages. First, we measure the effect of recruiting with career incentives on the inputs provided by the CHAs once hired—i.e., the quantity and quality of services they deliver. Second, we test whether CHAs who were recruited with career incentives affect facility utilization, health practices and health outcomes in the areas where they operate. Third, we assess the extent to which the performance gap can be explained by selection on observables such as skills and personality traits.

[1] In the average community in our sample, the arrival of two CHAs represents a 133% increase in health staff.

Our experimental design is as follows. In control districts, recruitment materials make salient benefits to the community, thus making the CHA position look similar to existing informal positions (e.g., village health workers, traditional birth attendants, barefoot doctors) that are common in these areas. In treated districts, recruitment materials make career possibilities salient by highlighting that CHAs are part of the Ministry of Health's hierarchy and that this gives them access to a career path leading to higher-ranked positions such as nurse, clinical officer, and doctor.

The first stage of the analysis follows the CHAs in the field over the course of 18 months to measure their performance in delivering health services. At this stage, all CHAs are similarly aware of career benefits, and thus performance differences, if any exist, cannot be driven by differences in incentives on the job. Importantly, attrition between recruitment and deployment is trivial, thus allaying the concern that CHAs might drop out after finding out that career benefits exceed those advertised in the control group.

The CHAs' main task is to visit households to conduct environmental inspections, counsel on women's and children's health, and refer them to the health post as needed (e.g. for routine checks for children and pregnant women, or for giving birth). Our core performance measure is the number of household visits completed over the study period. In addition to visits, CHAs are supposed to devote one day per week to work at the health post and to organize community meetings. We measure the numbers of patients seen and meetings organized.

We find that CHAs recruited with career incentives conduct 29% more household visits and organize over twice as many community meetings, while the difference in the number of patients seen at the health post is also positive but not precisely estimated. Supplementary evidence suggests that the difference is not due to measurement error and is not compensated by improvements on other dimensions, such as the duration of visits, targeting of women and children, or visiting hard-to-reach households.

The second stage of the empirical analysis tests whether the selection induced by career incentives affects outcomes that are related to the services delivered by the CHAs, but not directly chosen by them. Given that CHAs are supposed to focus on maternal and child health, we use administrative data on government facilities to test whether our treatment affects women's and children's use of health services (as it should if CHAs are doing their job effectively). Difference-in-difference estimates based on the comparison of treated and control areas before and after CHAs started working reveal that treatment increased the number of women giving birth at the health center by 31%, and the number of children under 5 undergoing health checks by 24%, being weighed by 23% and receiving immunization against polio by 20%. Next, we use survey data from our own survey of 738 households in the 47 districts served by the CHAs to measure treatment effects on health practices and outcomes. We find consistent increases in a number of health practices: breastfeeding and proper stool disposal increase by 5pp and 12pp, deworming treatments by 15% and the share of children on track with their immunization schedule by 5pp (relative to a control mean of 5%).

These changes are matched by changes in outcomes as the share of under 5s who are underweight falls by 5pp, or 25% of the mean in control areas.

Given the impact of CHA performance, we assess the extent to which the observed performance gap can be explained by selection on observables, which informs whether the effect of incentives can be mimicked by a change in the eligibility criteria. We measure standard determinants of performance such as skills, as well as pro-social preferences that might be relevant given the nature of the job, and might be crowded out by our treatment. We find that career incentives attract different types: CHAs in the treatment group have better skills (as measured by test scores during the training program), stronger career ambitions (as measured by psychometric scales),[2] and are more likely to choose career over community as the main reason to do the job, although only a handful do so. In line with this, CHAs in the two groups score similarly on psychometric scales that measure pro-sociality and donate similar amounts in a contextualized dictator game.[3]

We find that several of these characteristics correlate with performance: most notably, CHAs with higher test scores perform better, while those that put career over community perform worse, which supports the idea that pro-sociality improves public service delivery. Controlling for observables, however, only explains 9% of the performance gap, suggesting that career incentives attract agents whose unobservable traits make them more productive or harder-working. The difference between selection on observables and on unobservables is important because the principal can directly affect the former by changing the eligibility criteria, but obviously not the latter.

Taken together, the evidence discussed in this paper highlights the importance of incentive design at the recruitment stage to attract strong performers that cannot be identified on observables alone. That differences in performance are matched by differences in outcomes further strengthens the case for focusing on recruitment strategy as a tool to improve performance in organizations, and underscores the impact such differences in performance can make.

Our paper contributes evidence on the selection effects of incentives to the personnel economics literature that studies the effects of incentives on performance (see Lazear and Oyer, 2012, Oyer and Schaefer, 2011 for recent surveys). Our findings complement the literature that evaluates the effect of introducing material incentives for existing employees, especially for teachers in developing countries (Muralidharan and Sundararaman, 2011; Duflo et al., 2012; Miller et al., 2012), by showing that material incentives affect who sorts into these jobs in the first place, and that this selection affects performance.

[2]To measure preferences, we draw on the literature in organizational behavior that correlates individual psychometric traits with job attributes and performance (Amabile et al., 1994; Wrzesniewski et al., 1997; Barrick et al., 2001; Wageman, 2001; Barrick et al., 2002; Grant, 2008; Gebauer and Lowman, 2008; Duckworth et al., 2007).

[3]As we have data on all applicants who were interviewed, we can further decompose the selection effect into self-selection; namely, the treatment attracts different types, and employer selection; namely, recruitment panels choose candidates with different characteristics. We show that the treatment attracts a different applicant pool while recruitment panels put the same weights on the same traits. Observed differences are thus mostly driven by self-selection.

Our findings on the effect of career incentives on applicant traits are in line with Dal Bó et al. (2013), who exploit two randomized wage offers for a civil servant job in Mexico and show that higher wages attract more qualified applicants without displacing pro-social preferences. Importantly, we show that this selection pattern leads to higher performance. That higher wages attract better-quality applicants is also found in a related literature on wages and job queues in the private sector (Holzer et al., 1991; Marinescu and Wolthoff, 2013) and on the effect of wages on the selection of politicians (Ferraz and Finan, 2011; Gagliarducci and Nannicini, 2011).

2 Context and Research Design

2.1 Context and Data

In 2010, the Government of the Republic of Zambia (GRZ) launched a program to create a new civil service cadre called the Community Health Assistant (CHA) to address staff shortages in rural areas.[4] GRZ sought to formalize and professionalize a position similar to community-based lay health workers (e.g., village health workers, traditional birth attendants, barefoot doctors) that are common in rural Zambia; these informal positions had been the primary providers of health services to rural populations. The new position requires CHAs, after a year of training, to devote 80% of their time (4 out of 5 working days per week) to household visits. The visits' main goals are to provide advice on women's health—including family planning, pregnancy, and postpartum care—and child health, including nutrition and immunizations. In addition, CHAs are expected to inspect the household and provide advice on health-related practices such as safe water practices, household waste management, sanitation, hygiene and ventilation. During visits, CHAs are also tasked with providing basic care to any sick persons and referring them to the health post as needed. In the remaining time, CHAs are expected to assist staff at the health post (the first-level health facility in rural Zambia) by seeing patients, assisting with antenatal care, and maintaining the facility. They are also supposed to organize community meetings such as health education talks at the health post and in schools.

The CHA position confers career benefits because it is an entry point into the civil service from which agents can advance to higher-ranked and better paid cadres. Promotion into higher-ranked cadres within the Ministry of Health from the position of CHA requires additional training (for example, nursing or medical school). Being part of the civil service, CHAs are eligible for "in-service training," meaning that they attend school as a serving officer and the government pays their tuition for all of their training.

[4]The goal of this program was to create an "adequately trained and motivated community-based health workforce, contributing towards improved service delivery [and] the attainment of the Millennium Development Goals (MDGs) and national health priorities" (Government of Zambia, 2010).

In the program's first year, GRZ sought to recruit, train, and deploy roughly 330 Community Health Assistants across seven of Zambia's nine provinces.[5] Within these seven provinces, based on population density, GRZ chose the 48 most rural of the 58 constituent districts. Finally, across these 48 districts, GRZ identified 165 health posts that were deemed to be facing the most severe health worker shortages. From each community that surrounded each health post, the intention was to recruit two CHAs. We collaborated with GRZ at each stage of the recruitment process in all 48 districts as described below.

Stage 1: Job Ads and Application Requirements

The recruitment and selection process occurred at the community (health post) level, with on-the-ground implementation coordinated by district health officials. In each community, paper advertisements for the job were posted in local public spaces, such as schools, churches, and the health post itself. District health officials were responsible for ensuring that the recruitment posters were posted. To ensure that the recruitment process was carried out in a uniform manner across the 165 communities, GRZ included detailed written instructions in the packets containing the recruitment materials (posters, applications, etc.) that were distributed to district health officials (see Appendix 6).

The recruitment poster provided information on the position—varied experimentally as described below—and the application requirements and process. The posters specified that applicants had to be Zambian nationals, aged 18-45 years, with a high school diploma and two "O-levels."[6,7] All recruitment in the seven provinces occurred between August and October 2010. The recruitment drive yielded 2,457 applications, an average of 7.4 applicants for each position. Both the total number of applicants and their distribution across health posts is similar in the two treatment

[5]The two other provinces, Lusaka and Copperbelt, were excluded by GRZ on grounds that they are the most urbanized of Zambia's provinces.

[6]Ordinary levels, or O-levels, are written subject exams administered to Zambian students in their final year of secondary school. They are the primary entry qualification into tertiary education. The Examinations Council of Zambia requires candidates to take a minimum of six O-level exams, including English and mathematics as compulsory subjects that have to be passed. There are currently 33 O-level subjects, such as biology, chemistry, civic education, woodworking, and accounting. Exam performance is rated on a nine-point scale, ranging from "distinction" to "unsatisfactory;" all but the lowest point-score are considered passing. The cost of taking O-level exams comprises a registration fee of roughly USD 16 and an exam fee of USD 10 per subject.

[7]The posters instructed eligible applicants to retrieve application forms from the health center associated with the health post. Applicants were to hand in their application forms, along with photocopies of their national registration cards and high school transcripts, to the health center within two weeks of the posters being posted. In keeping with the principle that CHAs should be members of the communities that they serve, the application form also required applicants to obtain two signatures before submission: the signed endorsement of a representative of the applicant's "neighborhood health committee" (NHC), followed by the signed verification of the application by the health worker in charge of the associated health center. The NHC is a parastatal institution at the community level in rural Zambia. It is comprised of elected volunteer community representatives, whose collective responsibility is to coordinate community health efforts, such as immunization campaigns and village meetings about common health issues.

groups: the treatment poster attracts 1,232 applicants in total and an average of 7.2 per position, while the control poster attracts 1,225 applicants in total and an average of 8.0 per position.

Stage 2: Interviews and Selection by Panels

Once the application window closed, all completed application forms were taken to the district Ministry of Health office. There, district health officials screened applications to ensure that eligibility requirements were met. No discretion was given at this stage; applicants who did not meet the objective criteria were rejected, and those who did were invited for interviews. Overall, 1,804 (73.4%) applicants passed the initial screening and were invited for interviews; of these 1,585 (87.9%) reported on their interview day and were interviewed; of these, 48% came from the career incentives treatment and 52% from the control group. District officials were in charge of organizing interview panels at the health post level.[8] GRZ explicitly stated a preference for women and for those who had previously worked as community health workers, but the ultimate choice was left to the panels.[9]

Stage 3: Final Selection, Training, and Deployment

Out of the 1,585 interviewees, for the 165 health posts, the panels nominated 334 applicants as "top 2" candidates and 413 as reserves. The nominations were reviewed centrally by GRZ, and 334 final candidates were invited to join a yearlong CHA training. Of these, 314 applicants accepted the invitation and, in June 2011, moved to the newly built training school in Ndola, Zambia's second-most populated city. Of the applicants who joined the program, 307 graduated and started working as CHAs in August 2012. All CHAs were deployed to their communities of origin.

2.2 Experimental Design

The experiment aims to identify the effect of career incentives performance through selection. We use the recruitment posters described above to experimentally vary the salience of career incentives at the recruitment stage so as to engineer an exogenous change in selection. Once recruited, all CHAs face the same incentives; thus performance differences, if any, are due to selection. The posters, shown in Figures 1.A and 1.B, are identical except for the list of benefits and the main recruitment message.

[8] Each selection panel had five members: the district health official, a representative from the health post's associated health center, and three members of the local neighborhood health committee. These committees vary in size, but they typically have more than 10 members.

[9] In addition to submitting panel-wide nominations, individual panel members were instructed to rank their top five preferred candidates independently and, to this end, were given ranking sheets to be completed privately. Specifically, the ranking sheet instructions stated: "This ranking exercise should occur BEFORE panel members formally deliberate and discuss the candidates. Note that the ranking sheets are private and individual. Each panel member should fill out the ranking sheet confidentially so as to encourage the most honest responses. This step must be completed before the panel discussion."

The treatment poster makes career incentives salient. To do so it lists, as the main benefit, the opportunity to ascend the civil-service career ladder to higher and better-paid positions, which are illustrated and enumerated in the poster—e.g., environmental health technician, nurse, clinical officer, and doctor. This incentive is summarized in a bold caption stating, "Become a community health worker to gain skills and boost your career!" In this setting, the pay gradient associated with career advancement is steep, as the starting monthly wage is USD 290 for CHAs, USD 530 for entry-level nurses, USD 615 for environmental health technicians, and USD 1,625 for resident doctors.[10] Importantly, since there are shortages of health staff at every level, advancing to higher cadres does not require leaving the community.

The control poster, in contrast, lists as the main benefit the opportunity to contribute to one's community, such as "[gaining] the skills you need to prevent illness and promote health for your family and neighbors" and "[being] a respected leader in your community." This incentive is summarized in a caption stating, "Want to serve your community? Become a community health worker!" Potential applicants exposed to the control poster are thus presented with a description akin to the informal community health workers that are common in these areas, a position they would be familiar with.[11]

Since recruitment for the CHA position was organized by district officials, we randomized treatment at the district level in order to maximize compliance with the experimental assignment, evenly splitting the 48 districts into two groups. This implies that each district official is only exposed to one treatment and is unaware of the other. As district officials are the main source of information for aspiring CHAs, randomization at the district level minimizes the risk of contamination. Randomization at the district level also mitigates the risk of informational spillovers between communities, as the distance between health posts in different districts is considerably larger. Random assignment of the 48 districts is stratified by province and average district-level educational attainment.[12]

[10] At the time of the launch of the recruitment process in September 2010, GRZ had not yet determined how much the CHAs would be formally remunerated. Accordingly, the posters did not display any information about compensation. Although the CHA wage was unknown to applicants at the time of application (indeed, unknown even to GRZ), applicants would likely have been able to infer an approximate wage, or at least an ordinal wage ranking, based on the "community health" job description and the relatively minimal educational qualifications required, both of which would intuitively place the job below facility-based positions in compensation. In Section 2.3, we present evidence against the hypothesis that wage perceptions may have differed by treatment.

[11] When the recruitment process was launched, the position was called "Community Health Worker" or "CHW" in both treatment and control areas. It was later renamed "Community Health Assistant" everywhere to avoid confusion with informal community health workers.

[12] We stratify by the proportion of adults in the district who have a high school diploma, as reported in the most recent World Bank Living Conditions Measurement Survey, conducted four years prior in 2006. We sort districts by province and, within each province, by high school graduation rate. Within each sorted, province-specific list of districts, we take each successive pair of districts and randomly assign one district in the pair to the career incentives treatment and the other to the control group. For provinces with an odd number of districts, we pool the final unpaired districts across provinces, sort by educational attainment, and randomize these districts in the same pair-wise manner.

To ensure compliance with the randomization protocol, we worked closely with GRZ to standardize the information given to the district officials to organize the recruitment process.[13] To reinforce the treatment, we also include a basic written script that the district officials are invited to use to orient health centers and neighborhood health committees on the CHA program and recruitment process. In the career incentives treatment, the script describes the new program as follows: "This is an opportunity for qualified Zambians to obtain employment and to advance their health careers. Opportunities for training to advance to positions such as Nurse and Clinical Officer may be available in the future." In contrast, in the control group, the script states, "This is an opportunity for local community members to become trained and serve the health needs of their community."

Once CHAs were hired, they came to the city of Ndola for a one year training which they undertook together. During this year of training, the dual messages of serving one's community and the opportunity to advance one's career in the Ministry were reinforced.

2.3 Experimental checks

To provide evidence on whether the applicants' motivation in treatment and control areas matches that advertised by the poster, we survey CHAs when they arrive at the training school. This timing is ideal because control CHAs have not been told about career incentives yet, and at the same time both treatment and control CHAs have already been selected, so they have no incentive to answer strategically. To elicit information about their motives to apply for the position, we give each CHA a bag of 50 beans and ask her to allocate them to different cards describing potential benefits of the job in proportion to the weight they gave to each benefit when applying. This method has two desirable features: first, it forces respondents to take into account the trade-off between different motives, namely that giving more weight to one motive necessarily implies that other motives will be given less weight; second, it allows us to test whether the treatment affected other motives besides career advancement and community service.

The answers tabulated in Table 1 show that the reported motivations match the treatment and control posters well. The weight on career benefits is significantly higher in the career treatment (16.5% vs. 12.0%, p=.002) while the weight given to "service to the community" and "earn respect and status in the community" are both lower in the treatment group (39.6% vs. 43.2%, p=.050 and 3.7% vs. 5.7%, p=.048, respectively). Two further points are of note. First, "service to the community" is the main reason to apply in both groups, suggesting that pro-social preferences

[13] District officials are given a packet containing 10 recruitment posters and 40 application forms for each health post and are asked to physically distribute each packet to the respective health center and, from there, to ensure that recruitment posters are posted, application forms are made available, and so forth. The packets are sealed and labeled according to the health post and health center for which it should be used. GRZ provides fuel allowances to the district officials to enable the districts to follow through on the protocol. We conduct a series of follow-up calls over several weeks to the district point-persons to ensure that the recruitment process is conducted as planned.

might be equally strong in both groups, an issue to which we return in Section 5.1. Second, all other motivations are balanced across groups, suggesting that the poster did not convey different expectations about pay or the nature of the job. To investigate this further, we ask CHAs where they expect to work in 5-10 years' time. Over 90% of them expect to be with the Ministry, suggesting that the treatment and control posters do not convey different expectations about tenure.

2.4 Context descriptives and balance

Tables 2.A and 2.B describe three sets of variables that can affect the supply of CHAs, the demand for their services, and their working conditions. For each variable, the tables report the means and standard deviations in treatment and control, as well as the p-value of the test of means equality, with standard errors clustered at the level of randomization, the district. Tables 2.A and 2.B show that the randomization yielded a balanced sample as all p-values of the test of equality are above .05. As treatment and control means are very close throughout, we report values in the treatment group in what follows in this section.

Panel A reports statistics on the eligible population drawn from the 2010 Census, which shows that the eligibles—namely, 18-45 year-old Zambian citizens with at least Grade 12 education—account for 4.4% of the district population, and that among them 37% are female. A large fraction (13%) are unemployed and a further 7.6% are full-time housewives. The employed (63.1% of the total) are equally split between self-employment/unpaid labor in family business and wage employment. Among the self-employed/unpaid laborers the most common occupation is farming, which accounts for 17% of the eligibles. Among those who work for a wage, the most common occupations are teachers (13.2%) and low-skilled occupations (13.3%), which include services, sales, agriculture, crafts, and manufacturing. Only a small minority (2.3%) are already employed in the health sector. Taken together, the evidence suggests that, despite their educational achievements, the majority (65.3%) of the eligibles are not in stable wage employment. This indicates that the CHA program can draw talent from these areas without crowding out other skilled occupations.

Panel B illustrates the characteristics of the catchment areas. These variables are drawn from surveys administered to district officials and the CHAs themselves. Three points are of note. First, health posts are poorly staffed in both the treatment and control groups; the average number of staff (not including the CHA) is 1.5. Given that the aim is to assign two CHAs to each health post, the program more than doubles the number of health staff in these communities. Second, the areas vary in the extent to which households live on their farms or in villages, but the frequency of either type is similar in the treatment and control groups. This is relevant as travel times between households depend on population density and are higher when households are scattered over a large area, as opposed to being concentrated in a village. Third, over 90% of the catchment areas in both groups have at least some cell network coverage, which is relevant for our analysis, as some performance measures are collected via SMS messages.

Panel C illustrates the characteristics of the target population that are relevant for the demand for CHA services. First, population density is fairly low in both groups, which implies that CHAs have to travel long distances between households. This also implies that the ability to plan and efficiently implement visits is likely to play a key role in determining the number of households reached. Second, children under 5, who (together with pregnant women) are the main targets of CHAs, account for 19% of the population. Third, the educational achievement of the average resident is 4.2 years, well below the average for those eligible for the CHA position (12.6 years, panel A). Fourth, Panel C shows that access to latrines and—most noticeably—protected water supply is limited in these areas. Lack of latrines and protected water supply favor the spread of waterborne infections, to which pregnant women and children are particularly vulnerable and, through this, the demand for CHAs' services.

3 The Effect of Career Incentives on Performance through Selection

3.1 Measuring performance in service delivery

The CHAs' main task, to which they are required to devote 80% of their time, or 4 out of 5 days per week, is to visit households. Our performance analysis focuses on the number of visits completed over the course of 18 months, from August 2012 (when CHAs started work) until January 2014. The number of household visits is akin to an attendance measure for teachers or nurses: CHAs are supposed to work in people's houses, and we measure how often they are there. Naturally, differences in the number of visits can be compensated by behavior on other dimensions; we discuss this possibility after establishing the main results in Section 3.3.

Our primary measure of household visits is built by aggregating information on each visit from individual receipts. All CHAs are required to carry receipt books and issue each household a receipt for each visit, which the households are asked to sign. CHAs are required to keep the book with the copies of the receipts to send to GRZ when completed. They are also required to send all information on these receipts—consisting of the date, time, and duration of the visit, as well as the client's phone number—via text message to the Ministry of Health. These text messages are collected in a central data-processing facility, which we manage. CHAs know that 5% of these visits are audited.

Since visits are measured by aggregating text messages sent by the CHAs themselves, identification can be compromised by the presence of measurement error that is correlated with treatment. For instance, CHAs in the career treatment might put more effort in reporting visits via text messages or might report visits that never took place, leading to a positive bias in the estimated treatment effect. Outright cheating is made difficult by the fact that 5% of reported visits are au-

dited and that CHAs would need to falsify the household signature on the official receipt to report a visit that did not happen. While the SMS submissions carry no signature, CHAs are required to send their household visit receipt books containing carbon copies of the receipts to the Ministry of Health for cross-checking. Fabricating receipts thus entails a potentially high cost. Nevertheless, the estimated treatment effect might be upward biased because of differential effort in reporting.

We validate our visits measure by comparing it to administrative data and households' own reports of CHA activity. The administrative data is drawn from the Health Management and Information System (HMIS), which is the Ministry of Health's system for reporting, collecting, and aggregating routine health services data at government facilities. These are reported at the end of each month and sent electronically to the Ministry via a mobile platform, jointly by the two CHAs and the other staff working in each health post. While HMIS visit data are also collected by the CHAs themselves, the effort required is considerably lower since HMIS reports are compiled monthly rather than on every visit, and cheating is more difficult as the reports are compiled jointly by the two CHAs and the health post staff. As HMIS data are only available aggregated at the health post level—i.e., summed over the two CHAs in each health post—we regress these on our visit measure, also aggregated at the health post level. Column 1 in Table 3 shows that the two measures are strongly correlated (r=.766). Furthermore, there is no systematic bias: our measure is larger in 43% of the cases, the HMIS measure is larger in the remaining 57%.

The households' reports are collected via a survey that we administered to 16 randomly chosen households in each of 47 randomly selected communities chosen from the set of 161 communities where CHAs operate, stratified by district.[14] For each CHA, we ask respondents whether they know the CHA (97% do), whether they have ever been visited (43% of them have), and their level of satisfaction with each CHA on three specific dimensions—competence, caring, effort—and overall. Columns 2-6 show a precisely estimated correlation between our visit measure and the probability that a household reports a visit, as well as their level of satisfaction with the CHA's performance on every dimension.

Taken together, the findings in Table 3 validate our visits measure. Ultimately, however, we would not be able to detect a treatment effect on households' health outputs in Section 4if measured differences in visits capture differences in reporting rather than in actual visits. .

3.2 Treatment Effect on Household Visits

Table 4 reports the estimates of

$$v_{ihdp} = \alpha + \beta C_{id} + Z_h\gamma + \delta E_d + \rho_p + \epsilon_{ihdp} \tag{3.1}$$

[14] As CHAs are supposed to focus on mother and child's health we interview the wife of the head (if this is male) or the head herself (if female).

where v_{ihdp} is the number of visits completed by CHA i in catchment area h district d and province p, C_{id} equals 1 if agent i is recruited and operates in a district assigned to the career incentives treatment. Z_h is a vector of area characteristics, which includes the number of staff at the health post, cell network coverage, and the distribution of households between farms and villages described in Table 2.B. We control for the stratification variables, district-level high school graduation rate E_d and provinces indicators ρ_p throughout. Standard errors are clustered at the level of randomization—the district.

The coefficient of interest is β, which measures the effect of making career incentives salient at the recruitment stage on the number of visits completed over 18 months. Under the assumption that, after completing one year of training, all CHAs have the same information on career incentives, β captures the effect of career incentives on performance through selection. Note that selection can affect performance by increasing productivity for a given level of effort or by increasing the marginal return to effort. An example of the former is talent for logistics: for the same amount of effort, a more talented CHA plans better and reaches more households in the same amount of time. An example of the latter is the utility weight put on career advancement: CHAs who value career more draw a higher marginal benefit from a given unit of effort and therefore exert more effort.

The causal effect of career incentives on performance can be identified under the assumptions that (i) C_{id} is orthogonal to ϵ_{ihdp}, (ii) there are no spillovers between the two groups, and (iii) the salience policy itself does not affect behavior. Orthogonality is obtained via random assignment, but measurement error in visits correlated to C_{id} can bias the estimates. We return to this in section 3.3 below. Spillovers are minimized by design, as recruitment messages were randomized at the district level, which, given the travel distance between rural communities in different districts, makes it very unlikely that applicants in one group might have seen the poster assigned to the other group. Importantly, information cannot spillover through the district officials that implement the program or through the recruitment panels, as these are only exposed to one treatment only. Finally, in Section 3.3 we present evidence to allay the concern that β captures the effect of the salience policy rather than career incentives themselves.

Column 1 reveals a large and precisely estimated effect of career incentives on household visits: CHAs recruited by making career incentives salient do 29% more visits over the course of 18 months. The magnitude of the difference is economically meaningful: if each of the 147 CHAs in the social treatment had done as many visits as their counterparts in the career treatment, 13,818 more households would have been visited over the 18-month period. Given that for most of these households CHAs are the only providers of health services, the difference between treatments is likely to have implications for health outputs in these communities. We return to this issue in Section 4.

Figure 2 provides evidence of treatment effects on the distribution of household visits. Both the comparison of kernel density estimates and quantile treatment effect estimates reveal that the

difference between the two treatments is driven by a group of strong performers in the treatment group. The effect of career incentives is positive throughout but flat until the 40th percentile and increasing thereafter. The quantile estimates indicate that career incentives lead to better performance by attracting a group of individuals who perform much better than the average CHA.

3.3 Identification: the effect of salience

The experimental design allows us to identify the effect of career incentives on performance through selection if the salience policy itself does not directly affect the applicants' utility once the real career benefits are known by both treatment and control CHAs. Since career benefits are greater than or equal to the values agents knew at the application stage, we need to effectively rule out behavioral biases that make agents value a given benefit differently if its value exceeds their expectation. This assumption might fail for two reasons. First, if agents are made worse off by discovering that the actual value of a given benefit is larger than the value advertised by the salience policy, agents for whom the participation constraint is met ex-ante but not ex-post would drop out once hired, and differences in performance among stayers would not be interpretable as the effect that career incentives have on performance through their effect on the applicant pool. Reassuringly, the drop-out rate at the relevant stage is minimal. Namely, 314 agents join training informed by the salience policy. They are then told about the actual benefits of the job at the start of the one-year training program. Contrary to the implication that some are made worse off by discovering that the actual value of a given benefit is larger than the value advertised by the salience policy, 98% of selected candidates stay on after discovering the actual benefits and complete the training program.

Second, if agents are made better off by discovering that the actual value of a given benefit is larger than the value advertised by the salience policy, they may react to the positive surprise by working harder. This would imply, for instance, that the effect of career incentives on effort would be stronger in the control group, to whom career benefits are revealed after being hired, than in the treatment group, who knew about career benefits all along. To be precise, our estimates overstate the effect of career incentives if this "surprise" effect is negative for agents in the control group (i.e., their effort response to finding out about career benefits is negative and larger (in absolute value) than what it would have been had they known the career benefits at the outset).

While we cannot measure the surprise effect directly, we can exploit the long time series of performance data to test whether the treatment effect changes with time in a manner that is consistent with there being a "surprise" effect. Specifically, if estimated differences between treatment and control are overstated due to the "surprise" effect, we expect treatment effects to shrink with time as the surprise wanes.

To test this implication, in columns 2-4, we divide the 18-month period into three semesters. We find that the estimated treatment effect is identical in the three sub-periods: in each semester, the average CHA recruited under the career salience policy does between 30 and 34 more visits.

Since the number of visits falls over time, the percentage effect *increases* with time from 20% to 51%. This casts doubt on the interpretation that CHAs' behavioral responses to differences between salience policy and actual incentives lead us to overstate the effect of career incentives on performance through selection.

3.4 Compensation Mechanisms and Work Styles

Table 5 investigates the hypothesis that CHAs in the control group take other actions that compensate for the lower number of visits. Column 1 tests whether career incentives improve performance at the expense of retention—e.g., whether they attract individuals who leave with their newly acquired skills as soon as it is feasible to do so. In our context, the CHAs are bonded to their position for one year.[15] Thus, we measure retention by the number of CHAs who make at least one visit after the one-year commitment has elapsed. We find that, by this measure, 18% of CHAs drop out, though some of this may be due to a combination of malfunctioning phones and the rainy season (falling between months 15-18 in our analysis window) making travel to cell network-accessible areas difficult. This attrition rate is balanced across treatments. It is important to note that according to the Ministry's rule, CHAs have to wait two years before applying for higher-ranked positions, such that none of those who left their positions did so for career progression. It is possible that career incentives will affect retention rates after the two-year mark. As we discuss in the Conclusion, the welfare implications of this effect (were it to materialize) are ambiguous.

Columns 2 and 3 investigate whether CHAs in the control group compensate by spending more time with each household or are better at reaching those they are supposed to target. The results show that CHAs in both groups devote the same time to a single visit, on average, and are equally likely to target their primary clients—women and children.

Columns 4 and 5 decompose the number of total visits into the number of unique households visited and the average number of visits per household to test whether CHAs in the career treatment do more visits because they cover a smaller number of easy-to-reach households. Contrary to this, columns 4 and 5 show that CHAs in the career incentive treatment reach more households and make more follow-up visits. The point estimates indicate that just over one-third (36/94) of the total treatment effect is due to career CHAs visiting more households and two-thirds to them visiting the same household more than once. This is consistent with the two groups of CHAs having a similar number of households in their catchment area and visiting them at least once, but treatment CHAs doing more follow-up visits. Note that longitudinal follow-up with households is considered an integral part of the CHA job, in view of which Ministry of Health guidelines state CHAs should

[15] The CHAs were told that, if they quit before one year of service, they would be required to pay monthly wages for any months not worked (rather than simply relinquishing pay) to compensate the government for the free one-year training that they received.

attempt to visit each household on a quarterly basis. Column 5 indicates that CHAs in both groups fall short of this target, suggesting that differences in performance are relevant to welfare.

The results in columns 4 and 5 also cast doubt on the hypothesis that observed differences are driven by measurement error, because it is equally costly to send SMSs for first or repeated visits, but differences are larger for the latter.

Besides household visits, CHAs are expected to assist staff at the health post by seeing patients, assisting with antenatal care, and maintaining the facility. They are also supposed to organize community meetings such as health education talks at the health post and in schools. Columns 6-7 investigate whether differences in household visits are compensated by differences in secondary tasks using HMIS data on the number of community meetings CHAs organize and the number of patients they attend to at the health post. The latter should be seen as a proxy of the quantity of services delivered by CHAs at the health post, as seeing patients is mostly a nurse's job. We find that CHAs recruited by making career incentives salient organize twice as many meetings over 18 months (43 vs. 22), and the difference is precisely estimated. The effect of career incentives on the number of patients CHAs see at the health post is also positive but small and not precisely estimated.

To provide further evidence on possible compensation mechanisms, we administer a time use survey that is meant to capture differences in work style. We surveyed CHAs in May 2013, nine months after they started working.[16] The survey asked CHAs to report the frequency of emergency visits typically done outside of working hours. The median CHA does one emergency call per week, and column 8 shows that this holds true for CHAs in both groups.

The time use survey is designed to collect information on hours worked and the time allocated to different activities. This allows us to assess whether the differences in performance documented above are due to differences in time allocation across tasks; namely, whether treatment CHAs do more visits because they devote more time to that task. To collect information on the latter, CHAs were given 50 beans and asked to allocate the beans in proportion to the time devoted to each activity within each task. Besides household visits, community meetings and time at the health post, we allow for two further activities: traveling and meeting with supervisors. For each activity, we calculate the share of time devoted to each activity by dividing the number of beans allocated to that activity by the total number of beans allocated to all activities. The share of time allocated to these five activities is .32, .22, .16, .22 and .09, respectively. We then estimate a system of equations for hours worked and share of time devoted to each task, omitting traveling. Table 6 reports our findings.

Column 1 shows that the average CHA reports working 43 hours per week in the typical week and there is no difference in reported working hours by treatment. This suggests that CHAs in the

[16]To implement this survey we took advantage of a refresher course organized by GRZ in the CHA School in Ndola. Of the 307 CHAs, 298 (97%, equally split by treatment groups) came to training and took part in the survey.

control group do not compensate for visiting fewer households by devoting more hours to other, possibly informal, tasks. It also provides further assurance that CHAs in the career treatment do not have differential incentives to overstate their contribution, as self-reported hours are unverifiable and hence easy to "game."

Columns 2-5 show that CHAs in the two groups allocate their time in a similar manner; thus, observed performance differences are not driven by differences in time allocation. Two, possibly complementary, explanations are possible. First, treatment CHAs might work more effective hours—e.g., by taking shorter breaks over the 43 weekly hours. Second, treatment CHAs might be more efficient at their jobs. Household visits take place in remote, low-density areas: the median 78 square km area has 200 households, with an interquartile range of 130 to 360. It is thus rather time consuming to go from house to house, and this is compounded by the fact that roads are bad. In this setting, the ability to plan—e.g., by making appointments with specific households or collecting information as to whether members are likely to be home before setting out to visit them—is an important determinant of completing visits successfully. These effects might be strengthened by peer externalities because each CHA works alongside another CHA hired through the same treatment, thus CHAs in the treatment group are more likely to have a highly productive peer than CHAs in the treatment group. Peer effects might be driven by imitation, social comparison or a perception that the other CHA competes for the same promotion.

Finally, Appendix Table A.1 tests whether CHAs in the two groups allocate their time differently within each activity, namely whether they have different work "styles." Panel A shows that CHAs in the control devote more time to counseling, inspections, and visiting sick members, but, taken one-by-one, these differences are small and not precisely estimated. CHAs in the career incentives treatment devote 1.6% less time to filling in forms and receipts and submitting SMSs, but the difference is not precisely estimated at conventional levels. Because the quality of reports is the same, this implies that career CHAs are more productive at this task. Panel B shows a similar pattern for time allocation during work at the health post: collecting data and filling in reports is an important component of the job, which takes 23% of the CHAs' time in the control group, but only 18% in the career treatment. As with household visits, there is no evidence that CHAs in the career treatment collect fewer data at the health post level or that these data are of worse quality. CHAs in the two groups are equally likely to submit HMIS reports in a given month, and these are equally accurate. Thus, the evidence suggests that CHAs in the career treatment are more productive, and this frees time for other tasks.

4 Impact on facility utilization, health practices and outcomes.

The CHA program leads to a substantial increase in the number of health staff: in the communities where CHAs are deployed, the number of health staff associated with the health post increases on

average from 1.5 to 3.5. Given the size of the program relative to existing personnel counts and the magnitude of the treatment effect on visits and community mobilization meetings, we expect treatment to affect aggregate outcomes. To shed light on this we present data from the Ministry's HMIS administrative records on the number of individuals seen at government facilities as well as household survey data on health practices and outcomes in the study areas.

4.1 Impact on facility utilization

The Ministry's HMIS administrative records are compiled by facilities' senior staff and transmitted to MoH via an electronic platform. Two level of facilities serve these communities: health centers and health posts.[17] The main remit of the CHA job is mother and child health, and CHAs are supposed to encourage women to give birth at the closest health center and to bring in children for regular visits and immunizations at the closest facility (health center or health post). The importance of institutional deliveries in this context cannot be understated: Zambia's maternal mortality rates are very high and health centers have the equipment and medical supplies that can prevent these deaths. Regular children's visits ensure that conditions such as diarrhea are treated before they become dangerous. Immunizations protect children from serious and potentially fatal illnesses.

To test whether the observed performance gap is associated with a change along these margins, we obtain information on institutional deliveries, children's visits, and immunizations for the period January 2011-June 2014 and estimate the following difference-in-difference specification:

$$y_{hdpt} = \alpha + \beta C_{hd} + \gamma A_t + \delta C_{hd} * A_t + Z_h\theta + E_d\phi + \rho_p + \xi_{hdpt}$$

where y_{hdpt} is the outcome in health facility h in district d and province p at quarter t.[18] h represents the lowest level of government facility to which the CHAs can refer their patients. This is the health post if it is operational in HMIS; if not, the closest health center. The only exception is childbirths that are always measured at the health center level, as that is where they are supposed to take place. C_{hd}=1 if facility h is located in a district where CHAs were recruited via career incentives. We have data for 14 quarters, equally divided before and after the CHAs' arrival, and A_t=1 after the CHAs' arrival (4th quarter of 2012). To minimize composition bias and to test for robustness to facility fixed effect models we restrict the sample to the facilities for which we have at

[17] Health facilities in Zambia are structured according to a population-based hierarchy. Health posts are the first-level health facility for most rural communities and provide basic medical care (no inpatient or surgical services). Health centers, which typically serve a population encompassing four to five health posts, provide both outpatient and inpatient services, including labor and delivery and minor surgical procedures. District hospitals in turn encompass several health center catchment areas and are primarily focused on inpatient care.

[18] HMIS data should be transmitted to MoH monthly, but in practice (due to poor connectivity), reports are missing for some months and the information added to the following month. We aggregate the data at the quarterly level to smooth out monthly fluctuations due to this.

least three observations before and after the CHAs' arrival.[19] Z_h is a vector of area characteristics, which includes the number of staff at the health post, cell network coverage, and the distribution of households between farms and villages described in Table 2.B. We control for the stratification variables, district-level high school graduation rate E_d, and provinces indicators ρ_p throughout. Standard errors are clustered at the level of randomization—the district.

The parameter of interest is δ, the difference in differences between facilities in treatment and control districts before and after the CHA's arrival. Under the parallel trend assumption δ captures the effect of career incentives for CHAs on these outputs.

Table 7 shows that indeed, career incentives improved clinic utilization outputs. In particular, the number of women giving birth at the health center increases by 31% relative to the mean in control areas at baseline. Regarding child health, the number of children under age five visited increases by 24%, the number of children under five weighed increases by 23%, and the number of children under 12 months of age receiving polio vaccination increases by 20%. The effects on postnatal visits for women, BCG, and measles vaccinations are also positive and in the 8-15% magnitude range, but are not precisely estimated. Reassuringly, there are no significant differences between treatment and control areas in any of these outcomes before the CHAs' arrival: all the estimated β coefficients are small and not significantly different from zero.

To provide support to our identifying assumption, in Table A.5 (Panel A) we run a placebo test where we split the pre-CHA period in two halves and test whether outcomes improve in treatment areas over time even in the absence of CHAs. Reassuringly they do not. Finally, Table A.5 (Panel B) estimates (2) with facility fixed effects; the fact that all estimated δ coefficients remain stable provides evidence that they are not biased by time-invariant facility unobservables correlated with treatment.

4.2 Impact on health practices and outcomes

To provide evidence on the effect of treatment on health practices and outcomes we survey households in 47 randomly chosen communities located in each of the 47 districts where the CHAs operate. We randomly choose 16 households in each community, surveying 738 in total.[20] As the main focus of the CHA job is mother and child health, we only survey households that contain a child under age five years. The survey contains modules on health and sanitation knowledge, health practices, incidence of illnesses and anthropometrics for the youngest child. Knowledge, practices, and illnesses are self-reported; deworming and immunization data are drawn from the child health

[19] This restriction keeps 77% of the health posts and 70% of the health centers in the sample.

[20] A complete sample would have been 752 households. The difference of 14 households is due to several factors. In some communities, safety concerns related to local political tensions forced the survey team to leave the community before completing surveying. In other communities, especially low-density communities where travel times between households could exceed one hour, the survey team was unable to find 16 eligible households within the allotted survey time. One household interview was lost due to malfunction of the mobile device on which the interview was recorded. The minimum number of households surveyed in a community was 13.

card, and anthropometrics are measured by trained enumerators. We interview the main carer of the child, which is their mother in 90% of the cases and either a grandparent or a sibling in the remaining 10%. All questions are drawn from the DHS Zambia questionnaire, with the exception of the health knowledge module which we designed based on the CHA curriculum, and mid-upper arm circumference, which the DHS does not measure.

Table 8 reports the estimates of:

$$y_{idp} = \alpha + \beta C_{id} + D_i\gamma + \delta E_d + \rho_p + \epsilon_{idp} \tag{4.1}$$

where y_{idp} is the outcome of child (or respondent) i in district d and province p, C_{id} equals 1 if child (or respondent) i lives in a district that is assigned to the career incentives treatment. D_i is a vector of child, respondent and household characteristics that include child age and gender, household size and number of assets, and the education level of the respondent. As above, we control for the stratification variables, district-level high school graduation rate E_d and provinces indicators ρ_p throughout and cluster standard errors at the district level.

Column 1 shows that the average respondent answers 75% of the knowledge questions correctly and this is does not differ by treatment status. In contrast, treatment affects all the health practices we collect information on. In particular, Columns 2 and 3 show that children under 2[21] living in treatment areas are 5 percentage points more likely to be breastfed, and their stools are 12 percentage points more likely to be safely disposed; these effects represent a 8% and 20% increase from the control group mean, respectively. Columns 4 and 5 show that treatment also increases the incidence of deworming treatments by 15% and the likelihood that the child is on track with the immunization schedule by 4.7 percentage points, which is 81% of the control group mean (5.8%).[22] Importantly, the treatment affects the incidence of immunizations for children who are young enough to be exposed to CHAs when their immunization period started (as shown in Column 5) but not for those that were too old to start the cycle when the CHAs started working. This echoes the findings in Table7 that show no difference in immunization rates between treatment and control areas before the CHAs started working.

Columns 6-8 measure treatment effects on the incidence of three main illness symptoms: fever, diarrhea and cough. These are fairly common as 47%, 26% and 45% of children in control areas had experienced them in the past two weeks. We find that treatment reduces the incidence of cough symptoms by 7 percentage points while leaving the others unchanged. Finally, Columns 9-12 show treatment effects on anthropometric measurements. We report weight-for-age z-scores

[21] WHO recommends breastfeeding until the age of two years.

[22] A child is defined to be on track if she has completed all immunizations required for her age. At age 3 months, this includes BCG, OPV 0-2, PCV 1-2, DPT-HepB-Hib 1-2, and rotavirus 1-2. At 4 months, this includes, additionally, OPV 3, PCV 3, and DPT-HepB-Hib 3. At 9 months, this includes OPV 4 if OPV 0 was not given, and measles 1. The immunization series is complete at age 18 months with measles 2. Finally, we consider a child to be on track for vitamin A supplementation if she has ever been supplemented.

and mid-upper arm circumference (MUAC). The combination of these two allows us to measure both chronic and acute malnutrition.[23] Following WHO's guidelines we use the -2SD and -3SD thresholds for weight-for-age z-scores to measure moderate and severe underweight, respectively, and 12.5cm and 11.5cm for MUAC to measure moderate and severe wasting, respectively (Food and Nutrition Technical Assistance Project, 2011). According to these measures, 21% of the children in control areas are underweight, and 5% severely so. The incidence of wasting is much lower, with 3.6% of the children exhibiting some wasting and 1.4% severe wasting. These data, which match the corresponding DHS figures for rural Zambia (Government of Zambia, 2014), suggest that these areas are characterized by high rates of chronic malnutrition but low rates of acute malnutrition.

The findings in columns 9-10 show that children in treatment areas are 5 percentage points less likely to be underweight (25% of the control group mean) and 3 percentage points less likely to be severely underweight (60% of the control group mean). In line with this, columns 11 and 12 show a large percentage reduction in wasting, but given the limited occurrence of this in our sample the effects are not precisely estimated.

Taken together, the findings in this and the previous section show that differences in the inputs provided by treatment and control CHAs are matched by differences in facility utilization and household health practices. The selection effect of career incentives is strong enough to generate discernible differences in household behaviors and child health outcomes.

5 Selection on observables vs. unobservables

We now analyze whether career incentives attract agents who differ on observable traits (sub-section 5.1) and the extent to which this selection on observables can explain the performance gap identified above (sub-section 5.2). The answer informs the choice between career incentives and eligibility criteria at the recruitment stage. If the entire gap is due to observables, there exists a set of eligibility criteria that can mimic the effect of career incentives under the assumption that the participation constraint of those who meet the criteria is met in the absence of career incentives. In contrast, if the gap is due to unobservables, no set of eligibility criteria can mimic the effect of incentives.

[23] We elected not to measure height for two reasons. First, compared to weight, height measurement is more invasive, requiring, for children under two, laying the child down on a height board and having two enumerators hold the child while collecting the measurement. During survey piloting, many respondents (and the children themselves) balked at this procedure. Second, accurate height measurement is made difficult by high measurement error relative to standard effect sizes. For example, 1 millimeter is 12 percent of the increase in height-for-age typically observed in dedicated child nutrition programs (Dewey and Adu-Afarwuah, 2008).

5.1 The effect of career incentives on observable traits

Table 9 measures the effect of career incentives on CHAs' traits that can affect performance. We group these in four categories: skills, preferences, outside option, and demographics. For each variable, the table reports the means and standard deviations in treatment and control, as well as the p-value of the test of means equality, controlling for the stratification variables and with standard errors clustered at the level of randomization—the district.

To measure skills we use the CHAs' test scores in the examinations they took during the one-year training program. These examinations test the material taught in the program that will directly inform the work of the CHAs in the field. As all trainees are informed about career incentives at the beginning of the training program, differences in test scores solely reflect the selection effect of career incentives. We complement these test scores with MoH's records of the CHAs' high school results.[24] Panel A shows that career incentives attract higher-skilled candidates: treatment CHAs' test score are 18% of a standard deviation higher than control CHAs'. Differences in test scores date back to high school as treatment CHAs' O-level scores are 9% of a standard deviation higher, and the number of O-level exams passed in the natural sciences is 10% of a standard deviation higher, although these differences are not precisely estimated.

Panel B measures two sources of motivation that are relevant in this context: career ambition and pro-sociality. Differences in career ambitions and pro-sociality can drive differences in performance if more ambitious CHAs work harder to reach their goals and more pro-social CHAs work harder because they put a larger weight on the welfare of the individuals they serve. To measure these preferences we give trainees a battery of psychometric tests using validated scales commonly used in employment surveys. Full descriptions of these variables can be found in Appendix 6. We also implement a contextualized dictator game to measure the strength of pro-social preferences.[25] Finally, we measure the relative strength of career vs. pro-social preferences by asking trainees to choose whether they see "career advancement "or "service to community" as the main goal of the CHA job. While both career ambitions and pro-sociality can lead to higher performance, there might be cases in which a tradeoff arises between the two goals, and the effect on performance is ambiguous *a priori*.[26]

[24] As noted above, applicants were required to have finished grade 12 with two passed O-levels. The Examinations Council of Zambia requires that candidates take a minimum of six O-level exams, with English and mathematics being compulsory. In addition, students choose among subjects in the natural sciences, arts and humanities, and business studies.

[25] In the dictator game, we gave trainees 25,000 Kwacha (approximately USD 5; half of a CHA's daily earnings) and invited each to donate any portion (including nothing) to the local hospital to support needy patients. This donation decision occurred privately and confidentially in concealed donation booths. Previous work has found dictator games adapted for specific beneficiary groups to be predictive of performance on pro-social tasks (Ashraf et al., 2013) and choices of public sector nurses to locate to rural areas (Lagarde and Blaauw, 2013).

[26] To interpret the results in Panel B we need to keep in mind that these measures are self-reported and CHAs might give answers that are consistent with the recruitment poster rather than express their true preferences. Two considerations allay this concern: (i) the measures are collected after CHAs have been selected, so they have no incen-

The data in Panel B show that treatment CHAs have stronger career ambitions but the same level of pro-social motivation as control CHAs. In line with this, when asked to choose between "career advancement" or "service to community," only a minority chooses "career advancement," but this is larger in the treatment group (14% vs 6%, p=.015).

Panel C reports CHAs' occupation at the time of application. This is relevant both because it allows us to assess whether the CHA program crowds out talent from other sectors, and because CHAs with worse outside options might work harder to keep their CHA job (although, given the low frequency of dismissals of government employees, this effect is unlikely to be strong). Four categories account for over 90% of occupations and all four are similar in treatment and control. Over two-thirds of applicants in both treatment and control groups are farmers. This is more than double the share of farmers in the general population of eligibles (Table 2.A). The two other occupations listed by respondents are "trader" and "teacher," both of which are likely to have a higher return to skills than farming. These are slightly, but not significantly, more common in the treatment group and substantially lower than in the general population of eligibles. Housework is slightly, but not significantly, more common in the control group and higher than in the general population of eligibles. Noticeably, only 13% of the sample reports being unemployed, but in the absence of information on hours worked we cannot rule out that the data in Panel C hides underemployment. Regardless of the true share of unemployed, Panel C makes clear that a large majority of CHAs were not in jobs fit to their skill levels. The program might crowd out some agricultural production, but it is not drawing talent from other professions.

Finally, Panel D shows that treatment CHAs are older and more likely to be male, but have similar socio-economic status as the control CHAs.

Taken together, the data in Table 9 reveal that individuals in the two groups differ on some relevant traits. In the Appendix we show that this is driven by differential sorting, namely by the fact that career incentives attracted different types, rather than by differential selection by recruitment panels. In short, panels in the treatment and control groups put the same weight on the same traits, but they face different applicant pools.

5.2 Explaining the performance gap

We now establish the extent to which differences in performance identified in Section 3 are due to selection on observables vs unobservables. To do so, we augment specification (3.1) by adding the individual traits that differ significantly between treatment and control groups. If differences in performance disappear, we can attribute the selection effect entirely to the fact that career incentives attract applicants with different observable traits. If differences in performance remain,

tive to modify their answers to affect the probability of selection, and (ii) psychometric tests are not straightforward to game.

we conclude that the selection effect is partly due to the fact that career incentives attract applicants with different unobservable traits.

Table 10, column 1 replicates the baseline estimates in Table 4. Columns 2 to 5 add skills, preferences, and demographics, individually and then jointly. Column 2 shows that, as expected, skills are positively correlated with performance, but their effect is of a magnitude smaller than the effect of career incentives. A one standard deviation increase in test scores increases visits by 28, which is 32% of the effect of career incentives. Differences in skills only explain a small share of the performance gap: after controlling for skills, the difference in visits done by treatment and control CHAs drops from 94.0 to 89.1.

Column 3 shows that the intensity of career preferences is positively correlated with performance, as we would expect, but the effect is small (a one standard deviation increase leads to 6.5 more visits) and not precisely estimated. In contrast, CHAs who put career advancement over service to the community do 58 *fewer* visits. Because these types are more common in the treatment group the estimated effect of career incentives slightly increases from 94.0 to 97.1. This is in line with the hypothesis that strong incentives can crowd out pro-social types, and this can harm performance, but the crowding out is rather weak—only 14% of CHAs in the treatment group (and 5% in control) put career advancement over service to the community; the remaining 86% who do not perform better than their counterparts in the control group.

Finally, column 4 shows that there are no gender differences in performance (the coefficient is small and not significantly different from zero) but older CHAs perform better: one standard deviation increase in age (5.5 years) increases visits by 34.1. Since CHAs in the treatment group are on average older, the difference in visits done by treatment and control CHAs drops from 94.0 to 83.1.[27]

Taken together, the evidence in Table 9 and 10 indicates that career incentives attract agents with different observable traits, but while these are correlated with performance, their effect is small relative to the effect of career incentives and they explain a small share of the observed performance gap. Comparing columns 1 and 5, Table 10, shows that indeed the gap falls by 9% when all the traits that differ significantly between the two groups are accounted for.

6 Conclusion

Attracting effective employees is a core objective for all organizations. Our analysis shows that advertising career incentives at the recruitment stage draws in individuals who perform well once on the job in the health sector. Importantly, since most of the performance difference is driven by

[27]Further analysis, not reported, shows that the effect of observable traits on performance is the same in both groups, suggesting that these traits affect performance directly rather than by determining the response to career incentives—the sole exception is age, which is associated with performance in the control, but not in the treatment group.

unobservables, the selection effect deriving from incentives cannot be mimicked by a modification of the eligibility criteria.

The findings highlight the importance of incentive design at the recruitment stage. They suggest that estimates of the effects of incentives on performance obtained by strengthening incentives for a given set of agents might understate their true impact, both because they do not take into account the selection effect and because they measure the response of agents who have self-selected into jobs with low-powered incentives, and hence might be less responsive to incentives in the first place.

The findings allay the concern that offering material rewards for public service delivery jobs displaces applicants with desirable social preferences and ultimately worsens the quality of services provided. Naturally, the type of material benefit offered—a career in the Ministry of Health—was unlikely to attract purely selfish types, since government service implies some pro-social benefit. The findings do not rule out the possibility that there exists a level of financial compensation that attracts callous types, but rather they suggest that the material benefits that can be reasonably associated with these jobs have no drawbacks in terms of pro-social motivation and performance. The findings have implications for policy strategies based on this concern, such as maintaining the volunteer status of community-based work, or low salaries and lack of career incentives in teaching and health professions (World Health Organization, 2006; Lehmann and Sanders, 2007).

Our research provides evidence on factors that inform the welfare analysis of providing career incentives, but is not designed to conduct a full welfare analysis for three reasons. First, due to political constraints, all agents had to be paid the same amount. This implies that we cannot judge whether agents attracted by career incentives have a higher reservation wage, such that their higher performance comes at a price; in other words, the government could get the agents in the control group to work for a lower wage. A priori, the difference in reservation wages between applicants in the two treatments is difficult to sign: that applicants to the career incentives treatment are more skilled suggests that it might be positive, whereas the fact that they expect to move on to better-paid positions suggests that it might be negative (in the manner that interns are typically willing to forego compensation for the sake of career opportunities). Regardless, our results suggest that higher wages and career incentives can be substitutes for drawing candidates with better outside options and consequently higher skills. However, career incentives may be cheaper for the organization if the organization also requires higher-level positions to be filled, and has trouble filling them.

Second, since over 80% of CHAs were engaged in subsistence farming or housework we cannot quantify the opportunity cost of the CHAs' time (namely, the value of the activities they give up to become full time health workers and the size of this difference between treatment and control). If productivity in these alternative occupations is increasing in the same qualities that make a CHA productive the findings imply that the opportunity cost is higher in the career treatment (namely, the career treatment draws in more productive farmer or houseworkers). By revealed preferences

we know that the private value of the CHA jobs must be at least equal to the private value of these activities (otherwise these individuals would have not switched occupations) but we cannot quantify the extent to which the social value produced by career CHAs in their new jobs exceeds the loss in social value from agriculture and housework.

Third, while retention rates after 18 months are the same in the two groups, agents in the career incentives treatment might still leave their posts for higher-ranked positions sooner than those in the control group. Whether this entails a welfare cost depends on whether they can be easily replaced and whether their government can use their skills in other jobs. In our context, replacement is straightforward; the number of applicants per post was above seven, and the government faces scarcity of health staff at all levels, such that promoting high-performing CHAs to nursing and other higher-level cadres is likely to be welfare-improving. In contexts where retention in the original post is more important, the welfare cost of attracting agents who expect to move on will be higher.

A. Differences in sorting vs. differences in recruitment

A.1. Methodology

The goal of this section is to assess whether CHAs in treatment and control differ because career incentives attract different types, because recruitment panels choose different candidates, or both. To do so, we first test whether applicants differ along the dimensions discussed in Section 5.1 and compare them to the candidates chosen by the recruitment panels. To aid the comparison, we also test whether recruitment panels put different weights on these traits when choosing which candidates to nominate.

Recruitment panels have five members: the district health official, a representative from the health post's associated health center, and three members of the local neighborhood health committee. Recruitment panels are exposed to the salience policy as they see the same posters as the candidates. This notwithstanding, they know much more about the actual job attributes and who would be suitable for the positions. Indeed, contrary to the applicants (whose only source of information was the recruitment poster), the two more senior panel members—the district health official and the health center representative—are employees of the Ministry of Health, and hence familiar with career progression rules regardless of salience policy. The salience policy treatment is likely not as powerful, or perhaps entirely moot, for them.[28]

Table A3 reproduces the key variables presented in Table 6 for the 1585 candidates who interviewed for the CHA jobs (Part I) and for the 334 candidates who are chosen by the panels (Part II). The final 314 CHA trainees differed from the 334 nominees in two ways: (i) to obtain gender balance, GRZ replaced all male nominees (i.e., men ranked 1 or 2 by the interview panels) with female reserves (i.e., women ranked 3 to 5) when available, resulting in 68 changes (22% of the total), and (ii) 13 applicants who were ranked "top 2" declined, and were replaced by reserves. By the time training commenced, twenty spots remained empty.

The data is drawn from MoH's administrative data on the applicants' high school test scores and from a survey that we asked candidates to fill in at the interview stage. We mostly use the same measures as in Table 6, except for the psychometric scales that were too complex to be administered at the interview stage. As in Table 6, we report mean values in the two treatment groups and the p-value of the difference from a regression of the outcome of interest on the career treatment and the stratification variables, with errors clustered at the level of randomization, the district. To shed light on the differences between Part I and Part II, Table A4 estimates the probability that candidate i in health post h is chosen by the recruitment panels as follows:

$$s_{ih} = \sum_{j \in J} \alpha_j^c C_h X_i^j + \sum_{j \in J} \alpha_j^s (1 - C_h) X_i^j + \sum_{j \in J} \beta_j \bar{X}_h^j + \gamma N_h + \zeta_{ih}$$

[28] Further analysis, available upon request, shows that treatment does not affect panel composition.

where $s_{ih} = 1$ if i is one of the two nominated candidates and 0 otherwise; and C_h equals 1 if health post h is in the career incentives treatment and 0 if it is in the control group. X_i^j are individual characteristics, and the set J includes variables that are affected by salience policy (skills, pro-social preferences, career preferences) as well as age and gender, as GRZ requires giving preference to women. The coefficients of interest are α_j^c and α_j^s, which measure the weight given to trait j in the career and control groups, respectively. Differences, if any, could be due to the fact that panels think that a given trait is more important for a career (community) job, or to the fact that panels in the two treatments face different pools. To account for this, we control for the average traits of the applicants in the same health post $\bar{X}_h^j$ for all $j \in J$. To measure the strength of competition, we include the number of interviewed candidates in the same health post N_h. As in earlier specifications, we control for the stratification variables and cluster standard errors at the district level. Table 5 reports the estimates of α_j^c and α_j^s for all $j \in J$ and the p-value of the test of equality. We estimate the model with and without the characteristics of the applicant pool $\bar{X}_h^j$.

A.2. Results

Table A.3, Panel A.I shows that making career incentives salient attracts more qualified candidates; thus the differences we see among CHAs in Table 6 are at least partly due to differences in the applicant pools. Applicants in the career treatment have a higher total score (p=.019), and have a stronger scientific background (p=.006), which is directly relevant to medical practice. Table A4 shows that the strongest determinant of appointment is ability in both treatment and control groups: panels are between 17 and 23 percentage points more likely to appoint candidates at the top of the O-level exam score distribution within their health post. In the average health post, 21% of candidates are appointed; being at the top of the O-level exam score distribution doubles the probability of being selected. Panel A.II, Table A3, confirms that the recruitment process screened in the most skilled applicants, as both total scores and the number of O-Levels in science are higher for the selected CHAs than they are for the average applicant, and the difference between treatments is not precisely estimated. Recruitment panels were thus able to reduce differences in observable measures of skill, but as we know from Table 6, unobservable differences remained and CHAs recruited with career incentives had significantly higher test scores during the training program.

Panel B reports motivations and preferences. We see that the differences in career ambitions reported in Table 6 were already present in the applicant pool. Panel B.I shows that the share of applicants who aspire to be in a highly-ranked position (environmental health technician, clinical officer, or doctor) within the Government in 5-10 years' time is higher in the career treatment. The difference between treatment and control groups is 6 percentage points (32% of the control group mean) and precisely estimated (p=.026). Our main measure of social preferences at the interview stage is based on the adapted "Inclusion of Others in Self (IOS) scale" (Aron et al.,

2004), which measures the extent to which individuals perceive community and self-interest as overlapping. IOS has been validated across a wide variety of contexts, and adapted versions are found to be strongly correlated with environmental behavior (Schultz, 2002) and connectedness to the community (Mashek et al., 2007). The measure is coded as 0-1, where 1 implies highest overlap.[29] Panel B.I shows that 84% of the applicants in both treatments perceive their interests to be aligned with the community's, suggesting that career incentives do not displace this type of pro-social preference in the applicant pool. Table A4 shows that recruitment panels in both treatment and control are more likely to appoint applicants with career ambitions and with pro-social preferences. As a consequence, appointed candidates in Panel B.II have both stronger career ambitions and stronger pro-social preferences. The differences between treatment and control reflect the differences in the applicant pool, and these in turn determine the differences we observe in Table 6: CHAs in the treatment group have stronger career ambitions, but the same level of pro-sociality.

Interestingly, panels face no trade-off between skills, career ambitions and pro-sociality in either group. In particular, applicants with top O-level scores have stronger career ambitions and the same level of pro-sociality, and this holds in both the treatment and control group. Similarly, there is no trade-off between career ambitions and pro-sociality in either group.

Turning to demographics, Panel C.I shows no difference in either gender or age in the applicant pool, in contrast with the fact that selected CHAs in the treatment group are older and more likely to be male. Table A4 shows that recruitment panels in both treatment and control are about 9pp more likely to appoint women as directed by GRZ, yet the share of women drops by 2pp from applicant to nominated candidates in the treatment group and increases by 5pp in the control group. To shed light on this we note that recruitment panels in the two groups face a different trade-off between gender and skills: among the candidates with top O-level scores, the share of women is 25% in the control group and 17% in the treatment group (p=.025). This creates a difference in gender balance between nominated candidates that gets further reinforced by MoH's affirmative action policy, bringing the share of women among deployed candidates to 44% in the treatment group and 57% in the control group, as seen in Table 6. Regarding age, Table A4 shows that this is the only dimension where panels seem to differ: treatment panels put a small positive weight on age (1 SD increase in age increases the probability of nomination by 7pp) while control panels do not, and the difference is precisely estimated. The trade-off between age and skill is also different in the two groups as applicants with top O-level scores are younger in the control group (25.7 vs 26.5, p=.09) but not in the treatment group. Taken together, these imply that nominated and selected CHAs in the treatment group are on average one year older than those in the control group.

[29] Applicants are asked to choose between four pictures, each showing two circles (labeled "self" and "community") with varying degrees of overlap, from non-overlapping to almost completely overlapping. This variable equals 1 if the respondent chooses the almost completely overlapping picture, 0 otherwise.

Ultimately, the evidence in this Section shows that career incentives attract applicants who differ on the key dimensions of skill and career ambition, but not the weight that recruitment panels put on these attributes, so that appointed CHAs differ on these traits because they came from different pools, rather than having been chosen differently by the recruitment panels.

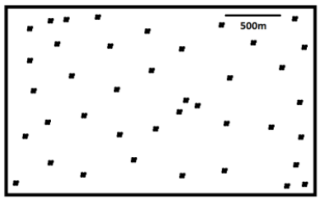
B. Data Appendix

In this section, we describe each of the variables used in our analysis, including its source, unit of measurement, and data source. Because we used a number of different data sources, we describe each of them below. We collect data at each stage of the program: application, selection, training, and performance in the field. Each variable indicates which data source it is generated from. A description of each source, including the sample, can be found in Section 6.

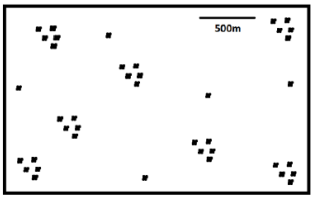
B.1 Eligible population and catchment area characteristics

- *Number of staff in health post* (source: district health officials survey, by phone) - Total number of nurses, environmental health technicians, and clinical officers assigned to the health post, as reported by district health officials we surveyed by phone.

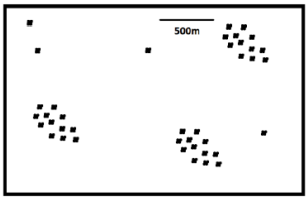
- *Geographical distribution of households in catchment area* (CHA survey, in person, at refresher training) - CHAs were shown stylized maps accompanied by the description above and asked to choose the one that most closely resembled the catchment area of their health post. Questions were asked to each CHA individually so that two CHAs from the same health post could give different answers. For the 5 out of 161 cases in which the two CHAs gave different answers, we used the information provided by supervisors to break the tie.



MAP 1: Almost all people live on their farms. There are few or no real villages with concentrated households.



MAP 2. Villages are made up of a few (5-10) households, and there are many of such small villages. Some households live on their farms.



MAP 3. Most people live in medium to large villages (>10 households). There are several of these larger villages in the catchment area. Some households live on their farms.

- *Poor cell network coverage* (source: attempted phone calls) - We attempted to call all CHAs after deployment. We made daily calls for 118 consecutive days. The health post was classified as having poor coverage if we did not manage to reach either of its two CHAs during this period.

B.2 Experiment Validation

- Relative weight variables are derived from a survey question (CHA survey, in person, at training) that asked the trainees to allocate 50 beans between different potential motivations for applying to the CHA position: "good future career," "allows me to serve the community,"

"earns respect and high status in the community," "pays well," "interesting job," "allows me to acquire useful skills," and "offers stable income."

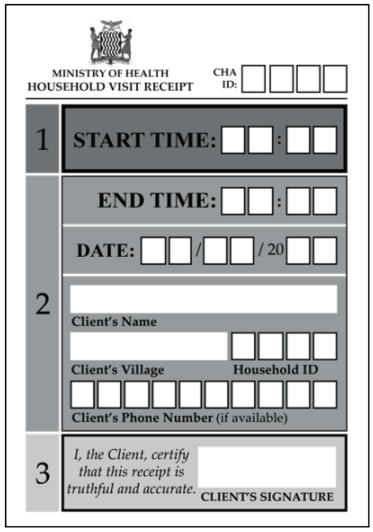
- *Expects to be employed in MoH in 5-10 years* (source: CHA survey, in person, at interview) - Circled any combination of being a "Community Health Worker," "nurse," "environmental health technician," "clinical officer," or "doctor" in response to the question, "When you envision yourself in 5-10 years' time, what do you envision yourself doing?"

B.3. Performance in Service Delivery

Household Visits

Source: SMS Receipts

- *Unique households visited*
- *Number of visits per household*
- *Average visit duration, in minutes*



Source: HMIS (monthly reports)

Each reported variable is the sum of each indicator's monthly values from September 2012 to January 2014.

- *Number of households visited*
- *Number of women and children visited per household visit*
- *Number of patients seen at HP*

- *Number of community mobilization meetings*

Time Use

Source: CHA survey, in person, at refresher training

- *Number of hours worked in a typical week* - CHAs were asked "In a typical week, how many total hours do you spend doing CHA work? Please count work that you do at the health post and in the village, including moving from household to household."

- *Frequency of out-of-hours calls in a typical week* - CHAs were asked "In a typical week, how often do you have to leave your house at night and do CHW work due to emergencies like a pregnancies or accidents?" Possible responses were "5-7 days per week," "3-4 days per week," "1-2 days per week," "2-3 times per month," "Once per month," "Sometimes, but less than once per month," and "Never."

- *Share of time allocated to* - To obtain time allocations, CHAs were asked to allocate 50 beans between different activities. The instructions were as follows:

  Please use the beans to show how much time you spend doing each activity. If you spend more time in an activity, you should place more beans on the card. If you never do an activity, you should place no beans on the card. Place the beans any way you would like. For instance, you can place all beans on one card, or 0 beans on any card.

  Household visits - Now I would like you to think about household visits specifically. Here are some cards that list different activities you may do during household visits.

  - *greeting household members*
  - *assessing and referring sick household members*
  - *reviewing and discussing the household's health profile and goals*
  - *asking questions about household health behaviors and knowledge*
  - *providing health counseling*
  - *doing household inspections (waste disposal, latrines, etc.)*
  - *documentation (filling registers/books and sending visit receipts via SMS)*

  Health Post - Now here are some cards that list different activities you may do at the HEALTH POST OR RURAL HEALTH center.

  - *seeing sick patients at the OPD*
  - *dispensing medications from the pharmacy*

- *helping with ANC visits*
- *cleaning and maintaining the facility*
- *assisting with deliveries and other procedures when needed*
- *documentation (filling registers/books and sending monthly reports through HMIS)*

In the Community - Now here are some cards that list different activities you may do as a CHA.

- *campaigns for polio, measles, child health, and other health issues*
- *health talks and other community mobilization activities*
- *school health talks and other school activities*
- *meeting with NHC and volunteer CHWs for planning*

B.4 CHAs' observable traits

Skills

- *Average test score at training [0-100]*- Average score in 11 tests on basic medical practices taken during the training program.
- *O-levels total exam score* (source: MOH application files) - This variable is constructed as the sum of inverted O-levels scores (1=9, 2=8, and so on) from all subjects in which the applicant wrote the exam, so that larger values correspond to better performance.
- *O-levels passed in biology and other natural sciences* (source: MOH application files) - Includes biology, chemistry, physics, science and agricultural science.

Applicants' Preferences and Motivations

- *Donation to local hospital (dictator game)* (source: baseline survey) - In the modified dictator game, trainees were given 25,000 Kwacha (approximately USD 5; half of a CHA's daily earnings) and invited to donate any portion (including nothing) to the local hospital to support needy patients. This donation decision occurred privately and confidentially in concealed donation booths. Previous work has found dictator games adapted for specific beneficiary groups predictive of performance on pro-social tasks (Ashraf et al., 2013) and choices of public sector nurses to locate to rural areas (Lagarde and Blaauw, 2013).

> I am happy to inform you that we have recently received a small donation from an outside donor to support the Community Health Assistants. In a moment, you will each receive an equal portion of this outside donation.
>
> While the money is yours to keep, the donor has also requested that we provide you with an opportunity for you to share this gift with the community. This is an opportunity to support people in this community who are sick but are unable to afford the health care that they need. As you know, there are many such people in the

communities from where you come from and also here in Ndola. They get sick, but because they are very poor, they are not able to get the health care that they need.

Because we want to protect your privacy, we have set up a donation booth in the next room. There you will see a collection box where you can deposit your donation, if you choose to donate. You do not have to give anything if you don't want to. No one here will know if you decide not to give anything. Your donation will be recorded, but we will not have access to this information. Once everyone has had an opportunity to give, IPA will collect any donations made to this cause, and we will donate the total amount to Ndola Central Hospital to directly support patients who are unable to pay for their medicines and treatment.

In a moment, we will give you the money, and you will come to this desk where you will be able to donate to help needy patients if you wish.

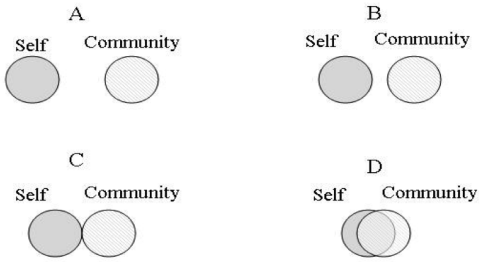
I am happy to announce now that the donor is able to provide each of you with 25,000 Kwacha.

In a moment, I will ask each of you to come to the registration table one-by-one. When you come to the table, that is when I will give you the money. I will also give you an envelope in case you want to support the patients at Ndola Central Hospital.

If you want to give any amount of money to help needy patients in the community, place the money in the envelope. Then seal the envelope, and place that envelope in the "Help Needy Patients in the Community" box. Please be sure to place the money INSIDE the envelopes before placing it in the cash box. Do not put any loose bills into the cash box. Whatever money you have remaining, you can keep in your main envelope.

- *Main goal is "service to community" vs. "career advancement"* (source: baseline survey) - Asked of all trainees: "In terms of your new CHA position, which is more important to you?" with two possible responses: "serving community" and "promoting career."

- *Perceives community interests and self-interest as overlapping* (source: CHA survey, in person, at interview) - Based on the "Adapted Inclusion of Others in Self (IOS) scale" (Aron et al., 2004) which measures the extent to which individuals perceive community- and self-interest as overlapping. The Inclusion of Other in the Self scale was originally designed by Dr. Art Aron and colleagues (Aron et al., 1992) as a measure of self-other inclusion and relationship closeness. The Continuous IOS makes use of the basic design of the original IOS, but allows for (a) the measure to be embedded within a web-based questionnaire, (b) the output values to be continuously scaled, and (c) modifications in the appearance and behavior of the measure. IOS has been validated across a wide variety of contexts, and adapted versions are found to be strongly correlated with environmental behavior (Inclusion of Nature in the Self, Schmuck and Schultz, eds 2002) and connectedness to the community (Inclusion of Community in Self, Mashek et al. 2007). The measure is coded as 0-1, where 1 implies highest overlap. Applicants are asked to choose between sets of pictures, each showing two circles (labeled "self" and "community") with varying degrees of overlap, from non-overlapping to almost completely overlapping. This variable equals 1 if the respondent chooses the almost completely overlapping picture (D), 0 otherwise.



- *Aims to be a higher-rank health professional in 5-10 years* (source: CHA survey, in person, at interview) - Circled any combination of being an "environmental health technician," "clinical officer," or "doctor" in response to the question, "When you envision yourself in 5-10 years' time, what do you envision yourself doing?"

Psychometric Scales

Each measure (source: baseline survey) takes on a value between 1 and 5 and represents, among the statements listed below, the extent to which the applicant agreed, on average. Levels of agreement are 1 (strongly disagree), 2 (disagree), 3 (neither agree nor disagree), 4 (agree), and 5 (strongly agree). The psychometric scales came from validated scales used in employment surveys on pro-social motivation and career orientation. Each variable is the average of the item scores within each psychometric scale. For instance, in a scale with three items, the variable value equals the sum of levels of agreement for all items divided by three. It represents the average level of agreement with the included items.

- *Career orientation* - Adapted from Wrzesniewski et al. (1997). In contrast to *Calling* below, individuals with high career orientation tend to have a deeper personal investment in their work and mark their achievements not only through monetary gain, but through advancement within the occupational structure. This advancement often brings higher social standing, increased power within the scope of one's occupation, and higher self-esteem for the worker (Bellah et al., 1988). This scale consists of the following items: "I expect to be in a higher-level job in five years," "I view my job as a stepping stone to other jobs," and "I expect to be doing the same work as a CHA in five years" (reverse-scored).

- *Pro-social motivation (pleasure-based)* - Adapted from Grant (2008) and consists of the following items: "Supporting other people makes me very happy," "I do not have a great feeling of happiness when I have acted unselfishly" (reverse-scored), "When I was able to help other people, I always felt good afterwards," and "Helping people who are not doing well does not raise my own mood" (reverse-scored).

- *Desire for positive pro-social impact* - Adapted from Grant (2008). This measure provides an index of the degree to which an individual desires and benefits psychologically from the positive impact of her work on others. The scale consists of the following items: "It is important to me to do good for others through my work," "I care about benefiting others through my work," "I want to help others through my work," "I want to have positive impact on others through my work," "I get motivated by working on tasks that have the potential to benefit others," "I like to work on tasks that have the potential to benefit others," "I prefer to work on tasks that allow me to have a positive impact on others," "I do my best when I'm working on a task that contributes to the well-being of others," "It is important to me to have the opportunity to use my abilities to benefit others," "It is important to me to make a positive difference in people's lives through my work," "At work, I care about improving the lives of other people," and "One of my objectives at work is to make a positive difference in other people's lives."

- *Affective commitment to beneficiaries* - Adapted from Grant (2008) and answers the following question: "How much do I care about/committed to the beneficiaries of my work?" The scale consists of the following items: "The people who benefit from my work are very important to me," and "The people who benefit from my work matter a great deal to me."

B.5 Data Sources

- **Source: Application** (sample: all applicants) - Applications were submitted from August-September 2010. The initial application stage comprised the initial application form, which includes fields for gender, date of birth, village of residence, educational qualifications, and previous health experience (position, organization, start and end years). The application form also included a question asking through what means the applicant first learned of the CHA job opportunity: recruitment poster, facility health worker, community health worker, government official, word-of-mouth, or "other."

- **Source: Interview Candidate Questionnaire** (sample: subset of applicants called for an interview) - Ranking questionnaires were filled and collected from September to October 2010. If applicants met the basic criteria noted above, they were invited for interviews, and asked to complete a questionnaire on the interview day. The questionnaire (written in English) included a series of questions about the interviewee's demographic background, community health experience, social capital, and work preferences and motivations. Notably, we included a measure employed by social psychologists, "Inclusion of Others in Self" from Aron et al. (2004) to measure connection with the community. The questionnaire stated that the answers would not be used for selection purposes but rather are part of a research project, although

we cannot rule out that panelists could have seen the questionnaire or referred to it when making their decisions.

- **Source: Ranking Sheet** (sample: members of interview panels) - Ranking sheets were filled and collected from September to October 2010. Each panel consisted of five members: the district health officer, a representative from the health center, and three neighborhood health committee members. Once all interviews were completed, every member of the selection panel completed a private and individual ranking sheet by ranking their top ten candidates. This ranking exercise occurred *before* panel members formally deliberated and discussed the candidates. After interviewing all candidates and deliberating, interview panels were requested to complete and submit a consensus-based "Selection Panel Report" that included fields for the two nominated candidates as well as three alternates.

- **Source: Baseline Survey** (sample: all trainees) - The baseline survey was conducted in June 2011 and consisted of five components:

    1. Questionnaire- Conducted one-on-one by a surveyor and collected information on the trainees' socio-economic background and livelihoods, previous experience with health work, motivations to apply, and expectations of the program.
    2. Psychometric scales- A self-administered written exercise which gathered alternative information on motivations to apply, determinants of job satisfaction, and other character traits.
    3. Modified dictator game- An experimental game whereby students received a small donation and were given the opportunity to give some of it back for a good cause. It explored the altruistic nature of the students.
    4. Coin game- An experimental game that explored the risk-taking behavior of the students.
    5. Self-assessment- A three-hour exam with multiple choice questions to determine the knowledge on health matters that each student had prior to the training.

- **Source: Catchment Area Survey** (sample: all deployed CHWs and supervisors) - Just prior to graduation in July 2012, all CHWs and supervisors were given a short survey that asked about characteristics of their health posts, including population density, rainy-season information, and general community health measures.

- **Source: Time Use Survey** (sample: all deployed CHWs) - This survey was conducted in April/May 2013 in Ndola, Zambia. The respondents were pilot CHAs who reported to Ndola for a supplemental in-service training to introduce new tasks as part of a revised CHA scope of work. The survey was administered by Innovations for Poverty Action, in partnership with the Ministry of Health, the CHA Training School, and the Clinton Health Access Initiative.

- **Source: SMSs** (sample: all deployed CHAs) - All CHAs carry with them receipt books for each visit, which require the signature of the client visited. The information on these receipts–consisting of the data, time, and duration of the visit, as well as the client's phone number–is then SMS'ed in real time to the MoH and our central data-processing facility. 5% of these visits are audited.

C. District Instruction Appendix

The CHA program was introduced differently to health centers depending on the treatment group. In each district, the district health official was given a package that contained a script, a memo from the Permanent Secretary, and detailed instructions about the CHA recruitment process. In addition, district health officials received "health center packages" for each participating health center in the district, which contained a set of posters and application forms and instructions for the health center representative on how to post posters and collect applications. The district health officials were to visit each health center and meet with the staff and neighborhood health committee members to introduce the program and distribute the health center packages, using the script provided to them in their packages. The script was only provided to the district health officials, and was addressed directly to them. It is unlikely that the applicants or health center staff were able to read this script themselves.

The following script was given to district health officials in the career-incentives treatment group:

> *To Health center and Neighborhood Health Committee: I would like to you let you know about a new government program to strengthen the country's health workforce. Applications are currently being accepted for a new Community Health Worker position. This is an opportunity for qualified Zambians to obtain employment and to advance their health careers. Opportunities for training to advance to positions such as Nurse and Clinical Officer may be available in the future. Successful applicants will receive 1 year of training, both theoretical and practical. All training costs, including transportation, meals and accommodation during the one-year training program, will be covered by the Ministry of Health. Please encourage all qualified persons to apply so that they can benefit from this promising career opportunity.*

The district health officials in the control group received the following script:

> *To Health center and Neighborhood Health Committee: I would like to you let you know about a new government program to improve health care services in your community. Applications are currently being accepted for a new Community Health Worker position. This is an opportunity for local community members to become trained and serve the*

health needs of their community. The new CHWs will work at the Health Post and community level in coordination with an affiliated Health center. Successful applicants will receive 1 year of training, both theoretical and practical. All training costs, including transportation, meals and accommodation during the one-year training program, will be covered by the Ministry of Health. Please encourage all qualified persons to apply so that they can benefit from this promising community service opportunity.

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Figure 1.A: Recruitment poster: Career incentives treatment

REPUBLIC OF ZAMBIA
MINISTRY OF HEALTH

DESIGNATED HEALTH CENTRE:	FOR POSTING AT:

TRAINING OPPORTUNITY

ONE-YEAR COURSE IN COMMUNITY HEALTH

The Ministry of Health of the Republic of Zambia is launching a new national Community Health Worker (CHW) strategy and invites applicants to participate in the inaugural training of community health workers.

The training will begin on **30th August 2010** and will be held at the Provincial level for selected applicants. All participation costs, including transportation, meals and accommodation will be covered by the Ministry of Health.

BENEFITS:

- Become a highly trained member of Zambia's health care system
- Interact with experts in medical fields
- **Access future career opportunities including:**
  - **Clinical Officer**
  - **Nurse**
  - **Environmental Health Technologist**

QUALIFICATIONS:

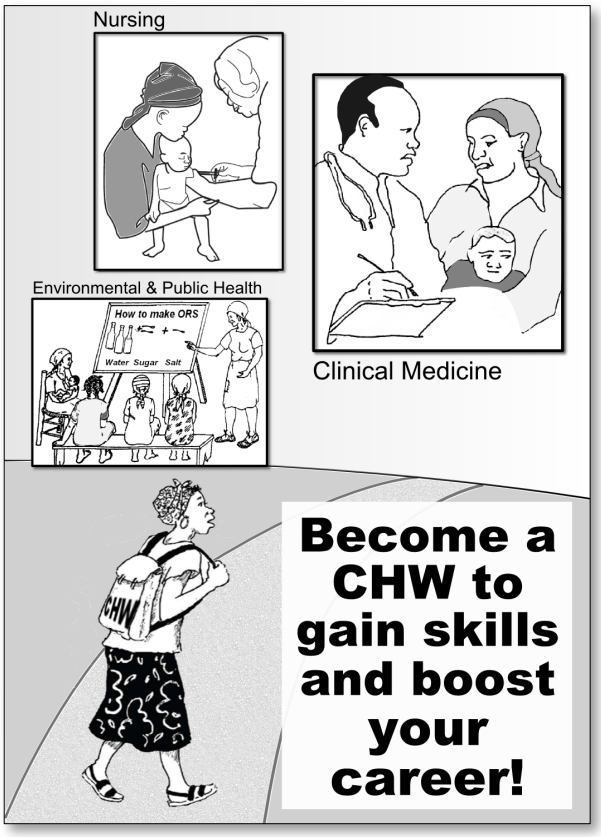
- Zambian National
- Grade 12 completed with two "O" levels
- Age 18-45 years
- Endorsed by Neighborhood Health Committee within place of residence
- Preference will be given to women and those with previous experience as a CHW

APPLICATION METHOD:

Submit to the **DESIGNATED HEALTH CENTRE** indicated above:

- Completed application form with necessary endorsements. If no blank forms are attached to this notice, kindly obtain a blank one at the nearest health centre.
- Photocopy of school certificate documenting completion of Grade 12 and two "O" levels.
- Photocopy of Zambian national registration card.

For more information: Contact the designated health centre indicated above.



CLOSING DATE: 30th JULY 2010.
Only shortlisted candidates will be contacted for interview.

Figure 1.B: Recruitment poster: control group

REPUBLIC OF ZAMBIA
MINISTRY OF HEALTH

DESIGNATED HEALTH CENTRE:	FOR POSTING AT:

TRAINING OPPORTUNITY

ONE-YEAR COURSE IN COMMUNITY HEALTH

The Ministry of Health of the Republic of Zambia is launching a new national Community Health Worker (CHW) strategy and invites applicants to participate in the inaugural training of community health workers.

The training will begin on **30th August 2010** and will be held at the Provincial level for selected applicants. All participation costs, including transportation, meals and accommodation will be covered by the Ministry of Health.

BENEFITS:

- Learn about the most important health issues in your community
- Gain the skills you need to prevent illness and promote health for your family and neighbors
- Work closely with your local health post and health centre
- Be a respected leader in your community

QUALIFICATIONS:

- Zambian National
- Grade 12 completed with two "O" levels
- Age 18-45 years
- Endorsed by Neighborhood Health Committee within place of residence
- Preference will be given to women and those with previous experience as a CHW

APPLICATION METHOD:

Submit to the **DESIGNATED HEALTH CENTRE** indicated above:

- Completed application form with necessary endorsements. If no blank forms are attached to this notice, kindly obtain a blank one at the nearest health centre.
- Photocopy of school certificate documenting completion of Grade 12 and two "O" levels.
- Photocopy of Zambian national registration card.

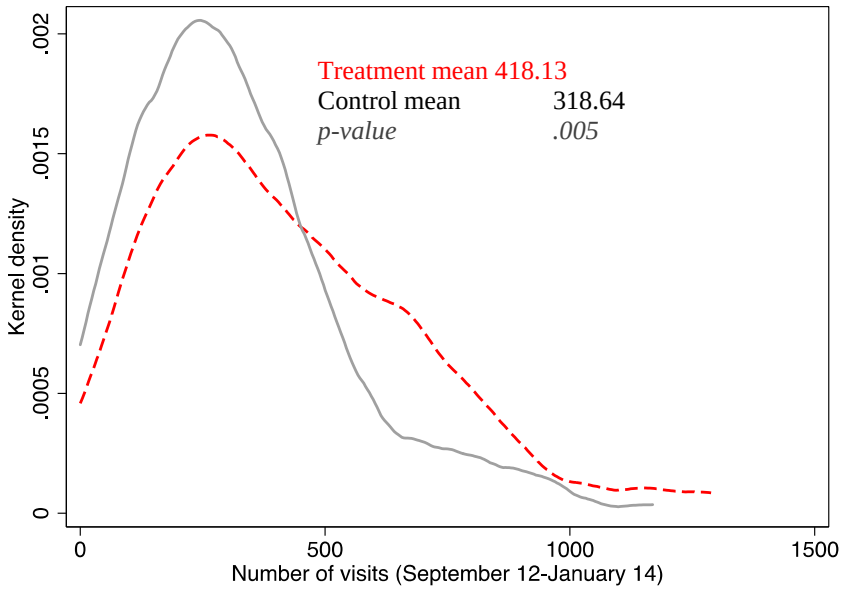
For more information: Contact the designated health centre indicated above.



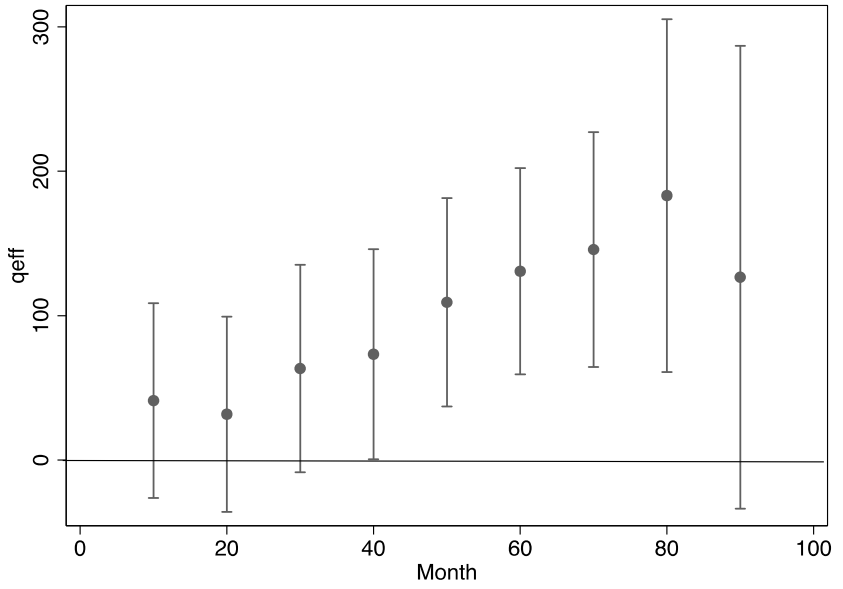
CLOSING DATE: 30th JULY 2010.
Only shortlisted candidates will be contacted for interview.

Figure 2: The effect of career incentives on performance

A. Kernel density estimates of visits



B. Quantile treatment effects



Notes: Total number of household visited, aggregated from individual SMS receipts sent by individual CHAs to MOH. Panel A plots kernel density estimates. Panel B reports quantile treatment effects using the same covariates as in Column 2, Table 6. Each point represents the treatment effect at the decile on the x-axis, each bar represents the 90% confidence interval. Confidence intervals are based on bootstrapped standard errors with 500 replication clustered at the district level.

Table 1: Experimental checks: reasons to apply

	treatment	**control**	p-value of the difference
Weight given to the following reasons at the application stage [0,1]			
Good future career	.165	.120	.002
	(.157)	(.112)	
Pays well	.031	.025	.442
	(.092)	(.057)	
Interesting job	.150	.152	.784
	(.162)	(.140)	
Allows to acquire useful skills	.181	.160	.214
	(.168)	(.136)	
Allows to serve the community	.396	.432	.050
	(.226)	(.239)	
Earns respect and status in the community	.037	.057	.048
	(.094)	(.109)	
Offers stable income	.027	.024	.469
	(.057)	(.054)	
Expects to be employed in MoH in 5-10 years	.924	.900	.728
	(.022)	(.026)	

Notes: Columns 1 and 2 show means and standard deviations in parentheses, Column 3 reports the p-value of the test of equality of means based on standard errors clustered at the district level. All variables are drawn from a survey administered at the beginning of the training program. To measure the "*Weight given to the following reasons,*" CHAs were given 50 beans and asked to allocate them on cards listing different reasons in proportion to the importance of each reason when applying. The cards were scattered on a table in no particular order.

Table 2.A: Eligible population by treatment (randomization balance)

	treatment	**control**	p-value of the difference
A. Characteristics of the eligible population			
I. Eligible candidates			
Share of eligibles in the district (18-45 year olds with grade 12 or above)	.044	.043	.917
	(.205)	(.203)	
Share of women among the eligibles	.371	.391	.241
	(.483)	(.488)	
Eligibles' average years of education	12.55	12.55	.929
	(.827)	(.829)	
II. Main activity of eligible candidates during the past 12 months			
Unemployed	.133	.125	.640
	(.340)	(.331)	
Housework/homemaking	.076	.067	.273
	(.266)	(.251)	
Fulltime student	.086	.087	.860
	(.280)	(.282)	
Self-employed or unpaid laborer in family business	.284	.304	.557
	(.451)	(.460)	
Farming	.170	.173	.938
	(.376)	(.378)	
Employees	.347	.337	.581
	(.476)	(.472)	
Teachers	.132	.158	.134
	(.339)	(.365)	
Health workers	.023	.025	.615
	(.149)	(.156)	
Low skill occupations	.133	.099	.127
	(.341)	(.298)	

Notes: Columns 1 and 2 show means and standard deviations in parentheses, Column 3 reports the p-value of the test of equality of means based on standard errors clustered at the district level. All variables are drawn from the 2010 Census (10% PUMS sample). Activities codes follow the ILO ISCO88 convention. Low skill occupations include workers engaged in services, sales, agriculture, crafts, manufacturing.

Table 2.B: Area and population characteristics by treatment (randomization balance)

	treatment	**control**	p-value of the difference
B. Catchment area characteristics			
Number of staff in health post	1.49	1.36	.559
	(1.09)	(1.17)	
Geographical distribution of households in catchment area:			
Most people live in their farms, none in villages	.082	.091	.848
	(.276)	(.289)	
Some people live in farms, some in small villages (5-10hh)	.529	.532	.855
	(.502)	(.502)	
Most people live in medium/large villages (more than 10hh), a few on their farms	.388	.364	.749
	(.490)	(.484)	
Poor cell network coverage	.082	.065	.675
	(.277)	(.248)	
C. Target population characteristics			
District population density (persons/km^2)*	13.58	14.08	.854
	(8.88)	(9.92)	
Share of district population under 5*	.187	.187	.915
	(.390)	(.390)	
Average years of education of district residents*	4.20	4.20	.993
	(3.83)	(3.82)	
Number of assets owned by average HH in district*	12.67	12.76	.741
	(4.58)	(4.46)	
Main type of toilet: Pit latrine or better	.718	.667	.494
	(.449)	(.471)	
Household water supply: Protected borehole or better	.361	.416	.248
	(.480)	(.492)	

Notes: Columns 1 and 2 show means and standard deviations in parentheses, Column 3 reports the p-value of the test of equality of means based on standard errors clustered at the district level. Number of staff in health post is the total number of nurses, environmental health technicians, and clinical officers assigned to the health post as reported by district officials surveyed by phone. Information on the geographical distribution of HHs was obtained from a survey of the deployed CHAs before deployment. CHAs were shown stylized maps accompanied by the description above and asked to choose the one that most closely resembled the catchment area of their health post. Questions were asked to each CHA individually so that two CHAs from the same health post could give different answers. For the 5 out of 161 cases in which the two CHAs gave different answers, we use the information provided by supervisors to break the tie. To measure cell network coverage we attempt to call all CHAs after deployment. We make daily calls for 118 consecutive days. The health post is classified as having poor coverage if we do not manage to reach either of its two CHAs during this period. Variables with * are drawn from the 2010 Census (10% PUMS sample). Variables with ** are drawn from the 2010 Living Conditions Monitoring Survey (LCMS), which covers 20,000 HHs and is representative at the district level. Main type of toilet: Pit latrine or better equals 1 if the surveyed household uses a pit latrine, ventilated improved pit (VIP), or flush toilet, and 0 if bucket, other, or no toilet. Household water supply: Protected borehole or better equals 1 if the water supply comes from a protected borehole or well, communal tap, or other piped water systems, and 0 if it comes from an unprotected well or borehole, river/dam/stream, rain water tank, other tap, water kiosk, water vendor, mineral/bottled water, or other. Number of assets owned is the number of durable goods and livestock owned by the household.

Table 3: Validation of household visit measures

dependent variable	Number of visits from HMIS records	"=1 if HH reports a visit by CHA"	HH satisfaction: level of CHA's knowledge	HH satisfaction: level of CHA's caring	HH satisfaction: level of CHA's effort	HH satisfaction: overall CHA's services
source	HMIS	HH survey	HH survey	HH survey	HH survey	HH survey
level	Health post	HH	HH	HH	HH	HH
	(1)	(2)	(3)	(4)	(5)	(6)
Number of visits (in 00s) reported by CHA between 9/12 and 1/14 via SMS receipts	0.767***	0.0210**	0.0342**	0.0394**	0.0358*	0.0402**
	(0.0672)	(0.00832)	(0.0149)	(0.0189)	(0.0210)	(0.0194)
Mean (SD) of dependent variable	643.6	0.438	4.302	4.314	4.309	4.329
Adjusted R-squared	0.473	0.014	0.012	0.012	0.011	0.014
N	145	1286	1214	1254	1247	1255

Note: OLS estimates, standard errors clustered at the health post level in columns 2-6. The dependent variable in Col 1 is the total number of visits done by the two CHAs in the health post drawn from HMIS administrative data. The dependent variables in Columns 2-6 are drawn from a HH survey administered to 16 HHs in ach of in 47 communities where CHAs are active. Satisfaction measures range from 1 (very dissatisfied) to 5 (very satisfied).

Table 4: The effect of career incentives on the number of visits

dependent variable	Household visits			
source	SMS receipts	SMS receipts	SMS receipts	SMS receipts
time horizon	months 1-18	months 1-6	months 7-12	months 13-18
level	CHA	CHA	CHA	CHA
	(1)	(2)	(3)	(4)
Career incentives	93.95**	33.93**	29.56**	30.46**
	(37.19)	(15.97)	(13.49)	(12.92)
Area characteristics	Yes	Yes	Yes	Yes
Mean of dependent variable in control	318.6	167.1	92.1	59.8
Adjusted R-squared	0.112	0.115	0.064	0.105
N	307	307	307	307

Notes: OLS Estimates, standard errors clustered at the district level. The dependent variable is total number of household visited over the relevant time horizon. SMS receipts are sent by individual CHAs to MOH for each visit. All regressions include the stratification variables (province dummies and share of high school graduates in the district). Area characteristics include: number of staff in the health post, geographical distribution of households in the catchment area, and an indicator variable that equals 1 if the CHA reports to have good cell network coverage most of the time or all the time.

Table 5: Compensation mechanisms

dependent variable	retention	visit duration	no of women and children visited per HH	no of unique HHs visited	no of visits per HH	community mobilization meetings	patients seen at health post	emergency calls
source	SMS receipts	SMS receipts	HMIS records	SMS receipts	SMS receipts	HMIS records	HMIS records	Time use survey
level	CHA	CHA	health post	CHA	CHA	health post	health post	CHA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Career incentives	0.0469	0.265	0.0437	36.35**	0.488*	17.06***	31.79	0.0469
	(0.0582)	(1.850)	(0.0947)	(15.49)	(0.246)	(5.220)	(260.4)	(0.0582)
Area characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean of dependent variable in control	0.796	33.9	2.07	179.4	1.817	20.32	1126.6	0.457
Adjusted R-squared	0.041	0.011	0.006	0.121	0.125	0.072	0.027	0.002
N	307	307	142	307	307	146	146	298

Notes: OLS Estimates, standard errors clustered at the district level. The dependent variable is total number of household visited over the relevant time horizon. SMS receipts are sent by individual CHAs to MOH for each visit. The Health Management and Information System (HMIS) is the Zambian Ministry of Health's system for reporting health services data at government facilities. The two CHAs are required to submit monthly reports that summarize their activities at the health post/community level. The number of observations varies because some health posts do not submit the reports; these are equally distributed between treatments. The time use survey was administered in May 2013 during a refresher training program. Emergency calls=1 if the CHA takes at least 1 out of hours call in a typical week. Retention=1 if CHA is active after 1 year. All regressions include the stratification variables (province dummies and share of high school graduates in the district). Area characteristics include: number of staff in the health post, geographical distribution of households in the catchment area, and an indicator variable that equals 1 if the CHA reports to have good cell network coverage most of the time or all the time.

Table 6: The effect of career incentives on time allocation

dependent variable	Hours worked	Share of time spent in:			
		HH visits	Health Post	Community meetings	Meeting with supervisor
	(1)	(2)	(3)	(4)	(5)
Career incentives	-.588	.007	-.021*	.011	-.001
	(1.19)	(.014)	(.012)	(.011)	(.008)
Area characteristics	yes	yes	yes	yes	yes
Mean of dependent variable in control	42.8	.312	.171	.213	.085
Adjusted R-squared	.071	.055	.081	.031	.063
N	298	298	298	298	298

Notes: SURE Estimates, standard errors clustered at the district level bootstrapped with 1500 replications. Data source is the Time Use Survey that was administered in May 2013 during a refresher training program. Hours worked is defined as the number of hours worked in a typical week as reported by the CHAs. To measure the "Share of time spent in," CHAs were given 50 beans and asked to allocate them on cards listing the different activities listed above plus travel. The cards were scattered on a table in no particular order. All regressions include the stratification variables (province dummies and share of high school graduates in the district). Area characteristics include: number of staff in the health post, geographical distribution of households in the catchment area, and an indicator variable that equals 1 if the CHA reports to have good cell network coverage most of the time or all the time.

Table 7: The effect of career incentives on aggregate health outputs

Dependent variable: total over each quarter 2011:1-2014:2	institutional deliveries	postnatal (0-6 weeks) visits	children under 5 visited	children under 5 weighted	children under 1 receiving BCG vaccinations	children under 1 receiving polio vaccinations	children under 1 receiving measles vaccinations
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Career incentives	-1.796	-13.81	-80.19	-86.81	10.48	-1.335	0.747
	(10.29)	(9.534)	(142.0)	(133.2)	(12.07)	(9.075)	(10.05)
After	3.479	15.08**	55.40	102.7	-1.611	-1.643	-1.517
	(4.425)	(5.191)	(63.22)	(63.91)	(4.566)	(3.717)	(3.591)
Career incentives*After	14.68**	8.253	318.1**	284.3**	7.158	14.98**	11.47
	(6.322)	(9.562)	(98.05)	(110.2)	(8.906)	(4.803)	(7.255)
Area characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean of dependent variable in control in year 1	46.7	49.9	1312.8	1261.5	89.8	73.9	73.6
Adjusted R-squared	0.331	0.203	0.246	0.246	0.146	0.143	0.108
Number of facilities	89	118	123	123	121	120	121
Number of observations	1269	1528	1618	1610	1518	1530	1535

Notes: OLS Estimates, standard errors clustered at the district level. Data source is the Health Management and Information System (HMIS) available monthly from January 2011 until June 2014. Health center and health post staff are required to submit monthly reports that summarize their activities at the health post/community level. These are aggregated at the quarter level in the regressions. The variable in Column (1) is defined at the health center level because health centers are equipped for child births and health posts are not. The variables in columns (2)-(7) are defined at the health post level if this reports data, at the health center otherwise. After=1 after September 2012 (from 2012:4 onwards), when CHAs started working. All regressions include the stratification variables (province dummies and share of high school graduates in the district). Area characteristics include: number of staff in the health post, geographical distribution of households in the catchment area, and an indicator variable that equals 1 if the CHA reports to have good cell network coverage most of the time or all the time.

Table 8: The effect of career incentives on health impact: from household survey

	Information	Health practices				Incidence of Ilness			Anthropometrics			
Dependent variable	% of correct answers in medical knowledge test	=1 if child under 2 yr old is breastfed	=1 if child's stool are safely disposed	number of deworming treatments	=1 if child exposed to CHA is on track with immunization schedule	= if child has experienced fever in the last two weeks	= if child has experienced diahrrea in the last two weeks	= if child has experienced cough in the last two weeks	=1 if weight for age z score <2 SD (moderately or severely undernourished)	=1 if weight for age z score <3 SD (severely undernourished)	=1 if MUAC<12.5 (moderately or severely wasted)	=1 if MUAC<11. 5 (severely wasted)
Career incentives	0.002	0.051**	0.121***	0.225*	0.047**	-0.003	0.037	-0.070**	-0.053*	-0.028*	-0.023	-0.014
	(0.010)	(0.023)	(0.039)	(0.129)	(0.020)	(0.037)	(0.027)	(0.033)	(0.030)	(0.015)	(0.015)	(0.014)
household controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
child controls	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Mean of dep var in control	.740	.641	.595	1.44	.058	.469	.255	.450	.210	.051	.036	.014
Adjusted R-squared	0.057	0.561	0.161	0.263	0.024	0.077	0.017	0.021	-0.006	0.003	0.018	0.017
N	738	613	736	659	462	731	731	731	582	582	581	581

Notes: OLS estimates, standard errors clustered at the district level. The medical knowledge test contains 14 questions on topics that CHAs are supposed to cover; these questions were drafted by the researchers in consultation with CHA program officials and the CHA curriculum Breastfeeding and stool disposal are self-reported. In line with UNICEF (2014), we define stools to be safely disposed if flushed in toilet/latrine. Deworming, immunisation data and schedule as reported in the child health card. A child is defined to be on track if they have completed all immunisations required for their age in months. The immunisation sample is restricted to children who were 3 months or younger (including unborn) when the CHAs started working. Thresholds for weight-for-age and MUAC are taken from WHO guidelines; following these, data are restricted to children between 6-59 months. Household controls include size, education level of the respondent, number of assets. Child controls include age and gender. All regressions include the stratification variables.

Table 9: The effect of career incentives on CHA's traits

	treatment	**control**	p-values
Panel A: Skills			
Average test score at training [0-100] *	69.2	68.0	.067
	(7.23)	(6.75)	
O-levels total exam score *	25.3	24.5	.559
	(9.92)	(8.70)	
O-levels passed in biology and other natural sciences *	1.47	1.39	.801
	(.868)	(.824)	
Panel B: Motivation and preferences			
Psychometric scale: Career orientation [1-5]	3.30	3.08	.025
	(1.050)	(.939)	
Psychometric scale: Pro-social motivation	3.64	3.63	.623
	(.541)	(.541)	
Psychometric scale: Desire for positive pro-social impact [1-5]	4.43	4.43	.824
	(.444)	(.509)	
Psychometric scale: Affective commitment to beneficiaries [1-5]	3.81	3.83	.873
	(1.153)	(1.170)	
Donation to local hospital (dictator game)	4063	3922	.739
	(4018)	(3937)	
Main goal is "career advancement" vs. "service to community"	.138	.055	.015
	(.346)	(.228)	
Panel C: Outside opportunity			
Farmer (=1 if yes)	.717	.659	.441
	(.452)	(.476)	
Houseworker (=1 if yes)	.103	.141	.586
	(.025)	(.030)	
Trader (=1 if yes)	.090	.081	.928
	(.287)	(.275)	
Teacher (=1 if yes)	.041	.015	.108
	(.200)	(.121)	
Panel D: Demographics and socio-economic status			
Gender (=1 if female)	.450	.585	.083
	(.499)	(.494)	
Age (years)	28.66	26.93	.005
	(6.42)	(5.49)	
Married (=1 if yes)	.462	.510	.156
	(.500)	(.502)	
Number of dependents	3.50	3.26	.369
	(2.54)	(2.56)	
Aims to remain in the same community in 5-10 years (=1 if yes)	.575	.612	.392
	(.496)	(.489)	
Poor (self reported) (=1 if yes)	.219	.204	.507
	(.419)	(.404)	
Number of household assets	5.07	5.22	.477
	(2.58)	(3.11)	
Owns transport (=1 if yes)	.781	.741	.651
	(.439)	(.415)	

Notes: Columns 1 and 2 show means and standard deviations in parentheses. Column 3 reports the p-values of the null hypothesis that the career treatment effect equals zero conditional on stratification variables and with standard errors clustered at the district level. Variables denoted by * are drawn from MOH administrative data, all other variables are drawn from surveys administered to CHAs at the interview or during the training program. The sample is the 307 CHAs deployed. Average test score at training equals the average score in 11 tests on basic medical practices taken during the training program. Ordinary levels or O-levels are administered by the Examinations Council of Zambia (ECZ) to 12th-grade students, the highest grade in the Zambian secondary education system. O-levels total exam score is constructed as the sum of inverted O-levels scores (1=9, 2=8, and so on) from all subjects in which the applicant wrote the exam, so that larger values correspond to better performance. O-levels passed in biology and other natural sciences, equals the number of O-levels passed in biology, chemistry, physics, science and agricultural science. Career orientation: from Wrzensniewski et al.'s (1997) Career-Calling Orientation scale, which consists of three items: "I expect to be in a higher-level job in five years," "I view my job as a stepping stone to other jobs," and "I expect to be doing the same work as a CHA in five years," each scored on a five-point scale from "strongly disagree" to "strongly agree." The psychometric measures of pro-sociality are adopted from Grant (2008). Each measure takes on a value between 1 and 5 and represents, among the statements listed below, the extent to which the applicant agreed, on average. Levels of agreement are 1 (strongly disagree), 2 (disagree), 3 (neither agree nor disagree), 4 (agree), 5 (strongly agree). Statements for the other variables are as follows: Desire for positive pro-social impact includes "It is important to me to do good for others through my work", "I care about benefiting others through my work", "I want to help others through my work," "I want to have positive impact on others through my work", "I get motivated by working on tasks that have the potential to benefit others," "I like to work on tasks that have the potential to benefit others", "I prefer to work on tasks that allow me to have a positive impact on others", "I do my best when I'm working on a task that contributes to the well-being of others", "It is important to me to have the opportunity to use my abilities to benefit others", "It is important to me to make a positive difference in people's lives through my work", "At work, I care about improving the lives of other people" and "One of my objectives at work is to make a positive difference in other people's lives." Sees self as pro-social: "I see myself as caring," "I see myself as generous," and "I regularly go out of my way to help others." Affective commitment to beneficiaries includes "The people who benefit from my work are very important to me" and "The people who benefit from my work matter a great deal to me". Donation to local hospital: trainees are given 25,000 Kwacha (approximately $5) and invited to donate any portion (including nothing) to the local hospital to support needy patients. This donation decision occurs privately and confidentially in concealed donation booths.

Table 10: The effect of career incentives on performance: observables vs unobservables.

	Household visits				
	(SMS receipt data: Total August 12-January 14)				
	(1)	(2)	(3)	(4)	(5)
Career incentives	93.95**	89.08**	97.10**	83.05**	85.69**
	(37.19)	(37.46)	(37.98)	(38.57)	(38.74)
Average test score at training		4.185**			3.013
		(2.001)			(1.997)
Main goal is "career advancement" vs. "service to community"			-57.79*		-63.75*
			(32.12)		(32.54)
Psychometric scale: Career orientation [1-5]			6.458		8.576
			(15.33)		(15.12)
Female				7.842	17.26
				(35.75)	(36.41)
Age				6.240**	5.382**
				(2.251)	(2.238)
Area characteristics	Yes	Yes	Yes	Yes	Yes
p-value of the test that individual controls are jointly=0		0.04	0.17	0.03	0.00
Mean of dependent variable in control	318.6	318.6	318.6	318.6	318.6
Adjusted R-squared	0.112	0.122	0.106	0.128	0.126
N	307	307	307	307	307

Notes: OLS Estimates, standard errors clustered at the district level. The dependent variable is total number of household visited between August 12 and January 14. SMS receipts are sent by individual CHAs to MOH for each visit. Average test score at training equals the average score in 11 tests on basic medical practices taken during the training program. Career orientation: from Wrzensniewski et al.'s (1997) Career-Calling Orientation scale, which consists of three items: "I expect to be in a higher-level job in five years," "I view my job as a stepping stone to other jobs," and "I expect to be doing the same work as a CHA in five years," each scored on a five-point scale from "strongly disagree" to "strongly agree." All regressions include the stratification variables (province dummies and share of high school graduates in the district). Area characteristics include: number of staff in the health post, geographical distribution of households in the catchment area, and an indicator variable that equals 1 if the CHA reports to have good cell network coverage most of the time or all the time.

Table A.1: Treatment effect on time use

Panel A: Time allocation during household visits

share of time allocated to:	counseling	inspections	filling in receipts and forms	asking questions about health behaviors and knowledge	discussing health profile and goals	visiting sick household members
	(1)	(3)	(5)	(7)	(9)	(11)
Career incentives	.006	.007	-.016	-.011	-.003	.010
	(.012)	(.015)	(.010)	(.009)	(.012)	(.009)
Mean of dependent variable in social treatment	0.207	0.196	0.146	0.137	0.122	0.100
Area characteristics	no	no	no	no	no	no
R-squared	.030	.041	.049	.026	.014	.027
N	292	292	292	292	292	292

Panel B: Time allocation during work at the health post

share of time allocated to:	seeing sick patients	filling in forms	dispensing medications	helping with ante natal care visits	cleaning and maintaining the health post
	(1)	(3)	(5)	(7)	(9)
Career incentives	-.002	-.050***	.006	.019	.019
	(.011)	(.018)	(.012)	(.019)	(.013)
Mean of dependent variable in social treatment	0.262	0.228	0.207	0.160	0.104
Area characteristics	no	no	no	no	no
R-squared	.051	.104	.091	.095	.133
N	271	271	271	271	271

Notes: System estimates (SURE), bootstrapped standard errors clustered at the district level in parenthesis. All regressions include the stratification variables (province dummies and share of high school graduates in the district). All 298 participants in the refresher training program were given 50 beans and asked to allocate the beans to show how much time they spent doing each activity within each task. They were instructed to place more beans on a card if they spent more time on an activity, to place no beans if they never do an activity, and to place the beans any way they would like, including placing all beans on one card, or 0 beans on any card. Panel A activities are: greeting household members, assessing and referring sick household members, reviewing and discussing the household's health profile and goals, asking questions about health behaviors and knowledge, providing health education and counseling, doing household inspections (waste disposal, latrines, etc.), and documentation (filling registers/books and sending SMS visits). The omitted category in Panel A is "greetings." The sample in Panel A covers the 292 out of 298 CHAs who reported spending time doing visits. Panel B activities are: seeing sick patients in the health post, dispensing medications from the pharmacy, helping with ANC visits, cleaning and maintaining the facility, assisting with deliveries and other procedures when needed, and documentation (filling registers/books and sending monthly reports through DHIS2). The omitted category in Panel B is "assisting with deliveries." The sample in Panel B covers the 271 out of 298 CHAs who reported spending time at the health post. Area characteristics include: number of staff in the health post, geographical distribution of households in the catchment area, and an indicator variable that equals 1 if the CHA reports to have good cell network coverage most of the time or all the time.

Table A.2: Psychometric tests

	treatment	**control**	p-values
Average Scores:			
Social Desirability	.353	.397	.100
	(.019)	(.022)	
Autonomy	2.244	2.102	.065
	(.048)	(.046)	
Internal Motivation	4.392	4.372	.851
	(.055)	(.063)	
Extrinsic Motivation	3.189	3.230	.215
	(.039)	(.038)	
Intrinsic Motivation	3.706	3.749	.448
	(.031)	(.034)	
Calling Orientation	4.049	4.063	.451
	(.040)	(.041)	
Status Striving	3.502	3.412	.305
	(.063)	(.054)	
Accomplishment Striving	4.285	4.332	.148
	(.033)	(.036)	
Consistent Interest	2.266	2.255	.589
	(.051)	(.055)	
Grit	2.083	2.063	.477
	(.036)	(.039)	
Persistent Effort	1.900	1.887	.734
	(.046)	(.048)	
Proactive Personality	3.582	3.591	.820
	(.056)	(.056)	
Personal Prosocial Identity	4.257	4.319	.375
	(.049)	(.051)	
Company Prosocial Identity	4.382	4.502	.030
	(.049)	(.043)	
Perceived Prosocial Impact	4.090	4.141	.303
	(.053)	(.055)	
Perceived Antisocial Impact	1.678	1.701	.698
	(.068)	(.073)	
Perceived Social Worth	4.100	4.087	.830
	(.057)	(.066)	

Notes: Scores are calculated as averages of a series of questions scaled 1 to 5, except for Social Desirability (RAND). Autonomy scales are taken from questions in Wageman, 1995. Internal Motivation is from Edmonson, 1999. Extrinsic Motivation and Intrinsic Motivation are from Amabile et al., 1994. Calling Orientation is from Wreszniewski et al., 1997. Status Striving, and Accomplishment Striving are from Barrick et al., 2002. Consistent Interest, Grit, and Persistent Effort are from Duckworth et al., 2007. Proactive personality is from Claes et al., 2005. Personal Prosocial Identity and Company Prosocial Identity are from Grant et al., 2008. Perceived Prosocial Impact, Perceived Antisocial Impact, and Perceived Social worth are from Grant et al., 2008b/c.

Table A.3: Applicants vs. nominated candidates

	Part I: Applicants (N=1585)			Part II: Nominated Candidates (N=334)		
	treatment	**control**	p-values	**treatment**	**control**	p-values
Panel A: Skills						
O-levels total exam score	24.8	23.3	.019	27.14	25.65	.173
	(9.81)	(9.35)		(10.95)	(8.81)	
O-levels passed in biology and other natural sciences	1.44	1.24	.006	1.55	1.47	.642
	(.858)	(.888)		(.890)	(.805)	
Panel B: Motivation and preferences						
Aims to be a higher-rank health professional in 5-10 years	.246	.188	.026	.354	.253	.031
	(.431)	(.391)		(.479)	(.436)	
Perceives community interests and self-interest as overlapping	.839	.842	.975	.865	.887	.685
	(.367)	(.364)		(.342)	(.317)	
Panel C: Demographics and socio-economic status						
Gender (=1 if female)	.292	.294	.458	.273	.345	.237
	(.016)	(.016)		(.447)	(.477)	
Age	26.0	26.2	.745	27.85	26.64	.040
	(.200)	(.205)		(6.63)	(5.99)	

Notes: For each part of the Table, Columns 1 and 2 show means and standard deviations in parentheses while Column 3 reports the p-values of the null hypothesis that the career treatment effect equals zero conditional on stratification variables and with standard errors clustered at the district level. Ordinary levels or O-levels are administered by the Examinations Council of Zambia (ECZ) to 12th-grade students, the highest grade in the Zambian secondary education system. O-levels total exam score is constructed as the sum of inverted O-levels scores (1=9, 2=8, and so on) from all subjects in which the applicant wrote the exam, so that larger values correspond to better performance. O-levels passed in biology and other natural sciences, equals the number of O-levels passed in biology, chemistry, physics, science and agricultural science. Aims to be a higher-rank health professional in 5-10 years: equals 1 if the candidate chooses any combination of being an "environmental health technician," "clinical officer," or "doctor" in response to the question, "When you envision yourself in 5-10 years' time, what do you envision yourself doing?" Perceives interests as overlapping: Adapted Inclusion of Others in Self scale (Aron et al., 2004). Applicants are asked to choose between sets of pictures, each showing two circles (labeled "self" and "community") with varying degrees of overlap, from non-overlapping to almost completely overlapping. This variable equals 1 if the respondent chooses the almost completely overlapping picture, 0 otherwise.

Table A.4: Effect of career incentives on candidate selection by panels

	=1 if nominated	p-value	=1 if nominated	p-value
High relative exam score X treatment	0.235***		0.201***	
	(0.0405)	.256	(0.0399)	.304
High relative exam score X control	0.174***		0.148***	
	(0.0369)		(0.0349)	
Aims to be a higher-rank health worker in 5-10 years X treatment	0.111***		0.138***	
	(0.0363)	.489	(0.0404)	.565
Aims to be a higher-rank health professional in 5-10 years X control	0.0778**		0.109***	
	(0.0309)		(0.0378)	
Perceives interests as overlapping X treatment	0.0203		0.0126	
	(0.0397)	.169	(0.0446)	.266
Perceives interests as overlapping X control	0.0981**		0.0729*	
	(0.0392)		(0.0388)	
Female X treatment	0.0913**		0.113***	
	(0.0354)	.901	(0.0393)	.689
Female X control	0.0854***		0.0926**	
	(0.0311)		(0.0361)	
Age X treatment	0.0125***		0.0134***	
	(0.00355)	.043	(0.00423)	.079
Age X control	0.00320		0.00463	
	(0.00280)		(0.00301)	
Number of interviewees in health post	-0.0103***		-0.00256	
	(0.00358)		(0.00338)	
Applicant pool controls	no		yes	
Adjusted R-squared	0.149		0.141	
N	1269		1230	

Notes: OLS estimates. All regressions include the stratification variables (province dummies and share of high school graduates in the district) and standard errors clustered at the district level. Independent variables are interacted with each treatment (social and career incentives). High relative exam score: equals 1 if the applicant's exam score is one of the 3 highest (4 in case of tie) among applicants to the same health post. Aims to be a higher-rank health professional in 5-10 years: equals 1 if the candidate chooses any combination of being an "environmental health technician," "clinical officer," or "doctor" in response to the question, "When you envision yourself in 5-10 years' time, what do you envision yourself doing?" Perceives interests as overlapping: Adapted Inclusion of Others in Self scale (Aron et al., 2004). Applicants are asked to choose between sets of pictures, each showing two circles (labeled "self" and "community") with varying degrees of overlap, from non-overlapping to almost completely overlapping. This variable equals 1 if the respondent chooses the almost completely overlapping picture, 0 otherwise. Number of interviewees in health post: total candidates interviewed per health post. Applicant pool controls include the following variables, all computed over applicants to the same health post: top 3 (4 in case of tie) exam scores, the share of applicants who aims to be a higher-rank health professional in 5-10 years; the share of applicants who perceive interests as overlapping; the share of applicants who are female; the average age.

Table A.5: Effect of career incentives on candidate selection by panels

Panel A. Placebo test

dependent variable: total over each quarter 2011:1-2014:2	women giving birth at the health center	postnatal (0-6 weeks) visits	children under 5 visited	children under 5 weighted	children under 1 receiving BCG vaccinations	children under 1 receiving polio vaccinations	children under 1 receiving measles vaccinations
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Career incentives	-3.700	-12.96	-17.60	-18.42	11.92	-4.133	2.792
	(11.18)	(9.580)	(175.7)	(157.7)	(13.55)	(10.58)	(10.34)
After	0.705	15.23**	89.93	152.6**	2.451	3.685	-3.144
	(4.055)	(4.617)	(78.79)	(74.58)	(5.338)	(4.130)	(3.838)
Career incentives*After	12.33**	8.964	369.4**	339.6**	8.490	12.18**	13.16
	(5.409)	(9.920)	(120.3)	(140.0)	(10.28)	(5.590)	(8.518)
Placebo After	7.191**	-0.0192	-65.29	-97.48	-8.328*	-10.79*	3.733
	(2.277)	(4.663)	(82.07)	(68.14)	(4.936)	(5.579)	(4.517)
Career incentives*Placebo After	4.554	-1.037	-108.4	-117.7	-2.230	6.373	-3.138
	(5.778)	(5.441)	(139.0)	(135.7)	(7.921)	(8.089)	(8.711)
Area characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean of dependent variable in control in year 1	46.7	49.9	1312.8	1261.5	89.8	73.9	73.6
Adjusted R-squared	0.336	0.203	0.245	0.247	0.147	0.144	0.107
Number of facilities	89	118	123	123	121	120	121
Number of observations	1269	1528	1618	1610	1518	1530	1535

Panel B. Health post fixed effects.

dependent variable: total over each quarter 2011:1-2014:2	women giving birth at the health center	postnatal (0-6 weeks) visits	children under 5 visited	children under 5 weighted	children under 1 receiving BCG vaccinations	children under 1 receiving polio vaccinations	children under 1 receiving measles vaccinations
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
After	5.082	15.46**	63.77	106.9	-1.094	-1.299	-1.024
	(4.194)	(5.205)	(65.98)	(65.64)	(4.786)	(3.893)	(3.844)
Career incentives*After	13.48**	8.906	306.7**	278.8**	8.349	15.40**	11.58
	(6.485)	(9.933)	(107.1)	(118.9)	(8.843)	(5.325)	(7.826)
Area characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean of dependent variable in control in year 1	46.7	49.9	1312.8	1261.5	89.8	73.9	73.6
Adjusted R-squared	0.819	0.664	0.618	0.591	0.496	0.565	0.445
Number of facilities	89	118	123	123	121	120	121
Number of observations	1269	1528	1618	1610	1518	1530	1535

Notes: OLS Estimates, standard errors clustered at the district level. Data source is the Health Management and Information System (HMIS) available monthly from January 2011 until June 2014. Health center and health post staff are required to submit monthly reports that summarize their activities at the health post/community level. These are aggregated at the quarter level in the regressions. The variable in Column (1) is defined at the health center level because health centers are equipped for child births and health posts are not. The variables in columns (2)-(7) are defined at the health post level if this reports data, at the health center otherwise. After=1 after September 2012 (from 2012:4 onwards), when CHAs started working. Placebo After=1 after September 2011, halfway through the period before the CHAs started working. All regressions include the stratification variables (province dummies and share of high school graduates in the district). Area characteristics include: number of staff in the health post, geographical distribution of households in the catchment area, and an indicator variable that equals 1 if the CHA reports to have good cell network coverage most of the time or all the time.