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Human Resources for Health in Ethiopia: Summary Report

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Contents

1 Introduction and summary

The supply and geographic distribution of health workers are major constraints to improving health in low-income countries. A number of recent studies have highlighted the shortage of skilled health workers in many settings (WHO, 2006), the impact this has on health outcomes (Anand and Barnighausen, 2004), and the risk this poses for the achievement of the Millenium Development Goals (WHO, 2006; Joint Learning Initiative, 2004). However, there remains limited evidence about what sorts of policies will attract nurses and doctors into medical training, improve the retention of trained health workers, and encourage them to work in rural areas where problems of inaccessibility of services are most acute.

The challenges of human development are particularly extreme in Ethiopia, a country with a population of over 70 million people, 85% of whom live in rural areas. It is one of the poorest countries in the world, with per capita income of about $150, and although the poverty rate has fallen by 8 percentage points over the last 10 years, it nonetheless remained at 37% in 2006. The country faces acute challenges in reaching all of the Millenium Development Goals, including the three goals relating to health - to reduce child mortality, improve maternal health, and combat HIV/AIDS, malaria, and other diseases. In 2005 the infant mortality rate was 77 per 1,000, the under-5 mortality rate was 123 per 1,000, and the maternal mortality rate was 673 per 100,000. In 2006 about half of all mothers received some kind of antenatal service, and 15% of deliveries were attended by a health worker. Ethiopia has escaped the ravages of HIV/AIDS compared with other countries in Africa, and had an adult prevalence of 2.1% in 2006.

With an eye to informing the policy-making process, this report summarizes the methodology and findings of a study of the health labor market conducted in Ethiopia in 2007. Below we first discuss the prevailing human resources setting in the health sector. This is followed by a description of the empirical methodology, including survey design and sampling issues, and presentation of summary statistics on the workforce and its demographic and economic characteristics. We then present two separate analyses using the data collected. First, we estimate the relationships between job assignments and career development, with special attention to the institutional mechanisms that characterize the health sector labor market – in particular distinguishing between the lottery system used to assign jobs to new graduates, and what we refer to as the market. Second, we estimate the expected labor supply responses to a variety of financial and in-kind incentives that might be provided in order to attract workers to rural areas.

We group our findings into three categories: descriptive, analytic, and predictive. Among the descriptive results, the most striking is the extent to which health worker salaries and incomes vary geographically. In Addis Ababa doctors earn 50 percent more than they would on average in Tigray and SNNPR if they work in the public sector, and on average three times as much if they work in the private sector. Of course, some of this reflects different characteristics

– such as age, experience, specialization, etc. Half of private sector doctors in Addis own a car, while fewer than 2 percent of SNNPR physicians do so.

Our analytic results focus mainly on the physician labor market. They include an analysis of the effects of job choices and assignments early on in a physician's career, including the long term career consequences of taking a job in the regions, and the long term effects of participating in the lottery system itself. We present evidence that the labor market for physicians who took part in the lottery operates *less efficiently* than the market for physicians who did not participate in the lottery. We rationalize this by suggesting that the lottery obfuscates information about physician quality, which would be valuable to future employers, and this information imperfection leads to adverse selection in the labor market.

Finally, our predictive results are based on a discrete choice experiment that was part of our questionnaire. This component of the study enables us to estimate the value that doctors and nurses place on different job attributes, and how they vary across individuals. We find, for example, that doubling wages in areas outside the capital would increase the share of doctors willing to work there from about 7 percent to more than 50 percent. Providing high quality housing would increase physician labor supply to about 27 percent, which is equivalent to paying a wage bonus of about 46 percent. Doubling wages paid to nurses for work in rural areas outside cities increases their labor supply from 4 percent to 27 percent, while the non-wage attribute that is most effective in inducing them to relocate to rural areas is the quality of equipment and drugs. The same impact could be achieved by increasing rural nursing wages by about 57 percent for men and 69 percent for women.

2 Human resources for health in Ethiopia

This section provides background information on human resources in the health sector, and a description of the institutional structure of the health labor market.

2.1 Human resources

This section reviews the size and distribution of the health workforce in Ethiopia. The Ministry of Health (2005) reports that in 2005 there were a total of 2,453 physicians in the country, of which 444 (17%) operated in the private sector, 578 (23%) in the NGO sector, and 354 (14%) in other government organizations (such as the military). As reported in Table 1, 42 percent of physicians are specialists (1,067 out of 2,543).

Of the 830 physicians classified as "public", 20 percent were located in Addis Ababa. Although the Ministry of Health reports the distribution of public doctors, data on the geographic distribution of *all* doctors is not readily available. Table 2 reports the geographic pattern of physicians and population/physician

	Specialists	GPs	Total
Public	240	590	830
Central	164	83	247
NGOs	270	308	578
OGOs	178	176	354
Private	215	229	444
Total	1067	1386	2453

Table 1: Physicians by sector and type. Source: Ministry of Health, 2005

Region	Number *public* physicians	Ratio of population to *public* physicians	Ratio of population to *all* physicians*
Addis Ababa **(4.0%)**	**167**	**17,291**	**5,851**
Larger regions **(92.2%)**	**555**	**121,395**	**41,075**
Oromia (35.3%)	186	138,802	46,965
Amhara (25.5%)	131	142,184	48,109
SNNPR (19.8%)	106	136,695	46,252
Tigray (5.8%)	77	88,004	18,557
Somali (5.8%)	55	76,696	25,951
Smaller regions **(3.8%)**	**108**	**25,756**	**8,716**
Afar (1.9%)	17	79,925	27,043
Ben Gumuz (0.8%)	14	43,536	14,731
Dire Dawa (0.5%)	30	12,784	4,326
Gambella (0.3%)	6	40,066	13,557
Hareri (0.3%)	41	4,623	1,564
Total	830	88,004	29,777

Table 2: Geographic distribution of physicians, 2005. * This column assumes all non-public doctors are distributed in the same proportion as public physicians. Source: Ministry of Health, 2005

ratios. The ratios of population to *all* physicians reported in the third column are calculated under the strong assumption that the geographic distribution of non-public physicians is the same as that of public physicians. Even under this very conservative assumption, the average population to physician ratio is fully seven times higher across the five most populous regions (where 92 percent of the population live) than it is in Addis Ababa.

If the distribution of non-public physicians is skewed towards Addis Ababa, then the disparity between the capital and the regions increases. Of particular importance in this regard is the private sector, which has grown rapidly in recent years, with the vast majority of this growth occurring in Addis Ababa. Figure 1 uses the MoH 2005 data to compare the geographic distribution of public
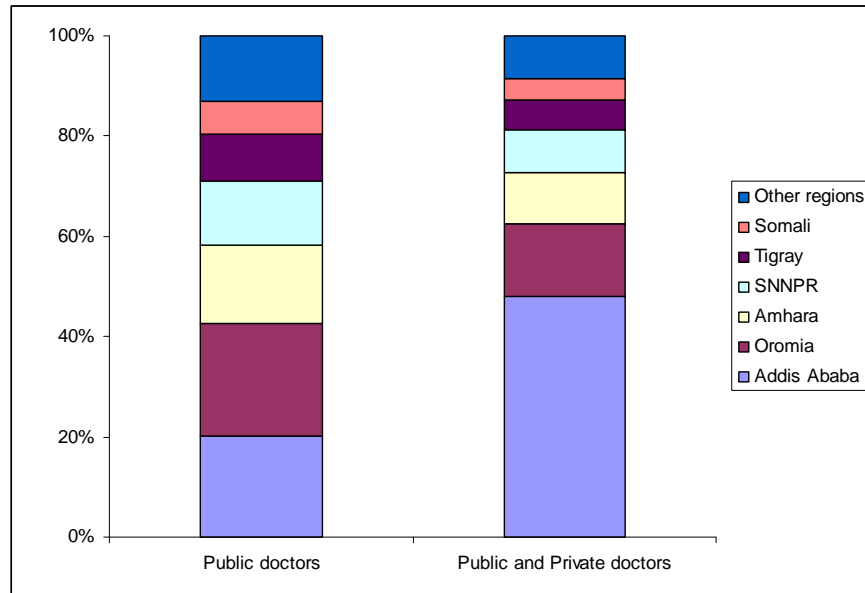
Figure 1: Geographic distribution of "public" doctors, and "public plus private" doctors. Source: Ministry of Health, 2005.

doctors, with that of public and private doctors, assuming all private doctors work in Addis. In this case, nearly half of the doctors (48%) worked in Addis in 2005, home to 4 percent of the population.

According to survey data we collected in 2007 on physicians in Ethiopia, 380 out of an estimated 597 physicians working in Addis (or 63%) currently work as physicians outside the public sector, the vast majority in the private sector. In one of the two other regions covered by the survey, Southern Nations Nationalities Peoples Republic (SNNPR), about 10% of physicians are estimated to be working outside the public sector (including NGOs). In the second surveyed region, Tigray, virtually all doctors are believed to work in the public sector.

Against this background, the World Health Organization recommends a population-physician ratio of 10,000. The last row of Table 2 reports the country *average* population-physician ratio to be about three times this level, suggesting that the first challenge facing Ethiopia is to train and retain enough doctors to triple the workforce. However, an equally pressing concern, and one that must be addressed if the WHO-recommended ratios are to be met in a meaningful way, is the paucity of physicians in rural areas. Training more doctors who end up working in the capital, or overseas, will have little impact on the availability of health care services for most people, and arguably little impact on health outcomes. With ratios of 40 to 50 thousand people per doctor in the

largest regions, there is an overwhelming need to attract medical providers to rural areas, and to get them to stay.

2.2 The lottery system

The primary vehicle through which the Ethiopian health system has ensures a supply of health workers to the rural regions is a kind of national clearing house. Each year a national lottery is announced through the media in September. Health workers who graduated in the previous June and July, as well as doctors who have completed their internships, are invited to go to the Ministry of Health, starting in October, to participate in the lottery.

Under the lottery, which is officially mandatory although in practice appears to be optional, a participant is randomly assigned to one of the twelve regions of the country, and the regional health bureau is informed of this assignment. Job assignments at the regional level are administrated by the relevant regional bureau (World Bank, 2006). Assigned workers are required to serve a fixed number of years before being "released" and permitted to apply for other positions.[1]

We estimate that about 60 percent of physicians currently working in Ethiopia participated in the lottery. While the lottery is still officially in place, during the past five years Ethiopia has embarked on a radical decentralization program across all areas of the public sector, with much of the responsibility for service delivery being devolved to lower levels of government and allowing private health facilities to operate alongside public ones. According to discussions with senior health officials, legal questions have also been raised about the government's ability to enforce the requirement that doctors whose training was federally funded can be required to work for a fixed period in a job assigned through the lottery.

In what follows, we use the lottery system to estimate the long-term impacts of rural assignment, and compare the effect of getting a job in Addis early in a doctor's career on later labor market outcomes among lottery participants and non-participants. We then examine whether participation in the lottery itself can compromise the efficiency of future allocations in the physician labor market.

3 Empirical methodology

In early 2007 a survey of physicians and nurses was undertaken by an Addis Ababa-based research firm, the Miz_Hasab Research Institute. Health workers at hospitals and health centers in Addis, Tigray, and SNNPR were interviewed

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[1] The maximum number of health workers assigned to each region is decided before October by a 3-person committee at the Ministry of Health, on the basis of the official requests for health workers sent by each region. An exception in the lottery system has been recently introduced with respect to the assignment to posts in the newest regions of Benishangul, Hafar, Somali and Gambella. Before the lottery takes place, each health worker is asked whether he/she would be willing to work in any of these new regions. If the answer is negative, as in the majority of cases, the corresponding posts are added to the lottery.
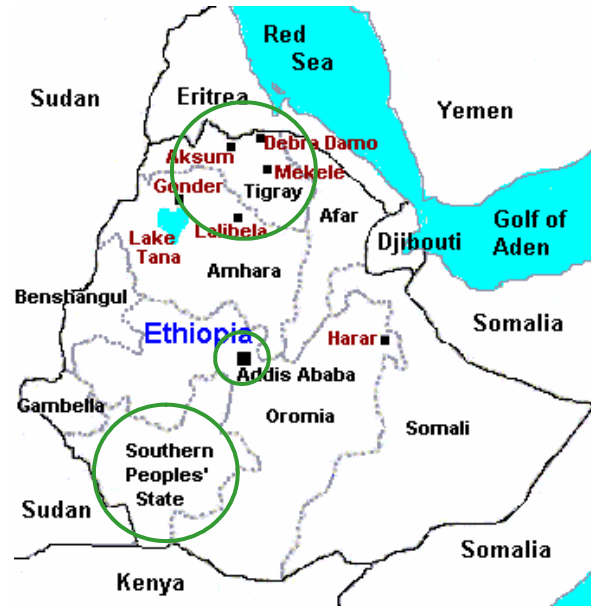
Figure 2: Ethiopia. Our survey was carried out in Addis Ababa, Tigary, and SNNPR

and asked about their work, careers, incomes, families, training, experiences, and other employment-related issues. They were also asked to provide information on the value they placed on different attributes of their jobs, including location, facility quality, etc. The results of this survey are presented below in Sections 4 through 6. In this section we review the sampling strategy and the nature of the questionnaires.

3.1 Sampling

Our sampling strategy aimed at obtaining representative samples of doctors and nurses from three of Ethiopia's eleven regions – the capital city of Addis Ababa, Tigray, and Southern Nations and Nationalities Peoples Republic (SNNPR), as illustrated in Figure 2.

Addis is a city of about 3 million people and is located in the central highlands. Tigray has a population of about 4 million people and lies in the extreme north of the country, bordering Eritrea, while SNNPR, with a population of 14 million borders Kenya to the south. Our sample is representative within these geographic areas.[2] The design over-sampled doctors in SNNPR and Tigray

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[2] Other regions, such as Oromia (which surrounds Addis Ababa) and Amhara (which is immediately north of Oromia) are larger (with 26 and 19 million residents respectively) and less remote, at least in terms of direct distance measures, but we have no reason to expect this to have introduced systematic biases in our estimates.

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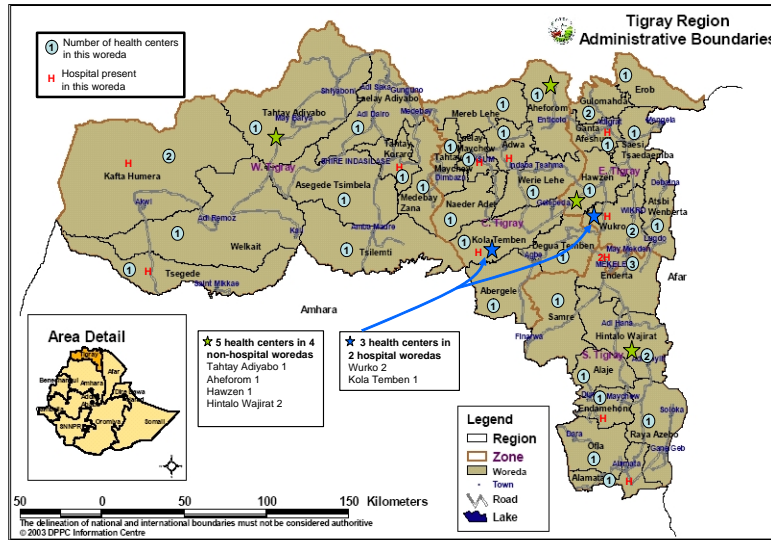
Figure 3: Tigray sampling information: each symbol H represents a hospital in the corresponding woreda. All hospitals were visited (except for the one in Kafta Humera woreda) The blue and green stars show woredas with and without hospitals respectively in which health centers were visited.

due to the small number of doctors outside Addis Ababa: all doctors in these rural regions were sampled, while only about one third of doctors in Addis were. Our final sample included 219 doctors and 645 nurses working in health centers and hospitals. Detailed sampling information is illustrated in for Tigray and SNNPR in Figures 3 and 4.

A random sample of 1/3 of doctors was achieved in Addis Ababa by (a) randomly sampling facilities of the various types with sampling weights corresponding to the estimated proportion of doctors working across the different facilities; and (b) interviewing all doctors at the sampled facilities. In SNNPR and Tigray, all doctors were included in the sample. This was achieved by sampling all public hospitals in SNNPR and Tigray (there are generally no doctors in non-hospital health facilities in these regions and there were no private hospitals). In addition to interviewing health workers, we administered a facility level survey with the facility administrator or other senior official at each facility we visited. A summary of our sample is provided in Table 3.

Amongst doctors, the interview response rate varied widely across regions. In Tigray it was very high (88%), while in SNNPR and Addis Ababa it was
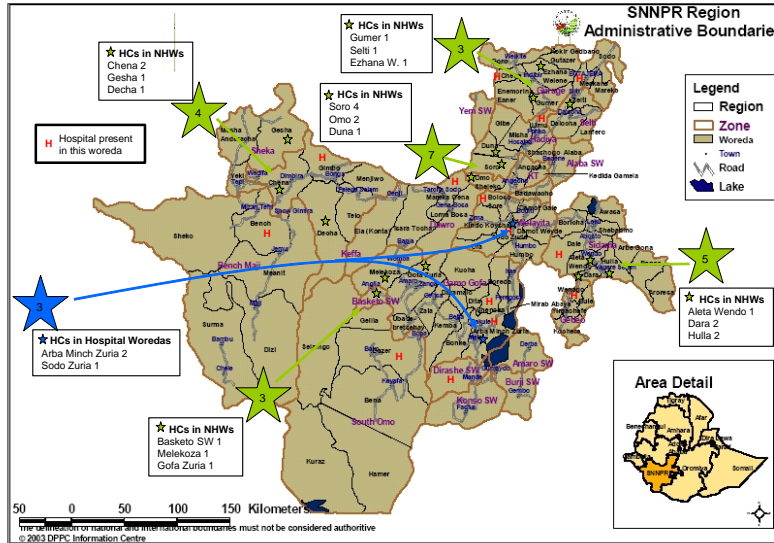
Figure 4: SNNPR sampling information: each symbol H represents a hospital in the corresponding woreda. All hospitals were visited. The blue and green stars show woredas with and without hospitals respectively in which health centers were visited. Non-hospital woredas were clustered.

	Addis Ababa	SNNPR	Tigray	Total
Facilities	40	39	18	97
Hospitals	6	12	11	29
Health centers and clinics	34	27	7	68
Health workers	362	206	293	861
Doctors	91	72	56	219
Nurses	271	221	150	642

Table 3: Numbers of facilities and health workers surveyed, by region

lower – 58% and 66% respectively. In Addis, the response rates differed in public and private facilities. At public facilities, all doctors present agreed to be interviewed, although 40% of sampled doctors were absent on the day of the interview (28% for unexplained reasons, and 12% for planned leave). However at private facilities, no unexplained absences were recorded, while 18% of doctors were absent on planned leave. In contrast to public facilities, the share of sampled doctors who were present but refused to be interviewed was 27%. In Tigray, non-response arose because one sampled facility no longer existed, and one was inaccessible for security reasons, but at visited facilities absenteeism and refusal rates were very low. In SNNPR, 42% of doctors listed as being employed were absent at the time of the facility visit, although nine out of ten of them were reported as being absent for training purposes.

3.2 Survey Instrument

Our survey instrument included three components.[3]   The first was a short questionnaire administered to the director or other senior administrative officer of the facility visited, and concerned facility-level information.   The other two components were administered to each health worker interviewed.   Of these, the first component asked for information about (i) lottery participation and characteristics of the worker's first job, (ii) work history, (iii) training, (iv) current income earning activities, and (v) household characteristics and incomes. The second component of the individual questionnaire presented respondents with a number of hypothetical employment choices, from which we estimated the value of alternative job characteristics, and how these valuations vary across different types of workers.

4   Descriptive results: facilities, people, and jobs

In this section we report summary statistics from both the facility and individual questionnaires, with a view to presenting a picture of the working conditions faced by health workers, their demographics characteristics, and the incomes they earn in alternative occupations, across the three regions coverd by the survey.   The bottom line of this analysis is that working conditions do not appear to differ markedly across regions, although they are somewhat better, on some dimensions, in the private sector in Addis. On the other hand, health workers are different across regions – they are more likely to be married in some places, to be women in others, and of different ages in others.   But the big difference is money, especially for doctors: they get paid significantly more in Addis than outside, and a *lot* more in the private sector in Addis.

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[3] The complete survey instrument can be found in the Appendix.

4.1 Facility conditions

Table 4 provides summary statistics from the facility survey for facilities at which at least one physician worked.[4] The summary statistics are weighted by the estimated share of physicians working in each type of facility. The table shows that at least along several measurable inputs, facilities in SNNPR and Tigray are not noticably worse than public facilities in Addis. In fact, SNNPR and Tigray facilities with physicians are better equiped to test for HIV and are more likely to have sufficient water supply. However, there are differences between the two regions outside Addis: for example, only half the doctors in Tigray work in facilities with sufficient medicine, compared with 73% and 88% of those in Addis and SNNPR respectively. Similarly, Tigray has more inpatient beds per doctor and more outpatients than both SNNPR and public facilities in Addis.

Private facilities in Addis are on the other hand much smaller, with about half the number of inpatients and outpatients per doctor compared with public facilities in the capital. Some quality indicators, such as water availability, are reported as significantly better in Addis' private facilities, but on other dimensions private facilities report being either no better (equipment), or somewhat worse (medicine).

SNNPR and Tigray are both remote areas of Ethiopia. Although Tigray is further from Addis, doctors working in SNNPR are more remote in terms of their travel times to the regional capital – it takes an average of 6 hours to reach the regional capital, Awassa, while compared with 5.1 hours for doctors in Tigray to reach that region's capital, Mekele, reflecting the fact that SNNPR covers a much larger geographic area.

Table 5 presents information relating to facility conditions and work environments as reported by individual health workers (and not by the administrator of the facility). We highlight two particular differences in work envorniment between public and private facilities: first, both doctors and nurses are much less likely to report being over-worked in private facilities: 22 and 20 percent of private doctors and nurses respectively report that there is often not enough time to complete tasks, compared with sample averages of 55 and 48 percent; and fully 6 percent of private doctors report that idle time is common in their jobs, compared with a sample average of 2 percent. Secondly, the degree of supervision seems higher in private facilities, in both "carrot" and "stick" forms. That is, the shares of doctors and nurses reporting supportive supervision, 62 and 69 percent respectively, is significantly higher than the sample averages (45 and 46 percent); and the shares that say their supervisor reprimands staff (36 and 49 percent) are also higher than the sample averages (31 and 40 percent).

The data also allow us to identify differences between the assessments made by physicians and nurses regarding their work environments. There do not

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[4] There are 77 such facilities in our survey, out of a total of 97. Twenty of the facilities visited are not staffed by a physician.

	All surveyed regions	Addis Ababa Public	Private*	SNNPR	Tigray
Number of sampled facilities (with at least one physician)	77	8	31	21**	17
Facility size					
Number of doctors	834	217	380	189	48
Doctors per facility	3.8	6.9	2.6	5.2	2.6
	(4.9)	(10.6)	(2.4)	(4.8)	(2.2)
Number inpatient beds	79.5	141.5	21.5	114.5	121.3
	(91.7)	(112.2)	(40.1)	(63.5)	(105.6)
Number inpatient beds per doctor	20.9	20.5	8.3	22.0	46.7
Number outpatients	104.4	181.5	38.0	139.8	143.9
	(93.3)	(86.9)	(43.0)	(77.0)	(106.8)
Number outpatients per doctor	27.5	26.3	14.6	26.9	55.3
Hours travel to regional capital	–	–	–	6.0	5.3
				(5.5)	(5.0)
Facility conditions (%)					
Reliable electricity/phone	99.3	100	100	97.4	97.9
Functioning X-raty machine	91.3	77.0	81.6	85.2	83.3
Functioning laboratory	100	100	100	100.0	100.0
Functioning operating theatre	62.1	61.8	42.6	92.6	97.9
Equipment to test for HIV	83.6	66.4	86.8	92.6	100
Sufficient water supply	74.5	23.0	96.0	87.3	85.4
Sufficient medicine	79.1	88.5	72.9	88.4	50.0
Sufficient equipment	87.1	83.9	84.5	100.0	70.8

* Includes for-profit and non-profit NGO and missionary facilities. ** Includes 3 private facilities
Statistics are calculated using frequency weights corresponding to total number of doctors by
region working in (1) public hospitals, (2) private hospitals, (3) government health centers, and
(4) private, NGO, or missionary clinics

Table 4: Facility level information, based on interviews with an administrator, for facilities with at least one physician

	All regions		Addis Ababa				SNNPR		Tigray	
			Public		Private*					
Facility conditions	Doc	Nurse	Doc	Nurse	Doc	Nurse	Doc	Nurse	Doc	Nurse
Availability of supplies (%)										
Soap	75.0	69.0	68.7	69.1	100	100	63.8	59.7	53.5	67.1
Water	75.0	75.2	82.5	79.9	98.0	100	59.0	61.8	44.2	77.2
Plastic gloves	88.7	85.7	84.3	84.8	100	100	92.2	84.3	68.6	82.8
Facial mask	58.7	43.0	57.8	51.8	88.9	92.5	49.1	32.1	16.2	23.5
Sterile syringes	93.7	91.8	91.1	92.1	100	100	94.7	92.1	84.4	87.2
Medicines	73.9	70.9	61.3	76.1	97.8	91.3	79.3	73.0	42.2	50.8
Physical condition of facility (%)										
Good	43.4	40.9	30.3	24.2	58.0	79.8	39.3	37.0	40.7	46.3
Fair	42.1	45.6	48.5	53.2	38.0	18.6	38.5	51.6	45.4	41.6
Bad	14.5	13.5	21.2	22.6	4.0	1.6	22.2	11.4	14.0	12.1
Work environment										
Workload (%)										
Often not time to do tasks	55.1	48.2	67.3	58.2	22.0	20.3	82.1	61.2	61.6	31.5
Usually time to do tasks	43.0	51.1	32.7	40.4	72.0	79.8	18.0	38.8	38.4	67.1
Idle time common	2.0	0.6	0.0	1.0	6.0	0.0	0.0	0.0	0.0	1.3
Supervision (%)										
Supervisor reprimands	31.1	40.3	34.7	39.5	36.0	49.0	34.2	38.8	12.8	38.9
Supervisor supportive	45.3	46.1	32.0	38.3	62.0	68.8	50.4	45.2	26.7	45.0

* Includes for-profit and non-profit NGO and missionary facilities

Table 5: Facility level information, based on interviews with individual health workers

appear to be systematic differences between reports of the two types of health worker, except in two cases. First, in terms of workload, the share of physicians who report that there is often not sufficient time to complete their tasks consistently exceeds the share of nurses who report the same thing, especially in the public sector. Staff appear most overworked on average in SNNPR, but the difference between doctors' and nurses' perceptions is largest in Tigray.

4.2 Demographic information

Demographic data from the individual-level questionnaires are reported in Table 6. Doctors in Addis Ababa, especially those working in the private sector, are older and more experienced than those in the regions. Men are over-represented in the private sector in Addis, while SNNPR has virtually no female doctors. The doctors in our sample come from large families – on average they have 6.4 siblings, but they have relatively small families of their own – on average they

have 1 child. Nurses have more children on average. Only one third of doctors and one half of nurses in SNNPR are married, but although marriage is most common amongst doctors in Addis (61 percent and 74 percent in the public and private sectors respectively, compared with 45 percent in Tigray), nurses are more likely to be married in Tigray (79 percent, compared with 65 percent in Addis). Similarly, about 50 percent of doctors have no children, but this share ranges from 28 percent amongst private sector physicians in Addis to over 80 percent in SNNPR. Amongst those doctors and nurses with children, the average numbers are 2.1 and 2.7, and there is relatively little difference across regions.

We find evidence that doctors are more likely to have moved away from their home region to Addis than to either of the regions. This is reflected in the fact that three quarters of those in Tigray reported having lived there at age 10, compared with one half in SNNPR, and about 41% in Addis. These data suggest two competing interpretations: either it is more difficult to get health workers to move to Tigray that to SNNPR, or natives of Tigray are more inclined to stay in their home region than those of SNNPR. The data on family structure tends to support the latter explanation.

While a sizeable share of health workers (about 18 percent of doctors and 19 percent of nurses) have siblings in the profession, there seems to be a surprisingly small inter-generational medical link. The link is most pronounced amongst public sector doctors in Addis Ababa - 5.2 percent of them report have parents who were health workers, compared to one and two percent in SNNPR and Tigray. This could indicate that having a parent in the business makes it easier to find a public sector job in Addis. If so, having such contacts seems to have no positive impact on a doctor's chance of getting a job in the private sector in Addis - none of the doctors in our sample with private sector jobs in Addis had parents in the profession.

Finally, if regions outside Addis Ababa have difficulty attracting health workers in general, they find it even more problematic recruiting specialists.

4.3 Incomes

In economic terms, doctors in Addis do better than those in the regions. As reported in panel II of Table 7, asset ownership is higher in Addis, with one half and one quarter the doctors working in private and public facilities respectively reporting ownership of a car, compared with less than two and five percent, respectively, in SNNPR and Tigray. House ownership is higher among private sector physicians in Addis (35%), but the rates among other doctors are similar (10-16%). These patterns of asset ownership naturally match the patterns of earned incomes.

Doctors working in the public sector in Addis earn salaries about 50% more than the average doctor in the regions, while salaries of private sector doctors are three times as much. Part of this differential likely reflects the return to

	Doctors					Nurses				
	All	Addis		SNNPR	Tigray	All	Addis		SNNPR	Tigray
		Public	Private				Public	Private		
Demographics										
Share female (%)	17.1	30.0	16.0	2.6	26.8	64.3	73.8	84.4	52.1	61.8
Share married (%)	55.5	61.3	74.0	33.3	45.2	63.3	65.3	65.5	50.2	79.3
Age (years)	36.1	39.2	41.2	29.3	31.5	33.4	34.5	35.3	31.0	34.7
	(0.90)	(1.64)	(1.78)	(1.16)	(1.61)	(0.49)	(0.73)	(0.86)	(1.25)	(0.71)
Number of siblings	6.4	6.1	6.5	6.4	6.6	6.5	6.4	6.7	6.5	6.3
	(0.19)	(0.31)	(0.37)	(0.26)	(0.62)	(0.12)	(0.21)	(0.39)	(0.22)	(0.18)
Number of children	1.01	0.90	1.68	0.44	0.71	1.56	1.26	1.32	1.48	2.14
	(0.11)	(0.14)	(0.22)	(0.22)	(0.20)	(0.12)	(0.09)	(0.16)	(0.27)	(0.17)
Share with no children (%)	52.6	48.5	28.0	82.1	61.6	42.5	44.3	44.9	53.8	22.7
Number of children (for those with)	2.14	1.75	2.33	2.48	1.85	2.72	2.26	2.40	3.22	2.77
	(0.15)	(0.15)	(0.23)	(0.54)	(0.20)	(0.11)	(0.09)	(0.22)	(0.25)	(0.13)
Family connections to profession (%)										
Parents Health Workers	1.8	5.2	0.0	0.85	2.3	5.1	6.8	5.9	5.2	2.7
Siblings Health Workers	18.2	14.8	18.0	20.5	19.8	19.5	22.2	28.5	17.2	15.3
Other family Health Workers	18.5	19.9	26.0	13.7	7.0	15.7	18.2	22.5	14.9	10.7
Live in same region as at age 10	50.2	44.1	42.0	53.0	75.6	63.8	35.6	34.2	74.7	93.3
Type of job (%)										
Primary job in the private sector	36.9	0	100	9.4	0.0	14.0	0	100	5.4	0.0
Specialist	27.8	40.4	38.0	6.8	19.8	-	-	-	-	-

Table 6: Demographic characteristics of sampled health workers

experience (Addis doctors are older) and specialization (they are more likely to be specialized). However, we find that the rates of specialization in the public and private sectors in Addis are virtually identical, suggesting that training is not the sole driver of observed income differentials. Nurses in Addis earn significantly smaller premiums over regional salaries – about 14 percent if they work in the public sector and 36 percent in the private sector.

The gap between private sector salaries in Addis and those of other doctors is partly offset by additional sources of income: public sector doctors in Addis earn additional income equal to 21% of their salaries, while the figures in SNNPR and Tigray are 17% and 33% respectively, and between a third and a half of doctors in the regions outside Addis report receiving housing allowances (although we do not have data on the monetary value of these allowances). Indeed, significant shares of doctors working outside the Addis private sector report holding more than one job – from 23% in the Addis public sector, to 12% in Tigray. On the other hand, private sector doctors in Addis supplement their (much higher) salaries by only 3 percent. Although 20% report holding more than one job, we expect that these multiple jobs are in some sense considered together to make up the worker's primary occupation, which accounts for the small amount of supplemental income. Finally, physician household incomes are higher in Addis than elsewhere.

The break-down of physician and household incomes across regions is illustrated in Figure 5, and the corresponding data for nurses are presented in Figure 6. Interestingly, while household incomes of *private* sector doctors in Addis trump those of households of doctors in the public sector and the outer regions, nurses who work in the *public* sector have higher household incomes (despite earning lower salaries themselves than private sector nurses in Addis). The opportunities to earn extra income outside of their primary jobs seem to be acutely attenuated for nurses.

We provide further statistical analysis of the differences between physician jobs in Addis Ababa and the regions in Table 8. This table confirms that differences in labor market outcomes between Addis and the regions do not merely reflect differences in observable characteristics of survey respondents. Controlling for experience levels, and variables that predict the location of the worker's first job (separately for the lottery and non-lottery samples), the table presents estimates of labor market outcomes. We find that physicians currently working in Addis earn salaries that are between 60 and 85% higher, are between about 20 and 50 percent more likely to be specialized, and are considerably more content with various aspects of their work, especially those who are currently working in Addis and who initially participated in the lottery.[5]

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[5] Job satisfaction are self-reported answers (5 categories) ranging from "not at all satisfied" to "very satisfied".

	Doctors					Nurses				
	All	Addis		SNNPR	Tigray	All	Addis		SNNPR	Tigray
		Public	Private				Public	Private		
Income										
Salary (US$)	284.5	244.6	480.5	156.4	176.6	100.9	106.8	128.3	87.7	100.8
	(17.4)	(10.5)	(39.0)	(14.8)	(13.9)	(2.0)	(2.1)	(9.6)	(2.7)	(1.96)
Other compensation with job (%)	52.7	29.3	46.0	85.5	53.5	47.0	15.5	35.9	73.3	48.7
Housing allowance (%)	18.9	0	0	52.1	34.8	5.9	0	0	11.7	6.7
Total income of health worker (US$)	320.9	297.0	496.8	181.4	233.1	102.6	109.3	130.1	87.7	103.7
	(24.8)	(24.8)	(40.1)	(29.7)	(38.2)	(2.1)	(1.7)	(9.5)	(2.70)	(3.7)
Total income of household (US$)	443.8	509.2	696.9	196.3	264.3	201.2	298.8	263.9	139.4	157.5
	(28.1)	(49.1)	(55.7)	(30.0)	(46.8)	(12.8)	(22.1)	(25.6)	(10.9)	(10.0)
Assets										
Own a car (%)		26.9	51.0	1.9	4.8					
Own land (%)		14.8	4.1	13.9	2.4					
Own house (%)		15.2	34.7	10.2	15.7					

Table 7: Incomes and assets of sampled health workers
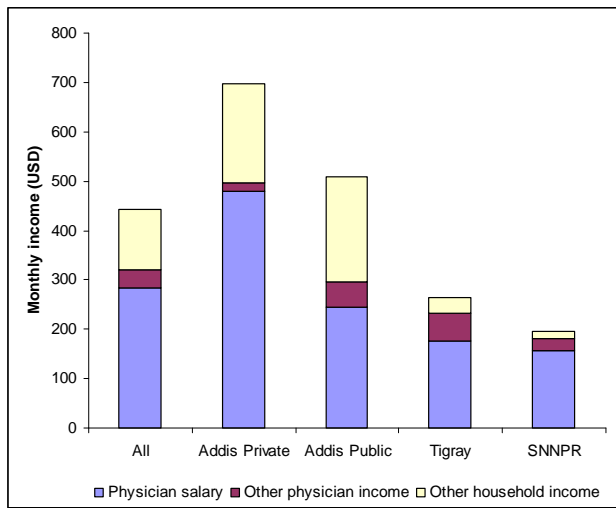
Figure 5: Sources of physician household income
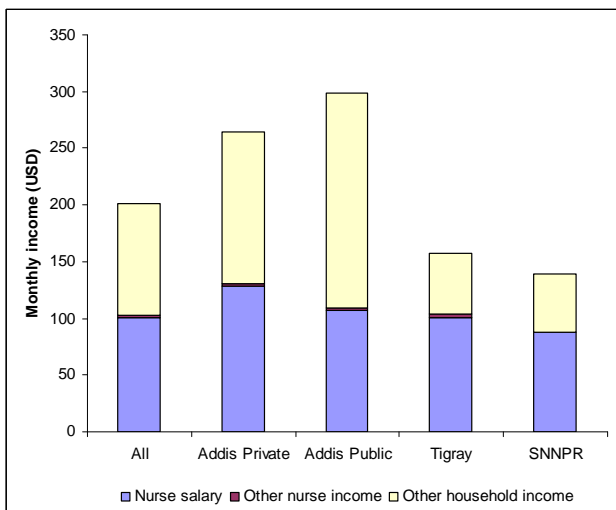
Figure 6: Sources of nurse household income.

	Lottery		Market	
Current salary (log)	0.815	***	0.789	***
	(0.144)		(0.167)	
Current income (log)	0.728	***	0.781	***
	(0.177)		(0.156)	
Doctor is specialized	0.232	**	0.476	***
	(0.104)		(0.112)	
Satisfaction with current wage	0.925	**	0.793	
	(0.457)		(0.581)	
Satisfaction with current training opportunities	-0.047		-0.465	
	(0.313)		(0.421)	
Satisfaction with current workload	0.769	***	0.576	
	(0.302)		(0.396)	
Overall satisfaction with job	0.653	*	0.827	**
	(0.389)		(0.373)	

Notes: Lottery includes those who participated in the lottery, while market includes those who
did not. Each cell represents a separate OLS estimation (rows 1 and 2) or (ordered) probit
estimation (rows 3 to 7) and reports the coefficient on a dummy variable indicating whether
the current job is in Addis (1) or one of the two regions (0). The dependent variable is in
the left hand column. Other controls are: class rank, family connections with the profession,
sponsor, sex, and experience, siblings, and birth order.

Table 8: Impact of currently working in Addis on physician job characteristics
and satisfaction

In sum, these tables support the presumption that on average, a job in Addis Ababa is more attractive than one outside the capital. They first show that the overall quality of the facility faced by the average doctor in terms of observable inputs is similar across the regions, although patient-doctor ratios do favor Addis. Instead, as shown in the last table, differences in labor market outcomes and satisfaction are more likely the principal reasons that physicians would prefer to work in Addis. Note too that non-lottery physicians currently working in Addis are significantly more content with their jobs overall than their non-lottery counterparts working in the rural regions despite not being more content about their much higher salaries, their workload, and their training opportunities. This suggests that Addis Ababa is likely to have favorable characteristics not directly related to employment, but more related to what we might refer to as quality of life.

5   Analytic results: The performance of the physician labor market

Next we explore two questions underlying the performance of the physician labor market in the Ethiopia. The first asks what the long-term impact of starting one's career in the rural areas is. This is important because it can help us understand the costs associated with inducing labor supply to these regions. It is understandable that we might need to pay workers a premium to compensate them for the *flow* disutility and income loss they suffer while they are located outside the capital. But if there are long-term costs imposed on workers who spend time in rural areas, then recruits will in addition need to be compensated for the reduction in the *stock* of human capital they suffer as a result of living and working in remote areas. We use the nearly-random nature of the lottery system for assigning jobs to new graduates, and other information, to identify this effect.

The second aspect of the labor market that we examine relates to the impact of the lottery itself on future labor market outcomes for physicians who take part in it. We find some evidence that suggests that the randomness of the allocation mechanism, although imperfect, and although possibly fair in some sense, induces an inefficiency in *future* physician labor markets. We suggest this is in fact because of the very (quasi-)randomness that characterises the lottery: random job assignments early on obfuscate information about workers that is useful to future employers, thereby potentially limiting the efficiency of the labor market later on. We find some evidence of this in wage dispersions amongst lottery participants and non-participants, and suggestions that attrition from the profession is higher among lottery participants.

5.1   The labor market effects of working in rural areas

Table 9 reports participation in the lottery and other labor market data for the physicians in our sample. Across the regions and the public and private

	All	Addis		SNNPR	Tigray
(Percent)		Public	Private		
Participated in the lottery	57.4	62.0	56.0	54.7	58.1
First job in Addis Ababa:					
of lottery participants	12.8	24.5	17.9	1.6	0.0
of non-participants	19.9	31.0	36.4	0	2.8
Medical training sponsored					
by federal government	71.4	67.7	80.0	70.1	59.3
Specialist training	27.4	40.4	38.0	6.8	19.8
Applied for official release					
from public sector	44.9	38.7	86.0	19.7	4.7
of whom, release granted	84.1	73.9	95.3	47.8	25.0

Table 9: Institutional features of the physician labor market

sectors in Addis, about 60 percent of respondents had participated in the lottery when being assigned their first job. Of those who participated in the lottery, 12.8 percent got their first position in Addis, while amongst those who did not participate in the lottery, the share who started their careers in Addis was 19.9 percent. If participation in the lottery was random, so that lottery participants were on average identical to those who chose not to participate in the lottery, and if job assignment under the lottery mechanism itself was random, then we could use the lottery to estimate the impact on future career development of getting a first job in Addis.

In fact, the data we collected reject both of these underlying assumptions. To start, lottery participants appear to be systematically different to non-participants: first, participants in the lottery tend to report having received lower grades in medical school; second they graduated less recently and were less likely to report that private health clinics were common when they started medical school; and third, they were more likely to have received federal government sponsorship for their training (as opposed to sponsorship from a regional government or from private or foreign sources). The regression results of one specification are presented in Table 10. The table also highlights the potential importance of the private sector in determining lottery participation. In the survey, we asked respondents if private clinics were common when they started medical school, and we find that this variable reduces participation in the lottery.

In light of these results on lottery participation, we cannot easily extrapolate the labor market experiences of those who participated in the lottery to the

Predicting lottery participation		
2nd ranked student	-0.081	
	(0.098)	
3rd ranked student	0.234	**
	(0.093)	
Sponsor: private/foreign government	-0.447	***
	(0.109)	
Years experience	0.071	***
	(0.015)	
Years experience squared	-0.002	***
	(0.000)	
Birth order	-0.062	**
	(0.027)	
Number of siblings	0.037	*
	(0.019)	
Private clinics were common when	-0.512	***
starting medical school	(0.151)	
2nd rank x private clinics were common	0.466	***
when starting medical school	(0.053)	
3rd rank x private clinics were common	0.196	
when starting medical school	(0.313)	
Observations	216	
Pseudo R-squared	0.2130	

Notes: Probit model, dprobit coefficients reported
P-values: *** 1%, ** 5%, * 10%, ~15%.
Std errors corrected for clustering at facility level.

Table 10: Predicting participation in the lottery

rest of the population of physicians, as they differ on dimensions that could themselves affect career prospects. However, *within* the group of physicians who participated in the lottery, we can make some inferences about the effects of assignment to the rural areas, even though we have evidence that job assignment under the lottery was not truly random. We find the assignment to the rural areas under the lottery was more likely for males and for those who had recevied sponsorship from a regional government for medical school. Importantly, we do not find any correlation between family connections with the medical profession and lottery assignment – that is, while there is anecdotal evidence that the lottery is manipulated by certain people, our data do not reject the hypothesis that such manipulations are absent. Of course, a longer and more probing questionnaire might have uncovered other determinants of job assignment under the lottery, including the influence of friends and/or relatives in positions of authority.

The determinants of first job assignment amongst those who *did not* participate in the lottery are orthogonal to those of lottery participants. Amongst this group, we find that good performance in medical school predicts assignment to Addis, and that connection to the medical profession is also important, although in a subtle way: having parents in the health sector actually reduced the chance of getting a job in Addis for those not participating in the lottery, while having other relatives (uncles and/or aunts) increased it. Those variables that predict the location of lottery participants' first jobs – sex and sponsorship – are not significant in explaining where lottery non-participants get their first jobs. These results are presented in Table 11. The two columns labelled "I" include all right hand side variables, while the two labelled "II" include those that are significant in specification I (as well as the second dummy for private/foreign government sponsor for lottery participants). This highlights the very different determinants of the location of physicians' first jobs under the lottery and market.

Correcting for these correlations, and employing statistical matching techniques, we are able to estimate the impact of being assigned to Addis Ababa versus the rural areas on a number of dimensions of a physician's subsequent career development. Interestingly, for lottery participants, being assigned to Addis by the lottery is not a guarantee of long-term benefits. Those assigned to Addis rather than to one of the rural regions are no more likely to be working in Addis now, to have employment in the private sector, or to have significantly higher wages in their current employment. Somewhat surprisingly, we find that lottery physicians assigned to Addis are significantly less likely to be specialized now (between 15% and 18%), so starting a career in the capital is not necessarily a ticket to specialization - if anything the opposite. In contrast, as shown in columns 3 and 4, both the OLS and NNM estimates indicate that market physicians with a first assignment in Addis are more likely to be specialized. One explanation for this difference is that Addis attracts high-ranking medical

Predicting first job in Addis Ababa							
	Lottery				Market		
	I		II		I		II	
2nd ranked student	0.078				-0.173	~	-0.209	~
	(0.078)				(0.114)		(0.131)	
3rd ranked student	0.029				-0.297	*	-0.248	**
	(0.100)				(0.148)		(0.122)	
Parents health workers	-0.031				-0.341	*	-0.258	**
	(0.083)				(0.194)		(0.118)	
Other relatives health workers	0.046				0.259	**	0.300	***
	(0.102)				(0.127)		(0.105)	
Sponsor: regional authorities	-0.190	***	-0.146	***	0.022			
	(0.055)		(0.053)		(0.098)			
Sponsor: private/foreign government	0.090		0.105		0.022			
	(0.107)		(0.103)		(0.161)			
Male (=1)	-0.232	**	-0.228	**	-0.127			
	(0.097)		(0.087)		(0.176)			
Years experience	0.011				-0.006			
	(0.016)				(0.019)			
Years experience squared	-0.001				0.000			
	(0.001)				(0.001)			
Order of birth	-0.011				0.034			
	(0.017)				(0.028)			
Number of siblings	0.022				-0.024			
	(0.017)				(0.031)			
Observations	122		122		85		85	
R-squared	0.1451		0.0971		0.2249		0.1915	

Notes: Linear probability model. P-values: *** 1%, ** 5%, * 10%, ~15%.
Standard errors corrected for clustering at facility level.

Table 11: Predicting assignment to Addis Ababa in first job after medical school

	Effects of first job in Addis						
	Lottery participants				Market participants		
Dependent variable	(OLS)		(NNM)		(OLS)		(NNM)	
Currently working in Addis	0.165		-0.109		0.046		0.421	***
	(0.210)		(0.154)		(0.131)		(0.098)	
Physician is specialized	-0.149	**	-0.176	***	0.195	*	0.426	***
	(0.065)		(0.040)		(0.097)		(0.143)	
Currently working in private sector	0.164		-0.037		0.014		-0.627	***
	(0.166)		(0.103)		(0.192)		(0.131)	
Current salary (log)	0.161		-0.011		0.065		0.345	**
	(0.170)		(0.091)		(0.186)		(0.155)	
Overall satisfaction with current job	0.687	*	0.202		0.087		-3.132	***
	(0.369)		(0.322)		(0.582)		(0.474)	
Physician currently lives in the same	0.386	***	0.433	***	-0.123		-0.259	***
region in which (s)he lived at age ten	(0.097)		(0.048)		(0.186)		(0.073)	
Number observations	121		121		85		85	

Notes: Each cell represents the estimate (or standard error) of the effect of having a first job
in Addis on the dependent variable listed in the first column. Other controls included are class rank,
connections to medical profession, medical school sponsor, sex, experience, birth order, and
number of siblings. Physicians with less than two years experience are excluded.

Table 12: Estimates of the long-term effects of starting a career in Addis Ababa

students through the market with whom average-ranked lottery students must
compete for specialist training.

Table 12 shows that, except for the specialization estimate, the estimates
for market physicians are unclear. None of the other coefficients on being first
assigned to Addis in the OLS estimates are significant, while all NNM estimates
are very significant yet unclear. They suggest that physicians landing a job in
Addis after medical school are significantly more likely to still be working there,
and earn higher incomes, but are less likely to work in the private sector and
less satisfied with their current job. We are reluctant to interpret these non-
lottery findings not only because of likely omitted variable bias, but these NNM
non-lottery findings are very sensitive to the matching variables.

In sum, these estimates suggest that in the long run there is a fare amount
of mobility following the initial lottery assignments. Still, physicians assigned
to Addis through the lottery may fare slightly better than those assigned to
the rural area as measured by their current job satisfaction. This is despite
having lower levels of specialization than lottery physicians initially assigned to
the rural regions. The bottom row in the table may be able to reconcile these
findings. Physicians assigned to Addis are significantly more likely to be living
now in the region they used to live in as adolescents, suggesting that despite

lower specialization, they may benefit from non-employment-related compensating differences.

5.2 The effects of participating in the lottery

Is the lottery an efficient and effective mechanism for allocating physician labor immediately after graduation? To answer this question, we ask whether using the lottery to allocate physicians to jobs early on in their careers has any impact on the long-run workings of the labor market. In particular, we examine the effects of the lottery itself on future wages, the location of future jobs, and the provision of training. We can examine the impact of the lottery on these outcomes because we can compare the careers of physicians who participated in the lottery with the careers of those who did not, correcting for other differences betweeh the two groups when necessary.

We find some evidence that the lottery system impedes the efficient working of the physician labor market, perhaps because it reduces the strength of the signal a physician's first job might provide to future employers. The idea is that future employers might use information about a physician's first job to learn about his/her quality, but if the lottery *randomly* assigns graduates to their first jobs, these jobs provide no useful information to future employers about the underlying characeristics of workers. As we saw above, if a physician received a high rank at medical school – which we assume is an indicator of high underlying ability – he is more likely to get a first job in Addis, as long as he did not participate in the lottery. Having a first job in Addis is thus a signal of quality, but only for non-participants in the lottery. For lottery participants, a first job in Addis provides no information about underlying physician quality, and thus could lead to adverse selection in the physician labor market. As a consequence, high quality phyisicians from the lottery will likely get paid less later in their careers than similar physicians who did not participate in the lottery. Also, high quality lottery physicians will be more likely to drop out of the profession later on, as they find they cannot command a salary commensurate with their skills.

5.2.1 Effects on wages

If information on worker quality is publicly observable then a physician's first job does not provide a useful signal to future employers. In our empirical analysis we do allow for the possibility that working in Addis Ababa (either in a good facility, or in a place with access to other colleagues and a richer learning environment) has a real, positive effect on productivity. In this case, conditioning on class rank, future wages may be positively correlated with having a first job in Addis. However, the distribution of wages should be the same for both lottery participants and those who enter the market immediately after graduation. On the other hand, if the lottery obfuscates worker quality information, then we expect that the conditional wage distribution will be narrowed. Figure 7,
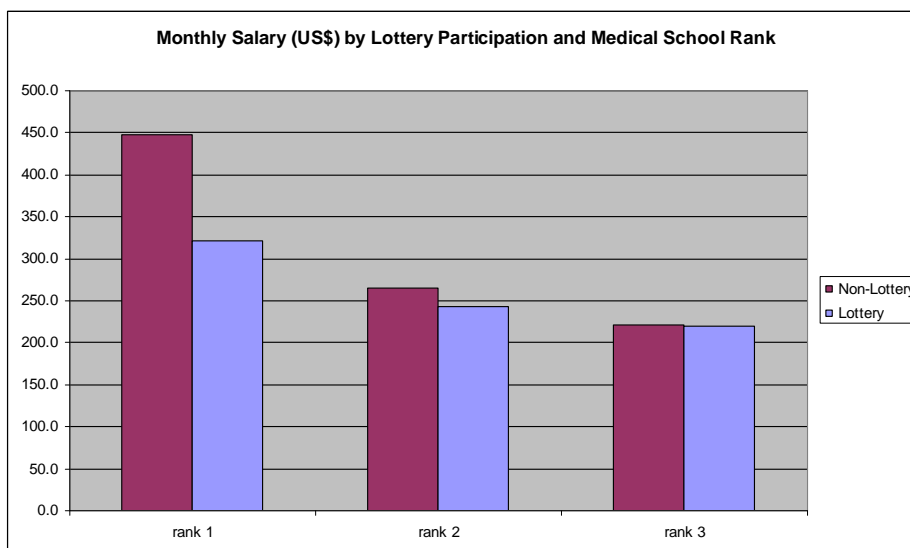
Figure 7: Unconditional current wages by rank and lottery participation.

which shows the unconditional wage distribution by rank separately for lottery and non-lottery physicians, provides suggestive evidence to this effect.

Consistent with the model, the graph shows that physicians who were 3rd ranked students earn virtually the same whether they were initially in the lottery or not. Among 2nd rank ones, non-lottery doctors earn slightly more but not much. However, there is a large difference among 1st ranked physicians, with non-lottery physicians earning 39% more on average. Table 13 explores this in a regression context predicting log wages using interactions between class rank and lottery participation. Here, 3rd rank is the left-out category to highlight the focus on 1st rank dynamics.

Due to power limitations, we first force the impact of lottery participation on third ranked physicians to be zero, consistent with Figure 7. Table 13 then uses separate dummies to allow wage levels of first and second ranked physicians to differ, but combines first and second rank in their interaction with lottery participation. the coefficients indicate that compared with 3rd ranked physicians, second ranked physicians earn 19% (0.187) more if they are outside the lottery but earn the same as 3rd ranked physicians inside the lottery (a combination of the direct effect and the interaction, $0.187 - 0.227$); first ranked physicians earn 48% (0.482) outside the lottery, but only 26% more inside the lottery (a combination of the direct and effect and the interaction, $0.482 - 0.227$).

Predicting Log Monthly Salary		
1st ranked student	0.482	***
	(0.131)	
2nd ranked student	0.187	~
	(0.118)	
1st & 2nd ranked student x	-0.227	*
lottery participation	(0.114)	
Experience	0.059	***
	(0.018)	
Experience squared (x 100)	-0.152	***
	(0.052)	
Sponsor: regional authorities	-0.289	*
	(0.151)	
Sponsor: private/foreign government	-0.120	
	(0.111)	
Birth order	0.072	***
	(0.026)	
Number of siblings	-0.025	
	(0.017)	
Number observations		205

Notes: Physicians with less than two years experience excluded.
P-values: *** 1%, ** 5%, * 10%, ~15%.
Robust standard errors clustered at the facility level

Table 13: Effects of lottery participation on future wages

Participation in the Federal Lottery
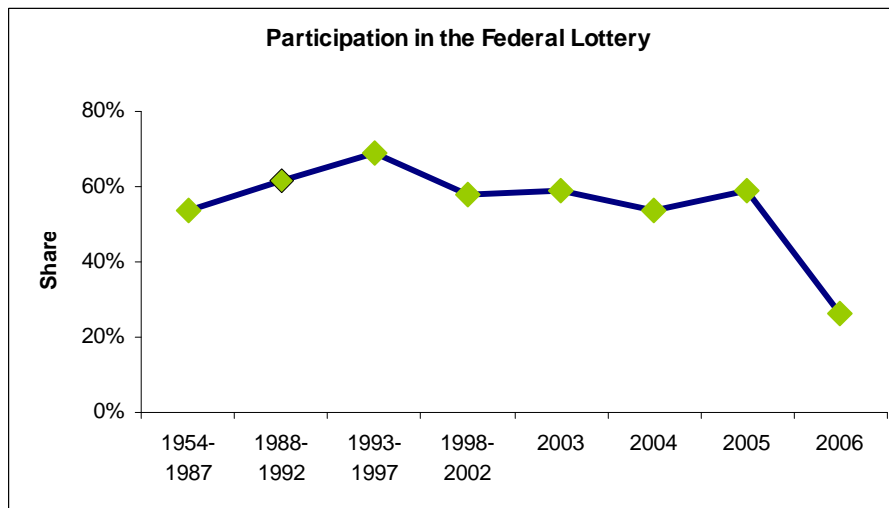
Figure 8: Participation in the lottery by cohort.

5.2.2 Effects on attrition from the physician labor market

Wage compression amongst lottery participants may induce high-ability physicians who participated in the lottery to quit the profession. The data – illustrated in Figure 8 – provide some supportive, although not definitive, support for this possibility. First, the time series of lottery participation show a drop not just among the latest 2006 cohort which is consistent with anecdotal evidence that the lottery is unravelling,[6] but also among the oldest cohorts who graduated before 1993. Anecdotal evidence suggests that government enforcement of the lottery has been declining over time, so one would expect that lottery participation would have been highest among the oldest cohorts. If this were the case, then differential attrition rates between lottery and non-lottery participants over time could have given rise to this pattern.

Table 14 explores in a regression context the extent to which high-ranked lottery participants have left the profession more than similarl individuals who did not participate in the lottery. The dependent variable is a dummy for being first ranked. The positive coefficient on experience (0.033) indicates that older cohorts are more likely to be first-ranked than younger cohorts, suggesting that over time first ranked individuals have chosen not to enter the profession (in Ethiopia). On the other hand, the negative coefficient on the interaction between experience and lottery participation indicates that within older cohorts, lottery participants in our sample are less likely to be first ranked than

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[6] We are unable to identify whether this change reflects a real drop in lottery participation, delayed attrition from the health sector by non-participants, or a combination of both.

Predicting First Rank		
Lottery participant	0.149	
	(0.137)	
Lottery participant x experience	-0.018	*
	(0.010)	
Experience	0.033	*
	(0.017)	
Experience squared (x 100)	-0.074	~
	(0.047)	
Number observations	209	

Notes: Physicians with less than two years experience
excluded. P-values: * 10%, ~15%.
Robust standard errors clustered at the facility level

Table 14: Evidence of labor market attrition by high-ranked lottery participants

non-participants. This suggests that amongst high-ranked individuals, lottery
participants have left the profession more than non-participants. This is con-
sistent with the idea that the lottery has long-term impacts on the workings of
the physician labor market.

6 Predictive results: Rural health care – how much does it cost?

Part II of our individual questionnaire adopted a different approach to Part I.
Instead of asking health workers about what they did, what they earned, who
they were, etc., we sought to find out what the *would do* faced with certain
hypothetical choices. With this information, we hoped to be able to estimate
the relative importance of alternative job attributes and the trade-offs workers
perceived between these attributes. While the job attributes we focus on –
higher pay, better housing, better equipment and more reliable drug supplies,
better training opportunities, improved supervision, and authorized private sec-
tor work – are all no doubt valued positively by workers, the data we collected
in this part of the questionnaire allow us to estimate the relative valuations, and
therefore represent a first step towards a full cost benefit analysis of alternative
interventions aimed at increasing rural physician labor supply.

6.1 Empirical methodology

We first present a brief outline of the methodology employed to estimate prefer-
ences for alternative job attributes. A full description of the questionnaire and
estimation techniques is provided in Hanson and Jack (2008). We characterized

physician and nursing jobs in the public sector by discrete values of each of six attributes. These attributes were chosen based on their perceived relevance to health worker decisions in Ethiopia, following discussions with officials from the Federal Ministry of Health and the heads of regional health bureaux in Addis Ababa, Mekele (the capital of Tigray) and Awasa (the capital of SNNPR). The attributes chosen are shown in Table 15.

The attribute *values* or *levels* were chosen both to be realistic, and to provide a wide enough range of variation to enable predictions about relatively large policy to be made. The values of the location attribute differed for doctors and nurses. In practice, very few doctors work outside towns, so for them we allowed the location attribute to be either "Addis Ababa" or "Regional Capital". For nurses however, this attribute took on the values "City" and "Rural". At the time of the study, public sector health workers were paid on the basis of a pay scale based on experience, qualifications, etc. We used the (unweighted) average monthly salary from these scales to determine a "base" salary for doctors and nurses separately, and let the pay attribute take on values each to 1, 1.5, and 2 times this value. The third (housing), fourth (equipment and drugs), and fifth (time[7]) attributes in Table 15 took on the same values for doctors and nurses. For doctors, the final attribute was permission to work in the private sector (taking the values "yes" and "no"). Since opportunities for providing nursing services outside regular hours are limited, the opportunity to work in the private sector is of limited use for nurses. However, experience from other countries has suggested that active and supportive supervision is an important job attribute for these health workers. This is the sixth attribute we included for nurses.

Our questionnaire presented individuals with a series of 15 pairs of jobs, listed in Table 16, and asked them to choose the one they preferred from each pair.[8] We presented these choices in a variety of different formats to ensure that fatigue and/or lack of interest did not affect respondents' answers.

The data we collect allow us to estimate the average rates at which respondents trade off one attribute against another. In particular, when one of the attributes is pay, we can speak of the marginal monetary valuation of an attribute. In addition, we can use the data to ask what impact a given policy intervention such as provide basic housing in rural areas will have on the share of workers willing to accept jobs there, and we can calculate the rural wage bonus that would have an equivalent effect on labor supply. This method of

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[7]Time refers to the number of years that an individual is required to work at an institution per year of further training sponsored by that institution, after the training is completed.

[8]With six attributes each with two or three values, the number of possible job pairs is much larger (20,592). The number of choices used is consistent with practice in the health economics literature

	Doctors	
	Attribute	Possible levels
X^1	Location	Addis Ababa vs Regional Capital
X^2	Net Monthly Pay ($Base = 2,500$)	$1 \times Base; 1.5 \times Base; 2 \times Base$
X^3	Housing	None, Basic, Superior
X^4	Equipment and Drugs	Inadequate vs Improved
X^5	Time Commitment	2 years vs 1 year
X^6	Private Sector	Yes vs No
	Nurses	
	Attribute	Possible levels
X^1	Location	City vs Rural
X^2	Net Monthly Pay ($Base = 1,250$)	$Base; 1.5 \times Base; 2 \times Base$
X^3	Housing	None, Basic, Superior
X^4	Equipment and Drugs	Inadequate vs Improved
X^5	Time Commitment	2 years vs 1 year
X^6	Supervision	High vs Low

Table 15: Job attributes and levels

	Location	Pay	Housing	Equipment and drugs	Pay-back time	Private sector/ Supervision
Job 1	Addis	1.5	Basic	Inadequate	1	Yes/High
Job 2	Addis	1.5	Superior	Inadequate	2	Yes/High
Job 3	Rural	1	Superior	Improved	2	Yes/High
Job 4	Rural	1	Basic	Improved	1	Yes/High
Job 5	Addis	1	None	Improved	1	Yes/High
Job 6	Rural	1.5	None	Improved	2	No/Low
Job 7	Rural	1.5	None	Improved	1	No/Low
Job 8	Addis	1	None	Inadequate	2	No/Low
Job 9	Rural	2	None	Inadequate	2	Yes/High
Job 10	Addis	2	Superior	Improved	1	No/Low
Job 11	Rural	1	Superior	Inadequate	1	No/Low
Job 12	Addis	1	None	Improved	2	Yes/High
Job 13	Rural	1	Basic	Inadequate	2	No/Low
Job 14	Addis	2	Basic	Improved	2	No/Low
Job 15	Rural	2	Basic	Inadequate	1	No/Low
Job 16	Addis	1	Basic	Inadquate	1	Yes/High

Table 16: The constant job, Job 1, and the 15 comparator jobs

| | Value as % of base salary | |
Variable	Doctors	Nurses
Location	26.8%	72.1%
Improved Housing	32.4%	46.9%
Adequate Equipment and drugs	26.4%	49.9%
Payback Time	18.2%	11.6%
Private sector/Supervision	48.0%	32.6%

Table 17: The direct effects model, for doctors and nurses

converting in-kind interventions into wage equivalents allows us to compare interventions in a more meaningful way. Finally, we estimate the impact of wage bonuses *and* selected in-kind interventions on labor supply responses.

6.2 Valuing job attributes

Table 17 reports average (marginal) valuations of each of the non-wage job attributes, measured as a percentage of the baseline public sector salary (2,500 Birr, or $275, per month for doctors and 1,250 Birr, or $140, per month for nurses). These figures were estimated

These results suggest that on average, the extra value of a job in Addis relative to one in a regional city for doctors amounts to about one quarter (27%) of the base public sector physician salary, the value of improved housing is about one-third (32%), the value of equipment is about one quarter (26%), and the value of reduced time commitment is about one fifth (18%). The most highly prized attribute for doctors is however, the ability to work in the private sector, which has a value of about half (48%) the base salary.

For nurses the most valuable job attribute is location. Indeed, location appears to be valued more by nurses than by doctors, especially when the value is measured as a share of the base salary. This partly reflects the fact that "location" means something different in the questions nurses were presented with than it does for doctors - switching a job from a rural area, which in principle can be very remote, to a regional capital, increases its value by 72% of the base public sector nurse's salary. (The other factor is of course the fact that the base nurse salary is only half the base doctor salary.) The least valued attribute for nurses appears to be payback time, as it is for doctors - having to pay back an extra year after receiving training is equivalent to a pay-cut of about 12% of base salary. Improved supervision is valued, but not as highly as the other non-time attributes.

The valuations reported in Table 17 reflect averages across different types of health workers, as characterized by age, sex, marital status, number of children, and current location. By including these individual characteristics in

the empirical specification, we can examine the extent to which job attribute valuations vary across individuals in predictable ways.[9]

We find for example that married doctors value a job in Addis twice as highly as single doctors (38% versus 19% of base salary). In contrast, married nurses value urban work, and housing, *less* than single nurses. We do not know why marriage should affect nurses' valuations differently to those of doctors. One difference is, of course, that "location" means something different in our estimation of the preferences of nurses and doctors.[10]

The impact of children seems perhaps surprisingly small, particularly the impact of the first child: Doctors with one child value an Addis job (presumably with better schools etc.) just 2 percentage points of base salary more than doctors without children (30.6 percent versus 28.6 percent). For nurses, the impact of children seems somewhat larger tha it is for doctors (in terms of the percentage of base salary), but again, having children does not seem to be an especially impenetrable barrier to rural work. The value of an urban job over a rural job is 60 percent of base salary for childless nurses, and 66 percent for those with one child. Thus urban jobs are highly valued - but not particularly so for nurses with children.

6.3 Can in-kind incentives significantly increase rural labor supply?

A useful way to interpret our estimated valuations is to use them to estimate the impacts of changes in job attributes on the probability that an individual will accept a job in a rural area over a job in Addis Ababa (for doctors) or in a zonal capital (for nurses). Holding public sector wages constant (i.e., without introducing wage bonuses), we calculate the change in the estimated probability of an individual accepting a rural job when one non-wage attribute is improved. The results of this exercise are reported in Table 18. Our point estimates indicate, for example, that about 7.5 percent of doctors would be willing to take a rural job over a job in Addis under prevailing conditions, if they had the choice.[11] Providing incentives in the form of superior housing increases the chance of accepting a rural job to more than one-in-four, while provision of basic housing, and training incentives (measured by a reduction in time commitment to one year) have relatively small effects, each increasing the likelihood from 7.5 percent to about 11 percent. The effect of improving the availability of equipment is in the middle of the range, increasing the probability of choosing a rural job to 17%. (We do not calculate the predicted labor supply increase in rural areas associated with permitting private sector work, since such work is relatively scarce outside of Addis Ababa.)

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[9] See Hanson and Jack (2008) for a more detailed discussion.

[10] Perhaps it is more important for single nurses to be in a city "marriage market" than it is for single doctors.

[11] Of course, demand side constraints mean that most health workers do not have much of a choice – they cannot all work for the public sector in Addis Ababa.

	Doctors			Nurses		
	p	95% CI	Increase	p	95% CI	Increase
Baseline	0.074	(0.029,0.122)	–	0.046	(0.034,0.058)	–
Basic housing	0.109	(0.046,0.173)	47%	0.097	(0.080,0.115)	112%
Superior housing	0.269	(0.137,0.400)	262%	0.192	(0.152,0.233)	319%
Equipment	0.167	(0.105,0.229)	125%	0.198	(0.165,0.231)	332%
Pay-back time	0.114	(0.047,0.180)	53%	0.056	(0.041,0.072)	22%
Equip & housing	0.226	(0.144,0.308)	204%	0.323	(0.284,0.362)	605%
Supervision	-	-	-	0.075	(0.055,0.095)	64%

Table 18: Impact of non-wage attribute improvement on probability of accepting a rural job, for doctors

For nurses, the non-wage attribute with the single biggest impact on the share of workers willing to take a rural job is the provision of adequate equipment. At baseline levels, only 4.4 percent of nurses would choose a rural job over a city job, but this jumps to 20 percent if they can be guaranteed adequate levels of equipment. The provision of basic housing, reducing pay-back time and providing better supervision have substantially smaller effects on the probability of choosing a rural job, increasing it to levels in the range of 5-8%.

6.4   Wage equivalents

Knowing that superior housing more than triples the willing supply of physician labor to rural areas is not particularly useful unless the cost of such a policy is known. Even if such cost information were available, policymakers would be advised to compare the costs with other policy interventions that had similar labor supply effects. While we do not have cost information on the in-kind interventions we examine in this research, we are able to estimate the wage bonuses that would have equivalent effects. Table 19 reports these wage equivalents (as percentages of the base salary) for doctors and nurses, and for men and women separately. Interestingly, while the point estimates of wage equivalents for most attributes tend to be higher for women, the difference is rarely statistically significantly. Figure 9 illustrates this by placing 95 percent confidence intervals around the estimated wage equivalents for each policy, by sex.

6.5   Combining financial and in-kind incentives

Finally, we investigate the impact of increases in rural pay *and* improvements in other job attributes on health worker labor supply. The results, for doctors and nurses respectively, are presented graphically in Figures 10 and 11, respectively. For doctors, doubling pay while keeping other attributes constant increases the probability of accepting a rural job from 7% to 57%%. Alternatively, to induce

	Doctors		Nurses	
	Male	Female	Male	Female
Basic housing	11.7	12.3	44.1	53.7
Superior housing	45.2	47.3	92.6	112.7
Equipment and drug	24.6	35.7	57.4	69.9
Pay-back time	14.1	7.1	8.0	9.8
Equipment & housing	36.2	48.0	101.5	123.6
Supervision	–	–	31.3	38.2

Table 19: Wage equivalents of attribute improvements, by sex for doctors and nurses
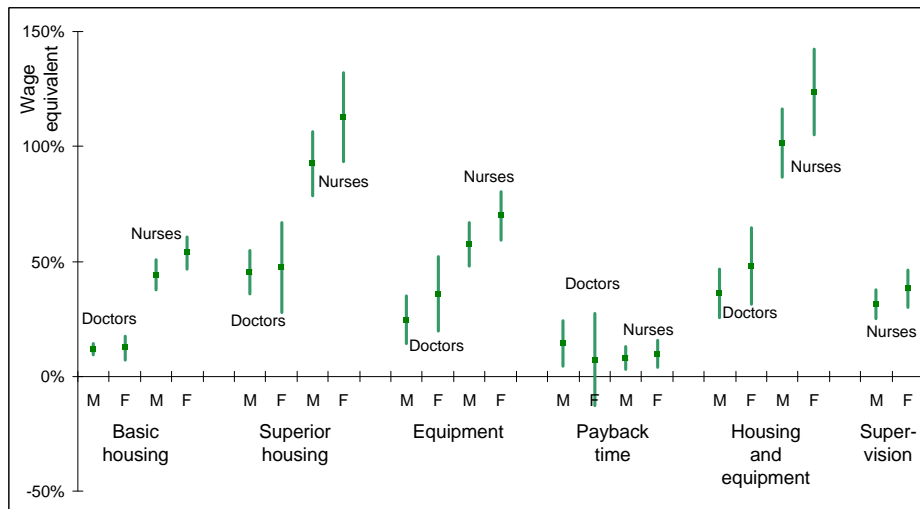
Figure 9: Estimated wage equivalents for each attribute, by doctor/nurse and by sex (M/F), as a percentage of the base wage.
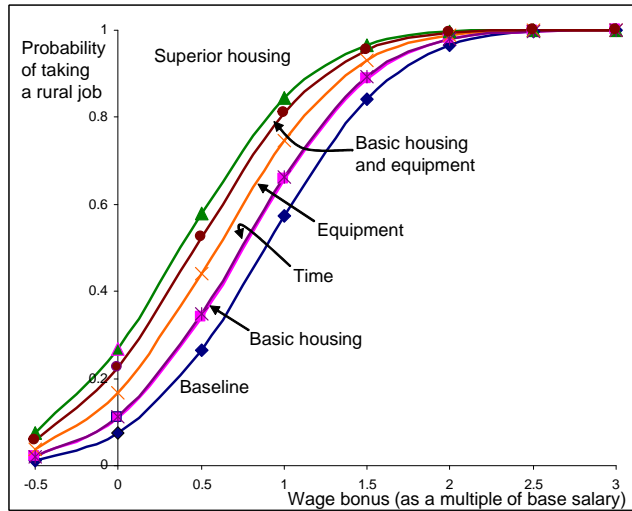
Figure 10: Share of doctors willing to accept a rural job as a function of the rural wage bonus (horizontal axis), with alternative in-kind attribute incentives.

half of doctors to locate in rural areas under current conditions, a rural bonus of approximately 89% (2,225 Birr) is required. Providing basic housing does not affect the impact of wages to a large extent, probably because most doctors already have at least basic housing. On the other hand, providing superior housing means that doubling wages increases the probability of accepting a rural job from 27% to 84%.

Our results suggest that nurses are much less responsive to proportionate wage bonuses than doctors – a doubling of pay increases the probability of accepting a rural job from 4% to only 27%, and inducing half of the nursing workforce to locate in rural areas would require a wage bonus of about 155% of the base salary. This bonus amounts to 1,937 Birr, and is only marginally smaller than that needed to induce a similar proportion of doctors to take jobs in rural areas. The impact of adequate equipment, both on willingness of nurses to take a rural job in itself, and on the impact of higher pay on such willingness, is of particular interest, especially since this attribute does not reflect personal consumption as such. Indeed, the impact of equipment is not only greater than that of basic housing, but it exceeds that of *superior* housing also. By itself, adequate equipment increases the likelihood of accepting a rural job from 4% to 21%, while coupled with a doubling of rural pay, this probability increases to 61%.
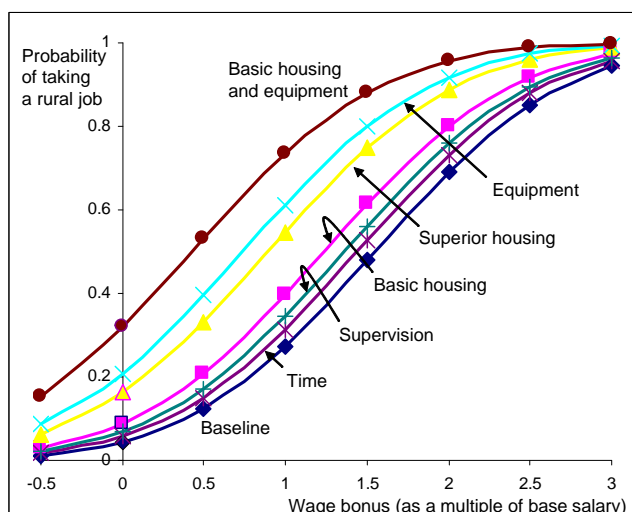
Figure 11: Share of nurses willing to accept a rural job as a function of the rural wage bonus (horizontal axis), with alternative in-kind attribute incentives.

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8 Appendix: Survey instruments

This appendix contains the instruments used in our survey. The first is the facility level quesitonnaire, administered to an official in charge at the facility visited. The second is the individual questionnaire administered to each interviewed health worker, in which we ask about individual and household characteristics, work and income, etc. The third is the discrete choice experiment questionnaire, again administered to each health worker. There DCE questionnaires for doctors and nurses are slightly different. We include the full questionnaire for doctors, and the introductory pages of that for nurses (as the questions that follow are otherwise identical).

Please ask the following to the Medical Director and/or other person(s) who are in a position to answer these questions

FA01	At this facility, what is the primary source of water?	01. Private well / borehole 02. Piped water 03. Public well / borehole 04. River / stream / lake	[ ]
FA02	How adequate is the water supply?	01. Adequate 02. Somewhat aduate 03. Not adequate	[ ]
FA03	Does this facility have electricity most of the time?	01. Yes 02. No	[ ]
FA04	Does this facility have a telephone or radio to communicate?	01. Yes 02. No	[ ]
FA05	Is there television reception in this area?	01. Yes 02. No	[ ]
FA05	What type of toilet(s) are there at this facility for staff to use?	01. Flush toilet 02. Pit latrine 03. Both 04. None	[ ]
FA06	Does the facility have medicine in stock that is adequate to meet demand most of the time?	01. Adequate 02. Somewhat aduate 03. Not adequate	[ ]
FA07	Is there a functioning x-ray machine at this facility?	01. Yes 02. No	[ ]
FA08	Is there a functioning laboratory at this facility?	01. Yes 02. No	[ ]
FA09	Is there a functioning operating / delivery theatre at this facility?	01. Yes 02. No	[ ]
FA10	How adequate is the equipment for basic care at this facility? (e.g. stethoscope, blood pressure etc.)	01. Adequate 02. Somewhat aduate 03. Not adequate	[ ]
FA11	Does this facility have adequate equipment to test patients for HIV?	01. Yes 02. No	[ ]
FA12	How many beds does this facility have for in-patient care?		[ ]
FA13	How many of these beds are currently used by patients?		[ ]
FA14	On average, how many out-patients visit this facility on a daily basis to seek medical care?		[ ]
FA15	At the moment, how many vacancies for doctors and specialists does this facility have?		[ ]
FA16	At the moment, how many vacancies for nurses does this facility have?		[ ]

FA17	From this facility, how many hours travel (one-way, by foot or public transport, whichever is faster) is it to the nearest private health care facility or private clinic?		[ ]
FA18	From this facility, how many hours travel (one-way, by foot or public transport, whichever is faster) is it to the nearest public health care facility?		[ ]
FA19	What is the population size of the village, town, or city where this facility is located?		[ ]
FA20	Does personnel at this facility need to sign in when they arrive at work in the morning?	01. Yes 02. No	[ ]
FA21	Does personnel at this facility need to sign in when they arrive at work after lunch?	01. Yes 02. No	[ ]

LO01	What is your position at this facility?	
	01. Doctor - Specialist	01
	02. Doctor - General Practitioner	02
	03. Health Officer	03
	04. Nurse	04
	05. Laboratory technician	05
	06. Health Assistants	06

LO02	In which year (Ethiopian calendar) did you **start** your medical studies? (post-secondary)	Year

LO03	When you **started** your medical study, were private hospitals and clinics already fairly common?	**Yes** **No**
		1 2

LO04	In which year (Ethiopian calendar) did you **complete** your first medical/nursing studies (including the internship)? (If not completed, write 9999)	Year

LO05	In terms of your exam results, compared with your classmates, in which percentile (from top to bottom) did you fall?	Write [1 ..5] below:
	Top **Middle** **Bottom**	
	Percentiles (100-81) (80-61) (60-41) (40-21) (20-1)	
	1 **2** **3** **4** **5**	**[ ]**

LO06	Did you participate in the federal lottery? **[If No, SKIP to LO13]**	**Yes** **No**
		1 2

LO07	In which year (Ethiopian calendar) did you participate in the federal job assignment lottery?	Year

LO08	Which region did the lottery assign for your first posting? (write # and name)
	01. Region [ ] _____

LO09	Which region, if any, would you have most preferred to work in at that time?
	01. Region [ ] _____

LO10	Did you exchange (swap) your initial regional posting with someone else? **If No, Skip to LO14**	**Yes** **No**
		1 2

LO11	If Yes, which region did you exchange it for? (write # and name)
	01. Region [ ] _____

LO12	Was there an exchange of gifts / money / services related to the swap?	**Given**	**Received**
	01. Gifts (value) (Birr)	___	___
	02. Money (Birr)	___	___
	03. Other - value (Birr)	___	___

After LO12, GO TO LO14

LO13	If not by federal lottery, how else was the region of your first job assigned?	
	01. By regional authorities	01
	02. I was free to choose any region	02
	03. Other (explain): _____	03

LO14	Within the **region in which you first worked**, how was your first job assigned? There were 1 or more vacancies, […]	
	01. Of which one was assigned by lottery	01
	02. Of which I could **choose** one	02
	03. Of which one was assigned by another **method**	03

LO15	**About how many** vacancies were there from which your job was Please Probe! If really has no idea, write "97"	

LO16	How many years/months were you officially required to work at this facility? (If none, write "0") **[ ] Years, and [ ] Months**

LO17	Official Release from Public Sector Certificate

Applied?	**Granted?**	**Needed to pay?**	**How Much?**
01. Yes	01. Yes	01. Yes	Birr _____
02. No	02. No	02. No	
99. Not Applicable			

Continue to LO18   Continue to LO18

Regions:	1. Addis Ababa	5. Dire Dawa	9. Somali
	2. Afar	6. Gambela	10. SNNPR
	4. Benishangul-Gumaz	8. Oromia	11. Tigray

Community and Facility Characteristics of First Job Following Completion of Medical / Nursing School and Current Job
(or just first job, if first=current)

LO18	Is your first posting following completion of medical school and your current one the same?	Yes 1	No 2

> If Yes fill in 1st column only, if No, fill in both columns

		First Job	Current Job
LO19	In which year (Ethiopian calendar) did you start the posting/job?		
	01. **Year**	[ ]	[ ]
LO20	How long (years and months) did you work / have you worked at the facility?	First Job	Current Job
	01. **Years**	[ ]	[ ]
	02. **Months**	[ ]	[ ]
LO21	Where was / is the facility? (use current names if names have changed)	First Job	Current Job
	01. **Region (write code # and name – see below)**	[ ] _____	[ ] _____
	02. **Zone**	_____	_____
	03. **Woreda**	_____	_____

LO22	In which sector was / is this posting? (select one)	Public 1	Private 2	NGO 3	Missionary 4			First Job [ ]	Current Job [ ]

LO23	Facility Type (select one)	Hospital 1	Clinic 2	Health Post 3	Phar-macy 4	Labo-ratory 5	Health Center 6	First Job [ ]	Current Job [ ]

LO24	How many hours travel one-way by public transport from facility to … ?	First Job	Current Job
	Regional Capital	[ ]	[ ]
	Addis Ababa	[ ]	[ ]

LO25	When you consider the patients in the woreda where you work(ed), please indicate what proportion of them had/has the **same** characteristic as yourself in… ? (select one for each characteristic)	First Job	Current Job
	01. Percentage Same Religion	[ ] %	[ ] %
	02. Percentage Same Spoken Language	[ ] %	[ ] %
	03. Percentage Same Ethnic Background	[ ] %	[ ] %

LO26	Were / are there internal or external training opportunities available to you?	Yes 1	No 2	First Job [ ]	Current Job [ ]

Regions:	1. Addis Ababa	5. Dire Dawa	9. Somali
	2. Afar	6. Gambela	10. SNNPR
	3. Amhara	7. Harari	11. Tigray
	4. Benishangul-Gumaz	8. Oromia	

Write Answers in Last 2 Columns

LO27 When you consider the following protective items that help minimize the risk to the medical worker of various infections in the facility where you work(ed), how adequate was/is their availability, **provided they are relevant to your work** (i.e. if because of the nature of your work an item does not apply, select not applicable)?

	Very Reliable (almost never out)	Reliable (out 2-5 days / month)	Not Reliable (out 6+ days / month)	Not Applicable to My Work	First Job	Current Job
01. Soap in stock for washing your hands	1	2	3	99	[ ]	[ ]
02. Water for washing your hands	1	2	3	99	[ ]	[ ]
03. Protective plastic gloves in stock	1	2	3	99	[ ]	[ ]
04. Potective mouth cover in stock (e.g. to protect against air borne infections)	1	2	3	99	[ ]	[ ]
05. Sterile syringes in stock	1	2	3	99	[ ]	[ ]
06. Supply of medicines	1	2	3	99	[ ]	[ ]

LO28 How would you describe your normal workload in this job?

	Often **not** time to complete tasks	Usually **enough time** to complete tasks	**Idle time** is common	First Job	Current Job
Workload	1	2	3	[ ]	[ ]

LO29 How would you rate the physical condition of this facility?

	Good	Fair	Bad	First Job	Current Job
Condition	1	2	3	[ ]	[ ]

LO30 Were / are people in your position reprimanded at this facility by (a) supervisor(s) if their attendance or performance is poor?

	Yes	No	First Job	Current Job
Reprimanded	1	2	[ ]	[ ]

LO31 Did / do you have access to a supervisor who was / is willing and able to provide advice and support?

	Yes	No	First Job	Current Job
Advice and support	1	2	[ ]	[ ]

LO32 Finally, on a scale from 1 to 5, how was / is your **satisfaction** with the following job characteristics?

	Very Satisfied >		Satisfied >		Not at all Satisfied	First Job	Current Job
01. Training opportunities	1	2	3	4	5	[ ]	[ ]
02. Salary	1	2	3	4	5	[ ]	[ ]
03. Workload and pressure	1	2	3	4	5	[ ]	[ ]
04. Work tasks	1	2	3	4	5	[ ]	[ ]
05. Overall assessment	1	2	3	4	5	[ ]	[ ]

LO33	When you consider **your group of patients** that came / come to the facility where you work(ed), what proportion do you suspect were infected with HIV in the last year (of first posting) / this year (of current posting), regardless of whether the patient was seeking treatment for HIV/AIDS or a different illness (e.g. malaria, broken bone, etc.)?							
							First Job	**Current Job**
	Percentage of your patients you suspect were/are infected w HIV						[ ] %	[ ] %

LO34	In an average month of work at this facility, how common is it that you came / will come into contact with a patient that was/is either bleeding or a patient whose blood you were/are handling (e.g. when taking someone's bloodsample)?							
		Rare (0-1 day / month)	Sometimes (2-5 days / month)	Often (6-10 days / month)	Very Often (almost every day)		**First Job**	**Current Job**
	Frequency	1	2	3	4		[ ]	[ ]

LO35	Finally, how frequent do you think the following practices are at this facility?							
		Never happens	Rarely	Sometimes	Common		**First Job**	**Current Job**
	01. Medicine is illegally taken from this facility by some staff and sold outside	1	2	3	4		[ ]	[ ]
	02. Patients visiting this facility are asked by some staff for money and/or gifts in return for receiving medical care	1	2	3	4		[ ]	[ ]

LO36	According to you, can there be a risk of infection to someone not infected with HIV if s/he comes into contact with the following bodily fluids from someone who is HIV positive?		
		Yes	No
	01. Sweat	1	2
	02. Saliva (e.g. through coughing)	1	2
	03. Blood	1	2

WORK AND TRAINING HISTORY IN PUBLIC AND PRIVATE SECTOR

Please fill in the table at the bottom of this page. The first table serves as an example only.

Instructions: Each column in the table refers to a year (Ethiopian Calendar). You start with the year in which you started your medical studies (from question LO01), and leave all years before blank. For each year, ask the respondent whether he / she was engaged in any of the five activities listed, even if the respondent engaged in an activity only part of the year.

For example, a respondent started her medical studies in **1992** at a public university and completed it in **1995**. The same year (**1995**), the respondent took up a job at a public health center where she worked from **1995** to **1997**. In 1997, the respondent stopped her public sector job and attended a training course for five months at a private training facility. Before the end of **1997**, the respondent completed the training and took a job at a private health facility where the respondent has been working since. The respondent has stayed at this facility and not done any more training since **1997**. The example table of this respondent would look as follows:

EXAMPLE TABLE:

	1980	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
Work: Public Health Sector																X	X	X		
Work: Private Health Sector																		X	X	X
Training: Public Health Training Facility													X	X	X					
Training: Private Health Training Facility																		X		
Other																				

PLEASE FILL IN TABLE

(Ethiopian Calendar)	1980	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
Work: Public Health Sector																				
Work: Private Health Sector																				
Training: Public Health Training Facility																				
Training: Private Health Training Facility																				
Other																				

SECTION WA (Income Generating Activities)
For this health worker, list the current employment activities, starting with the activity at this facility.

Note: Please list ALL CURRENT activities, incl. private, public, volunteer, farming, etc. (make sure to probe)

WA01	WA02	WA03	WA05	WA06	WA07	WA08
Type of Workplace (starting with this facility) [codes: 1 … 12]	**Sector** of work [codes: 1 … 3]	On average, how many hours **per week** do you usually spend on this activity?	For this activity, do you receive a monthly salary from your employer?	For this activity, what other sources of monetary compensation do you earn? **(read codes out loud and check all that apply)**	From these other sources, how much monetary compensation do you receive on average per month?	Are you provided with housing as part of this activity (job)?
[SEE CODES]	[SEE CODES]		(1) (2) (99) Yes No NA	[SEE CODES]	99 = Not Applicable	(1) (2) Yes No
1 This Facility:	1 2 3	_____ hrs/wk	[1._____Birr] 2 99	1 2 3 99	_____ Birr 99	1 2
2	1 2 3	_____ hrs/wk	[1._____Birr] 2 99	1 2 3 99	_____ Birr 99	1 2
3	1 2 3	_____ hrs/wk	[1._____Birr] 2 99	1 2 3 99	_____ Birr 99	1 2
4	1 2 3	_____ hrs/wk	[1._____Birr] 2 99	1 2 3 99	_____ Birr 99	1 2
5	1 2 3	_____ hrs/wk	[1._____Birr] 2 99	1 2 3 99	_____ Birr 99	1 2
6	1 2 3	_____ hrs/wk	[1._____Birr] 2 99	1 2 3 99	_____ Birr 99	1 2
7	1 2 3	_____ hrs/wk	[1._____Birr] 2 99	1 2 3 99	_____ Birr 99	1 2
8	1 2 3	_____ hrs/wk	[1._____Birr] 2 99	1 2 3 99	_____ Birr 99	1 2

Type of workplace:
01. HEALTH WORK: HOSPITAL
02. HEALTH WORK: CLINIC
03. HEALTH WORK: HEALTH POST
04. HEALTH WORK: PHARMACY
05. HEALTH WORK: LABORATORY
06. HEALTH WORK: HEALTH CENTER
07. HEALTH WORK: FROM HOME
08. HEALTH WORK: INFORMAL BASIS FROM HOME
09. HEALTH WORK: VOLUNTEER
10. NON-HEALTH: FORMAL EMPLOYMENT
11. NON-HEALTH: FORMAL SELF-EMPLOYMENT
12. NON-HEALTH: INFORMAL SECTOR

Sector of work:
01. PUBLIC SECTOR
02. PRIVATE SECTOR (incl. SELF-EMPLOYMENT)
03. NGO OR MISSIONARY

Compensation sources:
01. PER DIEM FROM EMPLOYER
02. REMOTE AREA COMPENSATION
03. OTHER FORMS OF PAYMENT / COMPENSATION
99. DOES NOT APPLY - NO OTHER SOURCES

SECTION WA (Income Generating Activities)
For this health worker, list the current employment activities, starting with the activity at this facility.

Note: Please list ALL CURRENT activities, incl. private, public, volunteer, farming, etc. (make sure to probe)

	WA01	WA02	WA03	WA05		WA06	WA07	WA08
	Type of Workplace (starting with this facility) [codes: 1 … 12]	**Sector** of work [codes: 1 … 3]	On average, how many hours **per week** do you usually spend on this activity?	For this activity, do you receive a monthly salary from your employer?	For this activity, what other sources of monetary compensation do you earn? (**read codes out loud and check all that apply**)	From these other sources, how much monetary compensation do you receive on average per month?	Are you provided with housing as part of this activity (job)?
	[SEE CODES]	[SEE CODES]		(1) (2) (99) Yes No NA	[SEE CODES]	99 = Not Applicable	(1) (2) Yes No
1	This Facility:	1 2 3	___ hrs/wk	[1. ___ Birr] 2 99	1 2 3 99	___ Birr 99	1 2
2		1 2 3	___ hrs/wk	[1. ___ Birr] 2 99	1 2 3 99	___ Birr 99	1 2
3		1 2 3	___ hrs/wk	[1. ___ Birr] 2 99	1 2 3 99	___ Birr 99	1 2
4		1 2 3	___ hrs/wk	[1. ___ Birr] 2 99	1 2 3 99	___ Birr 99	1 2
5		1 2 3	___ hrs/wk	[1. ___ Birr] 2 99	1 2 3 99	___ Birr 99	1 2
6		1 2 3	___ hrs/wk	[1. ___ Birr] 2 99	1 2 3 99	___ Birr 99	1 2
7		1 2 3	___ hrs/wk	[1. ___ Birr] 2 99	1 2 3 99	___ Birr 99	1 2
8		1 2 3	___ hrs/wk	[1. ___ Birr] 2 99	1 2 3 99	___ Birr 99	1 2

Type of workplace:
01. HEALTH WORK: HOSPITAL
02. HEALTH WORK: CLINIC
03. HEALTH WORK: HEALTH POST
04. HEALTH WORK: PHARMACY
05. HEALTH WORK: LABORATORY
06. HEALTH WORK: HEALTH CENTER
07. HEALTH WORK: FROM HOME
08. HEALTH WORK: INFORMAL BASIS FROM HOME
09. HEALTH WORK: VOLUNTEER
10. NON-HEALTH: FORMAL EMPLOYMENT
11. NON-HEALTH: FORMAL SELF-EMPLOYMENT
12. NON-HEALTH: INFORMAL SECTOR

Sector of work:
01. PUBLIC SECTOR
02. PRIVATE SECTOR (incl. SELF-EMPLOYMENT)
03. NGO OR MISSIONARY

Compensation sources:
01. PER DIEM FROM EMPLOYER
02. REMOTE AREA COMPENSATION
03. OTHER FORMS OF PAYMENT / COMPENSATION
99. DOES NOT APPLY - NO OTHER SOURCES

	HR01	HR02	HR03	HR04	HR05	HR06	HR07	HR08	HR09
I D C O D E	**First names** of usual household members living together with the health worker Start with Health Worker	Sex	Relation to health worker	Age of [name]	Years of schooling completed (incl. post-secondary)	Did [name] during the past 1 month work on any activity that generates income?	How much does [name] earn on average per month?	**Primary Income Activity:** Self Employed or Not	**Primary Income Activity:** Sector
		(1) (2) mal fem		If age<1, age=0		(1) (2) Yes No		(1) (2) Self NotSelf	
1	01. (Health Worker)	1 2	**01**			SKIP TO PERSON 2			
2		1 2				1 2	_____Birr	1 2	
3		1 2				1 2	_____Birr	1 2	
4		1 2				1 2	_____Birr	1 2	
5		1 2				1 2	_____Birr	1 2	
6		1 2				1 2	_____Birr	1 2	
7		1 2				1 2	_____Birr	1 2	
8		1 2				1 2	_____Birr	1 2	
9		1 2				1 2	_____Birr	1 2	
10		1 2				1 2	_____Birr	1 2	
11		1 2				1 2	_____Birr	1 2	
12		1 2				1 2	_____Birr	1 2	

01. HEALTH WORKER HIM/HERSELF
02. WIFE/HUSBAND/PARTNER
03. CHILD (INCL. STEP AND ADOPTED)
04. GRANDCHILD
05. FATHER/MOTHER
06. SISTER/BROTHER
07. NIECE/NEPHEW
08. UNCLE/AUNT
09. OTHER RELATIVE
10. SERVANT
11. OTHER UNRELATED PERSON

01. HEALTH - PUBLIC
02. HEALTH - PRIVATE
03. NON HEALTH - PUBLIC
04. NON HEALTH - PRIVATE
05. FARM WORK
06. ANIMAL HERDING
07. OTHER

	NHM01	NHM02	NHM03	NHM04	NHM05	NHM06	NHM07	NHM08	NHM09	NHM10	NHM11	NHM12
ID	First names of **spouse(s)/partner(s) and all children under 18 NOT living in household**	Sex	Age of [name]	Relation to health worker	Reason family member is not living with health worker **>1 may apply**	**Region** live now (write # and name)	Live now in **urban** area	Years of schooling completed (incl. post-secondary)	Did [name] during the past 1 month work on any activity that generates income?	How much does [name] earn on average per month?	**Primary Activity:** Self Employed or Not	**Primary Activity:** Sector
		(1) (2) mal fem	If age<1, age=0		[SEE CODES]		(1) (2) Yes No		(1) (2) Yes No		(1) (2) Self NotSelf	
1		1 2				[ ] _____	1 2		1 2	_____Birr	1 2	
2		1 2				[ ] _____	1 2		1 2	_____Birr	1 2	
3		1 2				[ ] _____	1 2		1 2	_____Birr	1 2	
4		1 2				[ ] _____	1 2		1 2	_____Birr	1 2	
5		1 2				[ ] _____	1 2		1 2	_____Birr	1 2	
6		1 2				[ ] _____	1 2		1 2	_____Birr	1 2	
7		1 2				[ ] _____	1 2		1 2	_____Birr	1 2	
8		1 2				[ ] _____	1 2		1 2	_____Birr	1 2	
9		1 2				[ ] _____	1 2		1 2	_____Birr	1 2	
10		1 2				[ ] _____	1 2		1 2	_____Birr	1 2	

Regions:

1. Addis Ababa
2. Afar
3. Amhara
4. Benishangul-Guma
5. Dire Dawa
6. Gambela
7. Harari
8. Oromia
9. Somali
10. SNNPR
11. Tigray

02. WIFE/HUSBAND/PARTNER
03. CHILD (INCL. STEP AND ADOPTED)

01. BETTER WORK OPPORTUNITIES
02. BETTER SCHOOLING OPPORTUNITIES
03. BETTER HEALTH CARE
04. CARE OF FAMILY MEMBERS
05. BETTER LIFESTYLE
06. ADULT CHILD
07. OTHER (SPECIFY)

01. HEALTH - PUBLIC
02. HEALTH - PRIVATE
03. NON HEALTH - PUBLIC
04. NON HEALTH - PRIVATE
05. FARM WORK
06. ANIMAL HERDING
07. OTHER

Part II: Discrete Choice Questionnaire

[This is module DocA1]

In this section of the questionnaire we want to try and understand what factors affect the employment preferences of doctors. There are many job attributes that could be important, but we have chosen to focus on six of them. They are:

- **Geographic Location**

  This attribute specifies whether your place of work is in Addis Ababa or in a zonal capital of one of the zones. If the latter, you should think of the job as being randomly situated in one of the zonal capitals in Ethiopia, or alternatively, in "an average zonal capital".

- **Net Monthly Pay (including regular allowances)**

  This attribute takes on different Birr levels. The first represents the base salary for a physician at an "average" grade in the civil service pay scale, while higher levels are multiples of this average base level. Note that the base salary does not necessarily reflect your current actual salary.

- **Government-provided Housing**

  This attribute measures the existence, and quality, of government-provided housing, and has three possible levels. "None" means there is no housing provided by the government as part of the conditions of employment. "Basic" housing means the government provides housing for the health worker, but that it is rudimentary, having no electricity or running water, and with at best an outside toilet. "Superior" housing means the government provides housing of higher quality, including the presence of electricity and running water, including an inside flush toilet.

- **Availability of Equipment and Drugs**

  This attribute simply takes on two values – "inadequate" and "improved". "Inadequate" is the standard of equipment and availability of drugs that you might expect in a poorly equipped public facility in the given location. "Improved" is that level of supplies that would result from a doubling of the budget currently spent on equipment and drugs.

- **Time Commitment following Training**

  Suppose your employer provides or sponsors training on your behalf. This attribute measures the number of years you are required to work for the sponsor for each year of training provided. It can take on two values: 1 and 2.

- **Permission to hold a Second Job in the Private Sector**

  This attribute is 1 if you are permitted work in the private sector (either using the public facility or not), and 0 if you are not permitted to do so.

These attributes are summarized in the table below:

Attribute	Possible levels
Location	Addis Ababa vs Zonal Capital
Net Monthly Pay	2,500 (=base), 3,750 (=1.5 x base), 5,000 (=2 x base)
Housing	None, Basic, Superior
Equipment and Drugs	Inadequate vs Improved
Time Commitment	2 years vs 1 year
Private Sector	Yes vs No

Different combinations of the attributes listed above represent different *job descriptions*. Each job description is *hypothetical*, and you are asked to imagine what it would be like to have such a job. The job descriptions are intended to represent a range of employment choices for health workers in Ethiopia.

You will be presented with 15 pairs of job descriptions. In each pair, the jobs are referred to as "Job 1" and "Job 2". The attributes of Job 1 do not change, but those of Job 2 will differ slightly across pairs. Each job has advantages and disadvantages and you will need to trade-off these advantages and disadvantages in choosing which of the two you prefer.

In some cases, you might decide that, given your current circumstances, you would in practice be unwilling to accept either of the two jobs in a given pair. We would still like to know which one you would choose *if your circumstances permitted it*. Thus, for each pair of jobs, you should answer the question:

- *If your circumstances permitted it, which of the two jobs described would you choose? You should answer either "Job 1" or "Job 2".*

A description of Job 1 (which remains the same in all the comparisons) is provided first: this job is located in Addis Ababa, pays a net monthly salary of 3,750 Birr (which is 1.5 times the base salary considered here), has basic government-provided housing, has an inadequate supply of equipment and drugs, requires one year of service for every one year of employer-sponsored training, and permits outside private sector work.

Job 1	
Location:	Addis Ababa
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	Basic
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Private sector	Yes

Choice Set: Example

Below is an example of the kind of choice you will be asked to make. In this example, the attribute levels are the same across the two jobs, except for Housing, Time commitment, and Private Sector. In Job 1 you get basic housing, have to pay back just 1 year for every year of training, and are permitted to work in the private sector, while in Job 2 the housing is superior but you must pay back 2 years for every year of training, and you are not permitted to work in the private sector. Taking into consideration the values of the other job attributes, you need to decide which job you would choose if your circumstances permitted it.

Job 1	
Location:	Addis Ababa
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	Basic
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Private Sector	Yes

Job 2	
Location:	Addis Ababa
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	Superior
Equipment and drugs	Inadequate
Time commitment	2 years for every year of training
Private Sector	No

If your circumstances permitted it, which of the two jobs described would you choose?   ☐ **Job 1**   ☐ **Job 2**

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Choice Set: A

Job 1	
Location:	Addis Ababa
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	Basic
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Private Sector	Yes

Job 2	
Location:	Addis Ababa
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	Superior
Equipment and drugs	Inadequate
Time commitment	2 years for every year of training
Private Sector	Yes

If your circumstances permitted it, which of the two jobs described would you choose? ☐ **Job 1**   ☐ **Job 2**

Choice Set: B

Job 1	
Location:	Addis Ababa
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	Basic
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Private Sector	Yes

Job 2	
Location:	Zonal Capital
Net Monthly Pay:	2,500 Birr (base salary)
Housing	Superior
Equipment and drugs	Improved
Time commitment	2 years for every year of training
Private Sector	Yes

If your circumstances permitted it, which of the two jobs described would you choose?   ☐ **Job 1**   ☐ **Job 2**

Choice Set: C

Job 1	
Location:	Addis Ababa
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	Basic
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Private Sector	Yes

Job 2	
Location:	Zonal Capital
Net Monthly Pay:	2,500 Birr (base salary)
Housing	Basic
Equipment and drugs	Improved
Time commitment	1 year for every year of training
Private Sector	Yes

If your circumstances permitted it, which of the two jobs described would you choose?　　☐ **Job 1**　　☐ **Job 2**

Choice Set: D

Job 1	
Location:	Addis Ababa
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	Basic
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Private Sector	Yes

Job 2	
Location:	Addis Ababa
Net Monthly Pay:	2,500 Birr (base salary)
Housing	None
Equipment and drugs	Improved
Time commitment	1 year for every year of training
Private Sector	Yes

If your circumstances permitted it, which of the two jobs described would you choose? ☐ **Job 1** ☐ **Job 2**

Choice Set: E

Job 1	
Location:	Addis Ababa
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	Basic
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Private Sector	Yes

Job 2	
Location:	Zonal Capital
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	None
Equipment and drugs	Improved
Time commitment	2 years for every year of training
Private Sector	No

If your circumstances permitted it, which of the two jobs described would you choose?   ☐ **Job 1**   ☐ **Job 2**

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Choice Set: F

Job 1	
Location:	Addis Ababa
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	Basic
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Private Sector	Yes

Job 2	
Location:	Zonal Capital
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	None
Equipment and drugs	Improved
Time commitment	1 years for every year of training
Private Sector	No

If your circumstances permitted it, which of the two jobs described would you choose? ☐ **Job 1** ☐ **Job 2**

Choice Set: G

Job 1	
Location:	Addis Ababa
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	Basic
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Private Sector	Yes

Job 2	
Location:	Addis Ababa
Net Monthly Pay:	2,500 Birr (base salary)
Housing	None
Equipment and drugs	Inadequate
Time commitment	2 years for every year of training
Private Sector	No

If your circumstances permitted it, which of the two jobs described would you choose?   ☐ **Job 1**   ☐ **Job 2**

Choice Set: H

Job 1	
Location:	Addis Ababa
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	Basic
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Private Sector	Yes

Job 2	
Location:	Zonal Capital
Net Monthly Pay:	5,000 Birr (2 times base salary)
Housing	None
Equipment and drugs	Inadequate
Time commitment	2 years for every year of training
Private Sector	Yes

If your circumstances permitted it, which of the two jobs described would you choose? ☐ **Job 1** ☐ **Job 2**

Choice Set: I

Job 1	
Location:	Addis Ababa
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	Basic
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Private Sector	Yes

Job 2	
Location:	Addis Ababa
Net Monthly Pay:	5,000 Birr (2 times base salary)
Housing	Superior
Equipment and drugs	Improved
Time commitment	1 year for every year of training
Private Sector	No

If your circumstances permitted it, which of the two jobs described would you choose?   ☐ **Job 1**   ☐ **Job 2**

Choice Set: J

Job 1	
Location:	Addis Ababa
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	Basic
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Private Sector	Yes

Job 2	
Location:	Zonal Capital
Net Monthly Pay:	2,500 Birr (base salary)
Housing	Superior
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Private Sector	No

If your circumstances permitted it, which of the two jobs described would you choose?   ☐ **Job 1**   ☐ **Job 2**

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Choice Set: K

Job 1	
Location:	Addis Ababa
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	Basic
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Private Sector	Yes

Job 2	
Location:	Addis Ababa
Net Monthly Pay:	2,500 Birr (base salary)
Housing	None
Equipment and drugs	Improved
Time commitment	2 years for every year of training
Private Sector	Yes

If your circumstances permitted it, which of the two jobs described would you choose? ☐ **Job 1**   ☐ **Job 2**

Choice Set: L

Job 1	
Location:	Addis Ababa
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	Basic
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Private Sector	Yes

Job 2	
Location:	Zonal Capital
Net Monthly Pay:	2,500 Birr (base salary)
Housing	Basic
Equipment and drugs	Inadequate
Time commitment	2 years for every year of training
Private Sector	No

If your circumstances permitted it, which of the two jobs described would you choose?   ☐ **Job 1**   ☐ **Job 2**

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Choice Set: M

Job 1	
Location:	Addis Ababa
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	Basic
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Private Sector	Yes

Job 2	
Location:	Addis Ababa
Net Monthly Pay:	5,000 Birr (2 times base salary)
Housing	Basic
Equipment and drugs	Improved
Time commitment	2 years for every year of training
Private Sector	No

If your circumstances permitted it, which of the two jobs described would you choose?   ☐ **Job 1**   ☐ **Job 2**

Choice Set: N

Job 1	
Location:	Addis Ababa
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	Basic
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Private Sector	Yes

Job 2	
Location:	Zonal Capital
Net Monthly Pay:	5,000 Birr (2 times base salary)
Housing	None
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Private Sector	Yes

If your circumstances permitted it, which of the two jobs described would you choose? ☐ **Job 1**   ☐ **Job 2**

Choice Set: O

Job 1	
Location:	Addis Ababa
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	Basic
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Private Sector	Yes

Job 2	
Location:	Addis Ababa
Net Monthly Pay:	3,750 Birr (1.5 times base salary)
Housing	Basic
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Private Sector	Yes

If your circumstances permitted it, which of the two jobs described would you choose?   ☐ **Job 1**   ☐ **Job 2**

Part II: Discrete Choice Questionnaire

[This is module NurseA1]

In this section of the questionnaire we want to try and understand what factors affect the employment preferences of nurses. There are many job attributes that could be important, but we have chosen to focus on six of them. They are:

- **Geographic Location**

  This attribute specifies whether your place of work is in a City (i.e., a zonal or regional capital, or Addis Ababa), or in a Rural area. If the job is a "City" job, you should think of it as being randomly situated in one of the zonal capitals or larger cities in Ethiopia, or alternatively, in "an average city". If the job is a "Rural" job, you should think of it as being randomly situated in a town or village outside of the zonal capitals and larger cities.

- **Net Monthly Pay (including regular allowances)**

  This attribute takes on different Birr levels. The first represents the base salary for a nurse at an "average" grade in the civil service pay scale, while higher levels are multiples of this average base level. Note that the base salary does not necessarily reflect your current actual salary.

- **Government-provided Housing**

  This attribute measures the existence, and quality, of government-provided housing, and has three possible levels. "None" means there is no housing provided by the government as part of the conditions of employment. "Basic" housing means the government provides housing for the health worker, but that it is rudimentary, having no electricity or running water, and with at best an outside toilet. "Superior" housing means the government provides housing of higher quality, including the presence of electricity and running water, including an inside flush toilet.

- **Availability of Equipment and Drugs**

  This attribute simply takes on two values – "inadequate" and "improved". "Inadequate" is the standard of equipment and availability of drugs that you might expect in a poorly equipped public facility in the given location. "Improved" is that level of supplies that would result from a doubling of the budget currently spent on equipment and drugs.

- **Time Commitment following Training**

  Suppose your employer provides or sponsors training on your behalf. This attribute measures the number of years you are required to work for the sponsor after you have completed the training, for each year of training provided. It can take on two values: 1 and 2.

1

- **Level of supervision**

  This attribute attempts to measure the degree of professional interaction you have with your superiors, and takes on two values – high and low. A high level of supervision could result from regular and productive interaction with a supervisor who works in the same facility as you, or from regular visits (say every one or two weeks) from a more senior health worker from another facility, such as a zonal hospital. A low level of supervision could arise due to lack of interaction by more senior health workers who work at your facility, or because of infrequent visits (say once every six months or less) by such superiors from other institutions.

These attributes are summarized in the table below:

Attribute	Possible levels
Location	City vs Rural
Net Monthly Pay	1,250 (=base), 1,875 (=1.5 x base), 2,500 (=2 x base)
Housing	None, Basic, Superior
Equipment and Drugs	Inadequate vs Improved
Time Commitment	2 years vs 1 year
Supervision	High vs Low

Different combinations of the attributes listed above represent different *job descriptions*. Each job description is *hypothetical*, and you are asked to imagine what it would be like to have such a job. The job descriptions are intended to represent a range of employment choices for health workers in Ethiopia.

You will be presented with 15 pairs of job descriptions. In each pair, the jobs are referred to as "Job 1" and "Job 2". The attributes of Job 1 do not change, but those of Job 2 will differ slightly across pairs. Each job has advantages and disadvantages and you will need to trade-off these advantages and disadvantages in choosing which of the two you prefer.

In some cases, you might decide that, given your current circumstances, you would in practice be unwilling to accept either of the two jobs in a given pair. We would still like to know which one you would choose *if your circumstances permitted it*. Thus, for each pair of jobs, you should answer the question:

- *If your circumstances permitted it, which of the two jobs described would you choose? You should answer either "Job 1" or "Job 2".*

A description of Job 1 (which remains the same in all the comparisons) is provided first: this job is located in a City, pays a net monthly salary of 1,875 Birr (which is 1.5 times the base salary considered here), has basic government-provided housing, has an inadequate supply of equipment and drugs, requires one year of service for every one year of employer-sponsored training, and provides a high level of supervision.

Job 1	
Location:	City
Net Monthly Pay:	1,875 Birr (1.5 times base salary)
Housing	Basic
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Supervision	High

Choice Set: Example

Below is an example of the kind of choice you will be asked to make. In this example, the attribute levels are the same across the two jobs, except for Housing, Time commitment, and Supervision. In Job 1 you get basic housing, have to pay back just 1 year for every year of training, and have a high level of supervision, while in Job 2 the housing is superior but you must pay back 2 years for every year of training, and you receive a low level of supervision. Taking into consideration the values of the other job attributes, you need to decide which job you would choose if your circumstances permitted it.

Job 1	
Location:	City
Net Monthly Pay:	1,875 Birr (1.5 times base salary)
Housing	Basic
Equipment and drugs	Inadequate
Time commitment	1 year for every year of training
Supervision	High

Job 2	
Location:	City
Net Monthly Pay:	1,875 Birr (1.5 times base salary)
Housing	Superior
Equipment and drugs	Inadequate
Time commitment	2 years for every year of training
Supervision	Low

If your circumstances permitted it, which of the two jobs described would you choose?　　☐ **Job 1**　　☐ **Job 2**

With an eye to informing the policy-making process, this report summarizes the methodology and findings of a study of the health labor market conducted in Ethiopia in 2007. First, the prevailing human resources setting in the health sector is discussed. This is followed by a description of the empirical methodology, including survey design and sampling issues, and presentation of summary statistics on the workforce and its demographic and economic characteristics. Second, this report will present two separate analyses using the data collected: (i) an estimation of the relationships between job assignments and career development, with special attention to the institutional mechanisms that characterize the health sector labor market in particular distinguishing between the lottery system used to assign jobs to new graduates, and what we refer to as the market; (ii) an estimation of the expected labor supply responses to a variety of financial and in-kind incentives that might be provided in order to attract workers to rural areas.

Health Systems for Outcomes Publication

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