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Quality and Equity in Basic Health Care Services in Vietnam:

Findings from the 2015 Vietnam District and Commune Health Facility Survey

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Acronyms

ALOS	Average length of stay
CHS	Commune health station
DH	District hospital
GRM	Generalized Reducible Metrics
HCP	Health care provider
HSPI	Health Strategy and Policy Institute
IRT	Item response theory
MOH	Ministry of health
NCD	Non-communicable disease
PPS	Probability Proportional to Size
SARA	Services Availability and Readiness
SDI	Service Delivery Indicators
SRHS	Self-reported health status
SRS	Systematic random selection
TB	Tuberculosis
UHC	Universal health coverage
US	United States
VHLSS	Vietnam Household Living Standard Survey
WHO	World Health Organization

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Executive Summary

Vietnam's grassroots health care system —consisting of commune health stations and district hospitals — provides nearly all care for the poor and a substantial share of health care services for all but the wealthiest citizens.[1] There are concerns that low quality of health at the grassroots level may drive patients to seek care at higher levels, driving up out-of-pocket costs and creating pressure to build more higher level facilities. However, in the absence of systematic evidence, discussion of health care quality in Vietnam has relied largely on anecdote and partial evidence. This study helps fill that gap, drawing extensively from an innovative survey of commune health stations and district hospitals. The survey was designed to be statistically representative of patient experiences in six provinces drawn from six separate regions, in order to provide a portrait broadly reflective of the state of the grassroots health care system in Vietnam as a whole. In addition to providing information about facility readiness, doctor characteristics, and patient experiences, the resulting data allows for analysis of several different measures of doctor quality, including 1) a measure of doctor "ability" based on responses to a series of vignette scenarios testing their knowledge, 2) an "effort" index based on direct observations of time, questions, and diagnostic examinations per patient, and 3) an assessment of the correctness of practice observed in direct observation of treatment of simple conditions. Key findings and related policy questions include the following:

- Although the system exhibits a number of weaknesses in terms of quality, the grassroots health system provides remarkably equitable care. Services and experiences of patients do not vary greatly by socioeconomic background as much as in other countries. Differentiation does exist, however, in who accesses the grassroots system. Very few patients in the wealthiest quintile visit commune health stations, and only rarely do the poorest patients access provincial and national hospitals, which are above the grassroots system.

- Facilities generally have the basic infrastructure, staffing, and equipment needed to provide quality care, but there are gaps. Many commune health stations in Dien Bien lack clean water, and greater use of information systems could help improve service delivery at most facilities. Many facilities lack essential medicines, leading patients to buy medicines outside the facility at higher cost. Additionally, the low nurse to doctor ratio highlights the need to understand why more nurses are not being hired by hospitals.

- Doctors in district hospitals on average are much more knowledgeable than commune health station doctors, and the knowledge gap is largely attributable to their education background. At the same time, in vignette tests a significant share of doctors at both district hospitals and

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[1] This study concerns the *curative care* system. District-level *preventative care* health centers, which are also part of the grassroots health care system, are outside the scope of this study.

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commune health stations prescribed unnecessary and potentially harmful treatments. Possible approaches to address these knowledge gaps include clinical training and other support tools, greater exchange or supervision between the district and commune doctors, and standardizing the minimum entry level education competencies.

- Doctors in district hospitals on average exert far less up-front examination "effort" than commune health station doctors. This pattern is not explained by either greater efficiency or greater time constraints of hospital doctors. Hospital doctors appear to substitute testing for asking questions and performing physical exams. For simple cases of cough/cold and diarrhea, doctors at commune facilities are more likely to provide correct treatment than doctors at district hospitals, despite their lower level of ability. At both types of facilities, however, many doctors were observed to give unnecessary or potentially harmful treatments, mirroring the findings from vignette tests. This raises questions about the potential for commune health stations to be a preferable source of treatment for basic primary health care, the need to ensure that district hospitals do better at the basics while their focus is on higher level services, the need for clinical practice and facility-based incentives to put greater emphasis on initial examination and less on laboratory tests, and the need for quality assurance checks to ensure that appropriate treatments are followed.

- Doctors prescribe an average of 3 medicines per visit, including at least one antibiotic in 45% of visits at commune health stations and 39% of visits at district hospitals. At district hospitals doctors order at least one laboratory test for 46% of patients. Patterns of testing and prescriptions for particular conditions suggest that these rates are excessive. This should be of concern due to growing antibiotic resistance, the impact on out-of-pocket costs of the patients, and the health insurance expenditures that could be used for other purposes.

- In terms of facility capacity, availability of medicines, and doctor knowledge for diagnosis and treatment, the grassroots health system performed less well in terms of being able to address the growing health needs on managing non-communicable diseases.

- Off-hours private practice by doctors who work at district hospitals is very prevalent. Thirty-eight percent of hospital doctors perform some private practice work, and the average time per week in private practice across all hospital doctors is 11 hours. Doctors in district hospitals exert lower effort on average and are much more likely to engage in private practice. It is not clear, however, if some doctors may lower their effort in public facilities in order to attract patients to their private practice. A better understanding of the private practice phenomenon could be generated by further analysis based on 1) quantitative analysis of patient motivations that could be done by matching the facility survey to the household health survey data that was collected in parallel, and 2) additional qualitative interviews of doctors and patients.

1.   **The grassroots health care system is the main entry point of the population into the public health care system and the dominant health care provider for the lower income population.** The network of grassroots health care providers is extensive with more 11,000 commune health stations and 620 district hospitals, essentially reaching every administrative jurisdiction of the country. The function of the commune health stations are evolving from a legacy of providing community public health functions and maternal child health services to one providing a more comprehensive prevention and curative services for the families in their community. This includes the need to address changing health needs including rising non-communicable disease burden and a rapid aging society. District hospitals provide primary curative services, diagnostic services, and basic inpatient services including for internal medicine, obstetrics/gynecology, pediatrics and surgery.   District hospitals are also evolving providing increasingly more complicated services due to growing access to technology and more educated human resources. While under the management of the provincial government authorities--and certainly there are some variation in resources, capacity, organization and financing around the country--the basic legislation, regulations and incentive structures driving the performance of the system are set at the national level by the Ministry of Health and increasingly by the national health insurance system. The harmony of these central level policies and the implementation of those policies by the provincial authorities are necessary to see improvements in overall performance.

2.   **Concerns have often been raised about the quality and equity of basic health services provided by the grassroots health care system in Vietnam.** Although the country has made vast progress along a number of measures of health outcomes measured at the national level, particular deficiencies remain, such as the relatively high rate of infant mortality among the ethnic minority population—44 per 1000 live births as compared to 10 per 1000 live births among the Kinh and Hoa ethnic groups. Such gaps are suggestive of possible equity gaps in the quality of care. Additionally, there are concerns that the system is poorly equipped to provide quality care to address the changing burden of disease of Vietnam's rapidly aging society. Assessing health quality directly is challenging, and a systematic assessment of the quality of care—as opposed to outcomes—has not previously been conducted in Vietnam (1).[2] Critical questions include 1) do the poor receive substantially worse care than the better off? 2) are quality deficiencies associated with lack of knowledge or failure to apply knowledge in practice? and 3) what are critical areas where quality could be improved?

3.   **In order to assess quality in the grassroots health care system, a new survey was conducted in 2015 at the facility level.** The survey was carried out by the Health Strategy and Policy Institute of the Ministry of Health in partnership with the World Bank. The survey was designed to be representative of six provinces in six distinct geographical regions. The provinces include Dien Bien, which has a large ethnic minority population and is one of the country's poorest provinces, as well as Hanoi, one of the wealthiest areas in the country. The

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[2] The 2001 National Health Survey did collect information on health facilities and simple measures of doctor knowledge but did not include direct observation of doctor behavior like this study.

four other provinces (Binh Dinh, Dak Lak, Dong Nai, and Dong Thap) were selected because they have socioeconomic characteristics typical of their respective regions. Information was collected from a representative sample of commune health stations and district hospitals as well as patients who use those facilities. Elements of the information collected in the study include the availability of key inputs (infrastructure and medicines) at the facility, patient experiences, the qualifications and experience of doctors, the knowledge of doctors, and the actual practice of doctors as recorded in direct observations of clinical practice.

4.   **The study has two parts.** The first half of the study provides a description of various characteristics of the health care experience: 1) general service readiness in terms of infrastructure and basic service ability, 2) aspects of the experience from the patients' point of view, and 3) the characteristics of healthcare workers. The second half of the study explore three measure complementary measures of the quality of care. These include a) a measure of doctor "ability" based on responses to a series of vignette scenarios testing their knowledge, b) an "effort" index based on direct observations of time, questions, and diagnostic examinations per patient, and c) an assessment of the correctness of practice observed in direct observation of treatment of particular conditions. While each of these measures has weaknesses, collectively they provide a picture of the quality of services delivered. The equity of quality of service delivery is considered by comparing these three quality measures and other aspects of health care between district hospitals and commune health stations, between urban and rural facilities, between care for the poor and non-poor, and between care for ethnic minorities and members of the Kinh and Hoa ethnic majority.

5.   **Grassroots level facilities typically have much of the infrastructure required for delivery of basic health services, although there are important.** All surveyed health facilities have electricity, almost all have toilet facilities, and most have waste water and solid waste treatment systems. However, 24% of the commune health stations in Dien Bien province lack a source of clean water. A significant number of district hospitals do not have important equipment such as anesthesia equipment, child ventilators, electrocardiograms, and blood glucose analyzers, indicating difficulty in providing emergency response or analyzing newly emerging diseases such as diabetes. Nearly all facilities have computers and internet access, but only 22% of district hospitals and almost no commune health stations exploit those tools by using any form of information management system. The implementation of information management systems may require policies standards, regulations, and subsidies to increase uptake.

6.   **The lack of certain essential medicines at the facilities indicate both a replacement of these medicines with other, sometimes more expensive drugs, and lack of availability sending patients to purchase drugs outside the facility.** The assessment checked on the availability of a list of 30 essential medicines for the treatment of primary health care conditions at both district hospitals and commune health stations. On average district hospitals had half of the medicines on hand, and commune health stations had one-third. Facilities often lacked the basic medicines for treatment of these conditions but had more expensive medications available. In exit interviews, a significant share of patients reported that they were prescribed medicines not available at the facility itself. Survey participants who had

purchased medicines outside the facility were asked why they had done so. The most common reason was that the prescribed drug was not available in the facility for one of two reasons. In 49% of cases, patients responded that the medicine was not on the list of medicines covered by insurance, and in 15% of cases they indicated it was on the insurance list but out of stock. Given that the share of out-of-pocket payments out of total health expenditures has remained flat in Vietnam despite growing health insurance coverage (2), these findings suggest that the out-patient drug list reimbursed by health insurance should be reviewed. The findings also point to a need to review the hospital formulary and as well as tools and incentives to standardize prescription practices.

7. **Few commune health stations are provide services to non-communicable disease patients, even if they report themselves equipped to provide those services.** The study reviewed the number of commune actually providing a list of tracer services. Except in Dong Thap, very few commune health stations had dispensed diabetes medication or hypertension medicines. These findings reflect the historical role of commune health stations, which have traditionally focused on maternal and child health and are less equipped and have largely not been given the mandate, according to policy and regulations of the health sector, to address the growing profile of non-communicable disease. In most locations, commune health stations are limited to being able to describe any medication beyond a few days required for acute care treatment and need to refer patients to the district hospital for diagnosis as well as on-going management of a chronic disease. Further, it is not in the financial interest of district hospitals to refer patients for on-going treatment back to the commune health stations.

8. **The health care experience as reported by patients does not differ sharply by socioeconomic group.** Ethnic minorities and the poor are slightly more prevalent at commune health stations than district hospitals. Travel times for ethnic minorities and the poor to district hospitals are higher on average than those of other patients, and they may tend to seek care at district hospitals only when their health status is substantially worse. However, travel times were under 20 minutes for nearly all patients at commune health stations and most at district hospitals. However, it is important to note that the facility survey only captures the population of facility users. Potential users living in the facility catchment area but not using the facility—who may live on average farther away from the facility—are not captured in the facility survey. The health access of the remote population groups, which do have the worst health indicators, should be further explored using the household health survey which was collected in parallel to the facility survey.

9. **One difference by socioeconomic status is in wait times at commune health stations.** Among outpatients at district hospitals, waiting times are invariant to patient socioeconomic status, averaging close to 33 minutes for all patients across wealth levels. Poorer patients at commune health stations, however, do wait substantially longer than wealthier patients, and this difference persists even after controlling for facility effects. In other words this pattern is not due to poorer patients going to facilities with longer waits. Even the poorest quintile of patients, however, face fairly moderate wait times—averaging 20 minutes. It is unclear why wait times would vary with socioeconomic status.

10.	**Patients expressed high rates of satisfaction with their care in exit interviews**. Among hospital outpatients, 72% said they were satisfied or very satisfied with their care, as did 85% of commune health station outpatients. Satisfaction rates were lower for district hospitals than for commune health stations in every province. Service satisfaction data is difficult to interpret because it reflects a combination of the care itself and the patient's perceptions and expectations. Hanoi district hospital patients expressed relatively low satisfaction rates, which may be reflect expectations driven by the availability of higher quality care at national and private hospitals in Hanoi. Satisfaction rates tend to be useful when used by a health facility manager over time to look at changes over time. According to regulations, hospitals in Vietnam are supposed to measure patient satisfaction rates but few do it consistently or well.

11.	**Average expenditures are low for outpatients with insurance at both commune health stations and district hospitals.** Total out-of-pocket expenditures associated with the facility visit or stay were calculated by summing three categories: i) expenditures to the facility, ii) expenditure for medical services outside the facility, and iii) gifts, food, travel costs, and lodging for the patient and relatives, other than costs paid directly to the facility. Inpatients costs, for both those with and without insurance, were substantial. The largest component of expenditure for inpatients with insurance was gifts, food, travel costs, and lodging. The average lengths of stay for inpatients at district hospitals of 6.2 days is quite long, particularly for the type of basic services offered at district hospitals. The long length of stay is one factor that drives up out-of-pocket costs. The Government has tried to target these out-of-pocket costs through cash payments to the poor to cover travel and food expenses. This program is not universally available in all provinces or even in most provinces. The coverage of this program as well as clinical practice and incentives to reduce the average length of stay should be reviewed.

12.	**Doctors have lower levels of qualifications in commune health stations, particularly in the poorest areas.** Doctors at district hospitals are younger but with higher levels of qualifications than those at commune health stations. All district hospitals are staffed by fully-qualified doctors, as are 80% of commune health stations. Commune health stations without fully-qualified doctors are highly concentrated in Dien Bien, the poorest province in the survey. In Dien Bien, just 24% of commune health stations are staffed by at least one fully-qualified doctor. The remainder are staffed by assistant doctors, who have a lower level of qualification. Assistant doctors were trained under an earlier training regime which has been phased out.[3] Most fully-qualified doctors at commune health stations do not have standard university doctor training but instead have been promoted from assistant doctor through "twinning" training programs or pursued degrees through less competitive "direct entry" programs. Given the older age of doctors at the commune level, that most of these doctors were previously assistant doctors, that fewer pathways to become a doctor exist now, and that younger doctors prefer to work at

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[3] Throughout the report, except where otherwise noted, the terms "doctor" and "health care providers" are used to refer to the set which includes both fully-qualified doctors and assistant doctors.

hospitals, the system may face challenges over the long term in finding doctors to staff commune health stations after older doctors face retirement.

13.   **Work by doctors in private practice outside of their jobs at public facilities is common.** Thirty-eight percent of hospital doctors perform some private practice work, and the average time per week in private practice across all hospital doctors is 11 hours. The prevalence of private work and average private hours is slightly lower at commune health stations (31% of doctors, averaging 9 hours per week). Private practice is especially common in the southern provinces of Binh Dinh, Dong Nai, and Dong Thap. Very few doctors in Dien Bien conduct private practice, and private practice is much less common for other health care workers. It is not clear to what extent this is driven by demand for off-hours or care at home by patients, or whether it is because doctors direct patients to their private hours to earn additional income. Dual practice can be a concern if it results in shirking or lower effort while the public doctor is performing their public duties and shifting of patients to their private practice where they perform more effort. The issue could be explored through further qualitative work as well as analysis matching the facility survey to a parallel household survey. Dual practice work by doctors is believed to be common in other countries in South and East Asia, but hard data on its prevalence is scarce (3). The studies that have examined the issue in other countries are typically very dated or rely on non-representative samples and qualitative interviews.

Figure E.1. Private practice by doctors is common among doctors working at public facilities, particularly district hospitals

Percentage of doctors working at district hospitals and commune health stations performing private practices
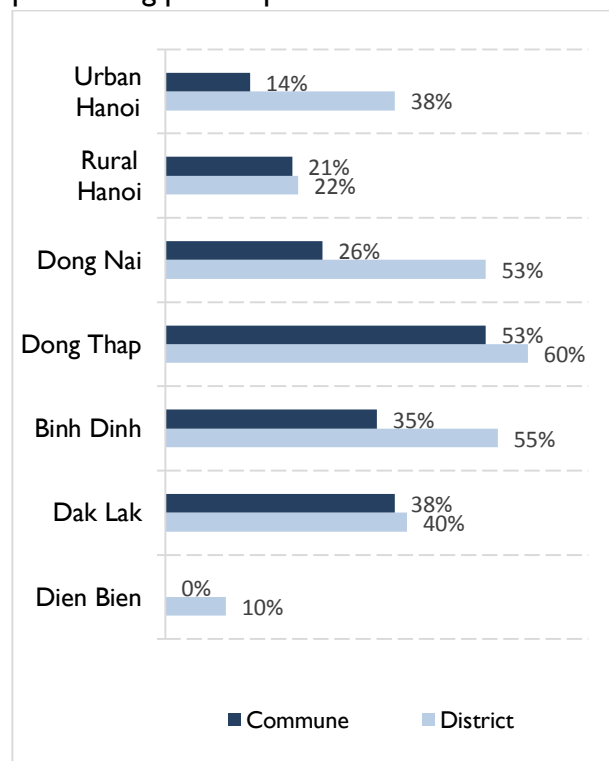
Average number of hours per week that district hospital and commune health station doctors spend on private practices
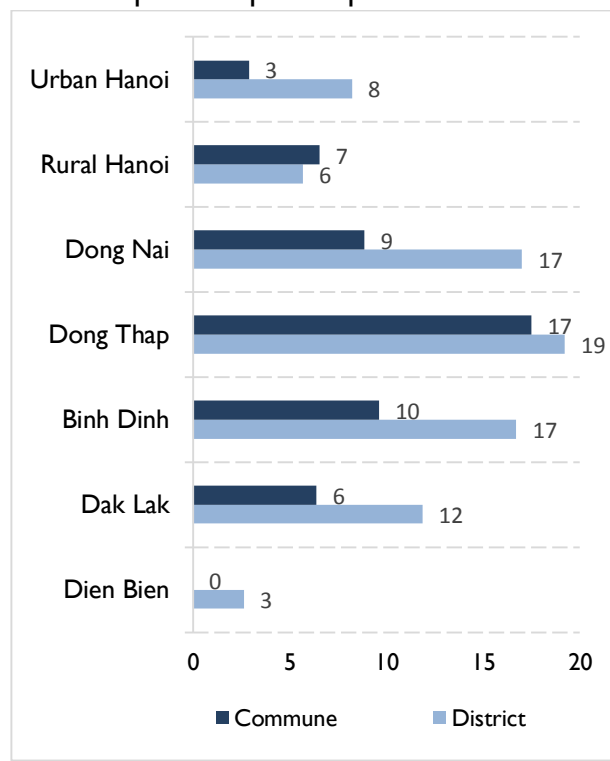
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

14.   **Doctors' knowledge was assessed through vignette tests.** The vignettes were developed in close consultation with Vietnamese medical experts, following Ministry of Health clinical guidelines and standards. (These vignettes are specific to Vietnam and have not been internationally validated.) The tests gauged (a) doctors' knowledge of clinical guidelines and standards of procedure in terms of history taking, physical examinations and laboratory tests, (b) their ability to process patient information from the guidelines to reach a correct diagnosis, and (c) their knowledge of appropriate treatment of cases. They covered a wide range of common conditions (infectious diseases and non-communicable diseases) involving diverse types of patients (female and male, children and adults as well as elderly). The test were given to more than 1000 doctors, undertaking 5 different vignettes each. The focus of this assessment is on what doctors know, which represents the best outcomes one can expect from doctors if they were to manage cases to the best of their knowledge.

15.   **Doctors were categorized across a spectrum of "ability" based on their knowledge of what to ask, what physical exams to perform and what diagnostic exams to request in order to reach a diagnosis and treatment plan.** An aggregate indicator of doctors' ability was generated using item response theory (IRT) to produce a ranking

or distribution of doctors by levels of ability. The IRT methodology uses maximum likelihood methodology to estimate the underlying "ability score" of providers based on their performance during the medical vignettes exercise. This score reduces the history questions and examinations behavior to a single metric that is comparable across providers. It quantifies their propensity to ask the history questions and perform the physical examinations that were graded as minimum or essential by the expert committee.

16.   **Doctors are generally able to interpret information and reach a correct diagnosis using information generated by following clinical guidelines, but their knowledge of these guidelines is limited**. Most doctors can give an accurate diagnosis once they have the necessary patient history and physical examination information typically generated from following clinical guidelines. Four of the five cases tested in this study were each correctly diagnosed by more than 70 percent of doctors after they were presented with essential patient history and physical examination information. The exception was acute diarrhea, which an overwhelming majority of doctors (81 percent) could only partially correctly diagnose.

17.   **The challenge for doctors was in their low knowledge of the right history questions to ask and physical examinations to perform in accordance to the clinical guidelines**. On average, doctors asked less than half of the essential history questions in each of the 5 cases presented to them. Only for acute diarrhea and hypertension did the average doctor carry out at least 50 percent of the necessary physical examinations. In this respect knowledge of clinical guidelines is modest. Doctors who knew more the appropriate questions and physical examinations were more likely to give an accurate diagnosis and know the correct treatment.

18.   **In the vignettes tests, a considerable number of doctors also offered harmful treatment, even after being provided knowledge of the diagnosis and patient history and physical exam information.** This applied to doctors at all levels of the ability scale, highlighting weaknesses in the knowledge of case management protocols as even a significant share of doctors most knowledgeable about the clinical guidelines at earlier stages of the consultation process offered harmful treatment. Harmful treatment in practice can result in part from doctors who know the correct treatment responding to incentives to offer other treatments. But the vignettes show that harmful treatment results in part from knowledge gaps, which could be addressed through improved training and clinical aids.   Most doctors have had some continuous medical education, so it is not clear if the training targets clinical guidelines for the most common primary conditions.

Figure E.2. Two-thirds of doctors provided harmful treatment in at least one vignette test scenario
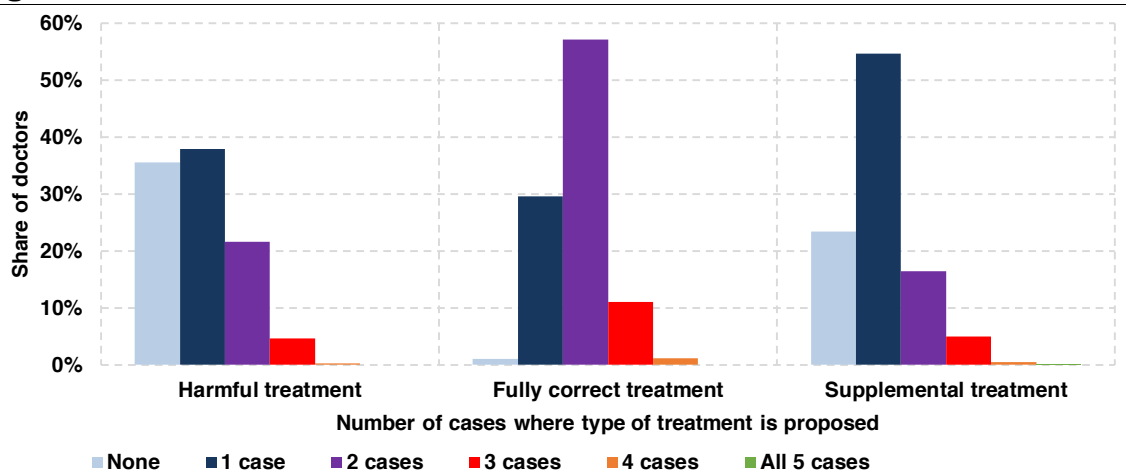
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

19.   **High ability doctors—as identified by the vignettes—are more likely to be found in district hospitals, Ha Noi and Binh Dinh and in richer areas compared to poor areas.** Differences in the ability of doctors across facility types or location are significantly attributable to differences in the education profile of doctors in these locations. The estimated ability of doctors with intermediate training is less than a fifth of the estimated ability of doctors with a medical degree, and their particular weakness was in the diagnosis and treatment of diabetes type II. This implies that training and the provision of supportive clinical aids needs to be targeted to those more difficult provinces, which also have less resources to undertake an effort like this by themselves. This would be consistent with Ministry of Health's on-going efforts that have training programs targeted specifically to the more difficult provinces.

20.   **Separate from knowledge or ability, doctor "effort" was assessed based on direct observation of care of actual patients.** An "effort" index was calculated using a composite index based on three variables collected during the survey: consultation time, the number of questions asked, and the number of physical examinations completed. Both studies from other countries using standardized patient techniques and a comparison to actual treatment demonstrate that this measure of effort is a strong predictor of correct treatment. An important caveat to this analysis is it is possible that due to the "Hawthorne" effect, doctors may exert more effort because they are being observed. However, previous studies using direct observation of doctors have found that the Hawthorne effect drops off quite quickly and disappears entirely after 4-5 patients, suggesting that the effect has minimal effect on the analysis of effort based on observations over a full day (4).

21.   **Patterns of the subcomponents of the effort index in Vietnam are broadly similar to those in other developing countries for which data is available.** Health care providers at grassroots facilities in Vietnam on average spend 5 minutes with patients, ask 7 questions, and complete 2 examinations. This level of effort is higher than what is observed in

India, but lower than in similar studies in Paraguay and Tanzania. As shown in the following graph, those doctors who exert low effort are spending just a few minutes and performing almost no physical exams. Doctors who exert higher effort spend much more time with patients and ask many more questions. The average number of drugs prescribed does not vary with the effort level of doctors.[4]

Figure E.3. A higher value of the effort index corresponds to more history questions, more time with the patient, and a greater number of physical exams
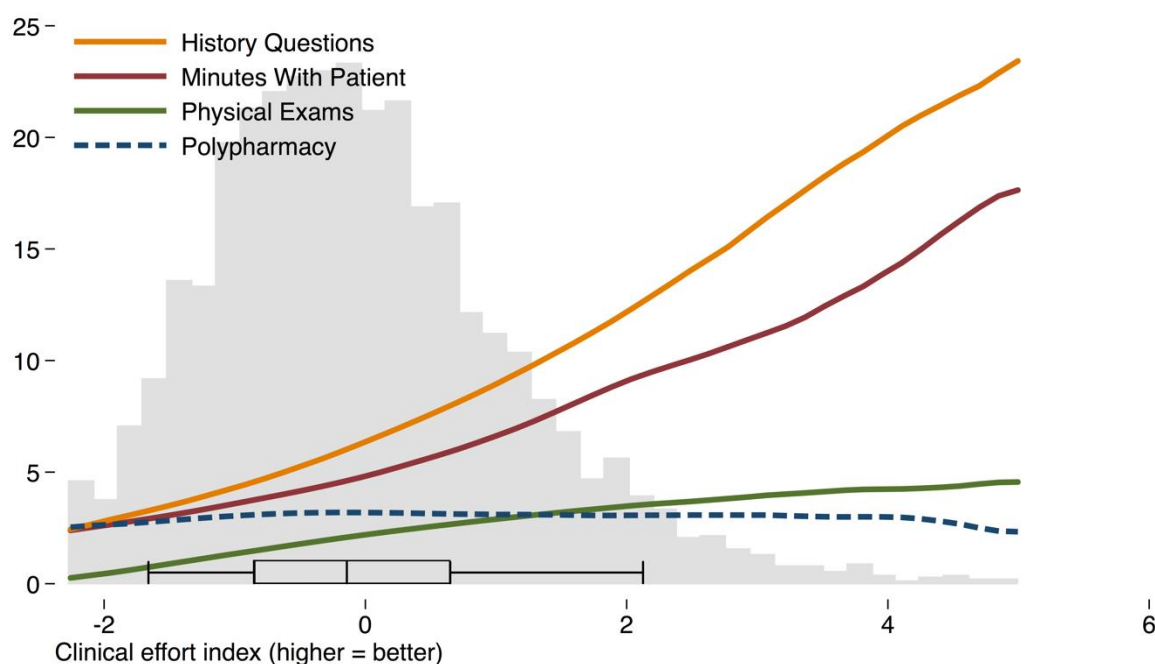
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: Box plot indicates 5th, 25th, 50th, 75th, and 95th percentiles of the effort index.

22. **Poor patients do not receive lower effort than better off patients.** Effort is essentially identical comparing facilities in wealthier vs. poorer areas, comparing facilities that receive more vs. fewer patients, and comparing poor vs. non-poor patients visiting the same doctor. This remarkable result stands in stark contrast to other developing countries for which similar data are available, where typically large gaps are found in effort for the care provided to poor as compared to better off patients.

23. **District hospital doctors exert substantially less effort, as measured by the index, than doctors at commune health stations.** Total time spent, questions asked and

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[4] It is not possible to compare the ability measure across countries, because it is based on vignettes which were designed to correspond to the Vietnam-specific standards of treatment. Likewise, the analysis of quality of care for two tracer conditions (based on the direct observation of treatment) is based on Vietnam-specific standards of treatment and thus cannot be directly compared to similar studies in other countries.
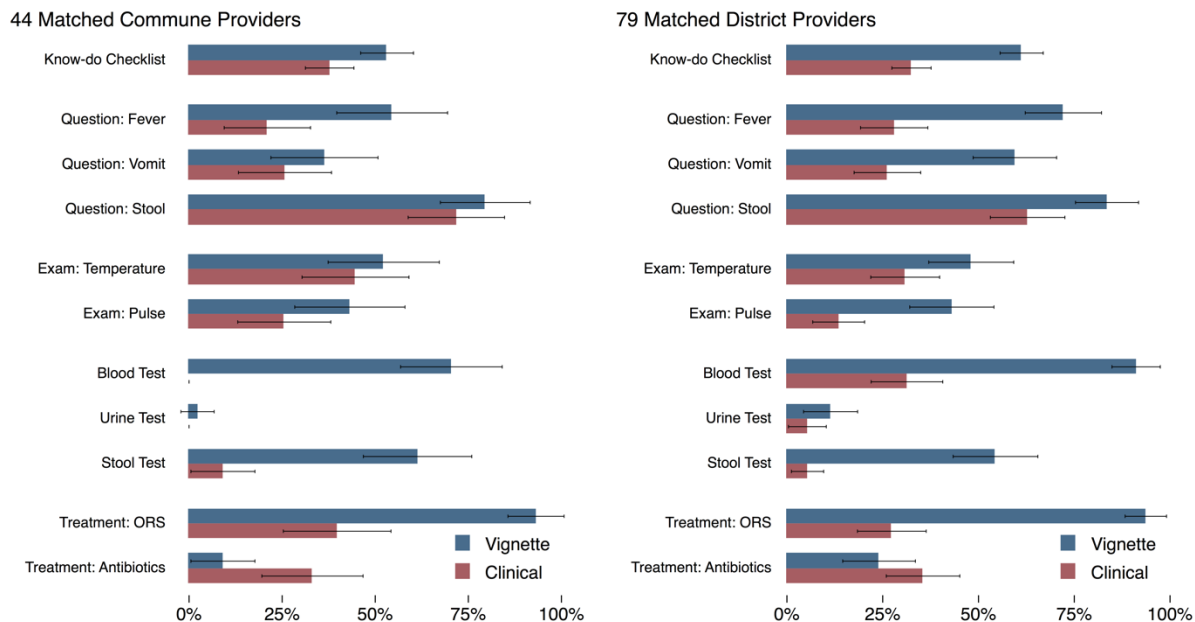
examinations performed are all significantly lower in district hospitals, although doctors in district hospitals offer far more tests. Given the importance of this result, two hypotheses were tested. One possibility is that this "effort deficit" arises because doctors in district hospitals are more knowledgeable, and hence can exert lower effort without adversely affecting quality. In reality, the data show precisely the opposite—when district hospitals and commune health posts are looked at separately, more knowledgeable providers always exert higher effort. Consequently, controlling for knowledge implies that effort levels are far lower in district hospitals than what they should be given their levels of provider knowledge. A second possibility is that doctors in district hospitals exert lower effort because they face heavier caseloads and thus have less time available per patient. Caseloads (patients per doctor per day) are very low in commune health stations and much higher in district hospitals. However, 80 percent of doctors in district hospitals either see fewer than 60 patients a day (which would be a five-hour daily caseload at 5 minutes per patient). The average provider in a district hospital sees patients for only 2.7 hours a day, compared to 1.1 hour at commune health stations. Most providers at both levels do not appear to have a caseload that should adversely affect their effort levels.

24. **Medication use is at similar high levels in district hospitals and commune health stations, with high use of antibiotics in all facilities.** On average a patient is prescribed three different medicines per visit, including at least one antibiotic in 45% of visits at commune health stations and 39% of visits at district hospitals. At district hospitals doctors order at least one laboratory test for 46% of patients. Patterns of testing and prescriptions for particular conditions suggest that these rates are excessive. These patterns suggest that doctors at district hospitals are substituting tests for medical history and physical examinations, even when the tests are not necessary for the indications presented.

25. **The quality of care was also evaluated using direct observation of actual care for patients with two specific tracer conditions.** This method is a complement to the other two quality of care measures used in this study--the ability measure derived from the vignette tests and the effort measure calculated based on direct observation for all patients (regardless of conditions). The two conditions tracer conditions—cough/cold and diarrhea—are common and easily identified in direct observation, with clear guidelines on proper care. For the simple tracer conditions where we have clear metrics of quality (cough/cold and diarrhea),

26. **For these two common tracer conditions, commune facilities provide higher quality care than district hospitals.** For diarrhea 94% of all doctors said in vignette tests that they would give oral rehydration solution (ORS) (a correct treatment). In practice 40% of commune doctors actually gave ORS to real patients and only 27% of district hospital doctors did so. In district hospitals, a large number of doctors responded in vignettes that ORS patients should receive antibiotics (an incorrect treatment) and an even larger number (36%) actually gave them in practice. Since doctors in district hospitals are far more knowledgeable, the gap between knowledge and practice is very high for district providers—a pattern that is observed in the data by comparing provider's clinical actions with outpatients to their own vignette responses.

Figure E.4. Know-do gap for matched clinical and vignette diarrhea cases

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: The red bars show doctor actions from clinical observations from actual care of diarrhea cases. Blue bars show responses to vignettes for the diarrhea case.

27.   **The findings in this report suggest both widespread deficiencies in knowledge and a wide gap between what doctors know and do.**   Knowledge gaps are pervasive — particularly in the failure to follow clinical guidelines in collecting patient history and physical examination information and in knowing what not to do. The "know-do" gap can be separated into a "know-can" gap and a "can-do" gap. The "know-can" gap expresses the difference between what's doctor's know to do and what they are able to do, given available tools at the facility. The "can-do" gap expresses what they are able to do and what they actually do in practice. The "know-do" gap described in this report is associated with simple conditions, for which doctors have the necessary tools at their disposal, which the margin for improvement is largely in terms of "can-do." At the same time, the lack of essential medicines and access to testing indicates that the "know-can" gap is also substantial.

28.   **A number of different approaches could help address the combination of knowledge deficiencies.** One key starting point is to improve and standardize the knowledge and skills of the new doctors entering in the system. This will require clearing defining what a doctor graduating with a basic medical education degree should know and do, an education system that teaches and trains well on basic primary health care, a quality assurance system to ensure that it happens. Online training and supportive clinical aids could also help doctors follow clinical guidelines.

29.   **Consideration of a separate set of issues is needed to address the "know-do" gap.** These include the "know-can" gap associated with the lack of access to laboratory tests and the limitations in medication access. Also, important are the expectations of the population that may expect a diagnostic procedure or an antibiotic as a sign of quality of care. Additionally, there is the lack of tools, such as information systems or simple clinical check lists that would prompt physicians to provide correct treatment. A final critical issue for consideration is the incentives faced by physicians in hospitals to provide more lab tests, more x-rays and more ultrasound examinations due to the hospital payment mechanism and the incentive to increase revenue.

30.   **Overall, the report shows that Vietnam's grassroots healthcare system exhibits remarkable overall equity.** Direct observation of doctor performance addressing two of the most basic curative health conditions shows that the actual quality is no worse at commune health stations than at district hospitals. This is despite the fact that doctors at commune health stations have lower qualifications and on average are less knowledgeable, particularly in the poorest areas. It is likely that this reflects the higher effort exerted by commune health station doctors.

31.   **The findings regarding ethnic minorities present a mixed picture.** Ethnic minorities represent 14% of the population and the majority of the poor in Vietnam. The survey covered two provinces with substantial ethnic minority populations: Dien Bien, where they form 81% of the population, and Dak Lak, where they comprise 29%. In Dien Bien, both district hospitals and commune health stations have much lower levels of infrastructure than in other provinces. A large number of doctors in both Dien Bien and Dak Lak are ethnic minorities themselves, who have been trained through special programs directed at ethnic minority and remote populations. The ability level of ethnic minority doctors is substantially lower than that of other doctors, and as a result, patients in those provinces (largely ethnic minorities themselves) tend to receive care from lower-ability doctors. On average, ethnic minorities tend to receive care characterized by *higher* effort, and there is no evidence of discrimination against ethnic minorities in the care they receive. In some, ethnic minorities receive care that is typically characterized by lower quality infrastructure, lower ability doctors, and greater effort. Apart from more general efforts to improve doctor knowledge and effort, targeted efforts to improve infrastructure in provinces like Dien Bien and Dak Lak could improve the quality of care for ethnic minorities.

32.   **The study has various limitations.** First, it only covers the grassroots health care system, and does not consider provincial and central hospitals, where the wealthiest Vietnamese more often seek care and where quality is likely to be higher. Second, although the survey is representative of six provinces spread across regions, in order to provide a portrait broadly reflective of the state of the grassroots health care system in Vietnam, the data is not statistically representative of the entire country. Third, each of the methods employed to measure aspects of quality has weaknesses and thus presents a partial view. Vignettes only capture knowledge and not actual practice. The measure of effort cannot control for the different mix of cases that may be found across doctors and facilities. And analysis of care based on direct observation can only

be conducted for common, easily identifiable cases and consequently is not informative about the quality of care for more complex and less common cases.

33.   **Following the technical findings of this report, a series of companion policy notes will be developed between the World Bank and the Health Strategy and Policy Institute (HSPI) in consultation with the Ministry of Health and other stakeholders**. The results raised several critical policy issues. First, what are the reasons for lack of information systems development for grassroots providers? Second, what are the reasons for the shortages in essential medicines, whether they are replacement with more expensive options, problems with the procurement process, and lack of incentives for the district hospital to adequately stock the commune health station? Third, while ability of the doctors is highly correlated with education, what is the future of commune health station doctors given the change in the education path, age of the commune health doctor, and current low productivity? Fourth, is private practice only a matter of convenience for the patients or are providers reducing their effort in public facilities to send patients to their private office hours? Fifth, why are doctors, particularly district hospital doctors, performing below their ability? Sixth, what factors explain the suggested pattern that testing is overused at district hospitals and that medicines—particularly antibiotics—are over-prescribed at both hospitals and commune health stations?

34.   **The study also points to areas for future analysis which could address many of these questions**. First, a follow-on study using the technique known as standardized patients could provide further insights into the quality of care for particular treatments and overcome the weaknesses of each of the methods employed for this study. Second, a better understanding is needed of why effort is low at district hospitals and what could be done to boost effort. Qualitative work could lend insights on this question. Third, a weakness of this study is that it was unable to collect information on insurance payments, which would make possible an analysis of total costs (rather than just costs to the patient), and this information could be collected in a future study. Analysis of such information would make clear the cost implications of the extensive use of testing and prescription of medication and could point to potential areas of cost savings. Fourth, it would be informative to match the results of this study with that of households measuring the health seeking behavior of the population to determine what factors may contribute to lower or higher utilization and choice of providers, including decisions for seeking care by public doctors in their private practice. This last line of analysis could be undertaken without any additional data collection, as a household health utilization survey was conducted in parallel to the 2015 Vietnam District and Commune Health Facility Survey.

Introduction and Overview

35.   **This report examines quality of basic health care services and the potential differences in quality within the grassroots level in Vietnam.[5]** It is motivated by the growing concern about the quality of public services generally and the Government's immediate policy question as to what it would take to strengthen the delivery of services by health care providers (HCPs) at the lower tiers of the health system for more efficiency and effectiveness of the health system overall. It is also motivated by the limited information available to assess actual quality gaps on any large scale basis (1; 5). The Ministry of Health's priorities in this area are outlined in the recently adopted Health Sector Development Plan for 2016-2020 (6), and a process is underway to reach consensus on the policy and investment choices to reach these goals. The analysis and findings of this study are intended to inform those discussions and raise questions for further research.

36.   **The World Bank has highlighted the need to rebalance Vietnam's health service delivery model towards the grassroots health system, in order to respond to changing health needs, rapid aging, and rising expectations of a growing middle class.** Vietnam will need to adapt its service delivery system at all levels through better policy/regulation, more value-driven purchasing of health services, and targeted investment strategies (7). The changing population health needs will demand more high technology and specialized health services, but that will only be the tip of the health service needs. However, the detection and management of the chronic conditions, meeting the health needs of elderly close to their homes, providing timely and responsive outpatient services to a demanding middle class will largely depend upon the grassroots health system providers as well as private sector providers that are for the most part absent in Vietnam, except in more urban locations. Therefore, policies and investments that would improve the quality of basic health services at the grassroots level while not sufficient are needed. Without being able to measure, support and motivate improvement and assure the quality of the health services, the population will be left with other signals of quality such as the availability specialized doctors, high cost technology and availability of expensive medication. Unfortunately, this would continue to pull Vietnam towards a high-cost health system and negatively impact its ability to use its scarce health resources to expand public- or insurance-financed health services to meet the other needs (such as rehabilitation services for the elderly, drugs for chronic conditions, and high cost cancer treatments). Understanding quality constraints at the grassroots level and then building a comprehensive policy and investment approach to addressing those gaps is an important step in this direction.

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[5] Grassroots is a term used in Vietnam to define the basic health services provided within an administrative district at the district (about 120,000 population), commune (about 8,000 population) or even village (about 1,500 population) level. In its more general meaning, it would also include the preventive medicine system at the district and commune level. Given the focus of this study on the quality of care, particularly for curative services, at the Commune and District Level, the focus of this study is on District Hospital and the Commune Health Stations which are the primary points of contact for the curative care system.

37.   **Vietnam has a tiered health system largely organized by administrative units of the country: commune, district, provincial and central level.** The commune, district and provincial health facilities are under the direct authority of the provincial government and its department of health. The legal and regulatory framework are largely set at the national level government and its Ministry of Health. As an example, the functions and services at each level are defined by the Ministry of Health Circular 43 (8),[6] and each facility needs to fulfill requirements from different aspects including location, function, activity, education level of human resources, facility, equipment, etc.

38.   **The grassroots health network—commune health stations and district hospitals—consists of a wide network of facilities. As of 2013 (9), it had more than 11,000 commune health stations reaching 99% of all communes.** Commune health stations are the front line public health service providers of vaccines, family planning, ante-natal and post-natal care, monitoring for infectious disease control, and providing information and communication activities to the community. Increasingly, commune health stations—particularly in rural and remote areas—are being integrated in the national health insurance system and providing basic illness consultations and treatment services. As of 2014, 80% of communes were participating in the national health insurance system. The commune health stations, with its prescribed team of about 5 health staff led by a doctor or assistant doctor, are a potential source of more comprehensive and family-medicine oriented primary health care. As of 2014, there were about 620 district hospitals of which about 85 had sub-units – closer to the commune health stations – called regional polyclinics. These district hospitals (average bed size 112 and average number of medical doctors 28) provide basic hospital in-patient services related to internal medicine/trauma, obstetrics/gynecology, pediatrics and surgery as well as specialized outpatient diagnostic and laboratory services. These facilities also provide primary outpatient services similar to commune health stations. They do not have the same functions as commune health stations to provide prevention services.

39.   **The grassroots level of the Vietnam health system is the main provider of primary and basic secondary services to the majority of the population.** The grassroots level--commune health stations and district hospitals—is the first point of contact with the public health system for most patients, and almost the sole provider of care to lower income groups. As of 2014, 41% of the insured population was registered with a commune health station facility as a first point of contact and 45% were registered at the district hospital with the remainder at provincial and central level hospitals (10). District hospitals have some supportive, but often not a direct supervision responsibility of the commune health stations as well as responsibility to provide the financing and drugs of the curative services provided at the commune level. The financing of commune health stations is mixed with the financing of salaries, a basic operating budget, provision of additional inputs for some of the prevention services and prices per unit delivered (such as vaccines). They will receive curative care drug supplies from the district

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[6] Circular 43/2013/ TT-BYT dated December 11, 2013 by the Ministry of Health defining specific services by technical level for curative care facilities.

hospital and a small amount of fees for delivering health insurance related consultations. The funds from health insurance are channeled through the district hospital and the funds for prevention through district health center as in fact the commune health stations are not independent juridical entities that would be able to be contracted directly. District hospitals receive a minimum operating budget from the provincial budget largely to cover salaries calculated based on normative allocations linked to their bed capacity. The growing share of their budget is from health insurance which is largely based on a capped fee-for-service model (by procedure, bed-day, drug provided). While there is some variation in this mechanism across the nation, universally the incentive for district hospitals is to increase the range and number of services provided. This can be odds with the commune health stations providing additional curative services.

40.   **The grassroots health system is part of a wider health service system context. Above the district hospitals are 492 provincial hospitals and 46 central level general and specialized hospitals under the supervision of the Ministry of Health.** The provincial and central hospitals provide more specialized, secondary, and tertiary-level health services. They also often provide similar basic health primary, specialized outpatient and secondary services to those provided by lower level providers. While set up as a network of health providers within an administrative area, it is important to note that patients have choice for where they can seek care – at no additional cost or, if at a higher level, with some additional co-payment. This has meant that when it has been physically and financially within their means, patients can vote with their feet where they perceive they will receive quality diagnosis and treatment. Health care providers are largely financed fee-for-service from the national health insurance system or by the patient out-pocket. They also are reliant on their revenue earning ability to finance the full cost of their operation, incentivize their staff, and make investments in their facilities. Therefore, health care providers have the incentive to maximize their revenue with more patients and more services, refer upwards only when necessary, and rarely transfer patients back to lower level facilities. These incentives can also impact on perceived quality such as when patients fear not being able to get a referral and, therefore, proceed directly to higher level facilities. While analyzing these system incentives are outside of the direct measurement of this study, they should be considered the study's findings in broader perspective.

41.   **Poorer segments of the population rely on the grassroots health care system. The poorest quintile of Vietnamese overwhelmingly rely on commune health stations and district hospitals and rarely access higher level facilities.** Commune health stations are used principally by patients from poorer quintiles. District hospitals, however, are accessed by patients across the socioeconomic spectrum. Therefore, while efforts to improve the quality of basic health services of the grassroots system will improve the care provided by the poor, they can also impact the population more broadly.

Figure O.1: Percent of people in each quintile who have used the facility type in the last 12 month
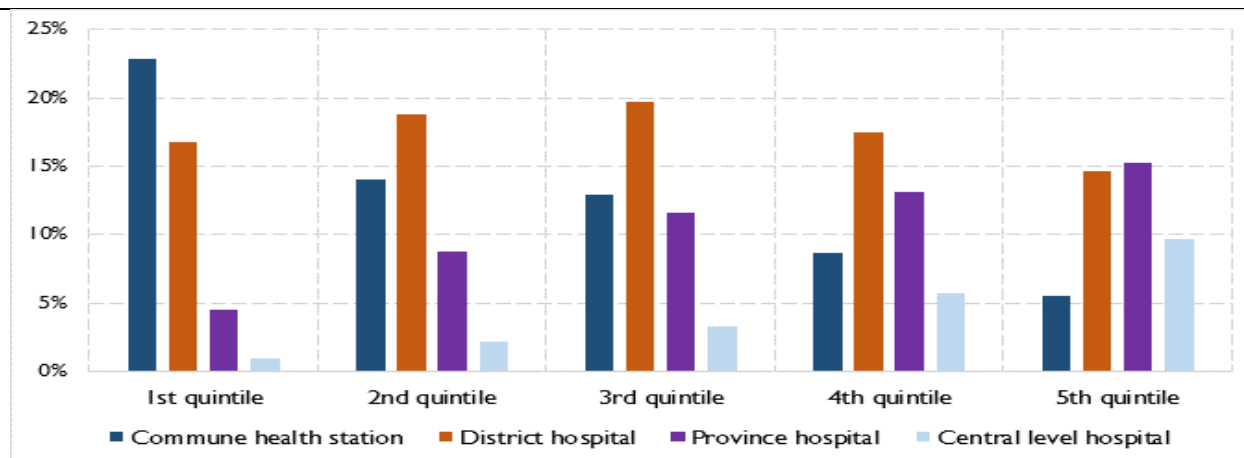
Source: Authors' calculations from Vietnam Household Living Standard Survey, 2014.

42.   **This report takes an internationally accepted and practical approach to measuring some aspects of quality of care.**   Defining and measuring quality of health services are understood to be complex tasks. It is understood that the ultimate desired optimal health outcome is result of many factors: when and if care is sought, the complexity and severity of the ill-health condition, the accessibility of the health services able to diagnose and treat the condition, the care delivered and how the care was delivered often by multiple care providers, the compliance of the patient and contributing roles of the family and community of that individual (11). Given the motivation factor of this study, this report uses the often relied upon *Donabedian model of measuring health service delivery quality as a function of structure (availability of necessary inputs), process (actual practice) and to some extent outcome (as perceived by the patient and the patient experience)* (12). The study starts with looking at the availability of key inputs and the technical capacity of the health service providers generally. This is often the starting point any policy and investment plan to address perceived weaknesses in the quality of care, but not necessarily targeted to most deficient needs. Given that care is most directly a function of the doctor-patient interaction and the policy choices affecting human resource development and distribution are different than other investment choices, the study gives particular emphasis to analyzing the availability, qualifications and the knowledge of the human resources. This study is very rich providing information not previously available in Vietnam about the process of delivering care at the grassroots level relying on extensive field work of directly observing doctor and patient interactions and patient exit interviews. In a few but important circumstances, the study also compares actual practice with the knowledge leading us and policy makers to discuss whether or not additional training is always the most necessary investment to address deficiencies in actual practice or whether other policies affecting motivation is of higher priority. Health outcome, given its complexity, is limited in this study to what is perceived by the patient, but the patient perspective is important given that the Vietnam health system is increasingly open to the choice of provider. Therefore, while not an exhaustive measurement of quality at the grassroots level,

this study provides extensive and new information through which policy makers and other researchers can make reasonable inferences and as well as target further investigations.

43. **This study examines quality through an equity lens.** There is a perception that the quality of care in Vietnam is greater at higher level facilities, at urban facilities, and for higher income patients. The perception of quality differences across facilities drives a tendency for patients to by-pass or self-refer themselves to higher level facilities, avoiding the grassroots level health system all-together (13). This study is not all-inclusive of looking at variations of quality across the different levels of the health system but considers differences within the grassroots health system. It reviews differences across 6 different geographical zones of the country as represented by different provinces; by urban and rural areas; between the commune health station and the district hospital; and through a proxy means test of the wealth of individual patients seen at the health facility.

44. **The data referenced in this study can be used as an indication of the situation in the country but is not nationally representative.** Due to resource constraints, it was not designed as a nationally representative survey. Six provinces were purposefully selected to represent the six different geographically distinct regions and following their "representativeness" of that province of that region. One province was chosen from a less developed and ethnic-minority concentrated province (Dien Bien). One of the larger urban centers was also selected (Hanoi). The following table summarizes the selected provinces.

Table O.1: Description of surveyed provinces

Region	Province Surveyed	Poverty Rate[1]	Per Capita Income[2]
Red River Delta	Hanoi	1.0	2944.9
Northern Highlands	Dien Bien	35.2	819.4
North and South Central Coast	Binh Dinh	9.9	1719.0
Central Highlands	Dak Lak	12.3	1639.2
Southeast	Dong Nai	0.7	2576.7
Mekong Delta	Dong Thap	7.5	1665.5
Vietnam Nationally		7.8	1999.8

Source: (1) MOLISA poverty rate 2013; (2) Vietnam Household Living Standard Survey 2012

45. **The new data collected was extensive.** Health facilities were selected following a stratified sample of households between the urban and rural areas of those provinces, selecting the commune (246) or district hospital (78) facilities within the administrative areas of those households, in order to compare differences in the quality of health care services between urban and rural areas.[7] The data set was based on a facility survey, with an extensive module on the human resources of the facility, the knowledge of the doctors using vignettes (1000 doctors

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[7] This survey complements a separate Household Survey being undertaken separately and solely by HSPI. However, in the future, the results measuring household health seeking behavior and factors of facility quality can be compared.

undertaking 5 vignettes each), and directly observed doctor patient interactions (385 doctors observed treating 8024 patients). Also, there was an extensive outpatient (at the commune and district level) and inpatient (at the district level) patient exit interview. The specific instruments were based on Vietnam experience with the National Health Survey in 2001, the World Bank Service Delivery Indicators Survey as well as other instruments such as WHO Service Area Readiness Assessment Survey. This study only begins to use this new data set which will be made available to the public and particularly other researchers following the publication of this study. For more specific information on the sampling and instrument design, please refer to Annex A and Annex B.

46.   **The structure of the report and principal questions addressed by chapter is as follows:**

47.   **Chapter 1: General Service Readiness –** When looking at selective tracers of infrastructure, medical equipment and pharmaceuticals are there indications that there may be potential gaps affecting service delivery? Are health care providers equipped with health information systems that would enable them to manage patients and analyze health information? Are the healthcare providers able to provide the services currently regulated by the Ministry of Health, which is a function of human resource and technology capacity? How is this general service capacity translating to case load at the moment? Are there key findings in differences across the country or between rural and urban areas?

48.   **Chapter 2:   Healthcare Workers --** What is the distribution and profile of healthcare workers? What are the key characteristics in terms of qualifications and experience that may lead to differences in knowledge and competency? What is the difference in terms of the doctors' entry into medical schools that is perceived to be a signal of the rigor of the doctors training? What are differences in gender and ethnic minority status? What do the doctors indicate as priority investments that would improve their professional satisfaction? Are there key differences in the profile of healthcare workers, particularly doctors, between the different grassroots health service providers and across different geographical areas?

49.   **Chapter 3:   Patient Experience** – Based on patient exit interviews, what is the satisfaction with various aspects of the patient visit including waiting time, doctor-patient interaction, and availability of service? What was the out-of-pocket cost associated with the visit? Based on the patients using the service and a proxy of their wealth using assets, is there any difference in the experience and perception of the experience across wealth quintiles? Does this different by different geographical areas of the country?

50.   **Chapter 4: Doctors Knowledge: Analysis of Clinical Vignettes –** Are the doctors able to ask for the appropriate medical history and tests, based on Ministry of Health approved clinical guidelines that would lead towards better diagnostic capability of a few common and priority health condition? Are doctors able to diagnose accurately based on given facts about medical history and test results? Are doctors able to prescribe the correct treatment with the given information on the diagnosis, again on the basis of the Ministry of Health approved

guidelines? What may be differences in the knowledge and competency of doctors across different geographical factors, but also based on their profile?

51.   **Chapter 5:   Doctors Practice and Differences between Knowledge and Practice** – What do doctors do based on actual observed practice of the doctor? How long is the actual consultation time?   Are there any indications of possible under-treatment, over-treatment or harmful treatment that would lead to quality concerns? In a couple of simple, but priority cases where we are able to match with the doctors knowledge, are we able to identify differences between the doctors knowledge and actual practice which could be signaled as a "Know-Do" gap? Are there any differences in practice or the "know-do" gap between different kinds of providers, doctors or geographical areas of the country?

Chapter 1: Facility Service Readiness

Vietnam's grassroots level facilities typically have much of the infrastructure required for delivery of basic health services, although there are important gaps. All surveyed health facilities have electricity, almost all have toilet facilities, and most have waste water and solid waste treatment systems. Many district hospitals lack important equipment such as anesthesia equipment, child ventilators, electrocardiograms, and blood glucose analyzers. Nearly all facilities have computers and internet access, but only 22% of district hospitals and almost no commune health stations exploit those tools by using any form information management system.

Many facilities lack essential medicines. The survey assessed availability of a list of 30 essential medicines at both district hospitals and commune health stations. On average district hospitals had half of the medicines on hand and commune health stations had one-third. This could be attributed partly to a reliance on more expensive medication, as opposed to the essential generic medications. In exit interviews, patients frequently reported that they were prescribed medicines not available at the facility itself, and the most common reason cited was that the prescribed medicine were not on the list of essential medicines covered by insurance.

With the exception of Dien Bien, the prevalence of doctors and specialists in commune health stations across provinces is similar. In every other province, more than 80% of commune health stations had at least one fully-qualified doctor, but only 24% of commune facilities in Dien Bien had a fully-qualified doctor present. Those without doctors had assistant doctors.

Caseloads are highly varied across facilities and low at many commune health stations. Caseloads average just 10 patients per day at commune health stations and 36 patients per doctor per day at district hospitals. Caseloads per doctor per day at hospitals vary from 18 to 65. However, bed occupancy rates at district hospitals are universally high—ranging from 83 to 97%. The average length of stay for inpatients at district hospitals of 6.2 days is quite long, particularly for the type of basic services offered at district hospitals. The long length of stay is one factor that drives up out-of-pocket costs.

1.1 Introduction

52.   **This chapter considers a set determinants of the quality of care: facility characteristics that can be summarized as "service readiness."** Facets of service readiness include 1) access to infrastructure, 2) medical equipment and pharmaceutical products, and 3) staff availability and qualification. The survey collected information on these aspects of service readiness in both district hospitals and commune health stations. The set of information collected in the survey and presented here is based on policy documents on required infrastructure, equipment, and medications, with adjustments and additions based on the informed views of Ministry of Health experts.

1.2 General service readiness amenities

53.   **In terms of access to infrastructure, the service readiness assessment presents a mixed picture.** Figure 1.2.1 provides a summary of basic infrastructure availability by facility type. All the surveyed health facilities have electricity, and almost all are equipped with a septic or semi-septic toilet. Nearly all (97%) of district hospitals and 95% of commune health have access to clean water, a critical resource for ensuring quality health care services.[8] The large majority of district hospitals have proper health care waste management systems, but they are much less common at commune health stations. Specifically, among district hospitals, 94% have waste water treatment system and 92% have a specialized incinerator system or had contracted a sanitation company for disposal of solid waste. The corresponding figures for commune health stations are 15% and 70%. Nearly all district hospitals owned an ambulance.[9] Access to computers and the internet was available at almost all facilities, but just 22% of district hospitals and no commune health stations had any hospital management or information management systems. Most of the health facilities (92% of commune health stations and 100% of district hospitals) had a landline phone.

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[8] Clean water is defined as piped water or water from a protected well.
[9] Commune health stations typically do not own ambulances. In the survey, 49% of the commune health stations that they in case of transfer of patients in case of emergency, they would use an ambulance (sent from a district hospital), rather than other forms of transportation.

Figure 1.2.1: Availability of general service readiness amenities at district hospitals and commune health stations
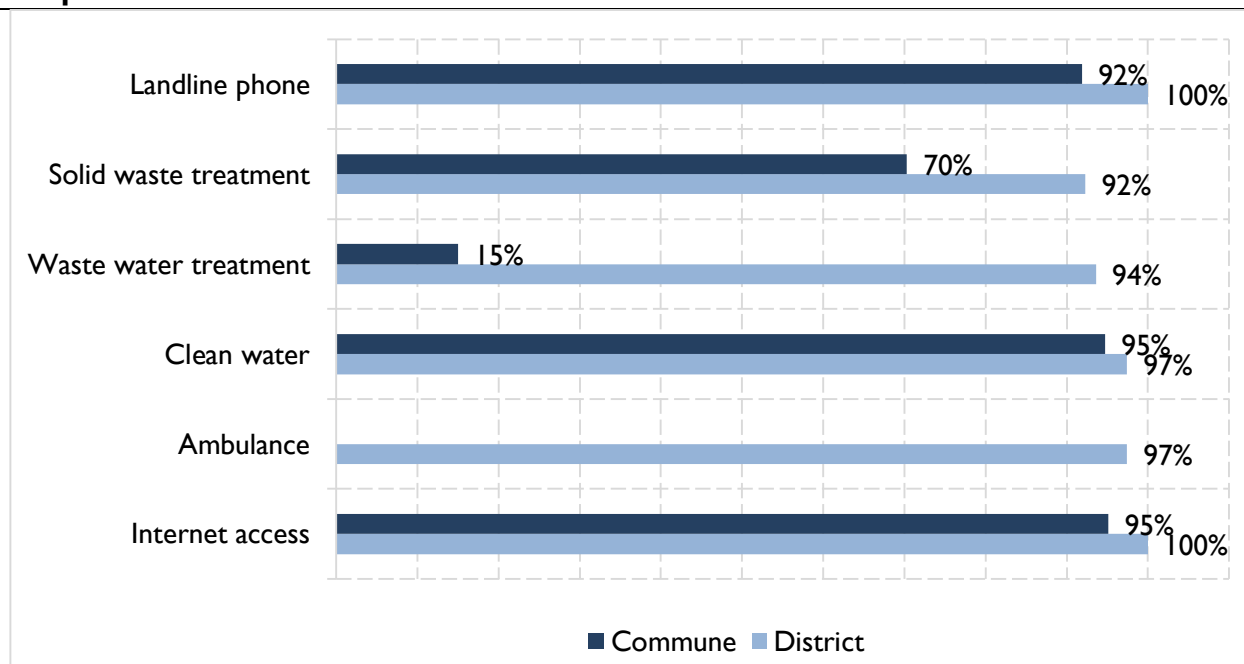
Source: Author's calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: (i) a facility is considered to have solid waste treatment system if its medical solid waste is processed by specialized incinerators or sanitation companies; (ii) a facility is defined to have water waste treatment system if the waste water is processed by concentrated sewage treatment system or laboratory sewage treatment; (iii) Clean water is defined as piped water or water from a protected well. (iv) Availability of ambulance for district hospitals refers to ownership of an ambulance by the hospital, and for commune health stations it refers. For commune health stations, the relevant question refers to what is the commonly used method of transferring patients to another facility (where other options are using vehicles other than ambulances.)

54.   **There are substantial spatial differences in access to some infrastructure.** Facilities in Dien Bien have the lowest levels of infrastructure. Just 76% of commune health stations in the province have clean water, and among hospitals in the province, only 70% have waste water treatment system and 50% possess solid waste treatment systems. Few commune health stations anywhere have waste water treatment systems, across a range from 2% in Binh Dinh to 30% in Dong Nai. The proportions of commune health stations with solid waste treatment systems ranged from 21% in Dien Bien to 93% in Dong Nai.

Figure 1.2.2: Commune health station access to clean water by province and urban/rural
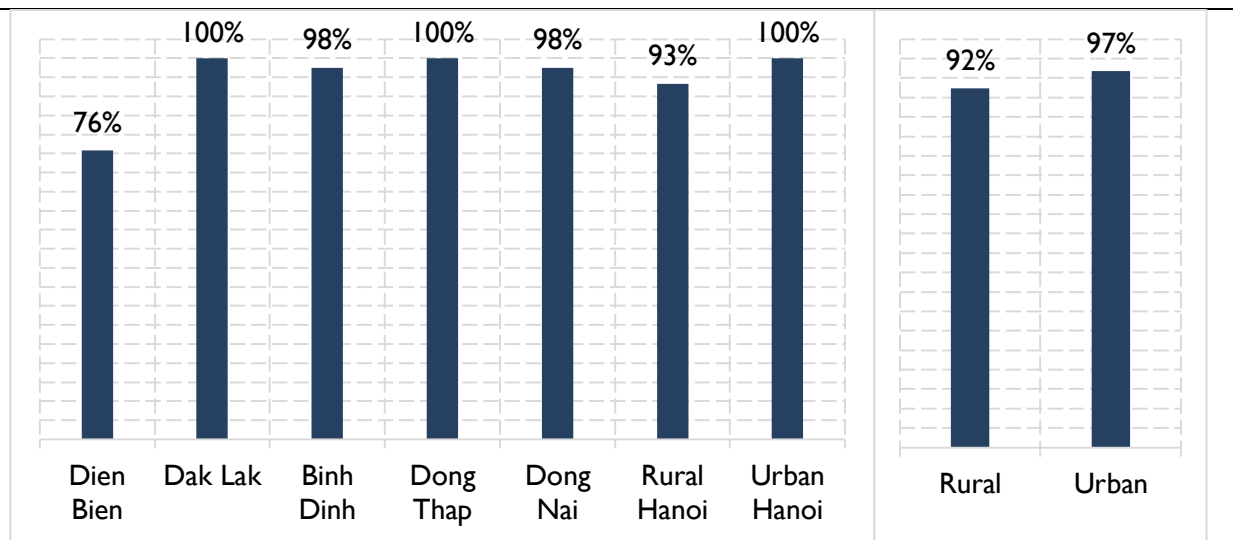
Table 1.2.1: Availability of waste management systems at district hospitals and commune health stations by province

	Wastewater		Solid waste	
	District (% of facilities)	Commune (% of facilities)	District (% of facilities)	Commune (% of facilities)
Dien Bien	70	6	50	21
Dak Lak	100	15	100	37
Binh Dinh	100	2	100	85
Dong Thap	100	13	100	77
Dong Nai	100	30	100	93
Rural Hanoi	89	24	94	78
Urban Hanoi	100	10	100	91

55.   **In comparison to a similar assessment of infrastructure in Indonesia, Vietnam's performance is stronger in all areas.** The conditions of Vietnam grassroots health facilities were similar or better as compared to those in Indonesia for electricity, clean water, toilet, and communication conditions (14).

Table 1.2.2: General service readiness indicators in Vietnam and Indonesia

	Electricity Access %	Clean water %	Toilet %	Communication %
Vietnam rural commune health station	99	93	92	87
Vietnam urban commune health station	100	97	98	97
Vietnam district hospital	100	98	97	100
Indonesia rural primary care facilities	97	69	71	81
Indonesia urban primary care facilities	99	81	84	89
Indonesia public hospital	98	94	100	100

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Notes: *for Vietnam facilities*: (1) clean water refers to having water from a piped source or protected well (2) toilet refers to having a septic or semi-septic for patient utilization; (3) communications refers to having a functioning landline telephone availability.

1.3. Medical equipment and medication

56. **Access to medical equipment is similar across provinces. An inventory of equipment was carried out in district hospitals and commune health stations.** Figure 1.3.1 shows the average number of items available by province and facility type. The average district hospital had 20 of surveyed 24 items, and the average commune health station had 10 of 16 surveyed items.

Figure 1.3.1: Average number of available pieces of medical equipment
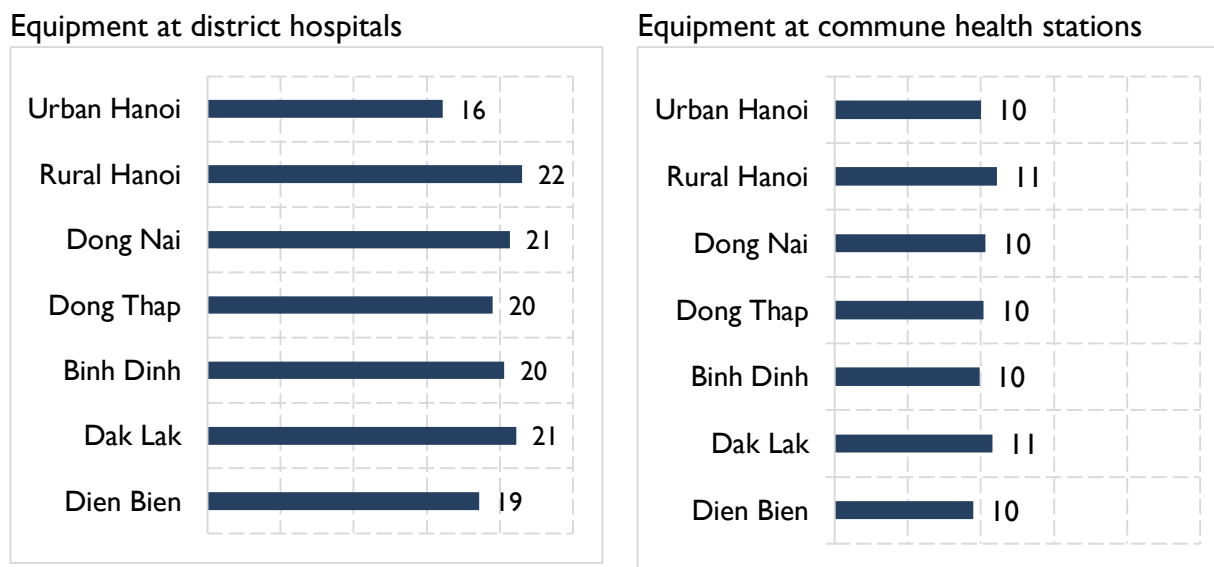
Equipment at district hospitals

Urban Hanoi	16
Rural Hanoi	22
Dong Nai	21
Dong Thap	20
Binh Dinh	20
Dak Lak	21
Dien Bien	19

Equipment at commune health stations

Urban Hanoi	10
Rural Hanoi	11
Dong Nai	10
Dong Thap	10
Binh Dinh	10
Dak Lak	11
Dien Bien	10

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: The indicator was calculated as the mean of number of equipment surveyed at district hospitals and commune health stations. (1) the list of surveyed equipment at district hospitals: adult scale, child scale (250g gauge), infant scale (100g gauge), thermometer, stethoscope, pinard horn, sphygmomanometer, vaccine cold chain (refrigerator, vaccine flaks), monitor, portable oxygen concentrator, ventilator, child ventilator, infant incubator, anesthesia machine, defibrillator and pacemaker, ECG device, C-section toolkit, X-ray, ultrasound scan, CT scan, electrocardiogram, blood analyzer, blood biochemical analyzer, HbA1C testing; (b) the list of surveyed equipment at commune health stations: adult scale, child scale (250g gauge), infant scale (100g gauge), thermometer, stethoscope, pinard horn, sphygmomanometer, oxygen canister, ambu bag, stomach cleansing toolkit, delivery/natal care table, oral fluid ventouse, antiseptic autoclave/oven, refrigerator, ice box, microscope.

57.   **Some equipment is only available at a minority of district hospitals. Table 1.3.1 presents the availability of selected equipment at district hospitals**[10]**.** While almost all surveyed hospitals had equipment to perform hematology and biochemical analyzer, only 44% had HbA1C testing devices for diabetes. The proportions of hospitals with HbA1C testing devices were quite low in Dak Lak and Dien Bien. Almost half of the hospitals in Hanoi and Dong Nai had a CT scanner compared to none in Dien Bien. Child ventilator and infant incubator were not widely available in district hospitals in Dien Bien, Binh Dinh, and Dong Thap. Only one third of district hospitals in these provinces had a child ventilator and infant incubator was only available in 46% and 60% of hospitals in Dong Thap and Dien Bien, respectively. Without these equipment, the hospital cannot establish neonatal care unit to provide essential pediatric intensive care services. The low figures for urban Hanoi reflect that the fact that the sample of 9 district hospitals in urban Hanoi includes 3 polyclinics, which do not provide inpatient and delivery services.

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[10] Some other equipment, including X-ray, Ultrasound, hematology and biochemical analyzer were available in almost all hospitals so that they were not included in the below table.

Table 1.3.1: Availability of selected equipment at district hospitals by province

	Basic equipment	Resuscitation & Emergency care				Diagnostic		Laboratory testing
	Infant scale (100g)	Child ventilator	Infant incubator	Anesthesia machine	Defibrillator and pacemaker	CT scanner	Electrocar-diogram	Hb1AC testing device
Dien Bien	90%	30%	60%	80%	90%	0%	30%	20%
Dak Lak	90%	70%	100%	100%	90%	20%	50%	20%
Binh Dinh	82%	27%	82%	100%	55%	27%	73%	27%
Dong Thap	100%	27%	46%	73%	91%	18%	73%	55%
Dong Nai	100%	44%	67%	78%	89%	44%	78%	89%
Rural Hanoi	100%	78%	100%	94%	89%	11%	72%	50%
Urban Hanoi	33%	33%	33%	50%	44%	56%	89%	50%
Total	87%	47%	73%	84%	80%	23%	67%	44%

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

Figure 1.3.2: Percentage of commune health stations having all surveyed equipment
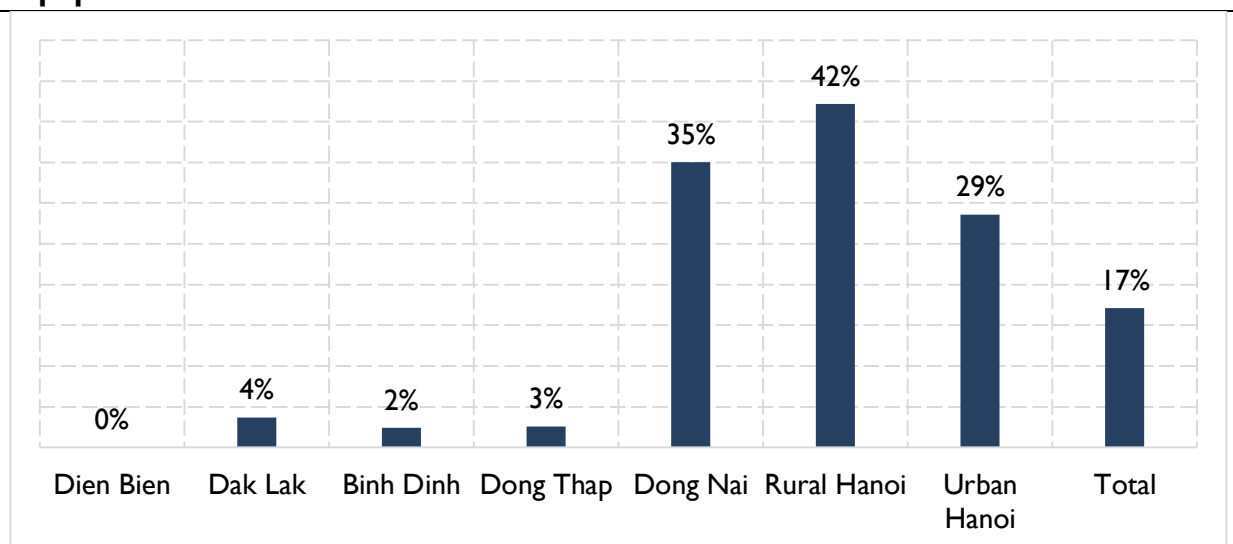
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: (1) 16 surveyed equipment for commune health stations: adult scale, child scale (250g gauge), infant scale (100g gauge), thermometer, stethoscope, pinard horn, sphygmomanometer, oxygen canister, ambu bag, stomach cleansing toolkit, delivery/natal care table, oral fluid ventouse, antiseptic autoclave/oven, refrigerator, ice box, microscope.

58.   **Just 17% of surveyed commune health stations had every piece of surveyed equipment, with large variation across regions.** No commune health stations in Dien Bien had all the equipment. More than 90% in Hanoi and Dak Lak had a microscope, compared to only 5% and 6% in Dien Bien and Dong Thap. Oxygen canisters were only available in 3% of commune health stations in Dien Bien and 15% Dak Lak. Equipment to serve for vaccine cold chain, such as refrigerator and ice box, were not available across all provinces. The rate of having a refrigerator ranged from 44% to 70% in Dak Lak, Binh Dinh and rural Hanoi. (See Table AE.3 Annex E.)

59.   **None of the surveyed health facilities had the full selected list of medicines.** The assessment included a check for the availability of a list of 30 essential medicines at both district hospitals and commune health stations. The list includes tracer medicines drawn from the World Health Organization's SARA guidelines for primary health care. The survey team checked the facility pharmacy for individual medicine in the list as well as the storage record book to identify if there was stocking out in the last 12 months. Half of the district hospitals had 50-75% of the required medicines. Among commune health stations, 42% had 25-50% of the essential medicines, and 30% of them had less than 25% of the medicine in the surveyed list.

60.   **On average district hospitals had 16 of 30 medicines and commune health stations had 11.** There was substantial variation across provinces. The medicines were more available in Dong Nai and Dong Thap than in Dien Bien and Dak Lak.

Figure 1.3.3: Average number of pharmaceuticals available at district hospitals and commune health stations
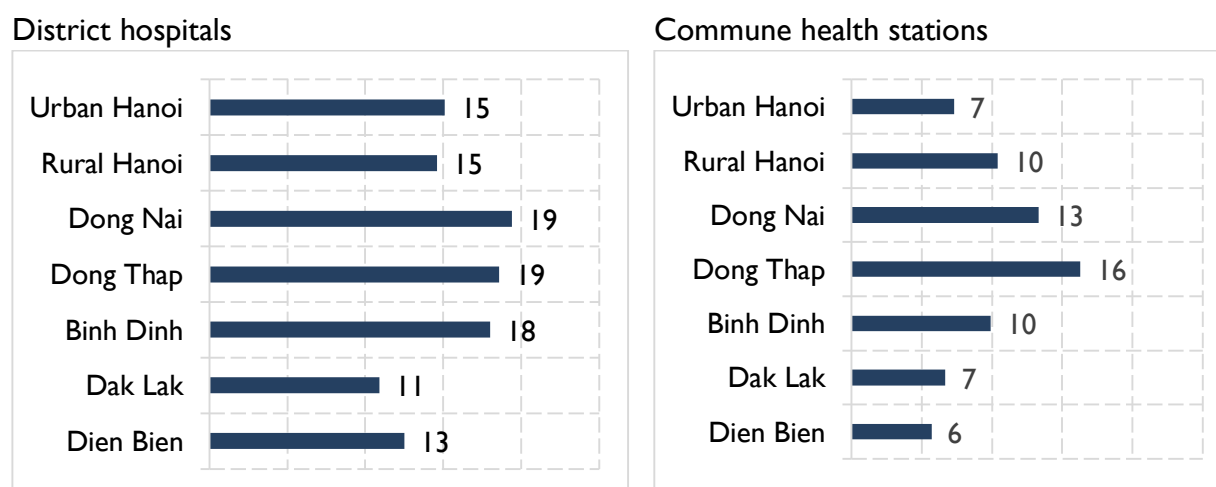
District hospitals		Commune health stations	
Urban Hanoi	15	Urban Hanoi	7
Rural Hanoi	15	Rural Hanoi	10
Dong Nai	19	Dong Nai	13
Dong Thap	19	Dong Thap	16
Binh Dinh	18	Binh Dinh	10
Dak Lak	11	Dak Lak	7
Dien Bien	13	Dien Bien	6

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: the indicator was estimated as mean of available pharmaceuticals (on the survey day) at district hospitals or commune health stations among 30 surveyed medicines. The list of these 30 pharmaceuticals is presented in Tables AE.6 & AE.7, Annex E.)

1.4. Health staff availability and qualifications

61.   **With the exception of Dien Bien, the prevalence of doctors and specialists in commune health stations across provinces is similar (Table 1.4.1).** In every other province, more than 80% of commune health stations had at least one doctor, but only 24% of commune facilities in Dien Bien had a doctor present. Those without doctors had only assistant doctors. Only 37% of commune health stations were equipped with a full team of doctor/assistant doctor, nurse, midwife, traditional practitioner and pharmacist. In average, each commune health station had 8 staff, include all types of civil servants, contracted staff, and temporary staff.

Table 1.4.1: The availability of qualified staff at commune health stations

	Having at least 1 doctor (%)	Having at least one specialist[a](%)	Having a full composition[b](%)
Dien Bien	24	3	3
Dak Lak	96	19	56
Binh Dinh	90	22	37
Dong Nai	92	39	54
Dong Thap	93	25	40
Rural Hanoi	82	22	20
Urban Hanoi	95	29	62
Total	82	23	37

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: The share was calculated for 246 commune health stations. (a) Specialist is a post graduate level (after 6-year training of medical doctor) on a specific clinical area. The program is 2 year training for Specialist level 1 and another 2 years for Specialist level 2; (b) Having full staff composition: have at least one doctor or assistant doctor, nurse, midwife, traditional practitioner, pharmacist.

62.   **Surveyed district hospitals have relatively few nurses per doctor.** Across hosptials the ratio averaged 1.4, which is similar to figures from administrative sources and is [11] low in international comparison (15). Only 30% of WHO member states have fewer than 2 nurses per doctor (16). Dien Bien and Dong Thap had the lowest doctor/nurse ratio while Urban Hanoi had more nurses than the others. The relative scarcity of nurses may explain why inpatients in hospitals are often cared for principally by the patient's relatives, who stay in the hospital and contribute to hospital overcrowding.

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[11] Ministry of Health, Health Statistics Year Book 20014

Figure 1.4.1: The ratio of number of nurses and doctors by provinces
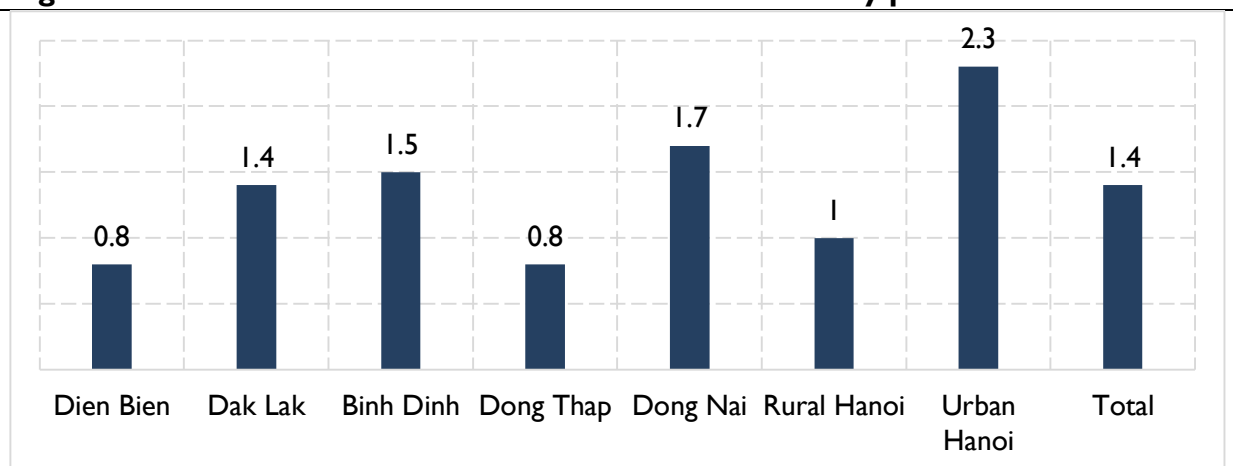
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

1.5. Service provision

Figure 1.5.1: Caseloads from commune health station clinical observation on the survey day

Based on direct observation on survey day
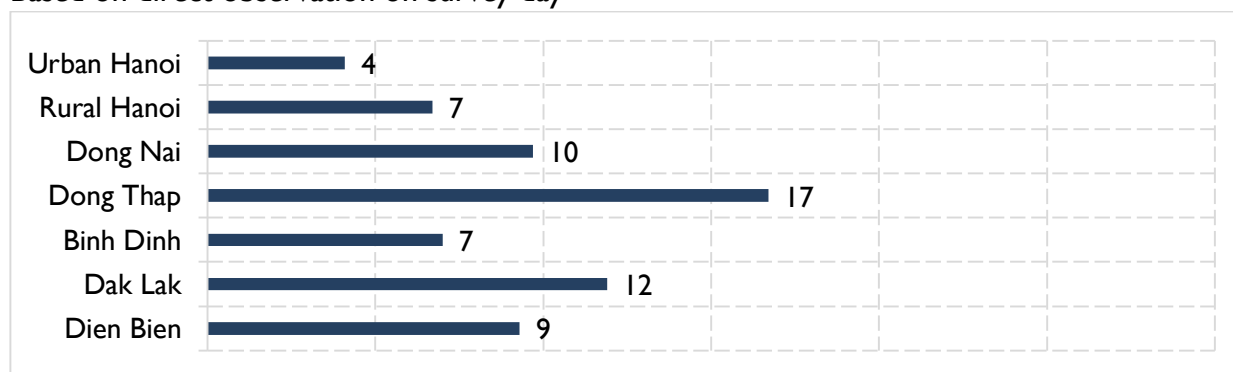
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: (a) a surrogate "caseload" variable was estimated based on the number of patients per doctor on the survey day. Despite the data we actually collected was only from one day, this visited day was selected randomly based on the study planning team.

63.   **Next we consider the caseload at facilities.** Caseload is calculated based on the counts of outpatients directly observed during the clinical observation portion of the study, considering only the health workers who were observed. There were an average of 10 outpatients per doctor, while the health reports of the commune health station reported 32 patients per commune health station. Many commune health stations have very lower patient

loads. At 49 commune health stations in 5 different provinces, the number of outpatients observed on the day of the survey was zero. Doctors at six commune health stations in Dien Bien did provide any patient care at all on the day of the survey. These facilities were all close to a hospital or polyclinic. The low caseload of these facilities raises the question of whether it is cost effective for these facilities to remain open only to provide services other than patient care by doctors. This issue is further discussed in Chapter 5.

64.   **At district hospitals, based on direct observations, outpatient caseload was far higher than at commune health stations.** Observed doctors had an average of 36 consultations per day. The figure was lowest in a polyclinic in Hanoi (7 patients per doctor per day) and was highest in Lap Vo district Hospital in Dong Thap province (87 patients per doctor a day).

Figure 1.5.2: Average number of outpatients per doctor on the survey day
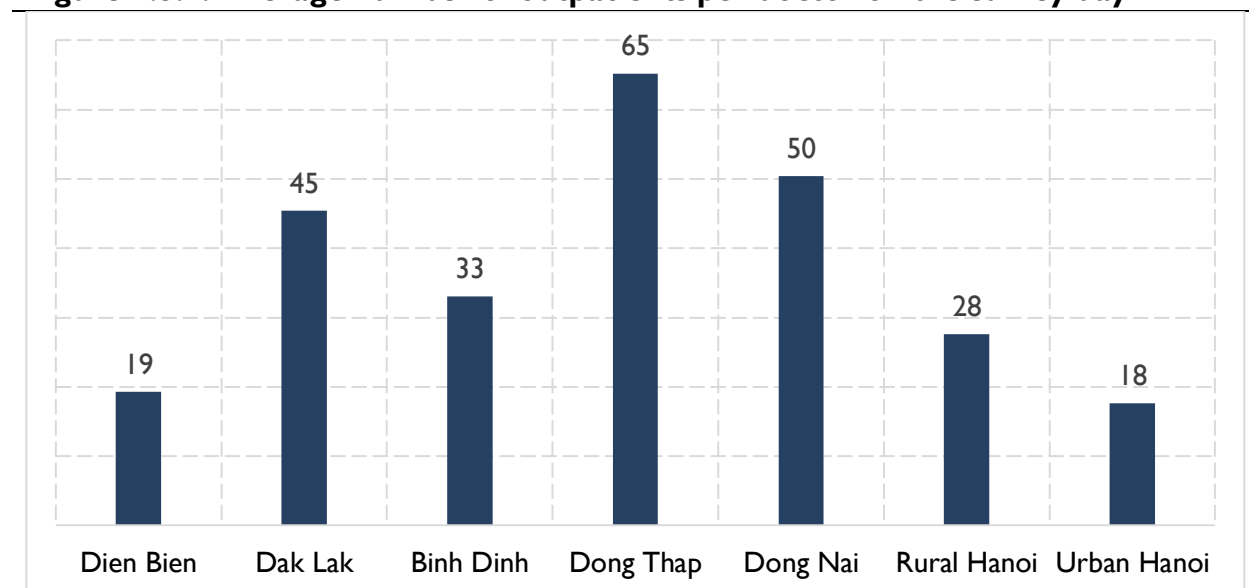
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

65.   **The table below shows the average number of inpatient that a doctor had to manage in a day, as well as the average length of stay and occupancy rate in the surveyed district hospitals.** District hospital doctors managed about four patient beds per day, except in Dien Bien when each doctor managed 1.8 patient beds. In all surveyed district hospitals, bed capacity was close to 90%, based on the number of actual beds.

Table 1.5.1: Number of inpatient per doctor per day at district hospitals

	Actual beds/doctor	Length of stay (day)	Occupancy rate by actual number of beds (%)
Dien Bien	1.8	5.8	93
Dak Lak	4.4	5.5	97
Binh Dinh	4.0	6.1	83
Dong Thap	3.9	5.4	83
Dong Nai	4.9	7.0	92
Rural Hanoi	3.8	6.2	96
Urban Hanoi	2.3	8.2	90
All district hospitals	3.7	6.2	91

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: Occupancy rate was calculated as the number of inpatient days for a given period divided by number of actual beds and number of days in the period.

66. **The average length of stay (ALOS) at district hospitals was 6.2 days.** The ALOS is one measure of the efficiency with which hospital resources are used. It is normally assumed that other things being equal, shorter stays reduce treatment cost by shifting care to less expensive outpatient and ambulatory options. The figure below shows the ALOS across countries for comparison (17). Note that the ALOS calculated in this study only reflects the situation in the lowest level of hospital, and normally length of stay is longer on average in higher level facilities. The extremely long ALOS in Japan and South Korea reflects the aging burden in these countries with high prevalence of chronic condition and sophisticated comorbidity.

Figure 1.5.3: Average length of stay in hospitals in selected countries

Country (Year)	Value
Japan (2010)	18.1
Korea, Republic (2010)	14.1
China (2011)	9.0
Mongolia (2011)	8.0
OECD (2009)	7.3
Vietnam (2003)	6.3
Vietnam (2015)	6.2
Myanmar (2008)	6.1
Australia (2009	5.5
Cambodia (2009)	5.3
Singapore (2011)	5.0
Indonesia (2011)	4.3
Malaysia (2010)	4.1
Thailand (2005)	4.1
Bangladesh (2008)	4.0
Srilanka (2008)	3.2
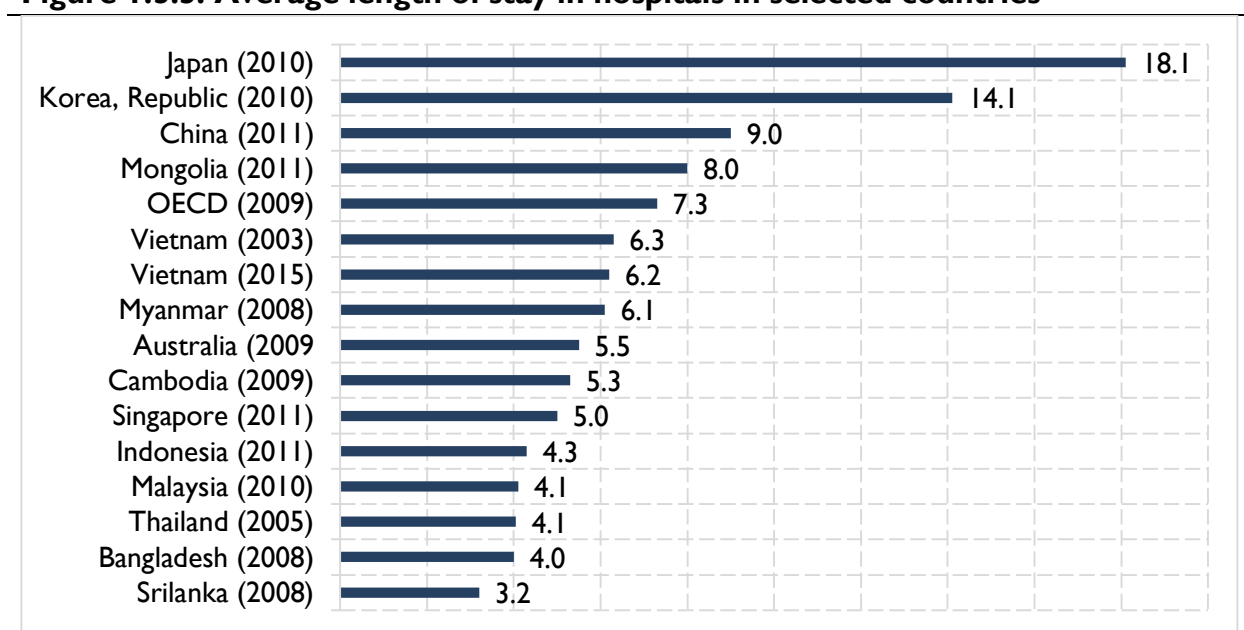
Source: OECD/World Health Organization (2012) (17)
Note: for the data of Vietnam 2015, the average length of stay was calculated from Equity in health survey, 2015.

1.6. Availability of basic services

67.   **The survey collected information as to whether particular services are offered by the facility.** The selected set of services covers a number of basic services related to maternal and child health and non-communicable diseases control and treatment. Overall, 30% of the district hospitals provide all 100% of the surveyed services, and 8% facilities can perform less than 50% of the required services.[12]

68.   **At commune health stations, antenatal care was almost universally available, but many other services were not available for a substantial fraction of facilities.** At the urban area, a low percentage of commune health station provide childbirth services, which are now more commonly sought at district hospitals. The fraction of facilities that offer Hepatitis B vaccination for newborn child within first 24 hours after delivery was just 34%.

69.   **The study also focused on the provision of non-communicable management services, specifically diabetes and hypertension, as they are emerging challenges for Vietnam**. Few commune health station implementing NCD related programs. About 50% of the commune health stations declared that they could register diabetes and hypertension patients,

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[12] Urban Hanoi was excluded for analysis because of small sample size and a large variation among the selected facilities.

and 40% of the commune health station declared that they could provide treatment to those patients. Across provinces, very few commune health stations could dispense diabetes medicines (only 17% in general and none of commune health station in Dien Bien province) (Table 1.6.1). Figure 1.6.1 compares the availability of services in rural and urban areas. Differences were minor across each trace service.

Table 1.6.1: Percent of commune health stations that can perform selected services

	Binh Dinh	Dak Lak	Dien Bien	Dong Nai	Dong Thap	Rural Hanoi	Urban Hanoi	Total
Antenatal care and pregnancy management	100	100	100	100	100	98	100	100
Tetanus vaccination for pregnant women	100	100	100	97	97	98	100	99
Attended vertex presentation normal delivery	78	52	70	55	90	89	5	68
Hep B vaccination within first 24 hrs	34	26	45	17	36	58	0	34
Child acute diarrhea: diagnosis and treatment	93	89	70	97	100	96	100	92
Child pneumonia	88	93	70	95	100	93	95	91
Diabetes type II: screening program	32	33	70	40	49	40	38	43
Diabetes type II: registration based management only	24	48	85	53	87	71	48	60
Diabetes type II: management and monitoring	17	41	64	45	90	42	33	48
Diabetes type II: Periodical drug dispense	10	7	0	13	56	7	14	16
Hypertension: Screening program	24	52	82	35	49	62	29	48
Hypertension: registration based management	24	63	85	55	79	78	43	62
Hypertension: management and monitoring	22	63	79	45	92	49	24	54
Hypertension: periodical medicine dispense	15	63	39	33	64	18	19	35

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

Figure 1.6.1: The availability of services at commune health stations by Rural and Urban areas

Rural area

Service	Percentage
Hypertension: periodical medicine…	39%
Hypertension: management and…	60%
Hypertension: registration based…	68%
Hypertension: Screening program	53%
Diabetes type II: Periodical drug…	18%
Diabetes type II: management and…	52%
Diabetes type II: registration based…	63%
Diabetes type II: screening program	39%
Child pneumonia: diagnosis and treatment	92%
Child acute diarrehea: diagnosis and treatment	92%
Hep B vaccination within first 24 hrs	46%
Attended vertex presentation normal…	87%
Tetanus vaccination for pregnant women	98%
Antenatal care and pregnancy management	100%

Urban area

Service	Percentage
Hypertension: periodical medicine…	31%
Hypertension: management and…	49%
Hypertension: registration based…	56%
Hypertension: Screening program	43%
Diabetes type II: Periodical drug…	13%
Diabetes type II: management and…	44%
Diabetes type II: registration based…	57%
Diabetes type II: screening program	46%
Child pneumonia: diagnosis and treatment	90%
Child acute diarrehea: diagnosis and treatment	92%
Hep B vaccination within first 24 hrs	22%
Attended vertex presentation normal…	50%
Tetanus vaccination for pregnant women	99%
Antenatal care and pregnancy management	99%

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

70. **As a cross-check on the health facility's declaration of their available services, the study checked the actual patients of these tracer services.** Data showed a low numbers of patients for these tracer services. The table below (Table 1.6.2) shows the percentage

of commune health stations that had at least one patient of the tracer diseases in the last year. Except in Dong Thap, very few commune health stations had dispensed diabetes medication, although substantial numbers reported that they had provided management and monitoring of diabetes. Likewise, few commune health stations in most provinces had dispensed hypertension medicines. These findings reflect the historical role of commune health stations, which have traditionally focused on maternal and child health and are less well equipped to handle the growing profile of non-communicable disease.

Table 1.6.2: The percent of commune health stations which have at least one patient by case type in the last year

	Dien Bien	Dak Lak	Binh Dinh	Dong Thap	Dong Nai	Rural Hanoi	Urban Hanoi	Total
Attended natural childbirths in facility	36	33	17	54	10	62	5	33
Child acute diarrhea	55	74	54	87	77	82	71	72
Child pneumonia	39	74	49	87	53	80	67	64
Diabetes type II: Management & monitoring	67	63	22	92	47	49	38	54
Diabetes type II: medicine dispense	0	7	10	56	12	7	10	15
Hypertension: Management & monitoring	67	67	22	92	45	56	29	54
Hypertension: medicine dispense	33	62	15	64	32	18	14	33

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

Chapter 2. A profile of health workers

Fully qualified doctors comprise just 11% of health care providers at the commune health stations visited by the survey. Assistant doctors, midwives, nurses, and others provide substantial components of CHS care. Most CHS health care workers were provided at least some form of in-service training in the previous 12 months. Considering pay across all professions, CHS doctors are paid the most, and salaries (including allowances) are highest in Dien Bien province due to the greater allowances paid to workers living in more remote and ethnic minority areas. CHS health care workers overwhelmingly express a desire to continue working long-term at their current facilities, except in Dien Bien, where only 60% have such intentions. CHS health care workers suggest additional staffing, more medical equipment, and more training opportunities as possible measures to improve the quality of CHS service. A brief profile of health facility directors shows that in many cases—particularly in Dien Bien—facilities are managed by assistant doctors rather than fully-qualified doctors. CHS directors tend to be older, with substantial years of clinical experience and are disproportionately men. Directors at district hospitals typically are doctors with higher level training and are overwhelmingly (94%) male.

Doctors at district hospitals tend to be younger but with higher levels of qualifications than those at commune health stations. In Dien Bien and Dak Lak provinces, a large fraction of doctors are ethnic minorities—equaling or exceeding their share of the general population. The large bulk of doctors at commune health stations (considering those in both commune health stations and district hospitals) do not have standard university doctor training but instead either have been promoted from assistant doctor through "twinning" training programs or pursued degrees through less competitive "direct entry" programs. Nearly half of doctors at district hospitals have bachelor's level training, and the remainder have either primary specialist or specialist level 1 training. There is wide variation in the amount of continuous medical education (in-service) training that doctors receive.

Variation in doctors' salaries reflects levels of education, experience, and location. On average ethnic minority doctors are paid more, reflecting the fact that they are chiefly in Dien Bien and Dak Lak, where doctors are paid greater allowances. No gender difference is found in doctor salaries.

Work by doctors in private practice outside of their jobs at public facilities is very common, particularly among doctors in the more southern provinces: Binh Dinh, Dong Nai, and Dong Thap. Thirty-eight percent of hospital doctors perform some private practice work, and the average time per week in private practice across all hospital doctors is 11 hours. The prevalence of private work and average private hours is slightly lower at commune health stations (31% of doctors, averaging 9 hours per week). Few doctors in Dien Bien conduct private practice. Private practice is much less common for other health care workers.

2.1. Introduction

71.   **This chapter provides a multifaceted profile of health workers in Vietnam.** The first section summarizes the characteristics of all health workers at commune health stations. It describes their broad professional profile, their training opportunities, the time they spend on private practice, their satisfaction rates, and their views on how to improve health services. The second section provides a more detailed profile of doctors, in both commune health stations and district hospitals. The survey collected general information on the characteristics of staff. The director of the district hospital and head of the commune health station were asked a separate set of questions on their management and clinical experience. Ten physicians in each district hospital and all physicians available in commune health station were interviewed on their working condition and satisfaction as well as through a vignette interview to measure their clinical knowledge, which is analyzed in Chapter 4 of this report.

2.2. Health workers in commune health stations

72.   **Commune health station health care providers are professionally diverse.** Among 1688 commune health station health workers in the survey, 11% are fully qualified doctors, 35% are assistant doctors, 6% are traditional medicine assistant doctors, 15% are midwives, 17% are nurses, 12% are pharmacists, and 4% are in other professions. There is notable variation by profession in the age, gender, and ethnic profile of health workers. Doctors and assistant doctors are typically the oldest staff—with average ages respectively of 45 and 40, compared to 35 for other staff. While there is substantial gender balance among doctors (40% women) and assistant doctors (65% women), nearly all (88%) other health workers are women. The fractions of ethnic minorities among doctors (12%), assistant doctors (15%), nurses (13%), midwives (10%) and others (13 %) are higher than the overall fraction of ethnic minorities in the population of six provinces in the survey (8%), but among traditional medicine assistant doctors and pharmacists few are ethnic minorities (4% and 7%, respectively).

73.   **The availability of training is one measure of the opportunities health workers have to improve their skills.** Across professions, doctors at commune health stations have the most training opportunities, while traditional medicine doctors and pharmacists have the fewest. Across provinces, Dien Bien, Binh Dinh, Dong Thap have higher proportions of health workers participating in at least one training, but lower average numbers of trainings per staff. Among the six provinces, Dak Lak health staff had the fewest training opportunities (Figure 2.2.1).

Figure 2.2.1: Frequency of training for health workers at commune health stations

Proportion of commune health station health workers having any training in last 12 months by profession
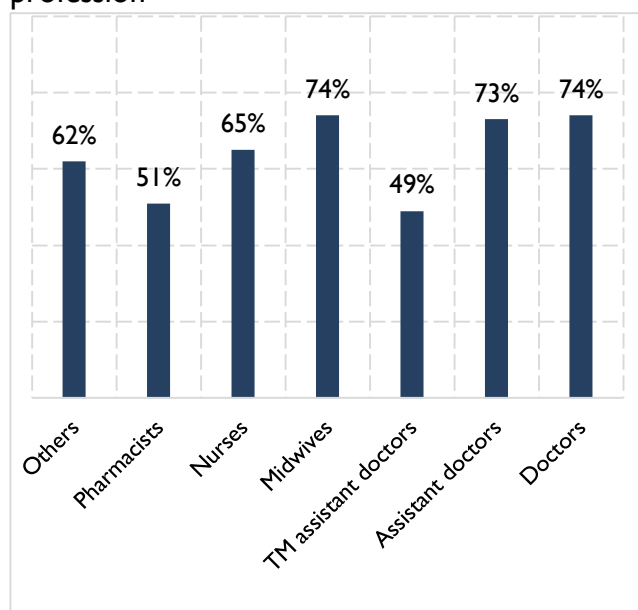
Average number of trainings per commune health station health worker in last 12 months by profession
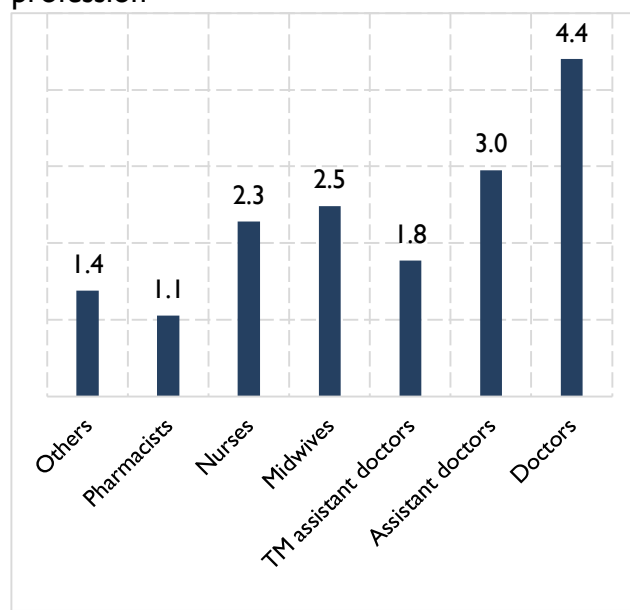
Proportion of commune health station health workers having any training in last 12 months by province
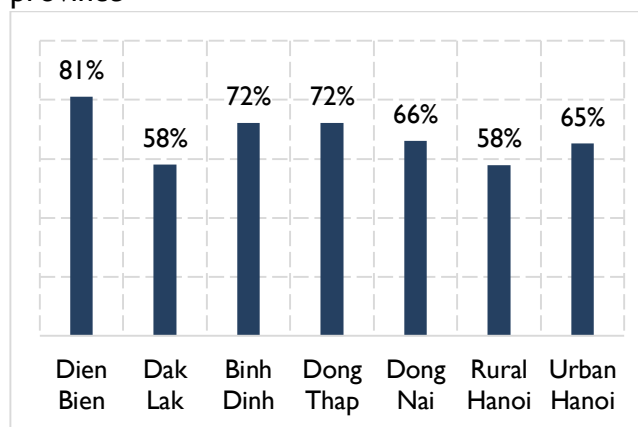
Average number of trainings per commune health station health worker in last 12 months by province
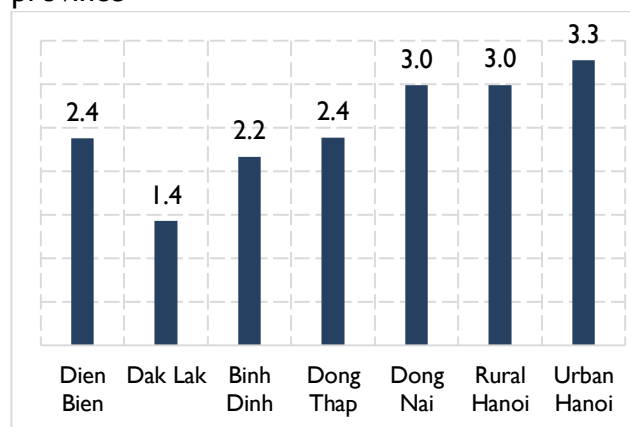
Source: Authors' calculations from Vietnam District and Commune Health Facility Survey (2015).
Note: TM assistant doctors is "traditional medicine assistant doctors".

74.   **Next we consider salaries (including allowances) of health workers at commune health stations (Figure 2.2.2).** Unsurprisingly, doctors' salaries are on average the highest, averaging 6.9 million VND per month. Average salaries, considering all professions, are lowest in urban Hanoi (4.2 million VND) and highest in Dien Bien (6.5 million VND), which is the poorest province in the sample. This reflects the greater allowances paid to workers in more remote and ethnic minority dominated areas.

Figure 2.2.2: Average monthly total salaries of health workers at commune health stations

Average total salary of commune health station health workers by profession (millions VND)
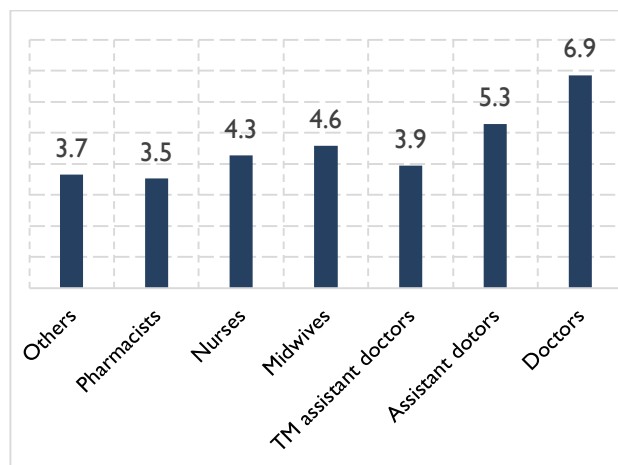
Average total salary of commune health station health workers by provinces (millions VND)
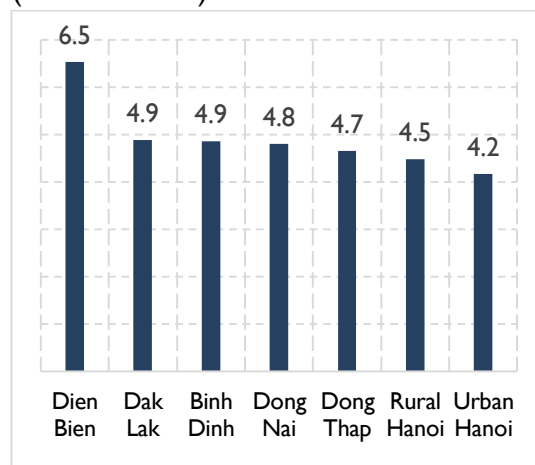
Source: Authors' calculations from Vietnam District and Commune Health Facility Survey (2015).
Notes: "TM assistant doctors" are traditional medicine assistant doctors. Total salary includes salary and allowances due to occupational risk and duty/management.

75. **Some commune health station health workers supplement their salaries by working in private practice.** While there are cases of other health workers providing private care, the practice is overwhelmingly most common among doctors. Surveyed doctors on average work 9.3 hours per week in their private practice (Figure 2.2.3). Commune health station workers in more southern provinces including Dong Nai, Binh Dinh, and Dong Thap on average worked in practice more than in other provinces. Dong Thap is a particular stand out, where doctors on average work 18 hours a week in private practice.

Figure 2.2.3: Average number of hours per week in private practice by health workers at commune health stations
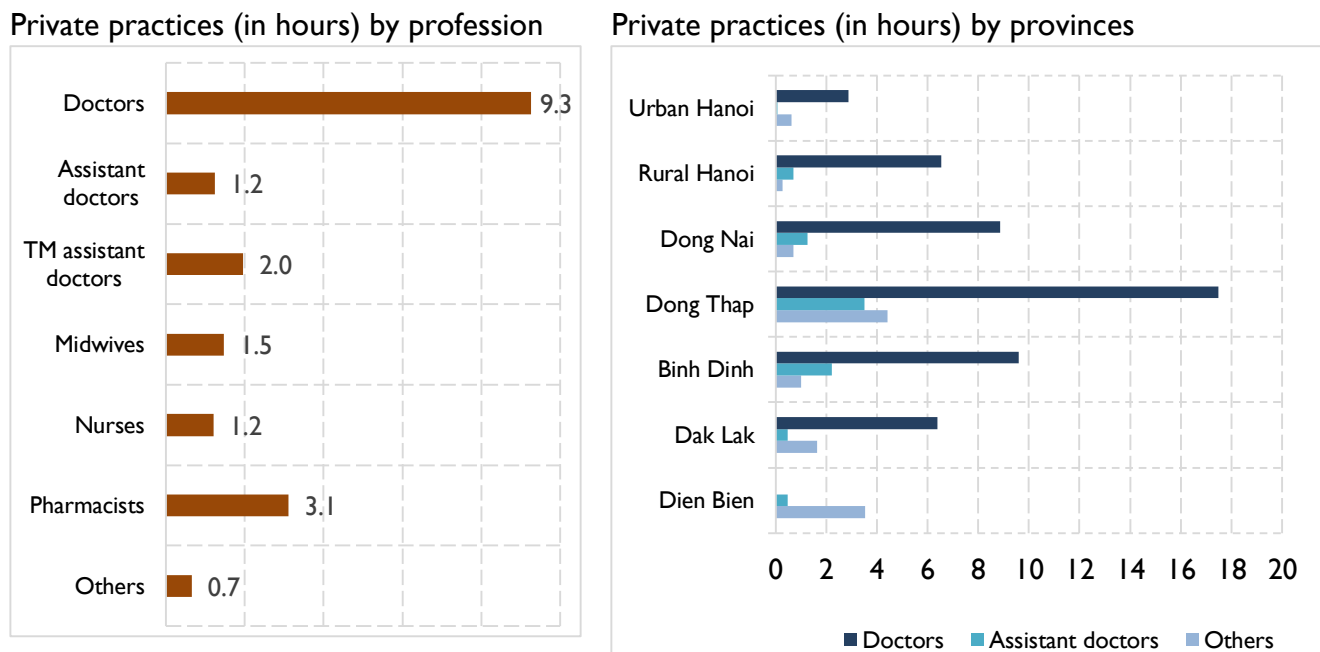
Private practices (in hours) by profession

Profession	Hours
Doctors	9.3
Assistant doctors	1.2
TM assistant doctors	2.0
Midwives	1.5
Nurses	1.2
Pharmacists	3.1
Others	0.7

Private practices (in hours) by provinces

■ Doctors ■ Assistant doctors ■ Others

Source: Authors' calculations from Vietnam District and Commune Health Facility Survey (2015).
Note: TM assistant doctors is "traditional medicine assistant doctors".

Figure 2.2.4: Commune health station health workers' satisfaction

Mean satisfaction scores by profession

Others	Pharmacists	Nurses	Midwives	TM assistant doctors	Assistant doctors	Doctors
3.3	3.1	3.1	3.1	3.1	3.2	3.0
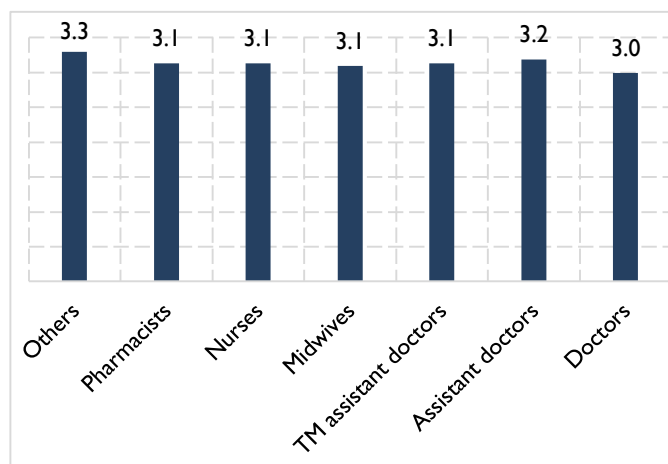
Percent commune health station doctors who want to work long term at the facility
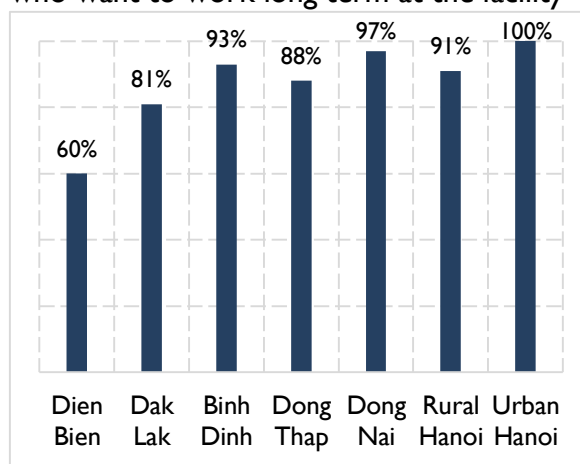
Dien Bien	Dak Lak	Binh Dinh	Dong Thap	Dong Nai	Rural Hanoi	Urban Hanoi
60%	81%	93%	88%	97%	91%	100%

Source: Authors' calculations from Vietnam District and Commune Health Facility Survey (2015).
Notes: The satisfaction score was calculated as the mean of ten satisfaction indicators for salary, allowance, training opportunity, promotion opportunity, occupational safety, hospital security, working environment, availability of medicines, availability of equipment, working pressure, and having enough staff. Each indicator was measured using a Likert scale with from very dissatisfied (1) to very satisfied (5).

76.   **Next we consider measures of job satisfaction for workers at commune health stations.** An overall index of satisfaction, calculated as a mean of satisfaction indicators, shows similar values across professions—all close to the middle of the 1 to 5 scale. Another measure of worker satisfaction is whether workers expressed a desire to work long term at the current facility. Nearly all workers other than doctors said they intended to work long-term at their current health facilities. Among doctors, however, there was substantial variation by geography. Smaller fractions of doctors in poorer provinces said they want to work long term at their current facility. Only 60% doctors in Dien Bien and 81% doctors in Dak Lak fall in this category (Figure 2.2.4).

77.   **Health workers were also asked about their recommendations for improving services at their facilities.** Responses were similar across different professions. The most common answers were that health facilities should have more training opportunities for staff, more medical equipment, and more health workers (Figure 2.2.5).

Figure 2.2.5: Suggestions of health workers at commune health stations for service improvement
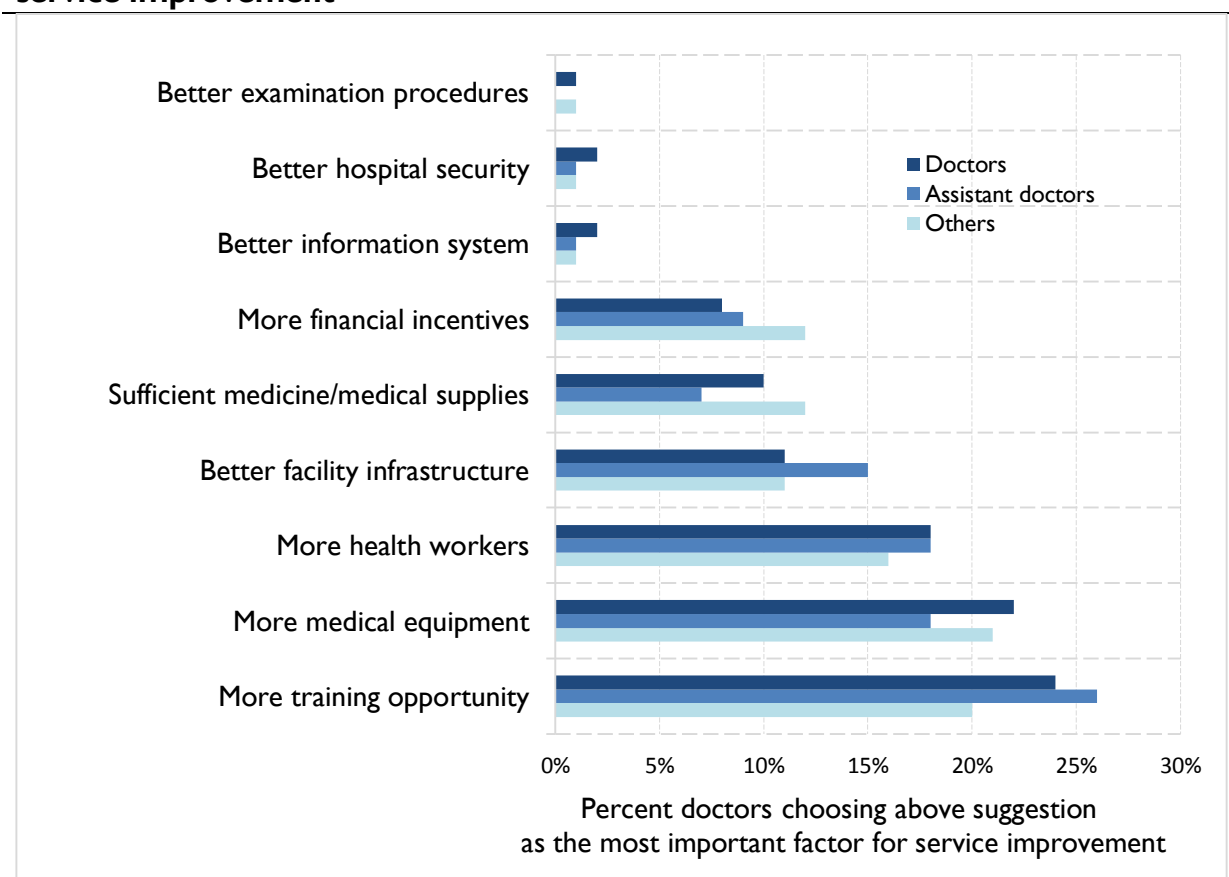
Source: Authors' calculations from Vietnam District and Commune Health Facility Survey (2015).

78. **At commune health stations, substantial numbers of women are directors, but male directors outnumber female directors in all provinces except Dong Nai.** The mean age of the commune health station head is 48 years. They have an average of 23 years of clinical experience and 11 years of management experience. Almost 56% of the commune health station heads have university (bachelor's or higher) degrees. The remainder are assistant doctors. Dien Bien has the highest numbers of commune health station head who are assistant doctors.

Table 2.2.1: Profile of directors of commune health stations by province

	Province							
	Dien Bien	Dak Lak	Binh Dinh	Dong Thap	Dong Nai	Rural Hanoi	Urban Hanoi	Total
Count by gender								
Male	19	16	30	22	18	32	5	142
Female	14	11	11	17	22	13	16	104
Average age	41	46	49	48	49	50	48	48
Count by highest training								
Specialist, master, PhD	0	3	6	11	5	5	4	34
Bachelor	3	14	18	19	19	19	12	104
Assistant doctor	30	10	17	9	16	21	5	108
Years clinical experience (mean)	18	20	25	25	26	25	23	23
Years management experience (mean)	7	10	15	9	10	12	12	11

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

79. **Extremely few hospital directors are women.** Only 5 out of 78 hospital directors in the surveyed hospitals are female. The mean age of the district hospital directors was 52. Almost all had post-graduate training, and they average 26 years of clinical experience and 6 years of management experience.

Table 2.2.2: Profiles of directors of district hospitals by province

	Province							
	Dien Bien	Dak Lak	Binh Dinh	Dong Thap	Dong Nai	Rural Hanoi	Urban Hanoi	All
Count by gender								
Male	9	10	11	11	8	17	6	72
Female	1	0	0	0	1	0	3	5
Average age	47	51	52	53	52	53	52	52
Count by highest training								
Specialist, master, PhD	9	9	11	11	9	18	8	75
Bachelor	1	1	0	0	0	0	1	3

Years clinical experience (mean)	22	25	26	31	28	25	25	26
Years management experience (mean)	5	8	8	6	6	5	6	6

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

2.3. Doctors in commune health stations and district hospitals

80.   **This section provides an additional focus on doctors, who play a particularly critical role in the health system, leading in patient consultations, diagnosis, and treatment decision.**   We examine their demographic characteristics, their training and experience, and their compensation. Unlike the previous section, which apart from the discussion of directors considers health workers at commune health stations only, the following analysis for doctors is presented for both those at district hospitals and those at commune health stations.

81.   **As noted in the previous section, doctors are older on average than other health care staff, and across most provinces the mean age of doctors is in the range 40-45 at both commune health station and district hospitals.** The one major exception is Dien Bien, the poorest province covered by the survey, where doctors are much younger, averaging age 30 in commune health stations and age 35 in district hospitals. Doctors in district hospitals are on average slightly younger than those in commune health stations, and this age gap is more prominent in Hanoi (Figure 2.3.1).

Figure 2.3.1: Mean age of doctors by province and facility type
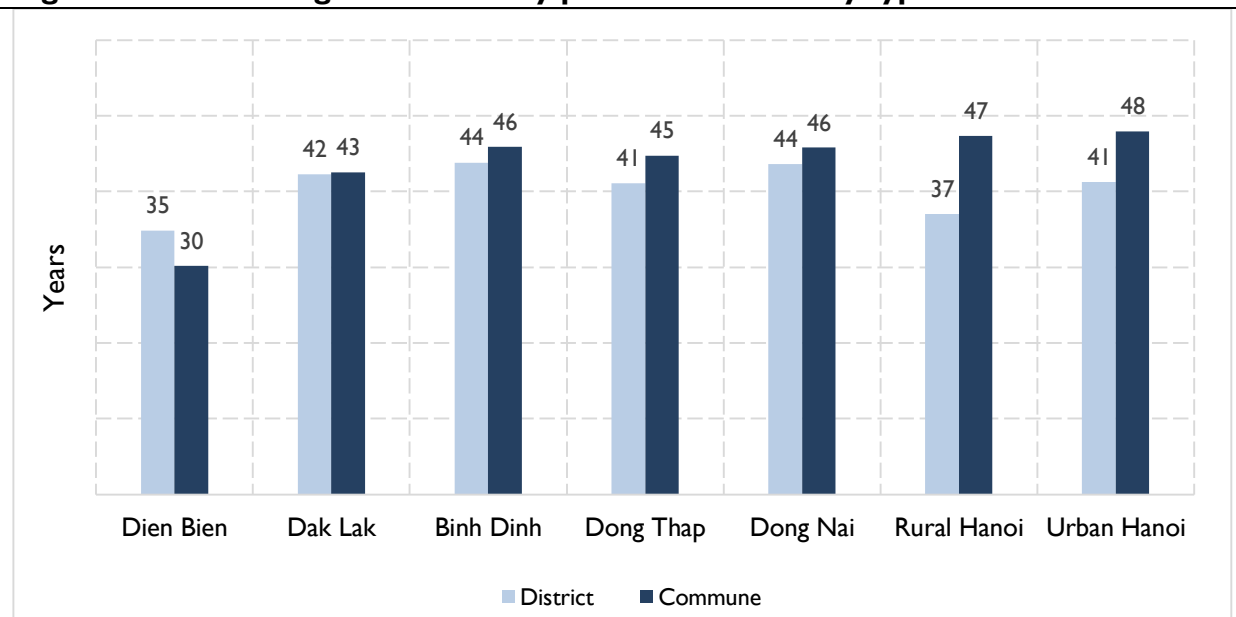
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

82.   **A substantial number of doctors are women, but with wide variation by facility type and location.** While overall 39% of doctors are women, they are nearly half of doctors at urban commune health stations and a smaller fraction (31%) of doctors at rural commune health

stations. At district hospitals of various levels, the percentage who are women falls between those extremes (Figure 2.3.2).

Figure 2.3.2: Percentage of doctors who are women by facility type
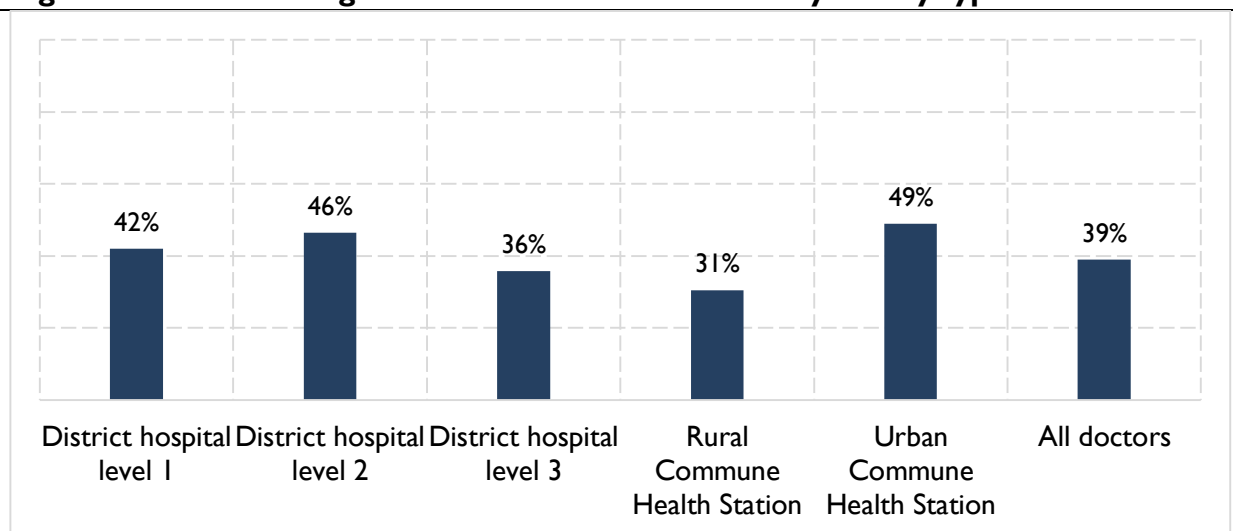
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

Figure 2.3.3: Percentage of doctors who are ethnic minorities by facility type, and percentage who are ethnic minorities in the general population, by province
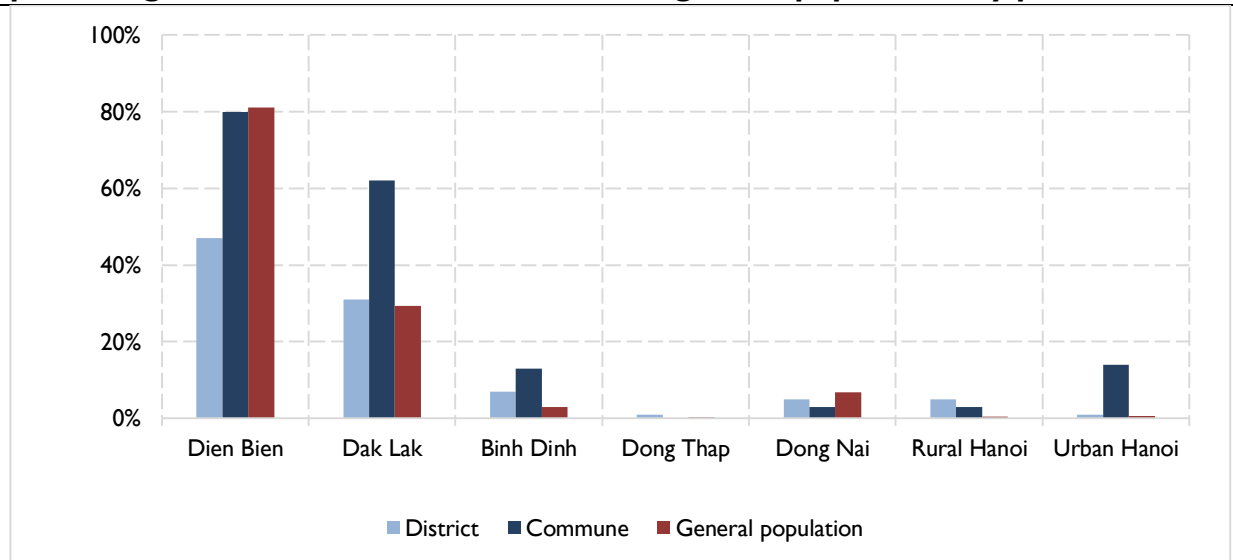
Source: Authors' calculations from the Vietnam District and Commune Health Facility Survey (2015) for percent ethnic minority doctors at commune health stations and district hospitals and from 2014 Vietnam Household Living Standards Survey 2014 for the general population.

Box 2.3.1: Levels of Doctor Training
Each doctor in Vietnam has one of three levels of training, all of which correspond to a **bachelor's degree**:

(i) *Standard university doctor training*: after students complete upper secondary school, they can be admitted to a doctor training program at medical universities based on a competitive entrance exam. Formal medical doctor training usually takes 6 years.

(ii) *Promotion from assistant doctor:* under an earlier training regime, students could train to become assistant doctors through a four year program after upper secondary school (with admissions also based on a competitive exam). These assistant doctor training programs required 4 years of full-time study. Assistant doctor training programs no longer exist. As a transitional measure, medical schools now have a program known as "twinning" by which assistant doctors can become full doctors through an additional four years of study.

(iii) *Direct entry programs:* some medical schools offer less competitive admissions for particular populations, with no entrance exam. Such programs exists for applicants who i) are ethnic minorities or living in poor areas, and ii) willing to commit to work in remote areas after graduation. They receive scholarships. Top ranked medical universities generally do not offer these programs.

Additionally, some doctors have various levels of post-graduate training (beyond bachelor's degree-level):

Some doctors pursue a three year internship program. The internship program is very selective and its graduates work largely at central level hospitals. No graduates from this program were identified in the survey.

Doctors can also be designated as **primary specialists** with 1 year of training.

With additional training they can achieve designation as a **specialist level 1** and with further training as **specialist level 2**. These specialized trainings are hospital based and focused on clinical practice, while the internship program is more comprehensive, including both clinical and research skills.

A small number of doctors pursue **master's degrees** and **doctoral degrees** (Ph.D.)

83. **Next we consider the ethnic composition of doctors.** In the population of Vietnam as a whole, ethnic minorities constitute 14% of the population and are geographically concentrated. They form a substantial share of the population in two of the provinces covered by the Equity in Health Survey—Dien Bien and Dak Lak. In other provinces the share of doctors

who are ethnic minorities is small, except at commune health stations in urban Hanoi and Binh Dinh, where they constitute 14% and 13% of doctors, respectively. In Dien Bien, where ethnic minorities are a majority (81%) of the population, they make up a similar share of commune health station doctors (80%) and a lower but substantial share of district hospital doctors (47%). In Dak Lak, ethnic minorities make up larger shares of the doctor population in both commune health stations (62%) and district hospitals (31%) than they do in the population overall. Notably, all ethnic minority doctors in Dien Bien at commune health stations are under age 30, which suggests that their presence is the result of recent efforts to promote medical education for ethnic minorities (Figure 2.3.3).

84. **Doctors' education levels vary by province and type of facility.** While 100% of doctors at level 1 district hospitals have standard university doctor training, only one fifth of commune health station doctors have such training (Figure 2.3.4). The remainder were either promoted from assistant doctors or were trained in less competitive "direct entry" programs (see Box 2.3.1). Somewhat surprisingly, doctors at more sophisticated facilities have doctors who on average have less experience (Figure 2.3.6). At district hospitals, almost half of doctors (47%) have bachelor level training, 12% are primary specialists, and 36% are Specialists Level 1. Extremely few doctors at district hospitals have higher qualifications beyond Specialists Level 1 (Figure 2.3.5.)

Figure 2.3.4: Percent of doctors with standard university doctor training
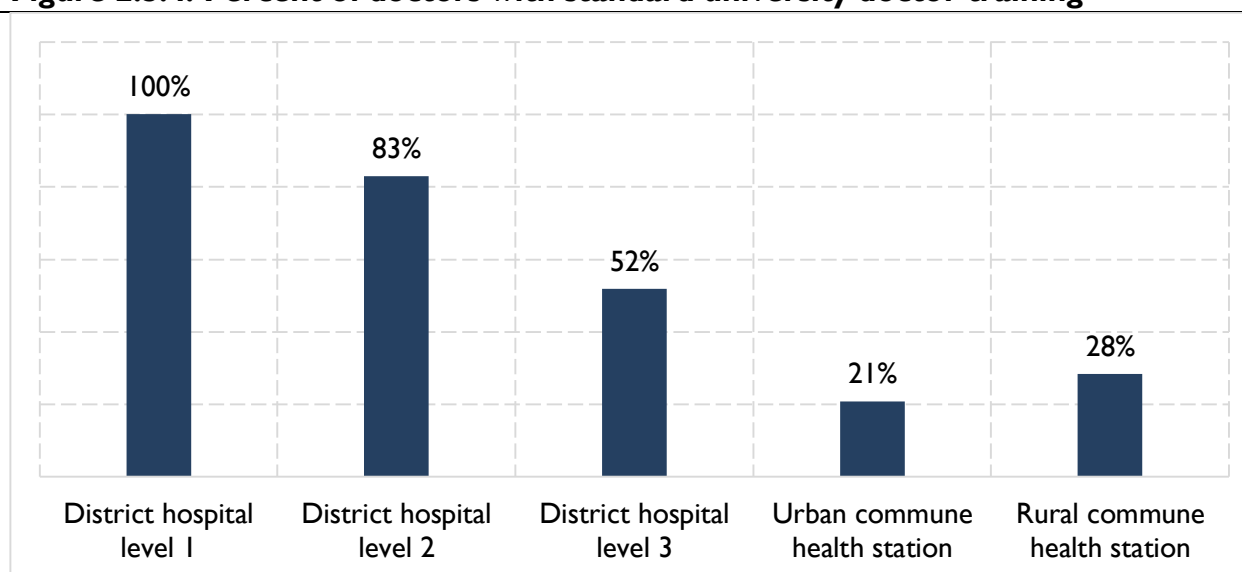
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

Figure 2.3.5: Health staff qualification at district hospitals

1.3% 3.8% 0.1%

46.7%

35.8%

12.2%

- Bachelor
- Primary speacialist
- Speacialist level 1
- Speacialist level 2
- Master
- PhD
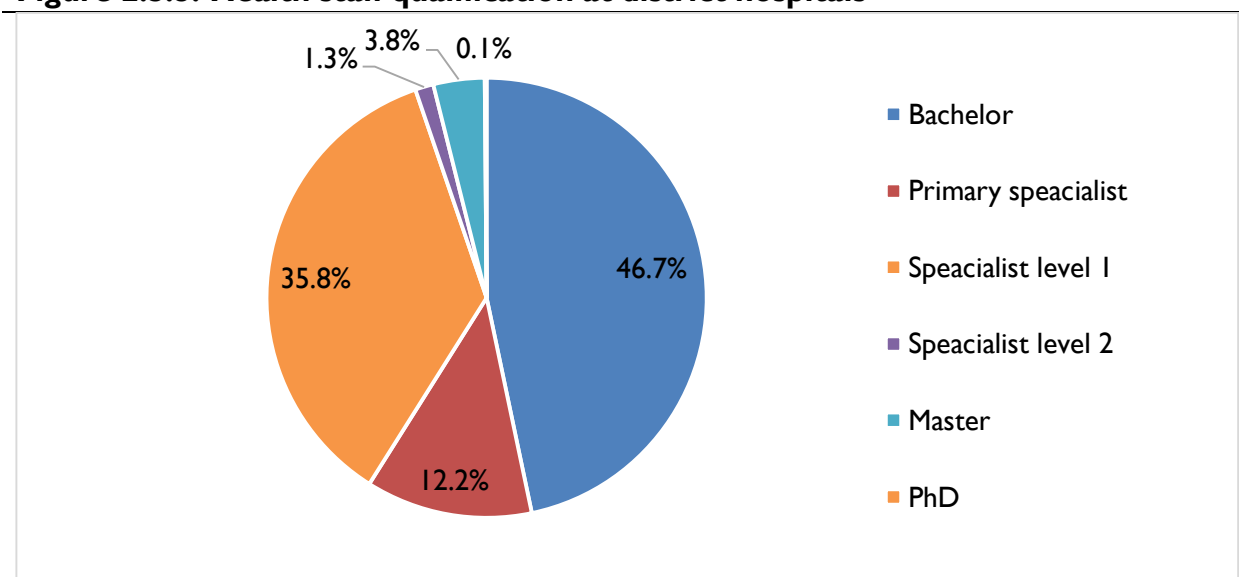
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

85.   **Surprisingly, experience levels are higher among doctors at commune health station than those at district hospitals.** In urban commune health stations, nearly all (87%) of doctors have 10 or more years of experience. In the district hospitals that offer the most comprehensive range of services (level 1 district hospitals), the fraction of doctors with this level of experience is much lower (61%), and a substantial fraction (29%) has less than five years of experience. Because commune health stations have low turnover of staff and are not expanding over time, their doctors are largely those with longer tenure. District hospitals have expanded over time, recruiting many young doctors and thus bringing down the average age of their doctors.

Figure 2.3.6: Doctors' clinical experiences in years across different levels of health facilities

Doctors' clinical experiences

- < 5 years
- >=5 years & < 10 years
- >=10 years
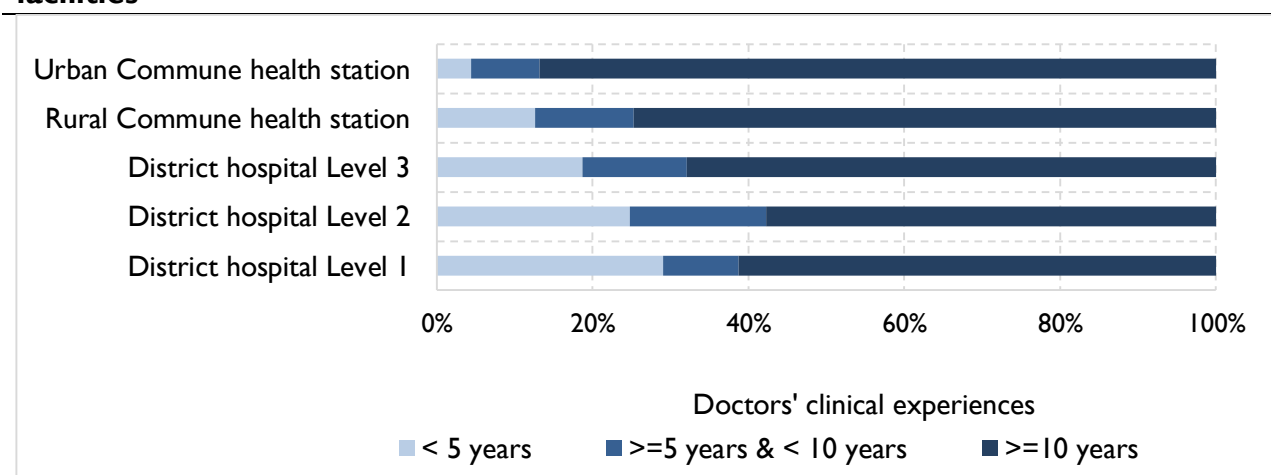
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

86. **There is wide variation in the amount of continuous medical education (in-service) training that doctors receive** (Figure 2.3.7). Roughly half of doctors at district hospitals report having received some form of training in the previous 12 months, and the average number of trainings received was 1-2, with small variation by province. Surprisingly, commune health station doctors in most provinces receive much more training than district hospital doctors, but with notable variation by province. Trainings average 3 or more per year among commune health station doctors in all provinces with the exception of Dien Bien, where they average one per year.

Figure 2.3.7: Training opportunities for doctors at district hospitals and commune health stations by province

Percent of district hospital doctors having any training in the last 12 months
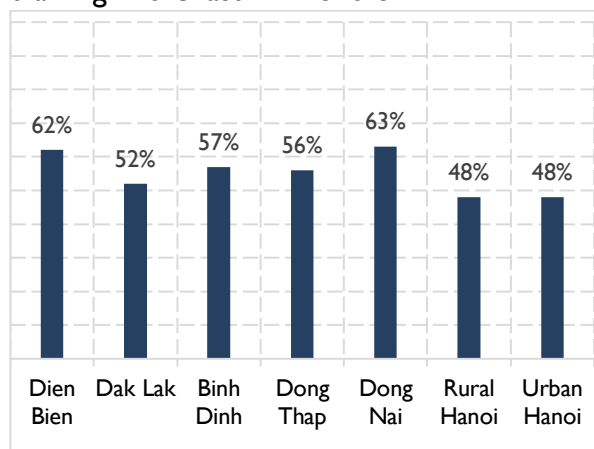
Percent of commune health station doctors having any training in the last 12 months
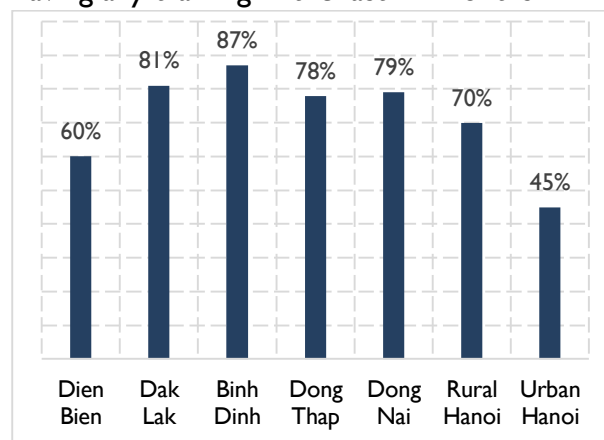
Average number of trainings that district hospital doctors had in last 12 months
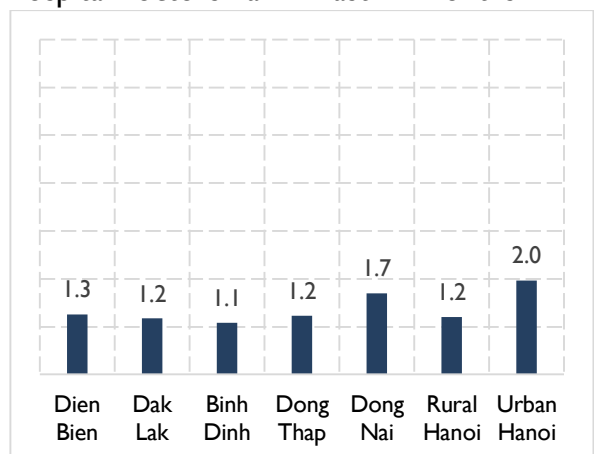
Average number of trainings that commune health station doctors had in last 12 months
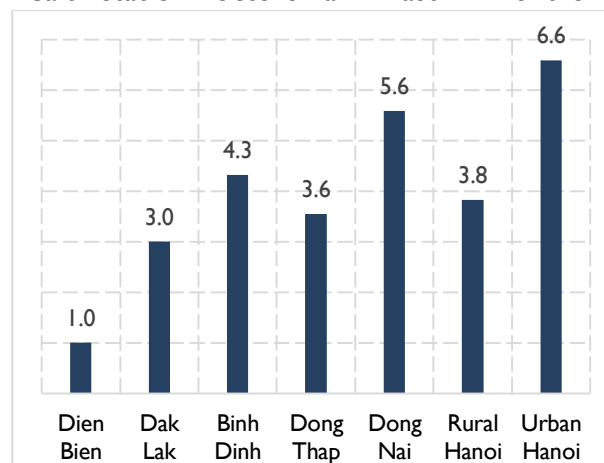
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

87. **Variation in doctors' salaries reflects levels of education, experience, and location.** Table 2.3.1 shows results from a regression of salary (including allowances) on a variety of characteristics. The results in the first column, without controls for province, show that doctors who hold management positions, who have more experience, and who have qualifications at the highest levels (specialist 1 and specialist 2) are paid more. There is no difference by gender in salaries. Without controlling for location, ethnic minorities are paid 11% more than other doctors. However, in the results in column 2, which include controls for province, this "ethnic minority premium" disappears. This indicates that the apparent higher average salaries for ethnic minorities are a reflection of the fact that they are chiefly in the Dien Bien and Dak Lak, where doctors are paid greater allowances. Other regression results are similar in the analysis with and without province controls.

Table 2.3.1: Regression of doctor's total salary

Dependent variable: log of monthly total salary[a]

Variable	(I)		(II)	
	Coefficient	Standard error	Coefficient	Standard error
Ethnic Minority	0.109***	0.024	0.033	0.026
Female	-0.024	0.016	-0.014	0.016
Holding management position	0.176***	0.019	0.163***	0.018
Years in clinical experience	0.031***	0.003	0.029***	0.003
Years in clinical experience squared	-0.000***	0.000	-0.000***	0.000
Highest qualification (base: less than or equal bachelor degree)				
Primary/Intern specialist	-0.017	0.027	0.001	0.027
Specialist level 1	0.076***	0.020	0.087***	0.019
Specialist level 2, Master, PhD	0.071*	0.040	0.125***	0.041
Working at district hospital	0.026	0.021	0.004	0.021
Province (Base: Urban Hanoi)				
Rural Hanoi			0.001	0.030
Dong Nai			0.118***	0.032
Dong Thap			0.027	0.031
Binh Dinh			0.081**	0.032
Dak Lak			0.149***	0.034
Dien Bien			0.184***	0.037
Constant	15.150***	0.030	15.110***	0.038
Number of observation	920		920	
R-squared	0.534		0.565	

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$; (a) monthly total salary includes monthly salary and allowances of occupational risk and duty/management.

88. **Work by doctors in private practice outside of their jobs at public facilities is common, particularly among doctors in the more southern provinces: Binh Dinh, Dong Nai, and Dong Thap.** In each of those provinces, more than half of doctors at district hospitals did some private practice work, and average time in private work across doctors exceeded 11 hours per week. The prevalence of private work and average private hours are lower at commune health stations. Very few doctors in Dien Bien conduct private practice (Figure 2.3.8). Such "dual practice" work by doctors is believed to be common in other countries in South and East Asia, but hard data on its prevalence is scarce. The studies that have examined the issue in other countries are typically very dated or rely on non-representative samples and qualitative interviews (Hipgrave et al 2013).

Figure 2.3.8: Prevalence of private practice by doctors at district hospitals and commune health stations

Percent doctors working at district hospitals and commune health stations performing private practices
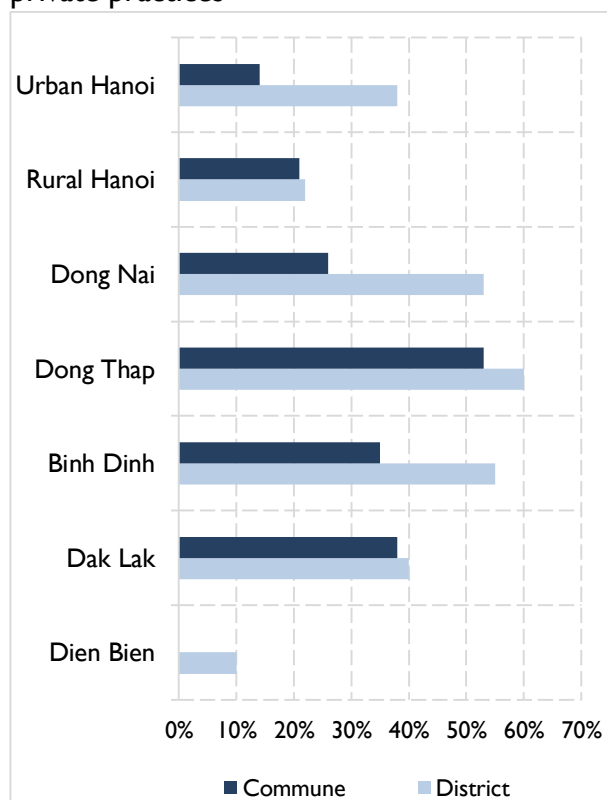
Average number of hours (per week) that district hospital and commune health station doctors spending on private practices
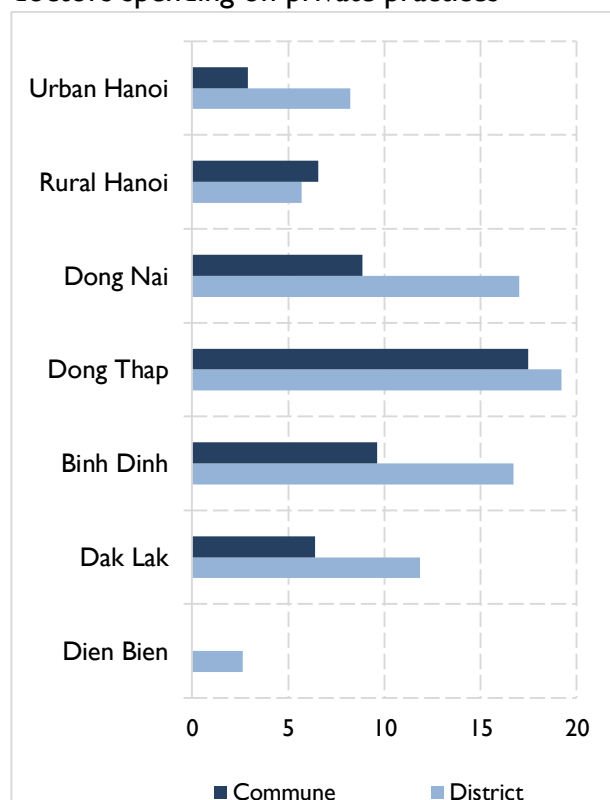
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

2.4. Doctors' satisfaction

89.   **As noted earlier, at commune health stations, doctors' overall levels of satisfaction falls in the middle of a scale.** We consider separate satisfaction results for doctors in district hospitals and commune health stations by individual satisfaction items. District hospital doctors express lower satisfaction with staff levels. Commune health station doctors express lower levels of satisfaction with hospital security. (In news reports, there have been numerous accounts of irate relatives of patients threatening or attacking doctors.) Doctors at both types of facilities gave lower satisfaction scores for their salary and allowances and relative high satisfaction scores to working environment and training opportunities.

Figure 2.4.1: Mean satisfaction scores of doctors working at district hospitals and commune health stations
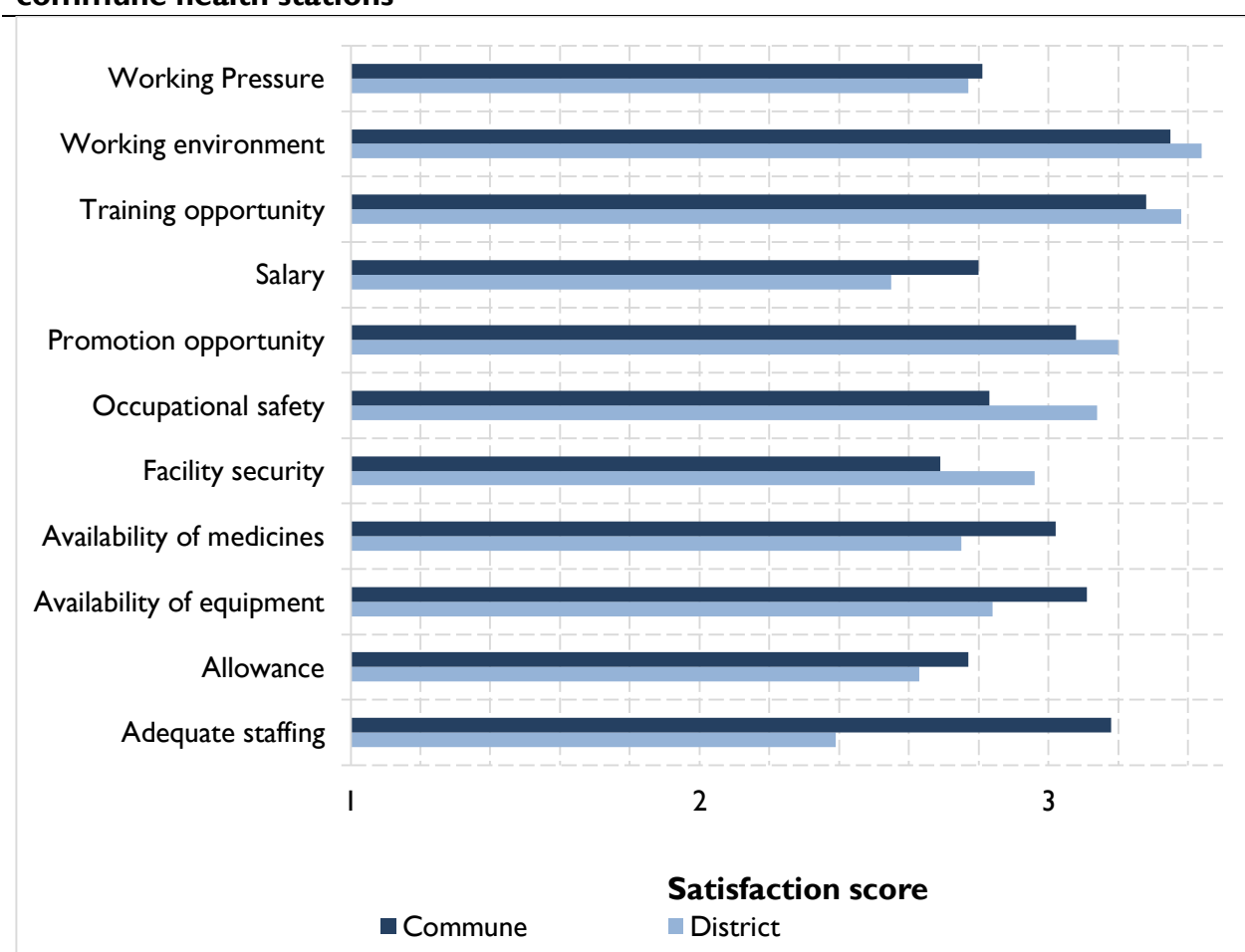
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: satisfaction score was calculated as the mean of ten satisfaction indicators including salary, allowance, training opportunity, promotion opportunity, occupational safety, hospital security, working environment, availability of medicines, availability of equipment, working pressure, having enough staff. These ten satisfaction indicators were measured by a Likert scale with 5 level from very dissatisfied (1) to very satisfied (5).

Chapter 3: Patient experiences

This chapter presents information on the health care experience from the patient's perspective, based on exit surveys conducted at commune health stations and district hospitals as part of the survey. Analysis of the characteristics of patients confirm findings from other surveys that although the socioeconomic profile of patients across the two facility types is not sharply different, for outpatient care, ethnic minorities and those classified as poor are more prevalent at commune health stations than district hospitals.

Most patients said they chose the facility for the visit because it was their primary facility registered for health insurance purposes, although substantial numbers indicated that quality of care and health worker attitudes drove their choice, particularly among patients at district hospitals. Ethnic minority and poor patients at district hospitals tended to rate their own health more negatively than other patients on average, which may reflect selection among which of those patients visit district hospitals. Travel times for ethnic minorities and the poor to district hospitals are higher on average than those of other patients, and they may tend to seek care at district hospitals only when their health status is substantially worse. Travel times were under 20 minutes for nearly patients at commune health stations and most at district hospitals. Extremely few patients have travel times of over 1 hour.

Among outpatients at district hospitals, waiting times are invariant to patient socioeconomic status, averaging close to 33 minutes for all patients across wealth levels. Poorer patients at commune health stations, however, do wait substantially longer than wealthier patients, and this difference persists even after controlling for facility effects. In other words this pattern is not due to poorer patients going to facilities with longer waits. Analysis of consultation times mirror results from those concerning the composite effort index in Chapter 5: controlling for differences by facility, there is no difference in consultation times by wealth or ethnic minority status. Those with health insurance, do receive slightly shorter consultation times on average, however. The frequency of testing at district hospitals varies quite substantially across provinces (commune health stations do not typically provide testing.) In rural Hanoi hospitals, 74% of outpatients received at least one test, compared to 17% in Dong Thap.

Purchase of medicines outside the facility as a consequence of the visit was common for wealthier patients at district hospitals. The most common reason patients cited for purchasing medicines off-site was that specific medicines prescribed by the doctor were not covered by insurance.

Total out-of-pocket expenditures associated with the facility visit or stay were calculated by summing three categories: i) expenditures to the facility, ii) expenditure for medical services outside the facility, and iii) gifts, food, travel costs, and lodging for the patient and relatives, other than costs paid directly to the facility. Average expenditures were low for outpatients with insurance at both commune health stations and district hospitals. In particular, medical expenditures to facilities are minimal for children under 6. Inpatients costs, for both those with and without insurance, were substantial. Notably, the largest component of expenditure for inpatients with insurance was gifts, food, travel costs, and lodging.

3.1. Introduction

90.   **This chapter considers health care from the patient's perspective.** Drawing from the exit interviews collected as part of the survey, it considers the demographic profile of the patients, why they seek care, their reports of their experiences as patients, and their use of

health insurance. The exit interviews were conducted at the end of inpatients' stays and outpatients' visits. To ensure the high response and completion rates, the exit interviews were designed to take less than 15 minutes. Response and completion rates were 90% for inpatients and 80% for outpatients (82% among district hospital outpatients and 90% among commune health station outpatients). A total of 948 inpatients and 4989 outpatients were interviewed at district hospitals along with 1759 outpatients at commune health stations.

3.2. Patient profile

91.   **In considering the profile of patients, we distinguish between 1) district hospital inpatients, 2) district hospital outpatients, and 3) commune health station outpatients.** The very small group consisting of commune health station inpatients were not covered by the survey.

92.   **Three findings emerge from a comparison of basic demographic characteristics across the three groups.** First, relative to the overall population, patients in all three categories are more likely to be children or older individuals, reflecting the greater health demand of those groups. Second, ethnic minority outpatients are more prevalent at commune health stations than district hospitals. However, substantial numbers of ethnic minorities are found among inpatients at district hospitals. Third, paralleling the ethnic minority findings, among outpatients the poor are more likely to receive care at commune health stations (see Figure 3.2.1.)

Figure 3.2.1: Characteristics of outpatients at commune health stations, outpatients at district hospitals, and inpatients at district hospitals

Age

	Age: <15	Age: 15-59	Age: 60+
Outpatients, commune	25%	44%	31%
Outpatients, district	33%	42%	25%
Inpatients, district	30%	45%	25%

Poor versus nonpoor

	Poor	Nonpoor
Outpatients, commune	20%	80%
Outpatients, district	8%	92%
Inpatients, district	14%	86%
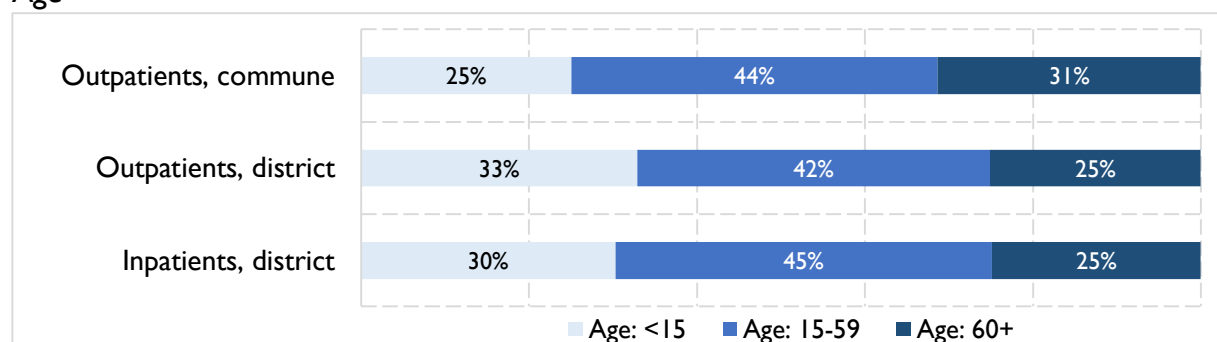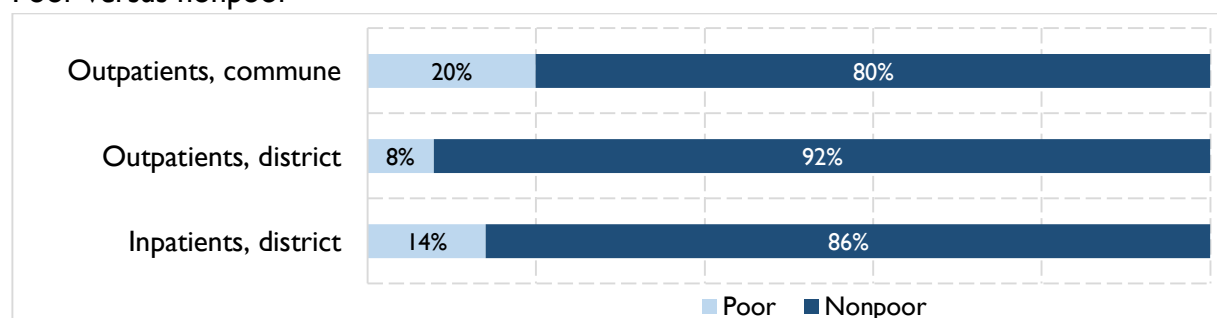
Ethnic minority versus ethnic majority
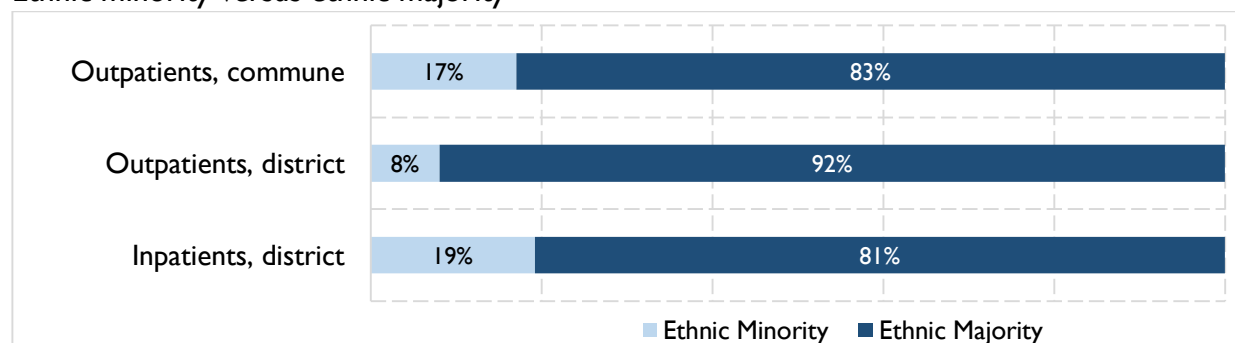
	Ethnic Minority	Ethnic Majority
Outpatients, commune	17%	83%
Outpatients, district	8%	92%
Inpatients, district	19%	81%

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: "General population" refers to the overall country population. (a) "Ethnic majority" consists of Kinh and Hoa people. (b) The poor and nonpoor classification is that of the "poor list" of the Ministry of Labour, Invalids, and Social Affairs, which is used to determine eligibility for various benefits. Patients were asked whether or not they were classified as poor.

3.3. Reasons for Seeking Care at Facility

93.   **Patients have the freedom to choose their place of medical care, but those enrolled in the social insurance system must designate a single facility as their primary destination of care.** At the time of the survey in 2015 patients who went to other

facilities faced larger co-payments for their care.[13] In the survey, patients were asked why they chose a particular facility for their current care (on the day of the survey). Unsurprisingly, for all three types of patients, by far the most common response was that the patient chose the facility because it was registered as the patient's primary place of care in the health insurance system (Figure 3.3.1). Quality of care was the second most common response among both inpatients and outpatients at district hospitals. Among patients at commune health stations, attitudes of health workers was the second most common response, followed by quality of care. Overall, the results indicate that while choice of facility is principally driven by health insurance registration, patients are sensitive to the quality of care, particularly for district hospital visits.

Figure 3.3.1: Reasons of patients' health facility selection
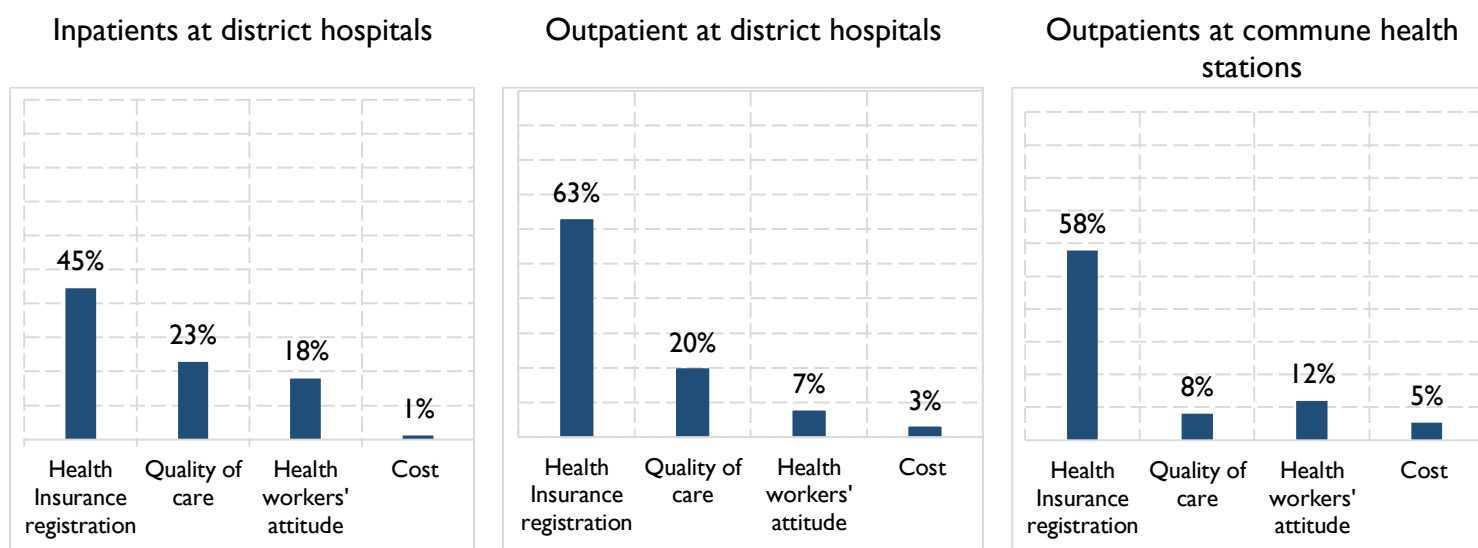
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: "health insurance registration" means that the health facilities were the place that patients registered their health insurance. This figure shows responses to the question "Why do you seek care this health facility?".

94.   **Surveyed patients were asked to give a subjective evaluation of their own health, rating their health status from 1 (very bad) to 5 (very good).** Among visitors to commune health stations, 42% of patients overall rate their health as poor or very poor, and similar figures are found for ethnic minorities and the poor. Among patients at district hospitals,

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[13] Nationally, 70% of the population has health insurance (based on analysis of the 2014 Vietnam Household Living Standards Survey.) For basic treatment, the insurance is effective when the insured patients receive care from the primary care facilities (commune health stations or district hospitals) or the higher level on referral. Insured people have the option to register their health insurance at eligible commune health stations and district hospitals defined by Ministry of Health (or provincial and central level hospitals for some specific groups such as senior civil servants.) Before January 1st, 2016 if insured patients received healthcare services at other facilities, they paid higher co-payment rates (30%, 50% or 60% at district, provincial, or central levels respectively instead of 20% at their health insurance registered facilities.) As of January 1st, 2016, insured patients can seek care at any health facility at the same level with no extra co-payment.

ethnic minority and poor patients were more likely than the general population to rate their health as poor or very poor. This could be a result of selection in who visits district hospitals: for the typical poor or ethnic minority patient living in a more remote area, travelling to a district hospital involves greater cost, and thus such patients are more likely to make the journey only when they have substantial illness or injury.

Figure 3.3.2: Percent of outpatients rating their health status bad or very bad on the day of visit to the facility
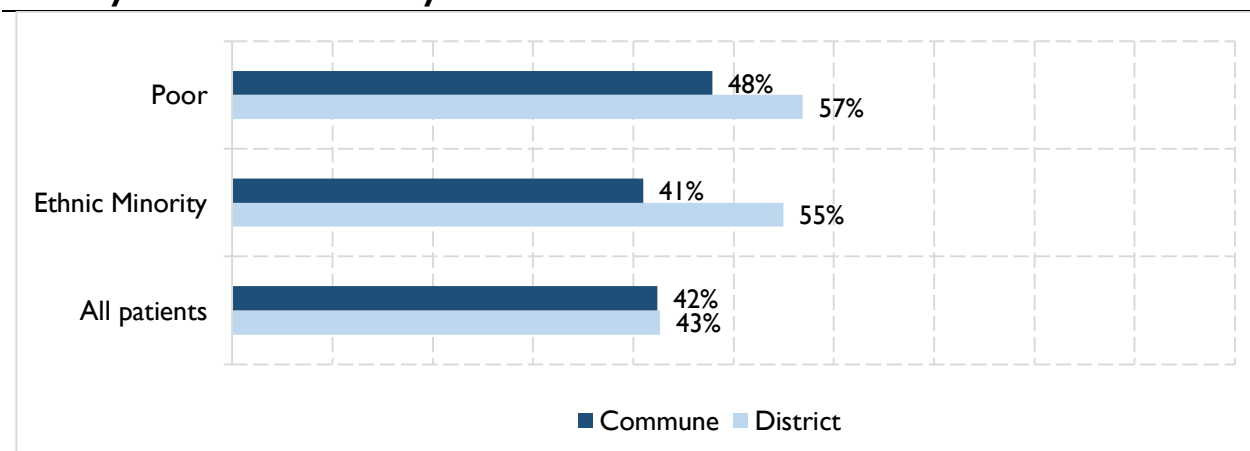
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: "commune" refers to commune health stations and "district" refers to district hospitals. This analysis is for outpatients at both district hospitals and commune health stations only because this data is not available for inpatients.

3.4. Experiences from Patients' Perspective

95.   **We consider several aspects of the patient experience: travel time, waiting time, consultation time, and whether doctors provided instructions to patients.** Each of these outcomes can vary as a consequence of a number of factors, but other things being equal a higher quality patient experience will have a shorter waiting time, a longer consultation time, and include provision of instruction to patients. (Travel time is not determined directly by the facility itself but is nonetheless included as an important element of the nonmonetary cost of seeking care.) This analysis considers only outpatients, in both district hospitals and commune health stations.

96.   **Mean patient travel times from home to commune health stations were 11 minutes, half that for district hospitals (considering only outpatients.)** Travel times were longest in Dien Bien and shortest in urban Hanoi. Similarly, for both commune health stations and district hospitals, travel times were substantially less for Kinh and Hoa people compared to ethnic minorities. Figure 4.4.1 shows a breakdown of the overall distribution of times. While nearly visitors to commune health facilities and most to district hospitals travel less

than 20 minutes a substantial share of district hospital patients travel more than 20 minutes. Very few travel more than an hour.

Table 3.4.1: Mean travel times from home to facilities for outpatients (in minutes)

	District Hospital	Commune Health Station
Dien Bien	32	15
Dak Lak	21	12
Binh Dinh	21	11
Dong Thap	25	12
Dong Nai	22	10
Rural Hanoi	19	9
Urban Hanoi	15	8
Ethnic Minority	36	16
Kinh & Hoa	21	11
Total	22	11

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

Figure 3.4.1: Distribution of travel times from home to facilities for outpatients (in minutes)
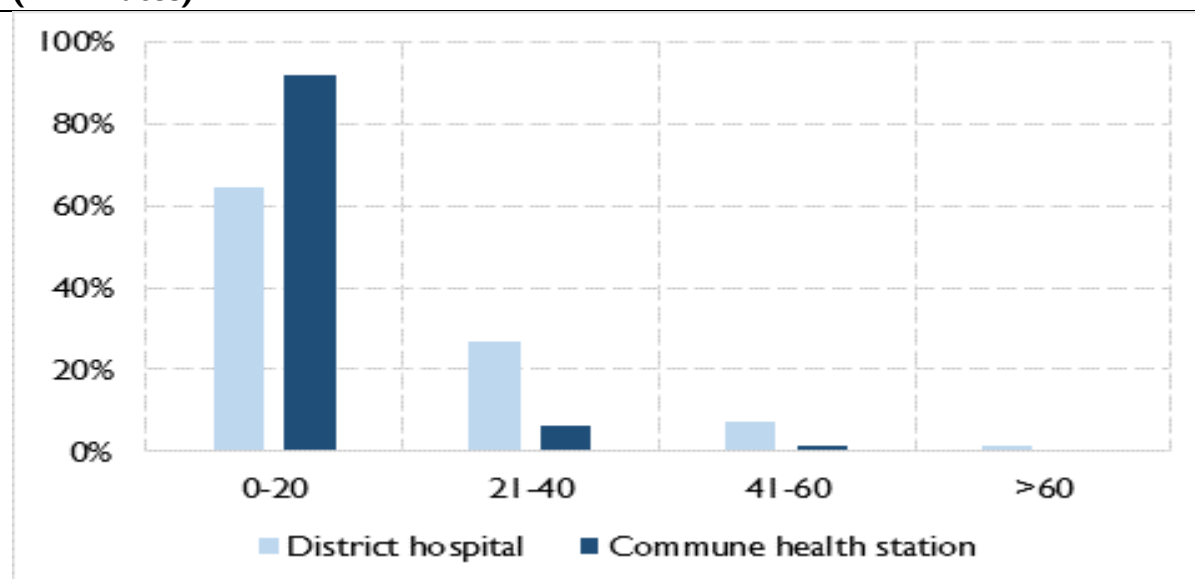
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

97. **At district hospitals, waiting times before receiving care show very little variation by patient wealth.** Across wealth quintiles, patients wait on average for 33 minutes before receiving care at district hospitals. At commune health stations, average waiting times are lower overall but with variation by wealth of the patient. Patients in the lowest wealth quintile face waiting times of 19 minutes on average, while those in the top quintile wait an average of 7

minutes (Figure 3.4.2). Further analysis shows that this not simply because poorer patients seek care at facilities with longer waiting times. There are small differences in waiting times by wealth within facilities. In a regression of waiting time on wealth index, controlling for facility using fixed effects, an increase of one standard deviation of the wealth index is associated with 3 minutes less waiting time (Table 3.4.2).[14]

Figure 3.4.2: Outpatients' average waiting time (minutes)
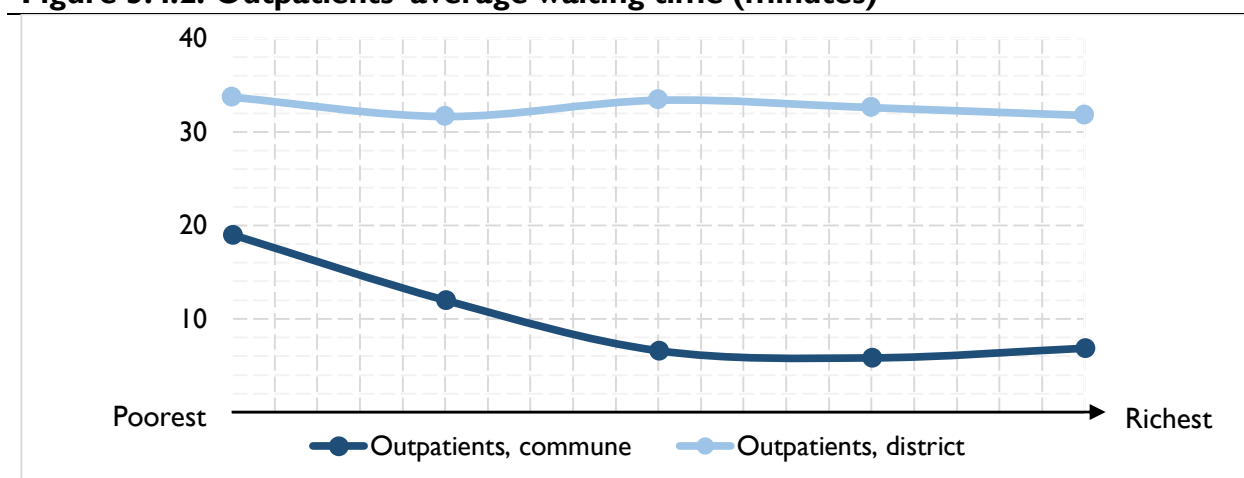
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: (i) "outpatients, district" refers to "outpatients at district hospitals", and "outpatients, commune" refers to "outpatients at commune hospitals". (ii) This analysis is based on outpatients' data only. Waiting time of inpatient data is not included in this figure.

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[14] The "poorest" and "richest" were defined as quintile 1 and quintile 5 determined by the wealth index of patients. This wealth index was developed using the principal component analysis method based on the patients' household assets (washing machine, (bath) water heater, computer, refrigerator, gas/magnetic cooker, cell phone, electric (rice/pressure) cooker, desk/chair/long bench/dressing table, motorbike, color TV.) The questionnaire designers selected these ten assets from the durable list of Vietnam Living Household Standard Survey (2014) that were most correlated to households' per capita total expenditure. In this regression analysis, wealth index was used under standardization form

Table 3.4.2: Regression of outpatient waiting time

Dependent variable: waiting time (in minutes)

Variable	(Without facility fixed effects)		(With facility fixed effects)	
	Coefficient	Standard error	Coefficient	Standard error
Have health insurance	-0.535	1.858	-0.036	1.829
Wealth index	-1.377***	0.457	-2.634***	0.485
Self-reported health status (base = normal)				
Bad or very bad	0.939	0.855	-0.310	0.840
Good or very good	-4.206	2.579	-5.178**	2.414
Ethnic Minority	3.351**	1.508	-0.063	2.003
Female	1.707**	0.838	0.598	0.774
Age	0.320***	0.056	0.384***	0.055
Age squared	-0.002***	0.001	-0.003***	0.001
Seeking care at district hospital (base: seeking care at commune health station)	22.490***	0.961		
Constant	2.249	2.103	19.170	1.992
Number of observation	6678		6678	
R-squared	0.087		0.290	

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

Note: (i) Significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$; (ii) This analysis is based on outpatients' data only.

98. **Consultation times are another rough measure of quality.** Table 3.4.3 presents results from a regression of consultation time on a variety of characteristics. Column 1 shows results from the basic specification, column 2 adds controls for facility fixed effects, and column 3 includes doctor fixed effects. Without facility or doctor controls, longer consultation times are observed for those without health insurance, those of higher wealth levels, those with worse self-rated health, ethnic minorities, and patients who are female and older. The results for wealth, ethnic group, and female are not statistically significant after controlling for facility, which suggests that on average women, ethnic minorities, and the wealthy are more likely to go to facilities where consultation times are longer. Even after controlling for facility, those with health insurance have shorter consultation times.

Table 3.4.3: Regression of outpatient consultation time

Dependent variable: consultation time (in minutes)

Variable	(Without fixed effects) Coefficient	Standard error	(With facility fixed effects) Coefficient	Standard error	(With doctor fixed effects) Coefficient	Standard error
Having health insurance	-1.352***	0.128	-0.730***	0.179	-0.673***	0.171
Wealth index[a]	0.753***	0.053	-0.035	0.047	-0.027	0.045
Self-reported health status (base = normal)						
Feeling bad/very bad	1.077***	0.099	0.405***	0.082	0.377***	0.078
Feeling good/very good	0.257	0.300	-0.754***	0.235	-0.620***	0.224
Ethnic Minority	1.762***	0.175	-0.207	0.195	0.002	0.188
Female	0.241**	0.097	0.105	0.075	0.061	0.072
Age	-0.044***	0.007	-0.016***	0.005	-0.001	0.006
Age squared	0.001***	0.000	0.000***	0.000	0.000***	0.000
Visiting district hospital (base: visiting commune health station)	-2.255***	0.112				
Constant	7.558***	0.247	5.607***	0.195	5.338***	0.197
Number of observation	6667		6667		6667	
R-squared	0.114		0.517		0.576	

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: (i) significance: *** p<0.01, ** p<0.05, * p<0.1. (ii) As consultation time is specific for outpatients only, this analysis was not performed for inpatients.

99.   **Next we examine the proportion of patients who received any tests during their health care visits as outpatients at district hospitals.** Inclusion of a test does not necessarily indicate higher quality of care. We would expect the frequency of testing to be similar across provinces, assuming a fairly homogenous profile of conditions. If that is the case, varying rates of testing may reflect both undertesting (failure to test when tests are called for) and overtesting (unnecessary testing.) The variation in testing rates is remarkable, both for testing overall and when specifically considering x-rays. At the low end, in Dong Thap just 17% percent of patients received any test, and 5% received an x-ray. At the high end, in rural Hanoi, 74% of patients received a test, and 31% received x-rays.

Figure 3.4.3: Percent of district hospital outpatients receiving any test or X-ray test
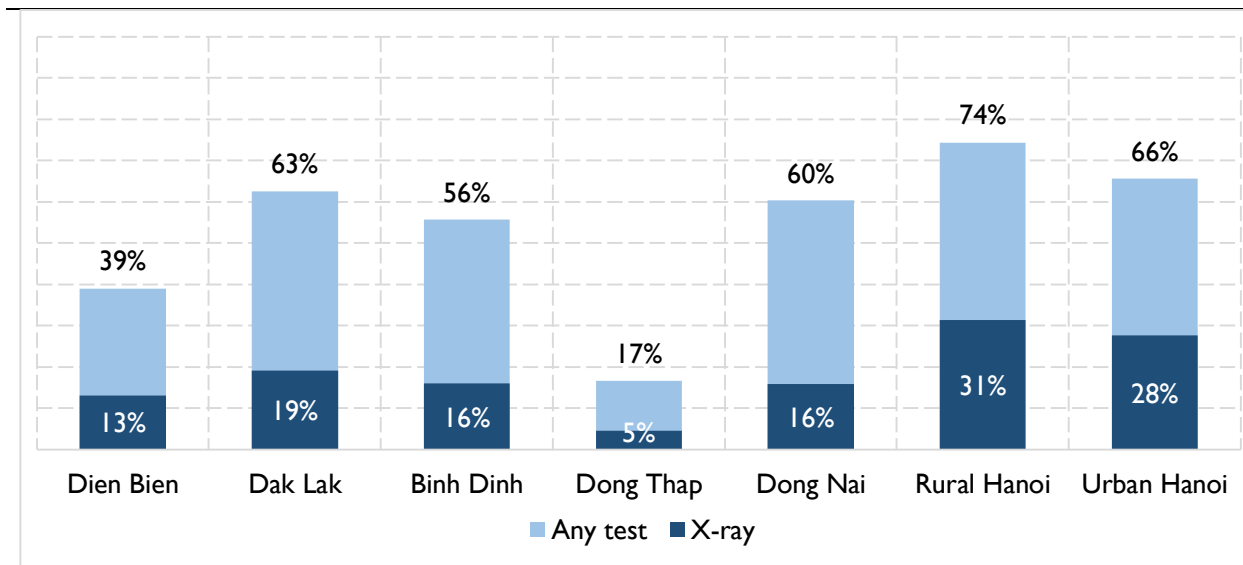
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: This analysis was performed for outpatients at district hospitals only. Commune health stations generally do not provide examination tests.

3.5. Experiences with health insurance

100.   **Nationally in Vietnam, 70% of individuals have health insurance.** Among patients in the survey, the fractions reporting that they used health insurance during their visit were higher—82% of commune health station outpatients, 93% of district hospital outpatients, and 88% of district hospital inpatients (Figure 3.5.1.) Slightly higher fractions of patients who are poor (and thus qualify for free insurance) reported using health insurance.[15]

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[15] The large majority of patients who report that they have health insurance report that they used it during their visit. Specifically, among those who have health insurance 99% of district hospital inpatients, 97% of district hospital outpatients, and 90% of commune health station outpatients reported *using* their insurance during their visit. It is unclear why a patient with health insurance might not use it during a visit. A patient with insurance but who had left his or her insurance card at home might pay non-insurance costs rather than the retrieve the card, particularly when visiting a commune health station, where fees are modest.

Figure 3.5.1: Percent of patients using health insurance
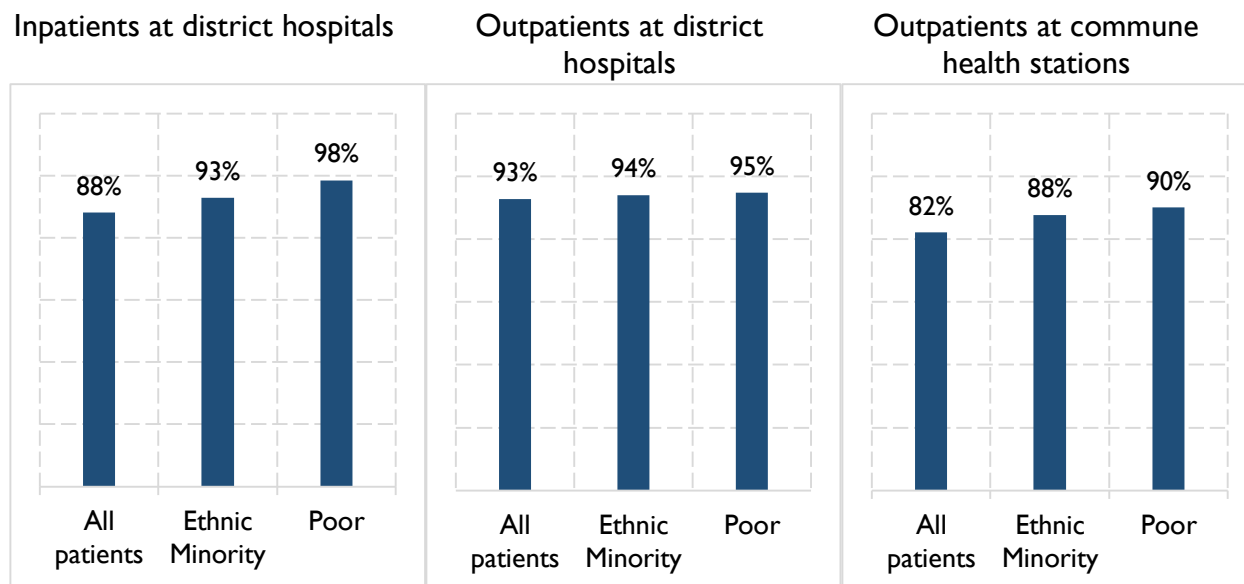
Inpatients at district hospitals	Outpatients at district hospitals	Outpatients at commune health stations

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: The "all patients" category includes all three populations of patients including (i) outpatients at commune health stations, (ii) outpatients at district hospitals, (iii) inpatients at district hospitals. The "poor patients" were individuals from poor households classified by local authority.

Figure 3.5.2: Percent of patients buying medicine outside the health facilities
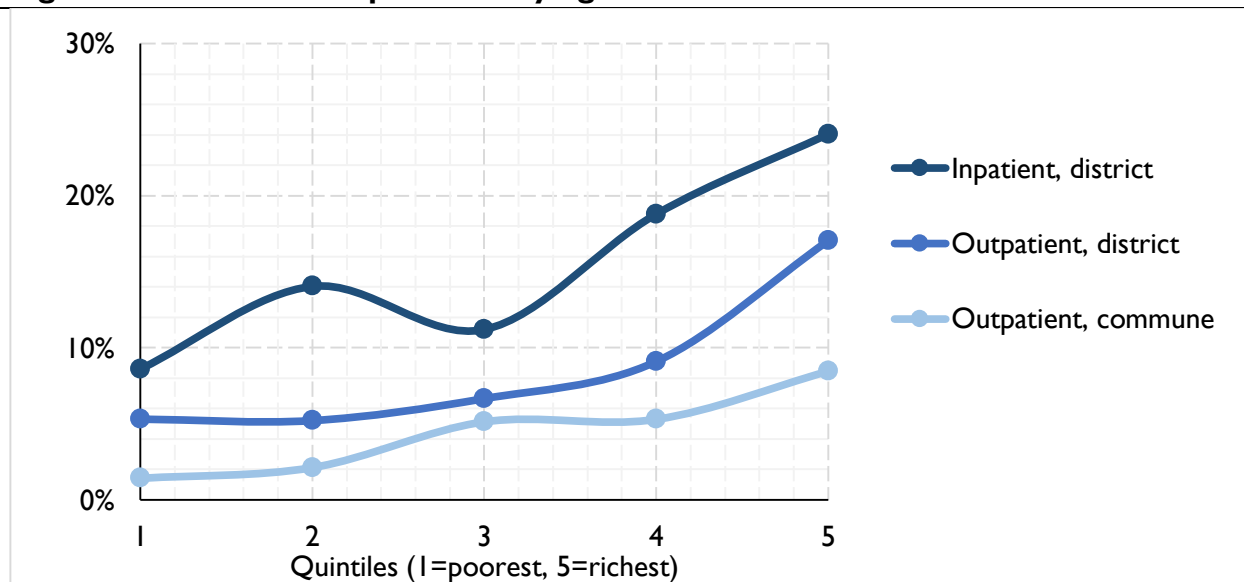
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: : "inpatients, district" refers to "inpatients at district hospitals", "outpatients, district" refers to "outpatients at district hospitals", and "outpatients, commune" refers to "outpatients at commune hospitals". This analysis was only performed for patients who used health insurance.

101.   **Next we consider the extent to which patients buy medicine outside the health facilities.** Purchase of medicine outside of facilities implies a higher cost for patients, because such medicines are generally not covered by health insurance. Inpatients are more likely

to buy medicines outside the hospital. This may reflect a greater tendency for inpatients to have more complicated conditions which require medicines not available at the hospital pharmacy. Across all three patient groups, wealthy patients are more likely to purchase medicines outside the hospital.

102.   **Survey participants who had purchased medicines outside the facility were asked why they had done so.** The most common reason was that the prescribed drug was not available in the facility for one of two reasons. In 49% of cases, patients responded that the medicine was not on the list of medicines covered by insurance, and in 15% of cases they indicated it was on the insurance list but out of stock (Table 3.5.1.)

Table 3.5.1: Reasons that inpatients at district hospitals bought medicines outside

	Percent
Medicine was not on the "health insurance medicine list"[a]	49%
Medicine was in "health insurance medicine list" but out of stock	15%
Patient didn't trust the quality of "health insurance medicine"	2%
Health workers requested patients to buy medicine outside without explanation	17%
Other	21%

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: this analysis was performed for district hospital inpatients who used health insurances for their stays and bought medicine outside. This data is not available for outpatients. The study inpatients can have multiple answers (among the above options) for the question "Why you bought medicines outside the facility?". (a) "health insurance medicine list" is referred to the medicines that covered by health insurance in the hospitals.

3.6. Health expenditure

103.   **Next we consider expenditure associated with facility visits.** Only information of health expenditure paid out-of-pocket by patients was collected in the survey. For all studied patients, total expenditures paid out-of-pocked consisted of three categories: (i) expenditure paid to facility, (ii) expenditure for medical services outside the facility, and (iii) gifts, food, travel costs, and lodging for the patient and relatives, other than costs paid directly to the facility.[16] Table 3.6.1 shows the mean expenditure of outpatients and inpatients (showing those with and without health insurance separately.) For outpatient care, expenditure at district hospitals were much higher than those at commune health stations. Patients with insurance paid much less out-of-pocket than those without insurance, but total out-of-pocket expenditures were still substantial for hospital inpatients with insurance (Figure 3.6.1.) Notably, the largest component of expenditure for inpatients with insurance was gifts, food, travel costs, and lodging.

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[16] Gifts include informal payments made to the doctor or health staff.

Table 3.6.1: Mean health expenditures by patient type and health insurance, in thousands of Vietnam dong

	Patients with health insurance	Patients without health insurance
Inpatients, district hospitals		
Expenditure paid to facility	206	1561
Medical expenditure for services outside the facility	48	25
Gifts, food, travel costs, and lodging	545	679
Total expenditure[2]	803	2285
Outpatients, district hospitals		
Expenditure paid to facility	12	157
Medical expenditure for services outside the facility	6	35
Gifts, food, travel costs, and lodging	16	33
Total expenditure[2]	33	226
Outpatients, commune health stations		
Expenditure paid to facility	1	34
Medical expenditure for services outside the facility	1	11
Gifts, food, travel costs, and lodging	2	3
Total expenditure[2]	4	48

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: (1) "health insurance patients" refers to the patients who owed and actually *used* the health insurances in their visits (for outpatients) or stays (for inpatients). For the patients who owed at least one health insurance but didn't use the health insurances in the visits/stays, they were considered as "*non* health insurance patients". (2) "Total expenditure" was the mean of summation of the expenditure components listed in the previous rows.

Figure 3.6.1: Average total out-of-pocket patient expenditures in thousands of Vietnam dong
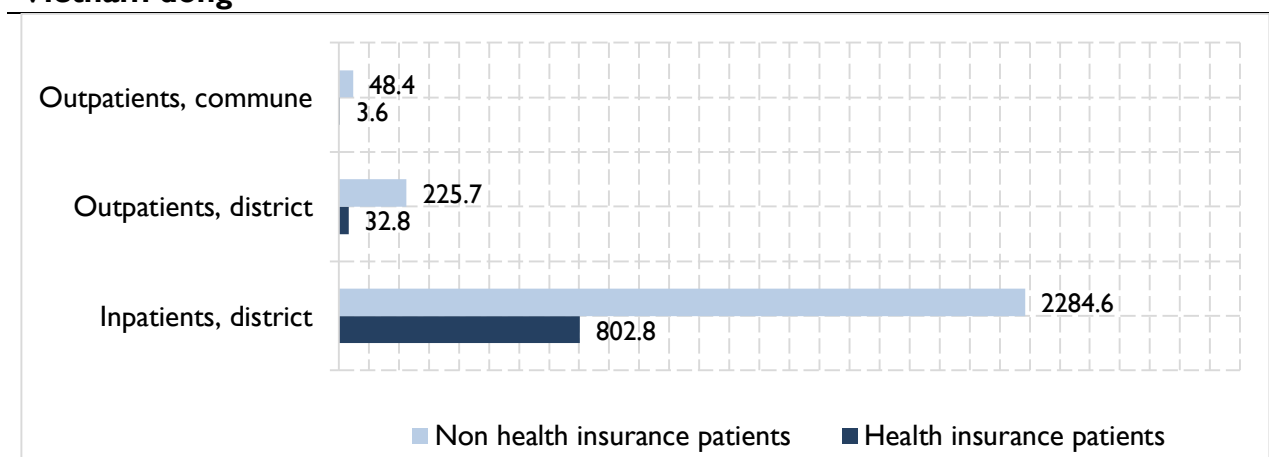
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: (i) "inpatients, district" refers to "inpatients at district hospitals", "outpatients, district" refers to "outpatients at district hospitals", and "outpatients, commune" refers to "outpatients at commune hospitals". (ii) "Health insurance patients" refers to the patients who owed and actually used the health insurances in their visits (for outpatients) or stays (for inpatients).

104.   **Outpatient total expenditure are highly varied across provinces.** Patients in the wealthiest province (urban Hanoi) both with and without insurance spent substantially more than patients elsewhere. The variation of total health expenditure was more notable among patients without health insurance. While commune health station outpatients in Dien Bien with insurance spent just 6000 VND on average, urban Hanoi patients spent almost 100,000 VND (Figure 3.6.2).

105.   **Among health insurance outpatients at both district hospitals and commune health stations, direct expenditure to facilities varied substantially across provinces.** The charges were very low at commune health stations but were substantial for inpatients at hospitals. Direct expenditures to facilities were highest in urban Hanoi for both inpatients and outpatients at hospitals. Notably, health insurance hospital outpatients in Dien Bien, one of three poorest provinces in the country, had to pay more than those in Binh Dinh, Dak Lak, and Dong Thap.

106.   **Next we consider medical expenditures to the facility for patients less than six years of age, who are registered at the visited facility.** Care should have been provided for free to such patients with presentation of their health insurance cards. Accordingly, medical expenditures to the facility of commune health station outpatients under 6 were low. Outside of rural Hanoi, average costs were less than 5,000 Vietnam dong. The same observation were also found for district hospital outpatients under 6 in Dong Nai, Dong Thap, Binh Dinh. The average expenditure to the facility for hospital outpatients in Dien Bien and Dak Lak was higher than in the three other southern provinces. District hospitals in both urban and rural areas of Hanoi charged patients under 6 the most (averaging 22,000 dong and 26,000 dong per patient.)

Figure 3.6.2: Patients' average total expenditures[a] (in thousand Vietnam dong) by provinces

Health insurance <u>inpatients</u> at district hospitals
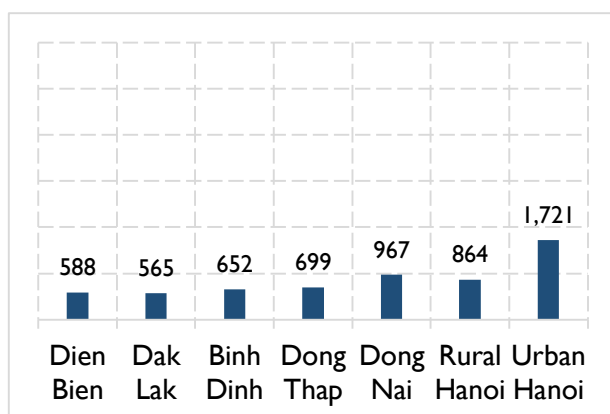
Non health insurance <u>inpatients</u> at district hospitals
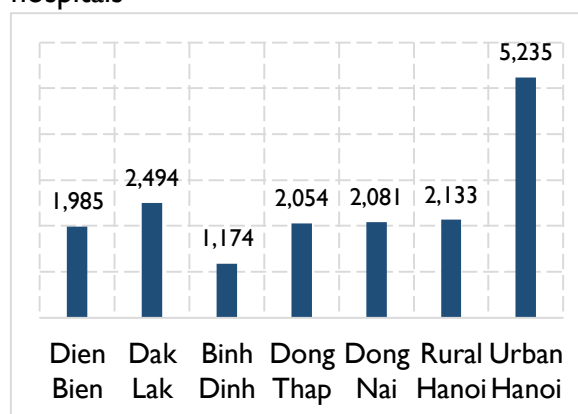
Health insurance <u>outpatients</u> at district hospitals
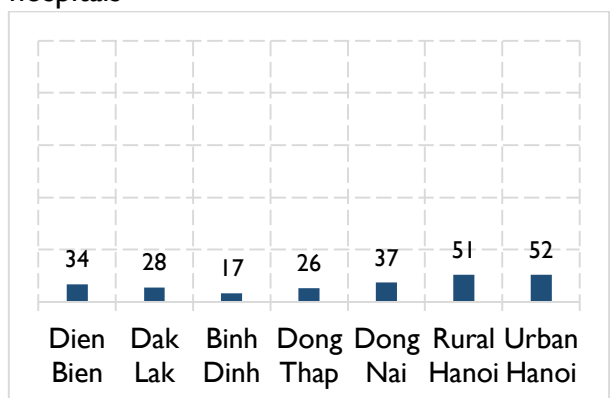
Non health insurance <u>outpatients</u> at district hospitals
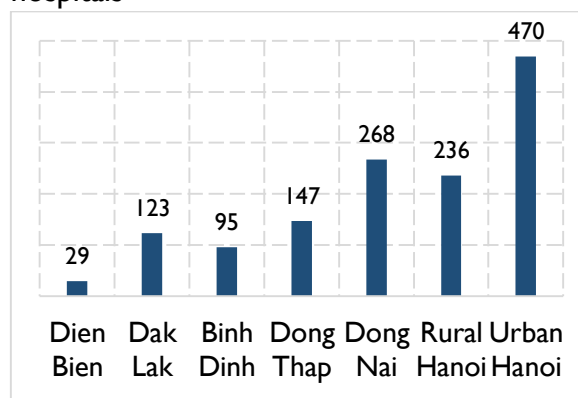
Health insurance <u>outpatients</u> at commune health stations
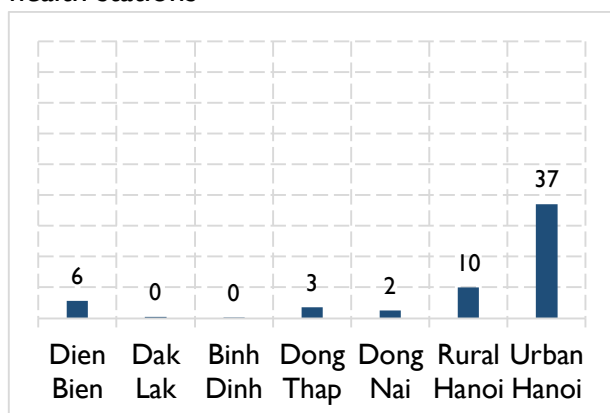
Non health insurance <u>outpatients</u> at commune health stations
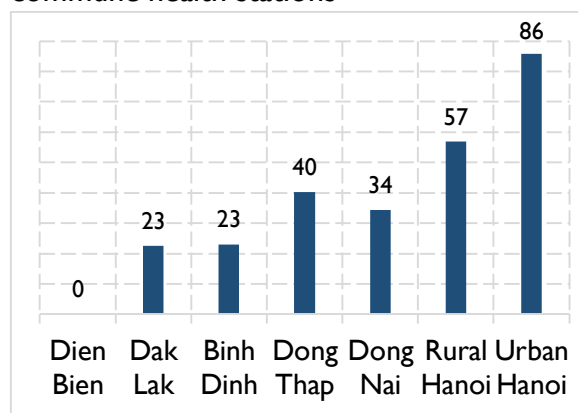
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: "Health insurance" patients refers to the patients who owed and used health insurance for their visit or stay.

Figure 3.6.3: Average medical expenditures to facility by patients with health insurance, by province

Inpatients at district hospitals
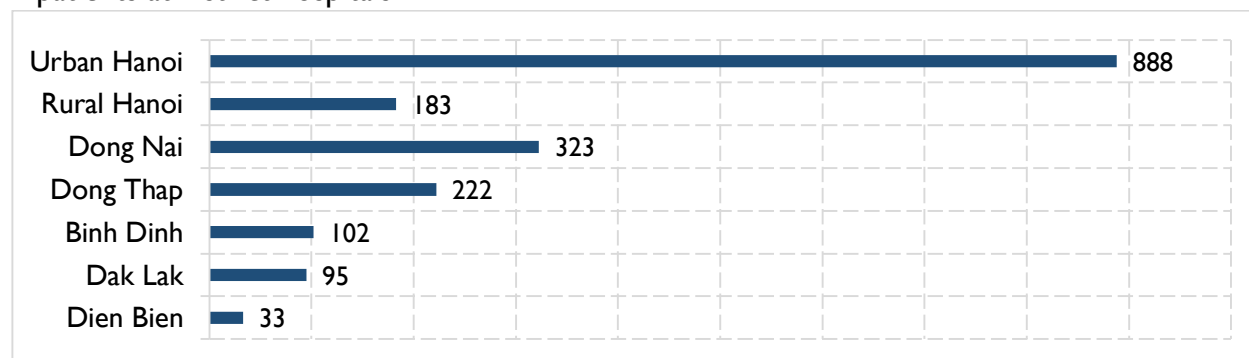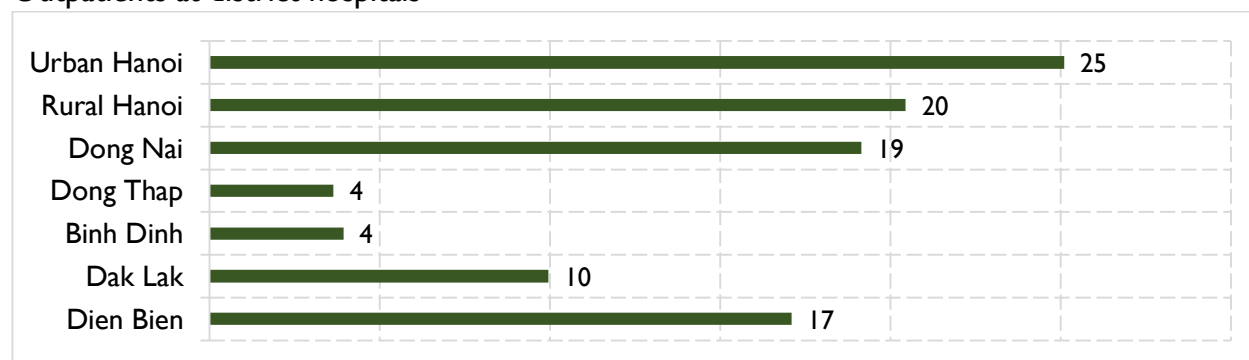
Province	Value
Urban Hanoi	888
Rural Hanoi	183
Dong Nai	323
Dong Thap	222
Binh Dinh	102
Dak Lak	95
Dien Bien	33

Outpatients at district hospitals

Province	Value
Urban Hanoi	25
Rural Hanoi	20
Dong Nai	19
Dong Thap	4
Binh Dinh	4
Dak Lak	10
Dien Bien	17

Outpatients at district hospitals

Province	Value
Urban Hanoi	1
Rural Hanoi	4
Dong Nai	1
Dong Thap	0
Binh Dinh	0
Dak Lak	0
Dien Bien	0
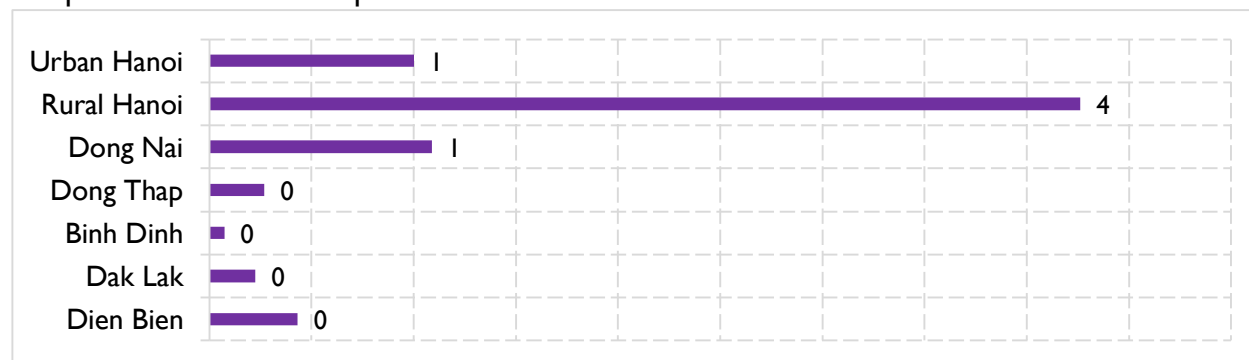
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: 'Medical expenditure to facility" is the expenditure that patients (inpatients at district hospitals, outpatients at district hospitals, outpatients at commune health stations) paid directly to the facilities. "Health insurance patients" refers to the patients who owed and actually used the health insurances in their visits (for outpatients) or stays (for inpatients). For the patients who owed at least one health insurance but didn't use the health insurances in the visits/stays, they were considered as "non health insurance" patients

Figure 3.6.4: Medical expenditure to facility of children under 6 by provinces (thousand Vietnam dong)

3.7. Are patients satisfied with healthcare services?

107. **Outpatients were also asked for their level of satisfaction with service received at the facility.** The fraction of patients answering that they were satisfied with their care were high (72% among hospital outpatients and 85% among commune health station outpatients.) Satisfaction rates were lower for district hospitals than for commune health stations in every province. Patients were the least satisfied at district hospitals in rural and urban Hanoi. Service satisfaction data is difficult to interpret because it reflects a combination of the care itself and the patient's perceptions and expectations. We can speculate that Hanoi district hospital patients may be less satisfied because they have higher expectations, driven by the availability of higher quality care at national and private hospitals in Hanoi.

Figure 3.7.1: Fraction of outpatients satisfied with health service during their visit
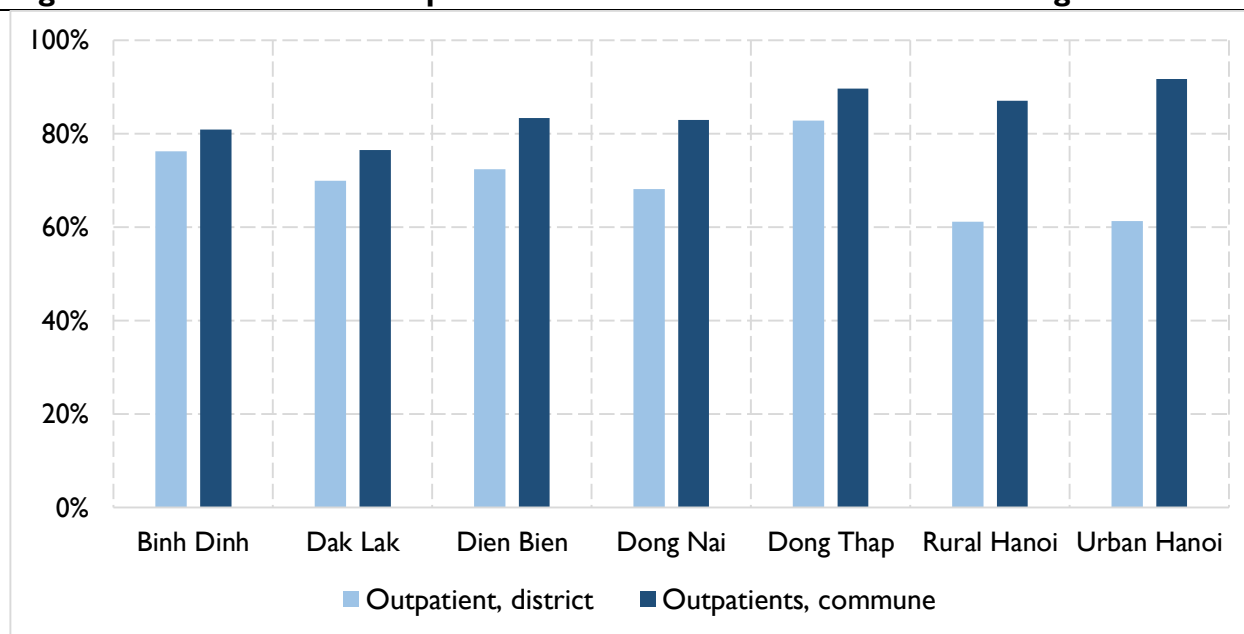
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

Note: "outpatients, district" refers to "outpatients at district hospitals", and "outpatients, commune" refers to "outpatients at commune hospitals". The analysis was not performed for inpatients at district hospitals and at commune health stations because the data is not available. For the patients' satisfaction, this indicator was estimated using the data from the question "are you satisfied with the services of the facility for this visit?". Among five scales of this question (from "very dissatisfied" to "very satisfied"), one patient was considered as "satisfied with the facility" if she answered "satisfied" or "very satisfied".

Chapter 4: How knowledgeable is your doctor? An assessment of doctor ability

In this chapter, we provide an assessment of the clinical knowledge of 1,010 healthcare providers using a series of structured medical vignettes covering five common outpatient conditions. We use item response theory (IRT) to score providers on their use of history questions, physical examinations, and diagnostic tests for each case. We directly evaluate diagnostic accuracy and the use of necessary, harmful, and unnecessary medications for each case. The IRT scores are compared against case management behaviors to understand how diagnostic knowledge and clinical management behaviors are related in practice.

We find large inequities in diagnostic knowledge across providers, with the top half of the diagnostic knowledge distribution completing substantially more of the appropriate history questions, physical exams, and diagnostic tests for each case. The median provider asked 4.0 questions during each vignette, while the top 20% of providers asked 5.8. Top providers are overwhelmingly concentrated in district facilities as opposed to communes, and significantly lower levels of knowledge are found in providers from minority ethnic groups and lower education levels. However, there are no systematic differences in knowledge by geographic location or local poverty rates once these provider characteristics are accounted for.

Correct diagnosis rates were above 75% for all cases at all levels of diagnostic knowledge, and providers with more knowledge were more likely to give the correct diagnosis in all cases but hypertension. Correct treatment was indicated in 52% to 97% of vignettes, depending on the case, once providers were given the necessary information, but were only significantly correlated with diagnostic knowledge in the diabetes case. The use of harmful treatment ranged from 9% to 68% depending on the case, and providers with higher knowledge of the recommended diagnostic procedures were more likely to give harmful treatments. The use of unnecessary treatments, by contrast, typically fell sharply as diagnostic knowledge increased.

Although we are unable to directly determine the link between knowledge of history questions, physical exams, and laboratory diagnostics and the quality of diagnosis or treatment due to the structure of the vignettes exercise, this survey demonstrates a great diversity of diagnostic knowledge throughout the health care system with real consequences. Even though they are much more likely to correctly diagnose any given case, highly knowledgeable providers are as likely as less knowledgeable providers to believe that harmful treatments are medically necessary. Therefore, we find on the one hand that increasing knowledge has a strong positive effect on the diagnostic actions a provider knows how to take and a small positive effect on the best case treatment, but on the other hand this knowledge is not linked to any reduction in the use of harmful treatments or excess testing.

4.1. Introduction

108.   **This chapter provides an assessment of doctors' knowledge, an important determinant of the quality of care provided at health facilities.** In this case, doctors are assessed on (a) their knowledge of clinical guidelines and standards of procedure in terms of history taking, physical examinations and laboratory tests, all of which are required to obtain essential information to diagnose conditions, (b) then their ability to process patient information from the guidelines to reach a correct diagnosis and (c) their knowledge of appropriate treatment of cases. The focus of this assessment is on what doctors know, which represents the best outcomes one can expect from doctors if they were to manage cases to the best of their knowledge. Key findings include the following:

4.2. Measuring doctor's ability

109.   **Doctors' knowledge is assessed using medical vignettes for five conditions selected to match the morbidity profile of Vietnam.** The five conditions are child diarrhea (acute diarrhea without dehydration), child pneumonia, tuberculosis, diabetes type II and hypertension category 1. For each of these, doctors were presented with specific symptoms from a carefully constructed script about a patient suffering from the condition (see Box 4.2.1) and then requested to provide the specific questions they would ask or actions they would take at various stages of the patient consultation process – namely history taking, physical examination, lab testing, diagnosis and treatment – in sequence. Answers to the relevant questions/actions from each stage are given to the doctors before they are asked to provide questions/actions for the next stage. The description of vignettes are provided in Table AD.1, Annex D. Such vignettes have been employed in several studies (see Peabody et.al. 2004 and Connor et.al. 2014) and found to be a good proxy of the quality of care (18; 19). However, it should be kept in mind that doctors knowledge is being measured, not what they actually do (see next chapter) and thus results from this chapter should be interpreted in this context as they may be biased towards overestimating the care doctors would provide (see Shah, et.al, 2010) (20). The vignettes were administered to 1010 doctors in total. Of these 749 were from district hospitals and the other 261 form commune health centers. A maximum of 10 doctors were randomly selected for the administration of the medical vignettes from a roster of doctors at district hospitals and 1-2 doctors/assistant doctors at health commune facilities.

110.   **Doctors' performance was evaluated using their responses to the medical vignettes, comparing them to the set of clinical guidelines for the management of these cases in Vietnam.** The clinical guidelines outline a set of essential history questions, physical examinations, mandatory laboratory tests and protocols for treatment that doctors should follow when dealing with a patient suffering from each of the five conditions. A score of 1 if recorded, for each item (i.e. history question, physical examination, test or recommended drugs) in the clinical guidelines that a doctor proposed, otherwise a zero is recorded. Thus doctors were assessed on whether they would ask or perform these essential questions or

actions, request mandatory laboratory tests, prescribe the correct treatment and whether given all the essential information, they could correctly diagnosed the condition.

Box 4.2.1. Medical Vignettes

Acute diarrhea without dehydration: The mother of a 15-month old child takes the infant to the clinic as her child has had diarrhea for two days and the condition does not go away after the child took medicine at home.

Child pneumonia: A 3.5-year child has cough and fever for three days and has been given medicines bought from a private drugstore but did not get better. The mother takes him in for examination and care.

Tuberculosis: A 37-year old male patient, with sporadic cough and fever for the last three weeks, fatigue and weight loss, came in for check-up. The patient said that sometimes he had mild fever during the day.

Diabetes (Type 2): A 58-years woman has signs of fast weight loss recently (3kg loss within 2 months) and frequently feel energy-less hungry despite eating more than normal. She doesn't know why, so she came for a check-up.

Hypertension (Category 1): A 65-year male patient, who sometimes has headache and burning face, came to your clinic for check-ups.

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111.   **An aggregate indicator of doctors' ability was generated using item response theory (IRT) to produce a ranking or distribution of doctors by levels of ability.** The IRT methodology uses maximum likelihood methodology to estimate the underlying "ability score" of providers based on their performance during the medical vignettes exercise. This score reduces the history questions and examinations behavior to a single metric that is comparable across providers. It quantifies their propensity to ask the history questions and perform the physical examinations that were graded as minimum or essential by the expert committee.

112.   **IRT also assesses the characteristics of each of the essential behaviors themselves.** Each item receives three estimated parameters that together shape the "estimated response curve", or the way in which average performance on a particular item improves with ability. The first parameter is the item's discrimination power, which is its ability to distinguish between high ability providers and low ability providers (questions or actions that high ability doctors are likely to ask or take but which low ability doctors are unlikely to). The second parameter is the difficulty of the question, or the ability level at which the item is usually mastered. The third parameter is the guessing rate, or the expected probability of correct behavior for an individual of the lowest ability level. Combining these parameters with the providers' actual behaviors on the items allows for a reliable estimate of their underlying ability levels with respect to the vignettes questioning and examination.

113.   **The composite indicator of ability necessarily correlates with the number of questions and exams correctly performed, but it is not guaranteed to predict the diagnostic accuracy or treatment quality of the providers**. The structure of the vignettes makes it hard to draw a link between the questioning and the diagnosis or treatment outcomes. All doctors were only provided with the same information prior to being asked to provide a diagnosis, since at that point, only the key history and physical examination information and key

test results contained in the vignette was provided regardless of whether they asked more or less questions and tests at each stage. Thus the measured indicator or ability should have no correlation with the diagnostic accuracy, as in the vignette setting, a high-ability provider does not necessarily have more information than a lower-ability provider would have at the diagnosis and the treatment stages. Any differences in diagnosis or treatment may only serve to reflect the inability of low ability doctors to even make sense of the basic information provided to them. Otherwise because of the structure of the vignette, it is not possible to look at the entire link from checklist to diagnosis to treatment as in Das and Hammer (2007). In fact, each of these vignettes can be conceptually treated as different cases, although the basic information and examination can be put together in the checklist to create a composite score as we do.

4.3. Main findings

114.   **Doctors are generally able to interpret information generated from clinical guidelines and reach a correct diagnosis, but their knowledge of these guidelines is limited.** Most doctors can give an accurate diagnosis once they have the necessary patient history and physical examination information typically generated from following clinical guidelines. Four of the five cases tested in this study were each correctly diagnosed by more than 70 percent of doctors after they were presented with essential patient history and physical examination information (see Table 4.3.1). The exception was acute diarrhea, which an overwhelming majority of doctors (81 percent) could only partially correctly diagnose. Many diagnosed the case as "acute diarrhea, level A dehydration" (as per the outdated guidelines) or "acute diarrhea" instead of acute diarrhea without dehydration in accordance to the revised guidelines in Decision no. 4121 of Ministry of Health. Overall, close to half (48 percent) of the doctors accurately diagnosed 4 of the 5 cases each and a third correctly diagnosed 3 of the 5 cases. Close to 90 percent of the doctors either correctly or partially correctly diagnosed 4 of the 5 cases presented to them. Thus doctors are highly likely to correctly diagnose cases if clinical guidelines are followed to obtain relevant information.

Table 4.3.1: Diagnostic accuracy by condition

Figure 4.3.1. Distribution of doctors by number of cases correctly diagnosed
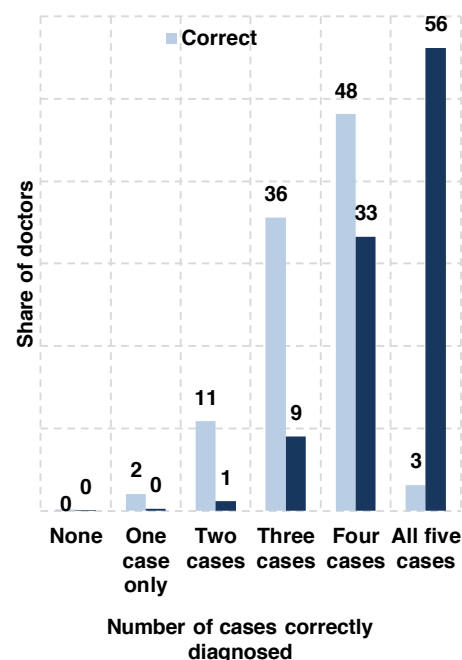
		Diagnosis Accuracy			
Condition	Statistic	Partial or full Correct	Partially Correct	Fully correct	Incorrect
Child Diarrhea	Share (%)	88	81	6	12
Child Pneumonia	Share (%)	97	2	95	3
Tuberculosis	Share (%)	92	2	90	9
Diabetes Type II	Share (%)	86	14	72	14
Hypertension Category I	Share (%)	81	6	75	19

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: the shares were calculated for the sample of 1,010 doctors.

115.   **The challenge for doctors was in their low knowledge of the right history questions to ask and physical examinations to do in accordance to the clinical guidelines.** On average, doctors asked less than half of the essential history questions in each of the 5 cases presented to them. Only for acute diarrhea (58 %) and hypertension (50%) did doctors ask at least 50 percent of the necessary physical examinations on average. In this respect knowledge of clinical guidelines (SoPs) is modest (see Figure and Figure 4.3.3).

Figure 4.3.2. Median number of history questions asked by condition
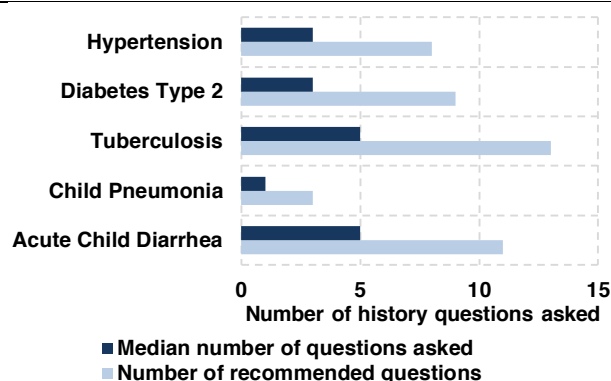
Figure 4.3.3. Median number of physical examination actions by condition
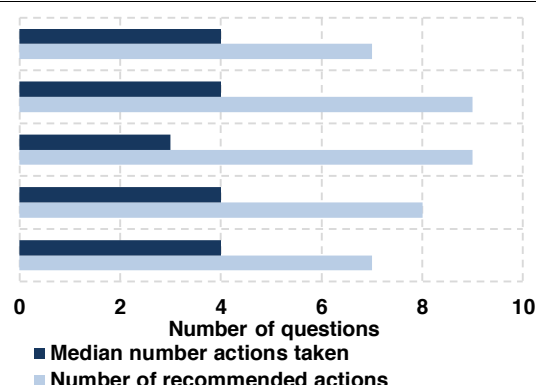
116.   **Indeed, the variation in the knowledge of the clinical guidelines on history questions and physical examinations between low ability doctors and high ability doctors was high (Figure 4.3.4).** To give an example, the top 20 percent ability doctors on average asked between 7 (for Child Pneumonia) and 12 necessary questions per case, compared to an average ranging from 3 to 6 questions for the bottom 20 percent. The gap between high ability and low ability doctors was wider on physical examinations where doctors in the highest ability quintile asked more than twice as many necessary physical examination questions when compared to doctors in the ability lowest quintile.

Figure 4.3.4. Number of history question and physical examinations asked by doctors ability

Questions and Exams per Vignette, by IRT Ability Score
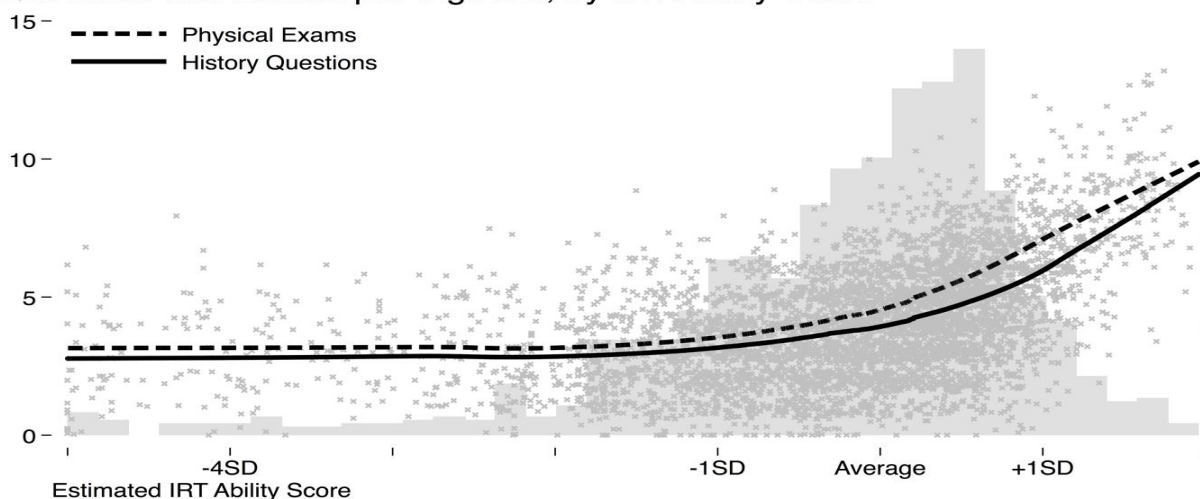
117.   **Knowledge of proper treatment of cases is a challenge, even when the diagnosis is known.** A plurality of doctors could only propose full treatment for just one or two of the five cases after being presented with both the diagnosis and other essential patient information about the case. A significant number also offered harmful treatment (see Figure 4.3.5). Just 2 percent and 4 percent of doctors proposed full treatment for diabetes type II and hypertension category one – the two cases where doctors were much more likely to prescribe partially correct treatment (63 and 73 percent respectively) and also prescribe harmful treatment (Table 4.3.2). Most doctors proposed harmful treatment for diabetes type II by prescribing a combination of two anti-hyperglycemic medicines and by prescribing two antihypertensive medicines for hypertension category 1. Knowledge of proper treatment was very low for child pneumonia for which only 52 percent proposed any correct treatment, be it full or partial, despite child pneumonia being correctly diagnosed by 95 percent of the doctors. Nearly all doctors prescribed ORS for diarrhea, but a quarter of them offered harmful treatment by prescribing antibiotics. Overall, most doctors could only prescribe fully treatment for just child diarrhea (58 percent) or child diarrhea and TB (58 percent). None of the doctors offered full treatment in all five cases.

Table 4.3.2: Share of doctors prescribing treatment by condition and treatment suitability

Condition	Statistic	Any correct	..of which		Any harmful	Any other
			Partly correct	Fully correct		
Child Diarrhea	Share (%)	96.7	0.1	96.6	25.5	69.7
Child Pneumonia	Share (%)	52.2	35.6	16.5	7.9	18.9
Tuberculosis	Share (%)	61.8	-	61.8	4.0	2.8
Diabetes Type II	Share (%)	65.4	63.4	2.1	28.7	1.9
Hypertension Category I	Share (%)	78.2	73.4	4.8	30.1	11.6

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: the shares were calculated with the whole sample of 1,010 doctors.

118.   **Even high ability doctors also proposed harmful treatment.** For example, nearly a third of doctors in the highest ability quintile proposed harmful treatment for diabetes type II and hypertension category I while more than 20 percent of these top ability doctors also offered antibiotics for child diarrhea. No statistically significant difference in prescription of harmful treatment is observed between low and high ability doctors in all cases, suggesting the understanding of clinical guidelines on treatment is a challenge faced by doctors at all levels of ability.

Figure 4.3.5. Distribution of doctors by number of cases correct or harmful treatment is prescribed
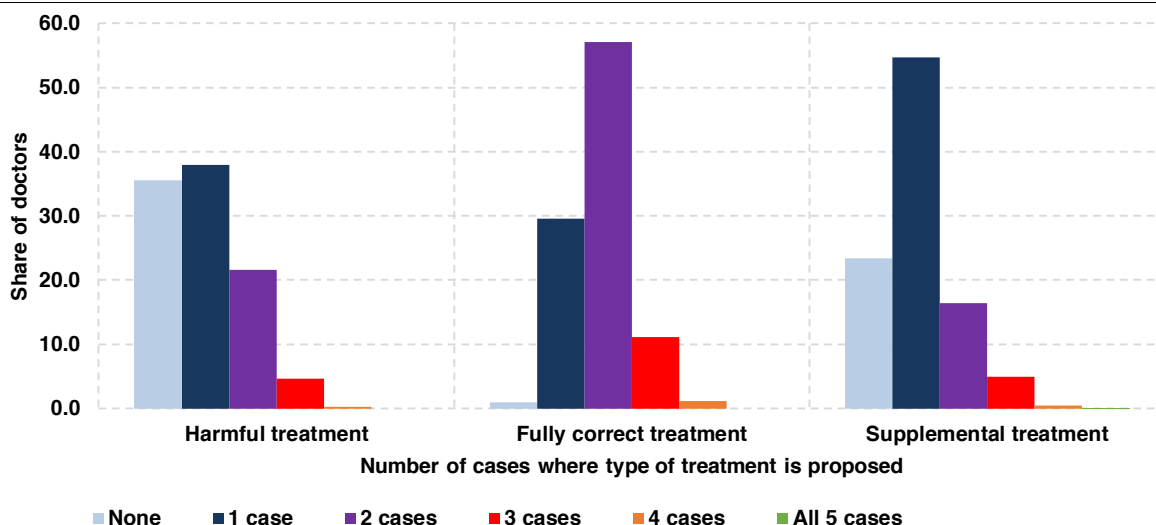
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

119.   **Doctors rely excessively on tests.** Just 6 percent and 3 percent of doctor's correctly indicated that no test would be required for child diarrhea and child pneumonia respectively if even though tests are not required to reach a correct diagnosis of these conditions. Instead, most doctors (around 95 percent) recommended optional tests in each of these cases (see Table 4.3.3), with a median of 3 tests being recommended for child diarrhea and 2 tests for child pneumonia. Doctors recommended more tests for TB (average of 4 tests), diabetes type II (5 tests) and hypertension (5 tests, see Figure 4.3.6). The mandatory tests for TB (at least one of AfB, TB culture or straight/side cardiopulmonary X-ray) were recommended by nearly everyone (98 percent of doctors). Of these, the Straight X ray was the easiest or most common, with almost all doctors in district hospitals likely to request it, followed by Afb test, whose likelihood of being asked was greater than 80 percent even among low ability doctors and equally likely to be requested in both district and commune facilities. No one requested for a TB culture test. About 90 percent of the doctors recommended a blood glucose test for the case of diabetes type II, mainly in additional to other optional tests. However, only 64 percent of doctors recommended at least 3 of the mandatory tests for hypertension, even though doctors recommended more than 5 tests for this case on average.

Table 4.3.3: Share of doctors recommending tests by condition and importance of tests

Condition	Statistic	Share requesting category of tests		
		Mandatory	Optional	Other
Child Diarrhea	Share (%)	6[a]	94	57
Child Pneumonia	Share (%)	4[a]	95	36
Tuberculosis	Share (%)	98	82	32
Diabetes Type II	Share (%)	90	92	47
Hypertension Category I	Share (%)	64	74	25

Figure 4.3.6. Average number of tests requested by condition
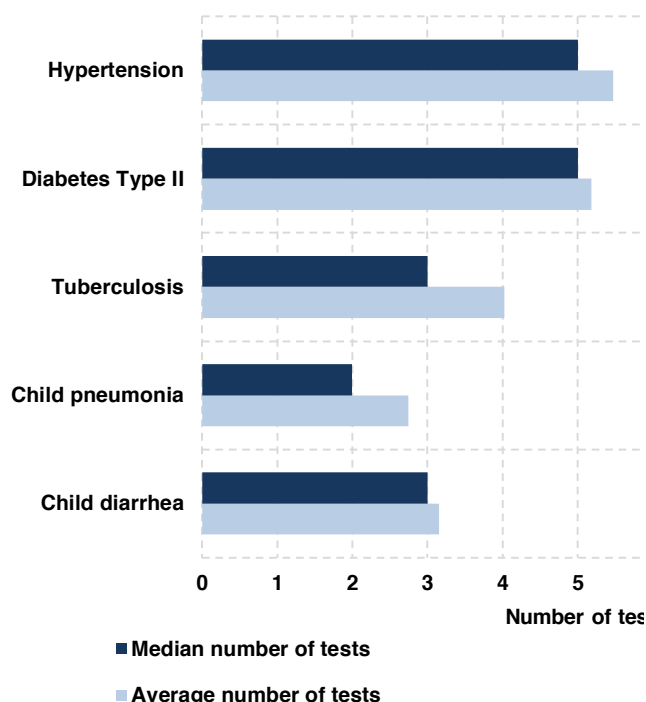
■ Median number of tests
■ Average number of tests

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Notes: The shares were calculated with the whole sample size of 1,010 doctors. (a) No mandatory tests required for Child Diarrhea and Child Pneumonia.

120. **Doctors in district hospitals were more likely to ask for mandatory tests than commune doctors at all levels of the ability scales, except at the very top ability levels.** At all ability levels, doctors in district hospitals favored requesting for a complete blood count test, whether it is essential or not. At least 88 percent of doctors in district hospitals asked for this test in the cases of child diarrhea (91 percent), child pneumonia (94 percent) and TB (89 percent), while close to half requested for the test in the cases of diabetes (45 percent) and hypertension (49 percent). For these last two cases, district hospitals – especially at high ability levels - were more likely to use a blood lipids tests, which were rarely requested by commune health centers doctors, especially those at the low ability scale.

121. **Low ability doctors have limited knowledge of diagnosis and management of chronic conditions, beginning from low knowledge of recommended guidelines form history and physical examinations and how to interpret obtained information.** Besides checking for vital signs, high ability doctors were more likely to ask or undertake essential history questions or physical examinations, particularly for diabetes type II. Figure 4.3.1 shows other history questions or physical examinations (other that vital signs), that distinguished low and high ability workers. The difference between the shares of low and high ability asking these questions were relatively smaller (even though still significant) for the two child illness conditions when compared to the other three cases. The largest differences were observed on diabetes type II. In

90

this case, high ability doctors were much more likely to ask for an assessment of the patient's weight and height, check for numbness in limps and ask for the history of diabetes in the patient's family. Less than 10 percent of doctors in the lowest ability quintile for asked the first 3 of these questions, compared to at least 55 percent in the highest ability quintile who did. In contrast, the discriminating essential physical examination for diarrhea included observation of sunken eyes and asking about the child's vomiting, which respectively, 45 percent and nearly 40 percent of doctors in the lowest ability quintile asked.

Figure 4.3.1. Share of doctors asking questions by doctors' ability level
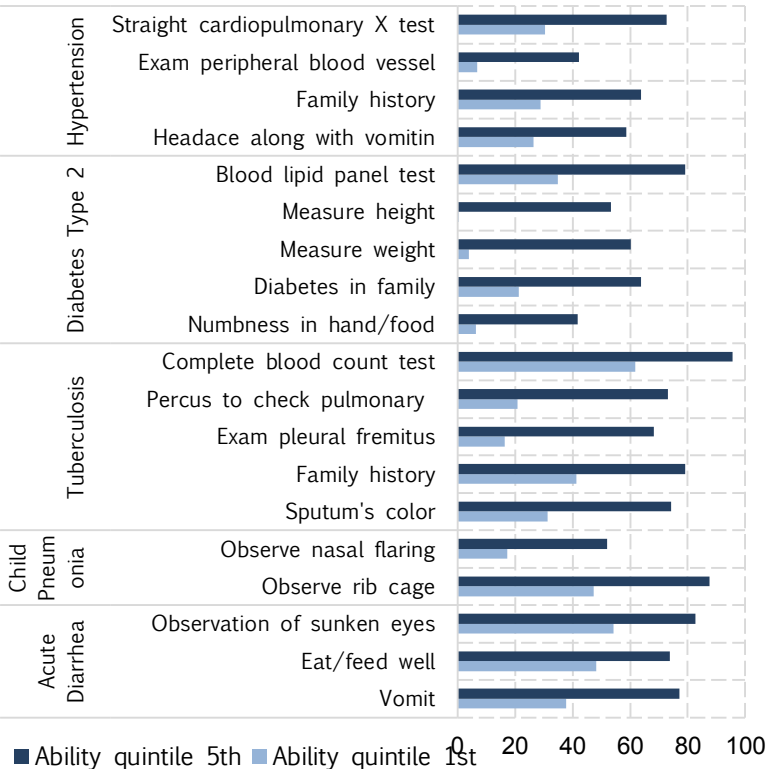
Figure 4.3.2. Diagnostic accuracy by doctors' ability levels
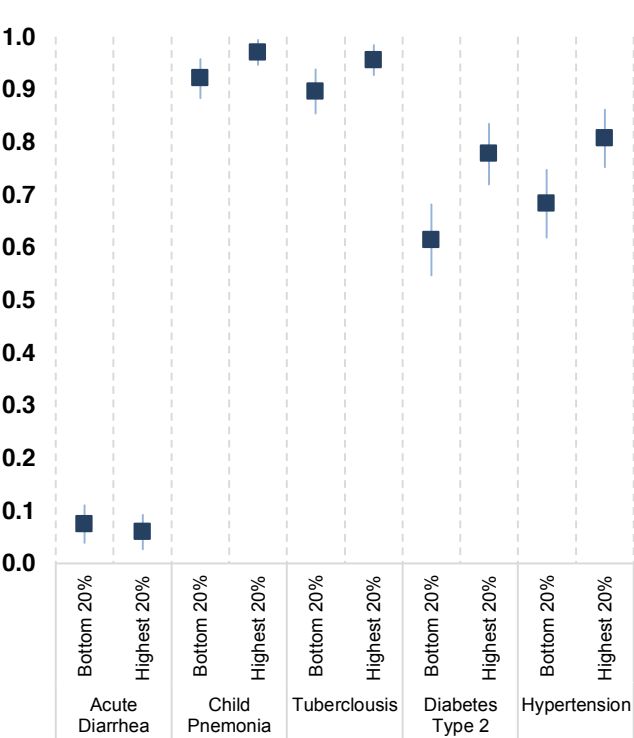
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Notes: 95% confidence intervals shown.

122.   **Lower ability doctors were also significantly less likely to correctly diagnose cases of diabetes type II and hypertension, even with the knowledge of the relevant patient history, physical examination and test results (Figure 4.3.2).** Thus high ability workers both knew the recommended questions and actions to ask and were able to process this information to reach a correct diagnosis when compared to low ability doctors. In addition, a significantly larger share of high ability doctors (90 percent among the top ability quintile) recommended at least 3 of the 8 mandatory tests for hypertension compared to low ability doctors (only 38 percent among the low ability quintile). Likewise, a statistically significant difference in the likelihood recommending the mandatory test for diabetes type II was also observed between low and high ability doctors (77 percent of doctors in the bottom quintile

compared to 98 percent of those in the top quintile). Even the optional tests for these conditions were more known to high ability doctors.

123. **In fact, diabetes type II and hypertension are the only two cases where the likelihood of correct diagnosis significantly increased with doctors' ability.** However, once aware of the diagnosis, no statistically significant differences are observed in the treatment offered by low and high ability workers. It seems the most difficult aspect for low ability workers in terms of managing the two chronic conditions is low knowledge of clinical guidelines for history taking and physical examination for these cases and interpreting the information that following these guidelines reveals in order to reach a correct diagnosis.

124. **There are significant differences in doctors' ability between commune and district hospitals and between poor and well to do areas. There are proportionately more high ability doctors in district hospitals than in commune health centers (see 4.3.9).** Estimated ability for three in every five doctors in commune health centers was below the national median, and only 7 percent of doctors working in commune health centers were among the top 20 percent in terms of ability. The share of recommended history and physical examination questions by doctors in commune health facility is statistically significantly and consistently lower than the share of questions asked by doctors in district hospitals (Figure 4.3.10). Knowledge of clinical guidelines for patient

Figure 4.3.9. Probability of being in a district hospital by doctors ability level
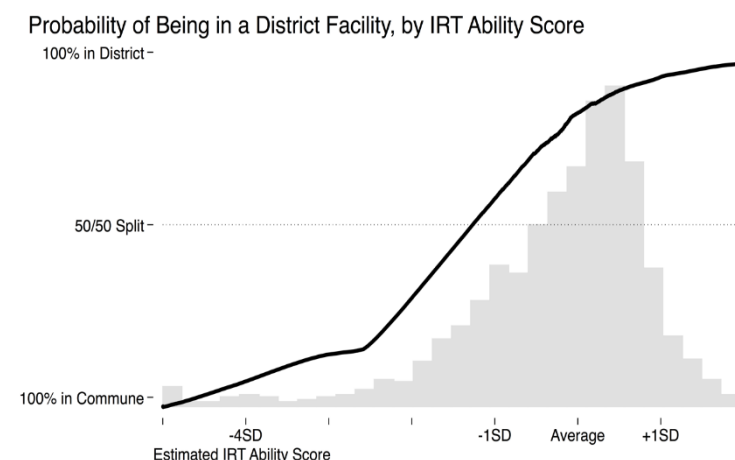
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

consultations for these cases is not only lower for the chronic conditions, but for child illnesses which they are routinely expected to manage at that level too.

125. **While some differences in treatment are observed, no statistically significant differences between doctors in commune and district facilities are observed when it comes to providing correct diagnosis once the key history and physical examination information is provided to the doctors.** The diagnosis of diabetes type II is the only exception (Table 4.3.4). In all other cases, commune health facilities doctors were equally likely to reach a correct diagnosis as doctors in district hospitals. However, 69 percent of doctors in district hospitals prescribed some correct treatment for diabetes type II compared to 54 percent of doctors in commune health centers. district hospitals doctors were also less likely to offer harmful treatment for TB (by 4 percentage points) but they were more likely to prescribe harmful

treatment for acute diarrhea (9.1 percentage points difference) and hypertension category 1 (6.4 percentage points higher) than doctors in commune health centers.

Figure 4.3.10. Share of recommended history and physical examinations by doctors' facility type
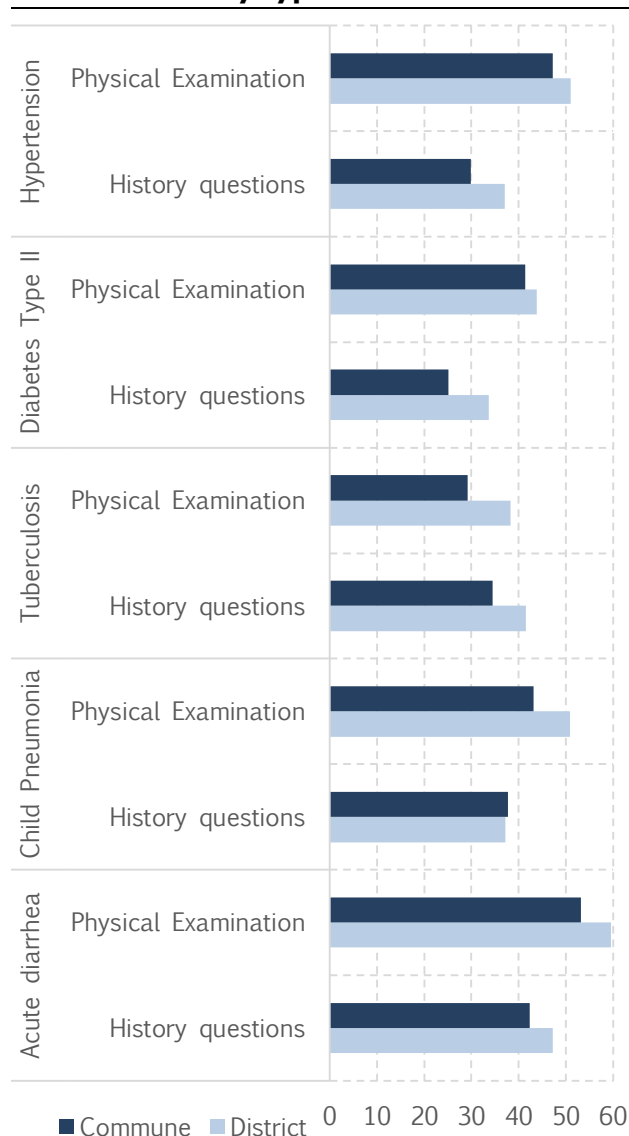
Table 4.3.4: Diagnostic accuracy by doctors' facility type

Condition	Variable	Facility type		
		district hospital[a]	CHC[b]	Difference[c]
Acute Diarrhea	Correct diagnosis	5.9	7.3	-1.4
	Any correct treatment	96.9	96.2	0.8
	Any harmful treatment	27.9	18.8	9.1***
Child Pneumonia	Correct diagnosis	95.5	93.9	1.6
	Any correct treatment	52.2	52.1	0.1
	Any harmful treatment	8.3	6.9	1.4
Tuberculosis	Correct diagnosis	90.4	88.5	1.9
	Any correct treatment	62.1	60.9	1.2
	Any harmful treatment	2.9	6.9	-4.0**
Diabetes Type 2	Correct diagnosis	74.2	66.3	8.0**
	Any correct treatment	69.4	54.0	15.4***
	Any harmful treatment	28.8	28.4	0.5
Hypertension	Correct diagnosis	75.8	74.3	1.5
	Any correct treatment	77.7	79.7	-2.0
	Any harmful treatment	31.5	26.1	5.5*

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Notes: (a) district hospital –district Hospital (b) CHC –commune Health Center, (c) *- p-value < 0.1; **-p-value < 0.05; ***-p-value < 0.01.

126.   **Poor areas are served with relatively more low ability workers than well to do areas, as evidenced by the disproportionate share of doctors working in the poorest 40 percent areas who are at the bottom of the ability distribution (Figure 4.3.11).** For instance, nearly half (47 percent) of doctors working in areas in the poorest poverty quintile are

in the bottom 40 percent of the national ability scale, compared to only 37 percent of doctors working in the richest 20 percent areas. Compared to doctors in the richest 20 percent areas, those working in the poorest areas (highest poverty quintile) were 12 percentage points less likely to correctly diagnose diabetes type II, even with test results and patient history and physical examination information provided to them, but no statistically significant differences in diagnostic accuracy of other conditions is found (Figure 4.3.12a). Only 44 percent of them prescribed any correct treatment for TB, compared to 70 percent of doctors in the richest 20 percent areas (see Figure 4.3.12b). However doctors in poor arears were most likely to prescribe a correct treatment of child pneumonia (about 60 percent of doctors in the poorest 20 percent) than doctors in the richest 20 percent areas (45 percent). Doctors in poor and well off areas were statistically equally likely to prescribe harmful treatment for all conditions however.

Figure 4.3.11. Comparison of distribution of doctors ability by poverty quintile
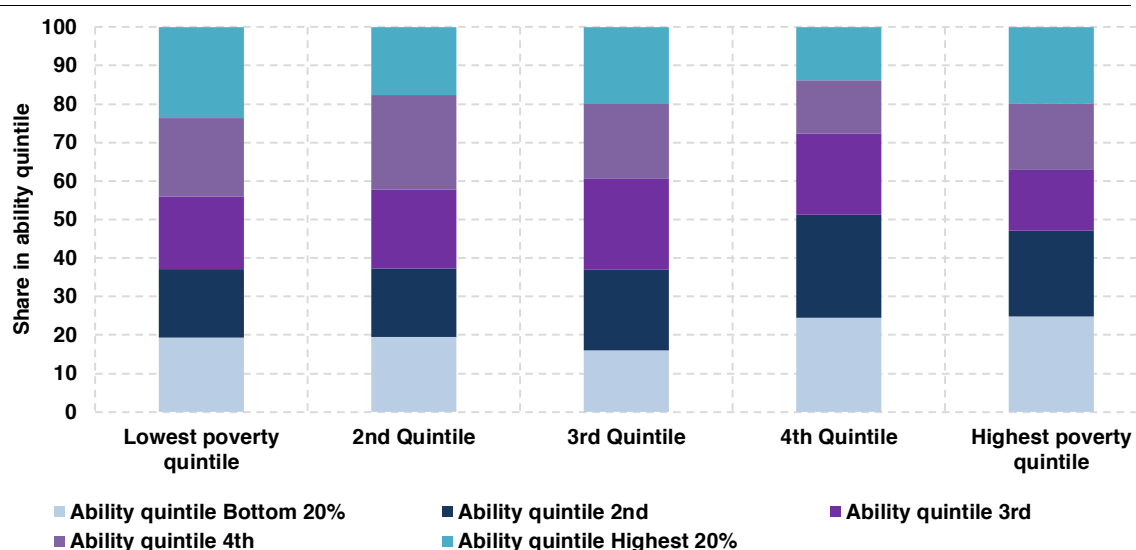
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

Figure 4.3.12. Share of doctors making a correct diagnosis and prescribing any correct drugs by facility area poverty quintile

(a)   Share of doctors making a correct diagnosis by case and poverty quintile
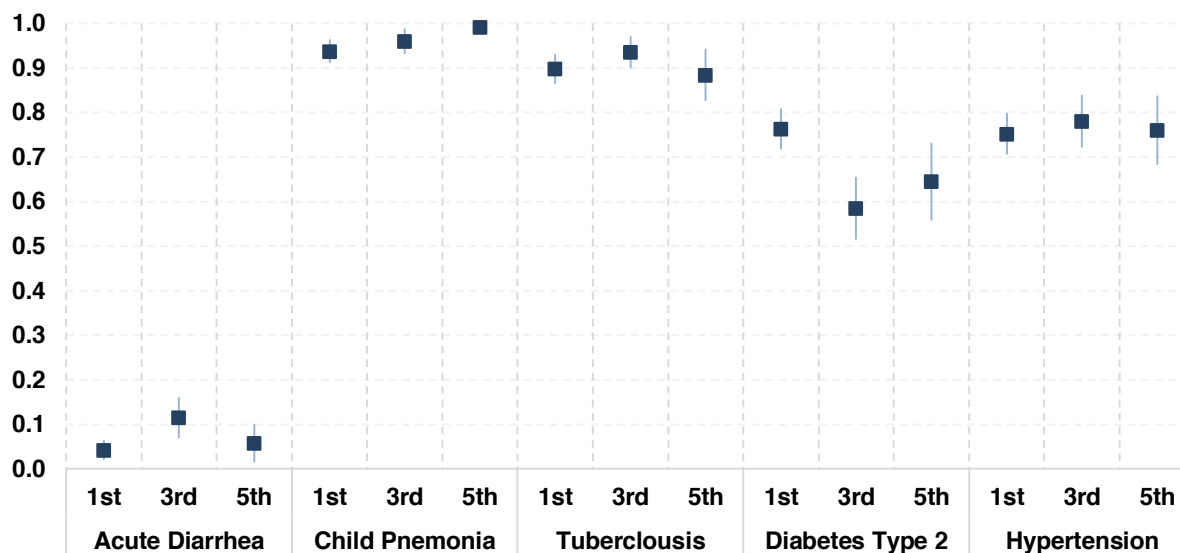
(b)   Share of doctors prescribing any correct treatment by case and poverty quintile
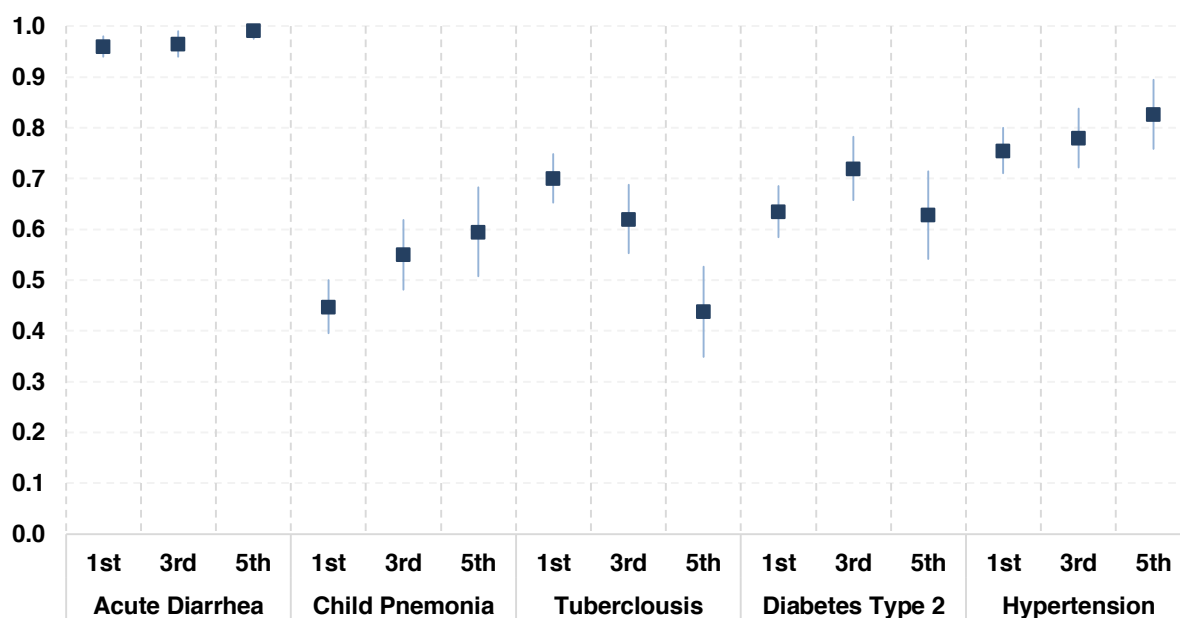
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Notes: 95% confidence intervals shown.

127. **Of the six provinces in the sample, the highest ability doctors can be found in Ha Noi and Binh Dinh.** Doctors in other provinces like Dien Bien, Dong Nai, and Dong Thap show substantially lower ability. Not only were the median ability levels substantially lower in Dak Lak and Dien Bien, but even the ability of their best performers were substantially lower than the best of Ha Noi and Binh Dinh (see Figure 4.3.13). The estimated average ability of the top 25 percent performers in Dien Bien was 40 percent lower than the top 25 percent performers in Ha Noi for example.

Figure 4.3.13. Comparison of distribution of doctors ability by province
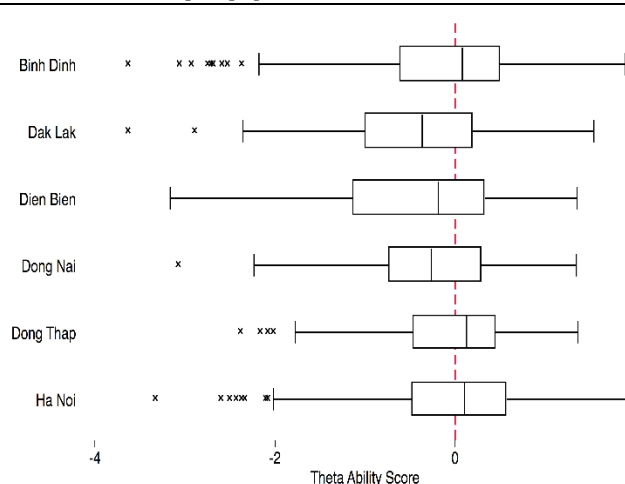
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

128. **Medical training received is the primary determinant of doctors' ability and to a large extent accounts for the variation in doctors ability between facility types and between poor and well to do areas.** Doctors with advanced medical training have a higher estimated levels of ability. The estimated ability of doctors with intermediate training is less than a fifth of the estimated ability of doctors with a medical degree (see Figure 4.3.14). As generally established for doctors at the low ability scale, a particular weakness of doctors with an intermediate qualification was in the diagnosis and treatment of diabetes type II for which these doctors were substantially less likely to correctly diagnose the condition or prescribe any correct treatment.

Figure 4.3.14. Average estimated ability level by individual doctor's characteristics
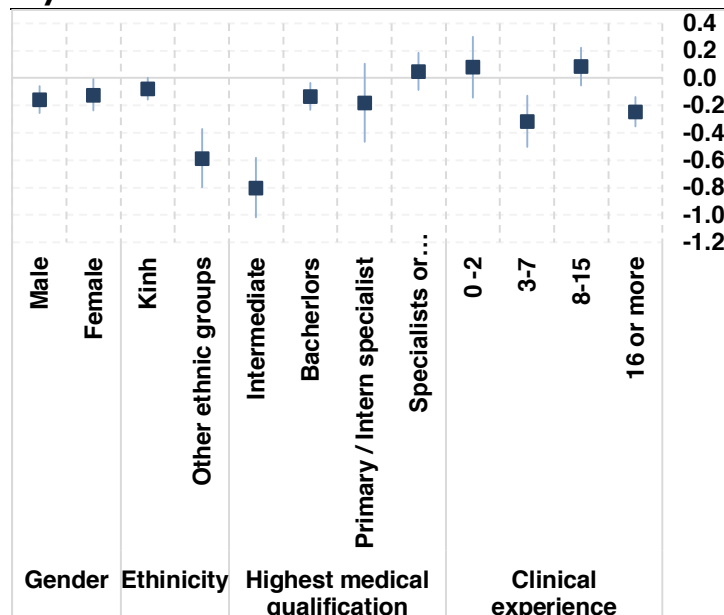
Figure 4.3.15. Profile of doctors education by facility type and location characteristics
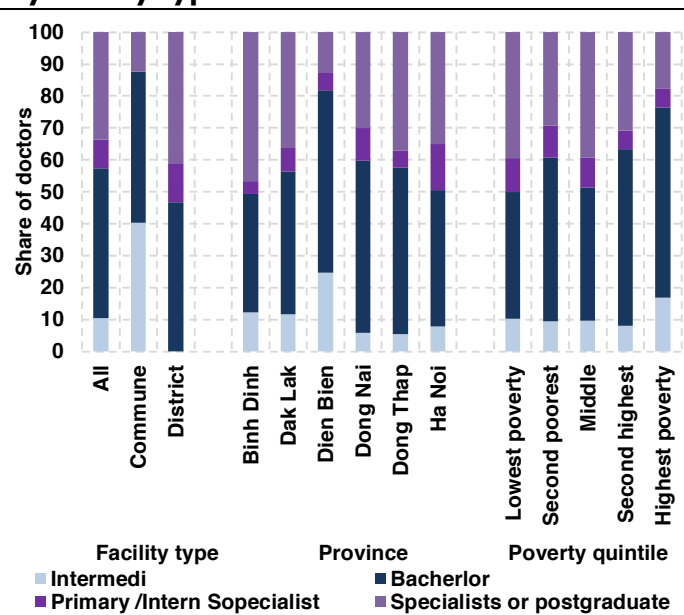
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Notes: 95% confidence intervals shown.

129.   **District hospitals, well-off areas and Ha Noi, all have relatively more doctors with advanced medical training which to a greater extent, accounts for the observed higher performance of doctors in these areas (see Figure 4.3.15).** About 40 percent of doctors in commune facilities have an intermediate qualification, compared to none in district hospitals, which have more doctors with specialist training instead. Similarly, facilities in areas with the lowest poverty rates have more specialist doctors (40 percent) compared to the poorest areas (20 percent), while both Binh Dinh and Ha Noi – with the best doctors in terms of doctors ability – also have the highest share of specialist doctors. Once the education profile of doctors is taken into account, no statistically significant correlation is found between doctor's ability and both facility type and the rate of poverty the facilities is located in (see Table 4.3.5). Thus doctors with similar level of medical training are found to have similar levels of ability on average whether they work in commune or district facilities and poor or non-poor areas.

Table 4.3.5: Correlates of doctors' ability

Variable	Coefficient	Standard Error
Gender	0.097	0.075
Age	-0.095	0.060
Age squared	0.001	0.001
Ethnic Minority	-0.413***	0.141
Years in clinical experience	0.048**	0.024
Years in clinical experience squared	-0.001*	0.001
Tertiary education branch	0.036	0.106
Highest qualification (Base) intermediate)		
Bachelor's degree	0.663***	0.171
Primary / Intern specialist	0.490**	0.229
Specialists or postgraduate degree	0.825***	0.176
district hospital	0.097	0.141
Rural	-0.088	0.141
Poverty quintile (Base: Poorest Quintile)		
Second	-0.006	0.102
Third	-0.047	0.127
Fourth	-0.252	0.179
Fifth	0.059	0.171
Province (Base: Ha Noi)		
Binh Dinh	0.047	0.130
Dak Lak	-0.260	0.181
Dien Bien	-0.054	0.162
Dong Nai	-0.139	0.135
Dong Thap	-0.097	0.119
Constant	1.255	1.174

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

130. **Differences in education qualification does not explain all the differences in ability however.** Clinical experience has a non-linear relationship with doctor's ability that suggested that ability increases with experience only up to a certain point (implied peak of 24 years) after which experience matters little. Intriguingly, ethnic minority doctors are found to have low estimated ability levels (see Figure 4.3.14), even after controlling for the level of education (Table 4.3.5). This could be an indication of unobserved heterogeneity. Ethnic minority doctors may have attended less prestigious schools where the quality of medical training is lower for example. Unfortunately not enough data is available in the survey to test this hypothesis.

Chapter 5. Knowledge and practice: clinical observation and the know-do gap

In this chapter, we evaluate the clinical behaviors of 385 healthcare providers in actual patient interactions. Using all-day clinical observations and matched patient exit interviews, we produce an effort score based on the providers' time spent with the patient and use of questions and examinations. While clinical observation does not allow direct assessment of the appropriateness of treatment and testing decisions, we assess how clinical effort responds to patient characteristics, how it varies with provider knowledge as demonstrated in the vignettes exercise, and how workload affects providers' clinical effort. We measure "effort" using a composite index based on three variables collected during the survey: consultation time, the number of questions asked, and the number of physical examinations completed.

Vietnam's highest-effort providers are on par with Paraguay, and its lowest-effort providers are on par with India. Our analysis suggests that 52% of that variation is explained by community, facility, provider, and patient characteristics, and we also observe highly equitable clinical effort. Patients receive similar effort at the systemic, facility, and provider level regardless of their wealth, gender, age, or ethnicity. However, the provision of unnecessary care seems to be endemic. Medication use is high, with 83% of patients receiving medication and 38% receiving an antibiotic. The use of diagnostic testing is also high at district facilities, with 51% of patients being ordered a laboratory diagnostic.

We observe large differences in clinical practice between district and commune facilities, even once caseload and location are accounted for, with communes exerting significantly more effort. Despite lower levels of clinical knowledge, communes perform closer to their knowledge levels and exhibit similar or better actual quality of care among two common cases. We investigate whether these differences are due to "effort conservation" among higher-knowledge providers (who tend to be located in district facilities) and find instead that more knowledgeable providers systematically exert higher effort. We also investigate whether caseload is a limiting factor on the effort providers allocate to patients. We find that providers reduce effort substantially as caseload increases; however, this reduction in effort occurs well before providers appear to be constrained by the duration of the workday.

The combination of low caseloads at commune facilities and high use of medication and diagnostics at district facilities – even though we find they are typically geographically proximate – suggests that costs are poorly contained across the system once salaries, insurance payments, and patient expenditures are taken into account. We observe substantial excess capacity throughout the system, especially at commune facilities where providers exert somewhat more diagnostic effort and cannot access laboratory tests. These findings are promising for the overall equitable availability of capacity throughout the Vietnamese health care system, while simultaneously drawing attention to barriers to the efficient use of resources that have already been invested in.

5.1. Introduction

131.   **This chapter analyzes the actual practice of doctors based on direct observation of patient care.** It examines a measure of provider "effort", considers variation in patterns of effort across geography, patients, and types of patients, and considers possible explanations for the relatively low effort observed in district hospitals. It also assesses the correctness of observed treatment for specific conditions and the interrelationship between effort, ability as measured using the vignettes, and correctness of treatments.

5.2. Measuring Effort

132.   **What happens when a real patient visits a provider?** To what extent does medical knowledge demonstrated in hypothetical interactions like those examined in the previous chapter translate to practice with real patients? To examine this question, we draw from an extensive database of clinical observations, with over 8,000 patients observed at both district hospitals and commune health posts. We measure "effort" using a composite index based on three variables collected during the survey: consultation time, the number of questions asked, and the number of physical examinations completed.

133.   **To measure clinical effort, providers were observed in their place of practice over the course of a full day, with an individual record for each patient who sought treatment.** As patients exited, they were interviewed by enumerators outside the facility, who asked the patient about their symptoms, basic demographic information, and other questions about the interaction with the provider so they could be matched back to the clinical observation record. This produced a record of 1,961 observed interactions at commune health posts, of which 1,757 (90%) were matched to exit interviews and 6,063 observed interactions at district health posts, of which 4,988 (82%) were matched to exit interviews. The combined information allows us to look at key provider behaviors as well as reference these against more detailed patient demographic information when assessing the determinants of diagnostic effort.

134.   **We measure "effort" using a composite index based on three variables collected during the survey: consultation time, the number of questions asked, and the number of physical examinations completed.** Using the data on clinical interactions, we extract the first principal component of these three variables, which represent visible costly actions the providers can take during each interaction. This index ranges over an approximately standard normal distribution ranging from -2 to +3 (just 3.8% of interactions fall outside this range), and the index is normalized so that the mean effort in the overall sample is zero. The mean effort in the matched sample is 0.02 and a t-test for difference gives p=0.25, strongly suggesting that a representative subsample of patients were interviewed on exit. Table 5.2.1 shows how various components of practice varies with the effort index and compares it to other countries where we have similar data (21; 22; 23; 24). Figure 5.2.1 shows the continuous variation in the components of the index over its range, as well as the shape of the full distribution.

Table 5.2.1. Cross-country comparisons of clinical behaviors across varying effort levels.

		(1) Time (min)	(2) Questions	(3) Physical Exams	(4) Polypharmacy
Vietnam	**Low Effort**	2.96	3.63	1.03	2.90
	Medium Effort	4.69	6.08	2.12	3.21
	High Effort	8.55	10.57	3.12	3.08
	All (Average)	5.40	6.75	2.09	3.06
Delhi	**Low Effort**	1.90	1.36	14%	2.13
	Medium Effort	3.36	2.94	78%	2.72
	High Effort	6.15	5.32	98%	3.05
	All (Average)	3.80	3.20	63%	2.63
Paraguay	**Low Effort**	5.79	5.33	1.38	1.36
	Medium Effort	7.90	7.50	2.93	1.55
	High Effort	11.34	11.91	3.64	1.65
	All (Average)	8.33	8.23	2.65	1.52
Tanzania	**Low Effort**	3.00	2.00	0.00	
	All (Average)	6.32	3.96	1.51	
Other	**Tanzania**	3.00			2.20
	Nigeria	6.30			2.80
	Malawi	2.30			1.80
	United Kingdom	9.40			

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015) and various other studies summarized in Das and Hammer, 2007 (India); Das and Sohnesen, 2007 (Paraguay); Leonard, Mimeo (Tanzania); Hogelzeir et al., 1993 (International Comparisons), and Deveugele et al. .2003 (21; 22; 23; 24).
Notes: Interactions are divided into effort terciles based on the distribution of behaviors within their own countries. Polypharmacy reports the number of distinct medications given to each patient during the interaction. Tanzania I and Tanzania II refer to separate studies.

Figure 5.2.1. Variation in clinical behaviors across the distribution of the effort index
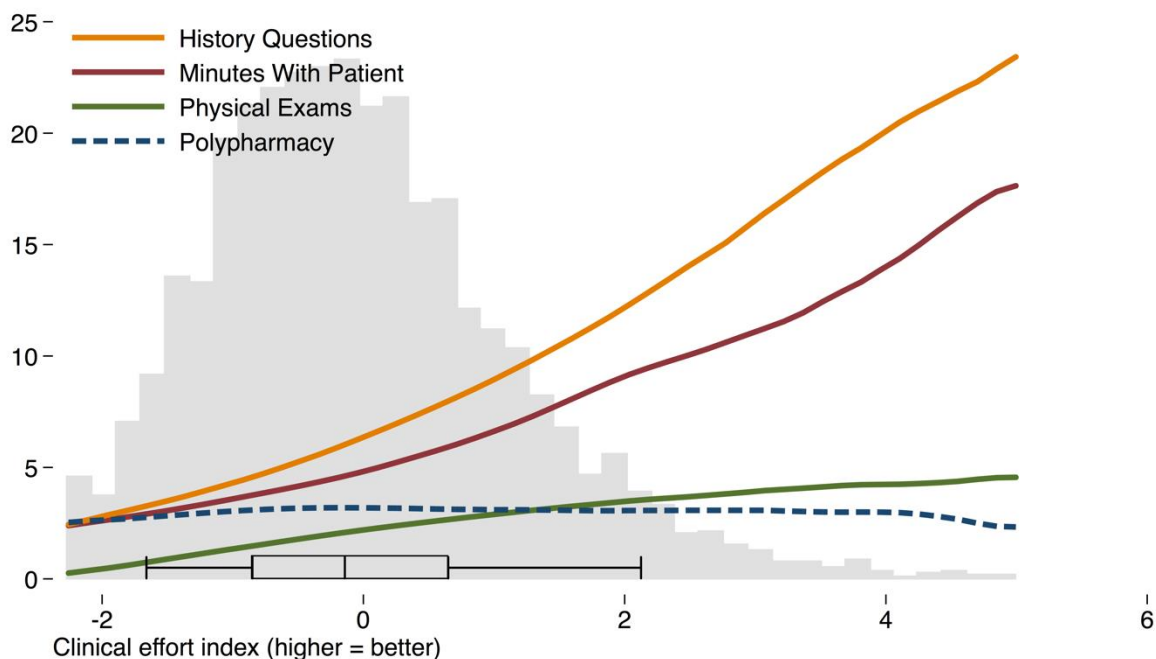
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Notes: Box plot indicates 5th, 25th, 50th, 75th, and 95th percentiles of effort. Effort distribution truncated at +5 (46 interactions excluded).

135.   **The bottom third of patients received effort similar to average doctors in India, with providers spending on average 2.96 minutes per patient, completing one physical exam, and asking 3.6 questions.** The top third of interactions were similar to those done by Paraguayan providers, spending 8.6 minutes per patient, asking 8.8 questions, and conducting three exams. One outcome of note is that polypharmacy, defined as the total number of distinct medicines given, is high and does not vary with effort.

136.   **It is natural to ask whether these large real disparities in terms of diagnostic effort have real consequences for the quality of care received by patients.** Could high effort simply reflect the fact that the provider knows the patient personally and asks them about general questions and spends more time, in which case effort does not affect the quality of care? Could increases in effort correlate perfectly with the seriousness or difficulty of the case, meaning that the variation in effort reflects appropriate time rationing by providers?

137.   **The appropriateness of providers' management choices is difficult to assess directly through patient observation alone because the underlying condition is unknown for most patients observed for such a short time.** However, there are good reasons to believe that there is in fact a strong correlation between clinical effort and appropriate treatment.

138. **Both studies from other countries and analysis with the Vietnam survey show that higher provider effort is associated with more correct treatment. Studies using standardized patients from other countries, where the illness and correct treatment are pre-specified by the research team, almost always show that higher provider effort is associated with more frequent correct treatment choices (25; 26; 27; 28).** We can also investigate directly whether a similar relationship holds in our data, using two common conditions with well-defined diagnostic checklists, and for which the observers specifically noted the questions asked and the examinations completed. In Figure 5.2.2, we use these two conditions—clinical diarrhea and cough/cold—to show several things. First, the histogram of the effort index is shown in the background, to show the underlying variation in effort even within two common and well-known conditions. The figure then shows the non-parametric relationship between (a) the effort index and the fraction of medically recommended checklist items that were completed and (b) the effort index and the use of medicines for these cases. As is clear, the effort index is strongly associated with the greater likelihood of completing medically necessary checklists for these two conditions. However, as found in other studies, more effort does not lead to lower use of medicines. To the extent that some of these medicines are unnecessary, it implies that effort and over-treatment are not necessarily correlated; this is much like the lack of correlation between knowledge and use of unnecessary medicines documented in the previous chapter.

Figure 5.2.2. Variation in essential checklist completion and medication use by effort index: diarrhea and cough/cold
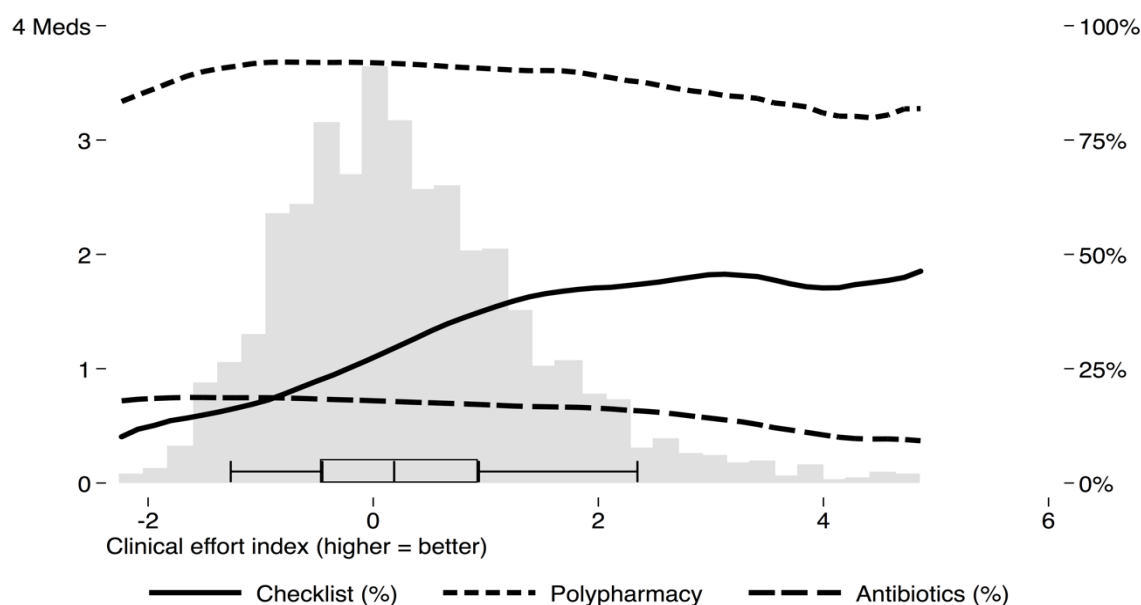
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Notes: N = 203 clinical diarrhea interactions and 1,889 clinical cough/cold interactions. Box plot indicates 5th, 25th, 50th, 75th, and 95th percentiles of effort. Effort distribution truncated at +5 (11 interactions excluded).

139.   **One reason that the effort we observe may be even larger than what patients truly receive is the so-called "Hawthorne" effect, whereby doctors put in more effort because they are being observed. In previous studies, the Hawthorne effect appears to drop-off quite quickly and after 4-5 patients, disappears entirely.** The clearest evidence we have on this comes from Leonard and Masatu's (2008) study, where the researchers interviewed patients outside the clinic before they went in to observe the doctor without the doctors' knowledge (4). They show that immediately on entering the clinic and starting observation, effort increases, but within 5 patients or so it returns to what it was before. Analysis shown in Annex Table AE.10. shows that the Vietnam survey data show patterns consistent with this behavior, with slightly higher effort in the first 5 patients. To the extent that the Hawthorne effect is at play in these results, we are estimating an upper bound of effort.

5.3. Decomposing the Variance of Effort

140.   **There are large variations in the effort index.** To understand where this variation comes from, a simple ANOVA decomposition shows that 4.1% is due to the community characteristics of province and poverty rate; 38% is due to the facility and community characteristics; 49% is due to community, facility and doctor characteristics (identifiable because we have multiple HCPs in many facilities) and the remainder due to patient-level variation and idiosyncratic error. Table 5.3.1 below shows, for instance, the variation across provinces.

Table 5.3.1. Cross-province variation in interaction effort and clinical behavior

	Dien Bien	Dak Lak	Binh Dinh	Dong Thap	Dong Nai	Urban Hanoi	Rural Hanoi	Total
Interaction Effort	0.04	-0.07	-0.21	0.01	-0.17	0.45	0.37	0.02
Time with Doctor (Minutes)	6.55	5.94	4.05	3.29	4.64	10.42	8.75	5.48
Number of Questions	7.11	7.48	6.53	6.33	5.92	7.59	7.65	6.78
Number of Exams	1.90	1.66	1.89	2.51	2.11	2.05	2.10	2.11
Test Ordered	23%	48%	43%	12%	48%	56%	60%	38%
Patient Satisfied	77%	71%	74%	84%	72%	66%	66%	75%
Referral	21%	2%	10%	2%	8%	14%	19%	9%
Price	10,520	12,381	4,728	10,562	31,827	92,316	52,939	24,354
Number of Medications	2.48	3.42	3.35	4.01	3.23	2.70	2.63	3.31
Antibiotics	51%	39%	41%	40%	38%	34%	41%	41%
Number of Observations	531	1,017	760	1,845	1,194	301	1,097	6,745

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Notes: Price includes all expenses incurred inside and outside the facility, as reported by the patient in exit interview.

141.   **Health care providers in rural and urban Hanoi are among the highest performing, while those in Binh Dinh are among the worst performing.** The average patient interaction in urban Hanoi lasts 6.4 minutes longer than Binh Dinh, with one additional question and 0.2 more physical exams. More patients are ordered tests and patients are also more likely to be referred to higher order care. They are given fewer medicines and fewer

antibiotics. All of this comes at a price—on average, patients in urban Hanoi can be expected to pay out of pocket VND 87,000 more than in Binh Dinh (note though that urban Hanoi patients also report the lowest satisfaction in any province.)

142.   **Remarkably, none of this variation is correlated with poverty at any level.** We can examine both whether effort is correlated with the poverty index in the community, as well as whether poor/rich patients receive different types of care from providers. Figure 5.3.1 shows first that is relatively stable over most of the poverty distribution with surprisingly small absolute differences between even very poor areas and the richest within the top 75% of the poverty distribution. The poorest 25%, however, may face substantially lower levels of effort from providers on average.

Figure 5.3.1. Mean effort index by local poverty rate
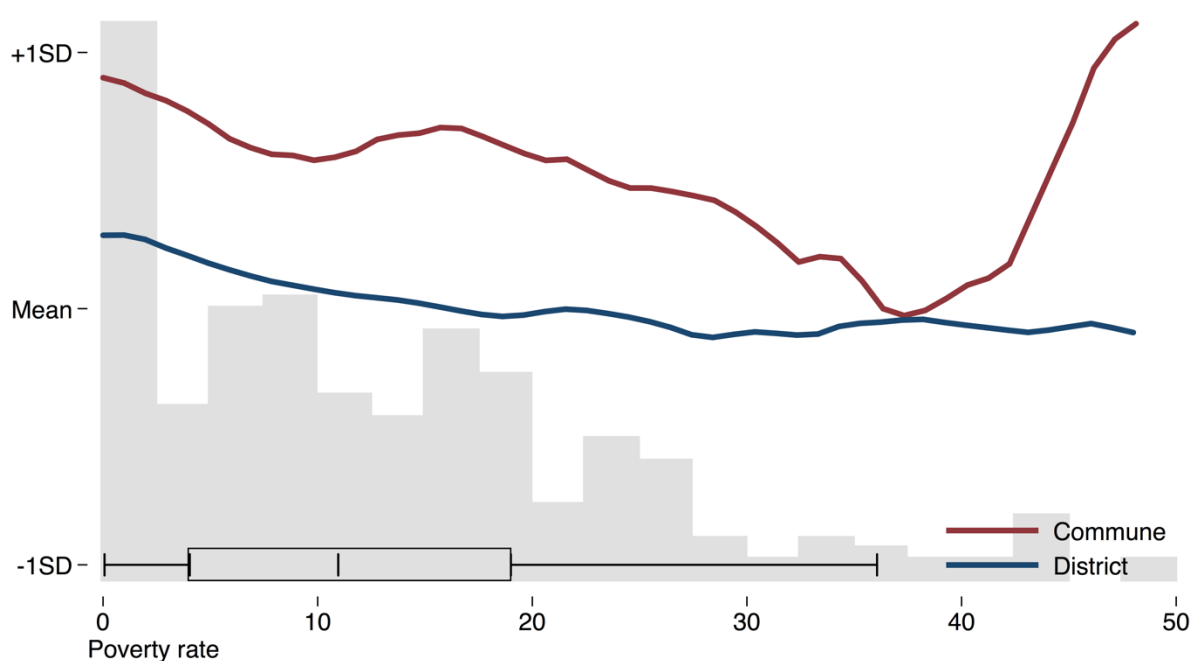
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Notes: N = 214 commune providers and 171 district providers. 27 facilities with poverty rates over 50% excluded from visualization for scale. Box plot indicates 5th, 25th, 50th, 75th, and 95th percentiles of effort in visualized facilities.

143.   **There is very little discriminatory correlation between effort and either ethnicity, education or wealth.** Table 5.3.2 shows results from a series of regressions of effort on patient characteristics. Because of the exit surveys, we have data on a rich set of patient characteristics including age, sex, measures of health status (Self-Reported Health Status or SRHS) as well as measures of ethnicity, education and wealth (computed using an asset index) and day of week and time of day that the patient was seen. Column 1 shows correlations without any

fixed effects; Column 2 with facility fixed effects and Column 3 with provider fixed effects (because we have many patients observed with each provider). Sicker patients as well as those who are older receive more effort.

Table 5.3.2. Effects of patient characteristics on provider effort

	(1) No Fixed Effects	(2) Facility Fixed Effects	(3) Provider Fixed Effects
Patient Asset Index	0.013	-0.007	-0.010
	(0.009)	(0.008)	(0.008)
Patient Health Status (Higher = Better)	-0.134***	-0.106***	-0.106***
	(0.026)	(0.023)	(0.021)
Male	0.005	0.007	0.014
	(0.030)	(0.024)	(0.023)
Patient Age	0.001	-0.000	0.002**
	(0.001)	(0.001)	(0.001)
Ethnic Minority	0.092*	0.030	0.088
	(0.052)	(0.061)	(0.057)
Hour of Interaction Start	-0.025***	-0.017***	-0.022***
	(0.005)	(0.004)	(0.004)
Can Read or Write / Primary School	-0.110***	-0.076**	-0.035
	(0.042)	(0.035)	(0.033)
Secondary School and Above	-0.203***	-0.207***	-0.109***
	(0.046)	(0.039)	(0.038)
Day of Week Controls	x	x	x
Patient Symptoms Controls	x	x	x
Facility Fixed Effects		x	
Provider Fixed Effects			x
Number of Observations	6,649	6,649	6,649
R2	0.053	0.414	0.512

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Notes: Results reported from multiple regression models with interaction effort on the left hand side. Education effects are relative to patients who reported that they were illiterate. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

144.   **These results also show sharp declines in effort through the day. Figure 5.3.2 shows that patients come in two shifts, the 7am to 11am shift and the 2pm to 5pm shift with a break in between.** Patient load peaks at 8:30am. The decline in effort over the entire day is striking, with patients who arrive in the evening receiving up to 0.75 standard deviations lower effort than those who come early in the morning, with the biggest decline in district facilities. In this figure we also introduce the difference in effort between district hospitals

and commune health stations. Effort declines over the course of the day in both type of faciilty. However, at all points in the day, effort in the commune facilities is higher than in district facilities.

Figure 5.3.2. Mean effort index by time of day
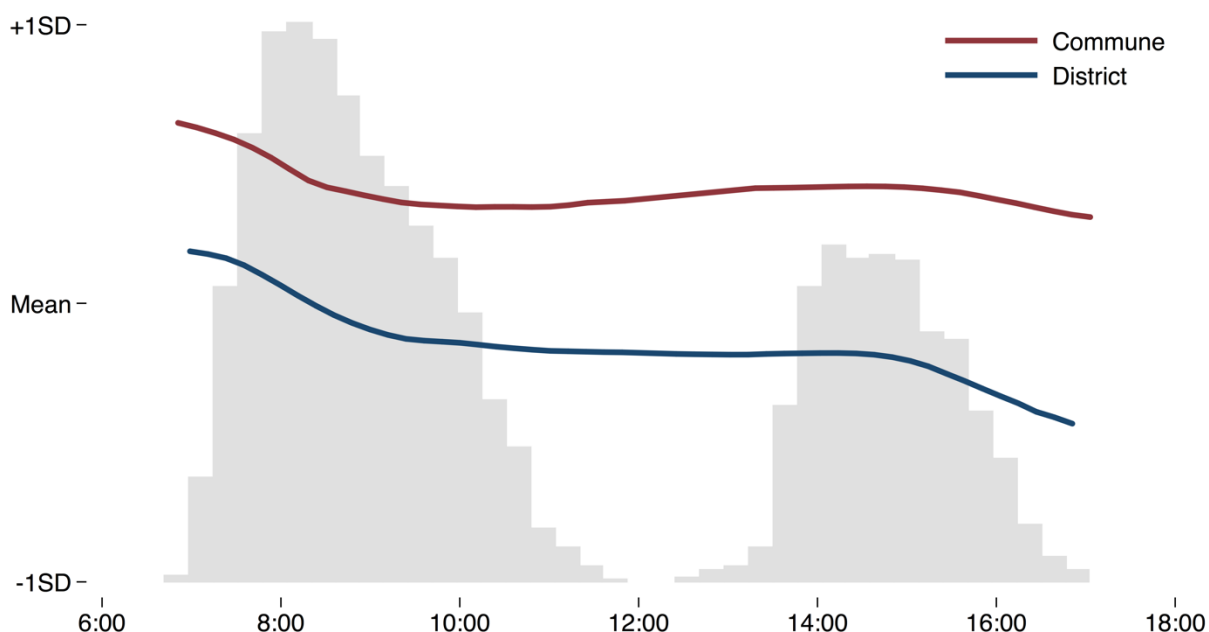
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Notes: Controlled for patient age, gender, asset index, health status, ethnic minority status, day of week, symptomatic presentation, and education, with provider fixed effects.

5.4. Comparison of district hospitals and commune health stations

145.   **District hospitals are staffed with the most medically knowledgeable providers in Vietnam.** Figure 5.4.1 shows this bifurcation very clearly; 90% of all providers who are two standard deviations below average in medical knowledge are in the communes and 90% of all those above average in medical knowledge are in district hospitals. Virtually *all* the doctors at the top of the knowledge distribution are in districts.

Figure 5.4.1. Probability of a provider being based in a district or commune facility as a function of demonstrated vignettes ability and average clinical interaction effort
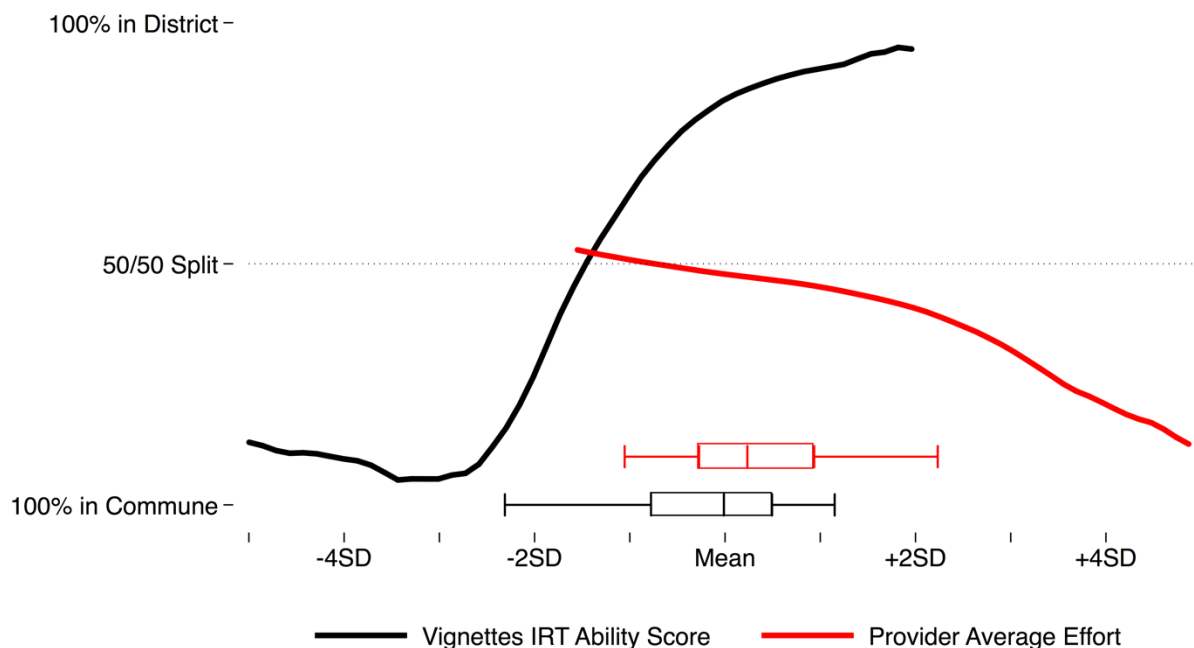
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: Box plots indicate 5th, 25th, 50th, 75th, and 95th percentiles of ability and average effort.

146.   **Effort is much lower in district hospitals than in commune health stations.** This difference is (a) present in every province and (b) remains virtually the same after controlling for patient characteristics, patient symptoms, and location characteristics such as poverty rate, which are all frequently cited as key driving forces for differential provider behavior. Overall, 70% of providers who average at least one standard deviation below the mean are in districts, while 70% of providers who average at least one standard deviation above the mean are in communes.

147.   **Similar differences between commune health stations and district hospitals are found when considering the components of the effort index. Table 5.4.1 summarizes the behaviors and reports the difference estimates both with and without controls, including an additional control for provider workload, the number of patients seen by the provider in a day.** These differences illustrate the portion of the difference is attributable to external characteristics. The effort difference between commune and district is larger after controlling for patient characteristics. However, the difference in workload accounts for two-thirds of that as workload because workload is strongly correlated with the effort.

Box 5.4.1: Do doctors with private practice have different levels of ability or exert different levels of effort than other doctors? The high prevalence of private practice raises the question of which doctors are in private practice and how private practice relates to behavior in doctors' work in public facilities.

Overall, doctors who have some private practice have on average higher levels of ability. Figure 5.4.2(a) shows the distribution of ability by whether doctors report that they have any private practice. Overall, doctors who have some private practice have on average higher levels of ability, as measured by the vignettes IRT score. Average ability levels are 0.37 standard deviation higher among those with private practice. In particular, very few doctors with extremely low ability have private practice. This difference is diminished but persists in a multivariate regression analysis that controls for doctor and facility characteristics. Even controlling for other factors, private practice doctors have ability scores that are 0.128 sd higher. (A comparison of doctor ability by various characteristics with and without controls is shown in Annex E Table AE8a.) This suggests that patients who seek private practice are at least somewhat sensitive to doctor ability and that lower ability doctors are less able to attract customers for private practice.

Figure 5.4.2 Distribution of ability and effort by whether doctors have private practices
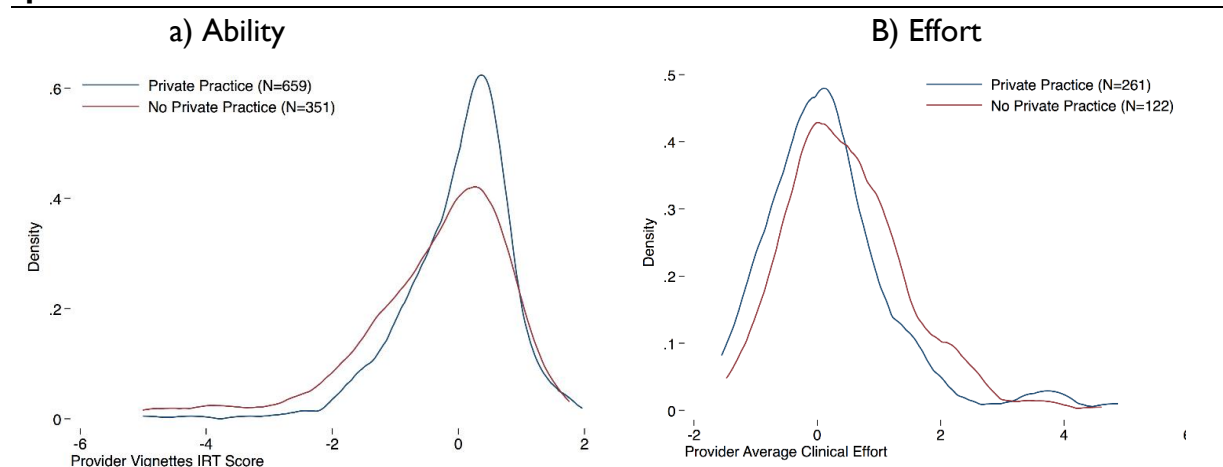
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

Doctors who have some private practice on average exert lower levels of effort, but this difference disappears after controlling for other factors. Figure 5.4.2(b) presents a plot with the distribution of effort by whether doctors have any private practice. Doctors with private practice exert notably lower levels of effort on average. Average levels of effort are 0.27 standard deviation *lower* among doctors with private practice. It is unclear why this would be the case. It is conceivable that some doctors exert lower effort in public facilities in order to direct patients to their private practice to receive care with higher effort. However, there is no statistically significant difference after controlling for facility and doctor characteristics. (Doctor effort by various characteristics with and without controls is shown in Annex E Table AE9b.) This suggests that the apparent lower effort of doctors with private practice may be an artefact of other variables. Most notably, doctors at district hospitals on average both exert lower effort and are more likely to engage in private practice. Further

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investigation is needed to understand the causes of their lower effort and whether private practice may play a role.

148. **Controlling for these factors, commune providers spent 2.6 more minutes with patients than district providers (1.2 minutes with controls); asked 0.9 more questions (0.4 with controls); and conducted 0.4 more clinical examinations (0.2 with controls).** Note that, as before, effort and the use of medicines are uncorrelated. While both district and commune providers gave a similar number of medications to each patient, commune providers were 6% more likely to give antibiotics (8% with controls).

Table 5.4.1 Overall clinical management behaviors and district-commune differences

	(1)	(2)	(3)	(4)	(5)	(6)
	Overall Mean	Commune Mean	District Mean	District - Commune Difference	Adjusted Difference	Adjusted With Workload Control
Interaction Effort	0.02	0.39	-0.11	-0.50***	-0.66***	-0.22***
Time with Doctor (Minutes)	5.48	7.37	4.81	-2.56***	-2.85***	-1.24***
Number of Questions	6.78	7.47	6.54	-0.93***	-1.47***	-0.42***
Number of Exams	2.11	2.39	2.01	-0.38***	-0.49***	-0.16***
Test Ordered	38%	4%	50%	0.46***	0.42***	0.46***
Patient Satisfied	75%	83%	72%	-0.12***	-0.12***	-0.12***
Referral	9%	5%	10%	0.05***	0.05***	0.08***
Price	24,354	8,823	29,794	20,970***	17,469***	12,069***
Number of Medications	3.31	3.31	3.30	-0.00	0.16***	0.04
Antibiotics	41%	45%	39%	-0.06***	-0.03***	-0.08***
N	6,745	1,757	4,988			

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: Adjusted differences are controlled for province, local poverty, provider ability, patient age, gender, asset index, health status, ethnic minority status, day of week, symptomatic presentation, and education. Workload control accounts for the number of patients seen by the provider during the observation period. *** p<0.01, ** p<0.05, * p<0.1.

149. **Commune health providers do not generally provide tests to patients.** Although we do see 4% of patients receiving some sort of test in the commune health posts, this is negligible relative to district hospitals, where providers ordered tests in 46% more interactions (46% with controls). It is difficult to assess the need for these tests in the outpatient setting with more information through, for instance, patient charts. Table 5.4.2 below shows the different symptoms that patients reported with as well as the fraction who received different tests. Blood tests are the most frequently performed, but ultrasounds and X-rays are also used frequently. While blood tests for fever in the outpatient setting is consistent with clinical guidelines for a variety of presenting symptoms, it is harder to understand why a quarter of patients with a cough/cold and

a third of patients with dermatological symptoms receive a blood test. Similarly, a third of all outpatients with diarrhea receive an ultrasound; again, this may be well warranted for some conditions but may seem excessive for a regular outpatient load.

Table 5.4.2. Laboratory diagnostic orders by patient symptom at district facilities

Percentage of patients presenting with __ who received…	(1) X-ray	(2) Ultrasound	(3) ECG	(4) Blood Test	(5) Urine Test	(6) Endoscopy	(7) Other Test	(8) Any Test
Fever (N=933)	11.6%	10.7%	3.2%	41.1%	3.4%	1.2%	1.6%	49.7%
Cough/Cold (N=1379)	19.2%	7.6%	4.6%	26.7%	2.5%	1.9%	1.7%	41.9%
Diarrhea (N=128)	7.1%	31.0%	2.4%	38.9%	4.8%	2.4%	12.6%	55.9%
Weakness (N=1216)	16.5%	17.2%	14.7%	32.4%	6.1%	2.1%	3.8%	56.3%
Injury (N=9)	66.7%	0.0%	0.0%	33.3%	0.0%	0.0%	0.0%	100.0%
Vomiting (N=245)	14.3%	25.3%	2.9%	37.6%	2.4%	5.7%	2.9%	59.6%
Dermatological (N=137)	2.9%	7.3%	2.9%	33.6%	4.4%	0.0%	0.0%	38.7%
Pregnancy (N=7)	0.0%	57.1%	0.0%	28.6%	0.0%	0.0%	14.3%	57.1%
Pain (N=2695)	20.2%	22.6%	9.1%	23.6%	5.5%	2.0%	3.1%	53.6%

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Notes: Test results may not sum to 100% due to the exclusion of surgery and acupuncture which were used for less than 1% of all conditions.

5.5. Does low effort in district hospitals reflect higher provider knowledge?

150.   **We explore two potential avenues through which lower effort in the districts could be consistent with higher quality for average patients.** The two possibilities are higher knowledge and higher caseloads. Under the first hypothesis, more knowledgeable doctors would exert less effort because their knowledge allows them to correctly treat efforts with less effort.

151.   **In both communes and districts, providers with higher knowledge exert higher effort, and the relationship is linear over the range of effort.** Figure 5.5.1 shows the non-parametric relationship between knowledge (measured as the vignettes IRT score described in the previous chapter) and observed average clinical effort. Moving across the range of knowledge increases effort by +0.5 standard deviation.

Figure 5.5.1. Relationship between vignettes ability score and mean clinical interaction effort
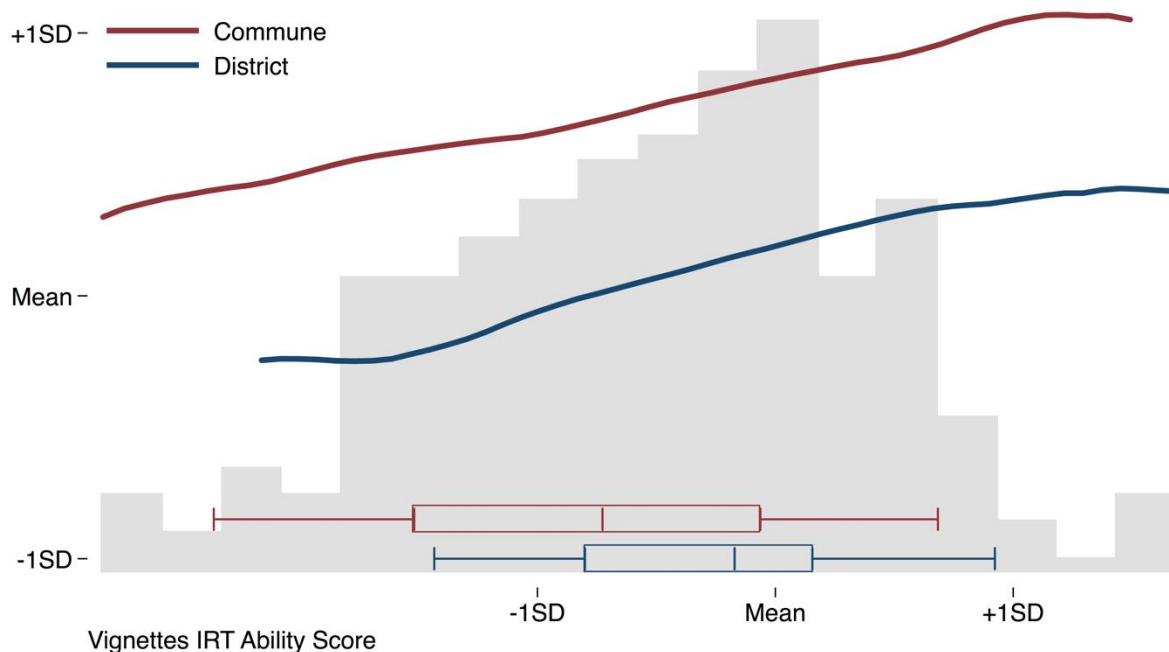
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Notes: Box plots indicate 5th, 25th, 50th, 75th, and 95th percentiles of ability scores.

152.   **The correlation between the effort index and knowledge (measured using the vignettes) is robust to controlling for other factors.** Table 5.5.1 shows a series of multiple regressions using the effort index as the dependent variable. The first column shows just the association with knowledge and suggests that a 1sd increase in knowledge is associated with a 0.25sd increase in effort. As before providers in the commune exert more than 0.6 standard deviations higher effort than those in districts. Column 2 then includes a host of patient characteristics that may be arguably correlated to effort. Column 3 is our most exacting specification with facility fixed-effects. Because we have multiple providers in each facility, with variation in knowledge among them, we can check whether *in the same facility*, providers with higher knowledge also exert higher effort. Note that, to the extent that there is queuing with random allocation to available providers, this should approximate the causal impact of knowledge on effort and would thus go beyond correlations. Providers who are more knowledgeable in district hospitals and in communes exert higher effort, suggesting that the district hospital "effort gap" cannot be explained by the higher knowledge among these providers.

Box 5.5.1: Do doctors with different medical degrees have different levels of ability or exert different levels of effort than other doctors? As outlined in Box 2.3.1, there are three different pathways to become a doctor with training corresponding to a bachelor's degree. These include standard university doctor training, promotion from assistant doctor through "twinning" training, and direct entry programs, which less competitive admissions for particular populations.

Differences in ability level by type of medical degree are small. A plot of the distribution of ability for each degree type is shown in Figure 5.5.2a. Doctors with direct entry degrees have slightly lower ability on average, and those who have been promoted from assistant doctors have slightly higher ability on average. These gaps are relatively small, however. They are not statistically significant, with or without controls for other variables. This suggests that the alternative pathways (direct entry and the twinning program) are reasonably successful in training doctors to a level of knowledge similar to that achieved by doctors who have gone through standard training.

Differences in effort by type of medical degree are negligible after controlling for doctor and facility characteristics. The distribution is shown in Figure 5.5.2b Those with direct entry degrees exert lower effort on average, and those with twinning degrees exert the highest level of effort. These differences, however, shrink to near zero and are statistically insignificant after controlling for facility and doctor characteristics. This suggests that differences in effort by degree reflect differences in other variables.

Figure 5.5.2 Distribution of ability and effort by type of medical degree
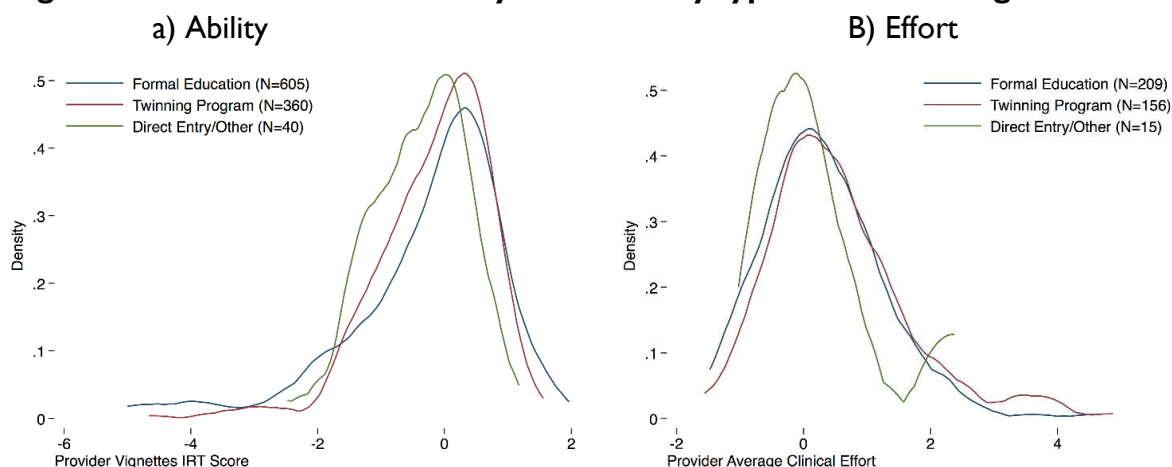
a) Ability

B) Effort

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

Table 5.5.1. Correlates of interaction effort

	(1) No Controls	(2) Patient Controls	(3) Facility Controls
Vignettes IRT Ability Score	0.231***	0.234***	0.111***
	(0.016)	(0.016)	(0.027)
District Facility	-0.640***	-0.664***	
	(0.034)	(0.035)	
Patient Asset Index		0.033***	-0.007
		(0.009)	(0.008)
Patient Health Status (Higher = Better)		-0.157***	-0.103***
		(0.025)	(0.023)
Male		0.012	0.007
		(0.029)	(0.025)
Patient Age		-0.000	-0.000
		(0.001)	(0.001)
Ethnic Minority		0.134***	0.050
		(0.051)	(0.061)
Hour of Interaction Start		-0.017***	-0.018***
		(0.005)	(0.004)
Day of Week Controls		x	x
Patient Symptoms Controls		x	x
Patient Education Controls		x	x
Facility Fixed Effects			x
Number of Observations	6,663	6,587	6,587
R2	0.064	0.116	0.415

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Notes: Results reported from multiple regression models with interaction effort on the left hand side. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

5.6. Does low effort in districts reflect higher caseloads?

153.   **A second potential reason for low effort in the districts is that they see more patients.** Figure 5.6.1 plots each provider in our sample, showing both the patients per day and the total hours seeing patients. Commune health posts are shown in red crosses and district hospitals in blue dots. As expected, district hospitals are busier than commune health posts; the blue dots tend to lie to the right of the red crosses and the red crosses themselves are clustered between 0 and 10, highlighting the very low caseloads in these facilities.

154.   **However, patient loads are sufficiently low in both district hospitals and commune health posts that most doctors spend less than 5 hours a day seeing**

patients. Only 2 providers in our sample of 383 providers sees patients for more than 8 hours. Although 8 hours may be too high of a workload target given the administrative work that providers need to complete during the day, it is reasonable to assume that they have at least 5 hours in their work schedule during which they can actively see patients in the outpatient setting. Still, only 12 providers (10 in districts and 2 in communes) are above this limit.

Figure 5.6.1. Total hours worked and number of patients seen per provider
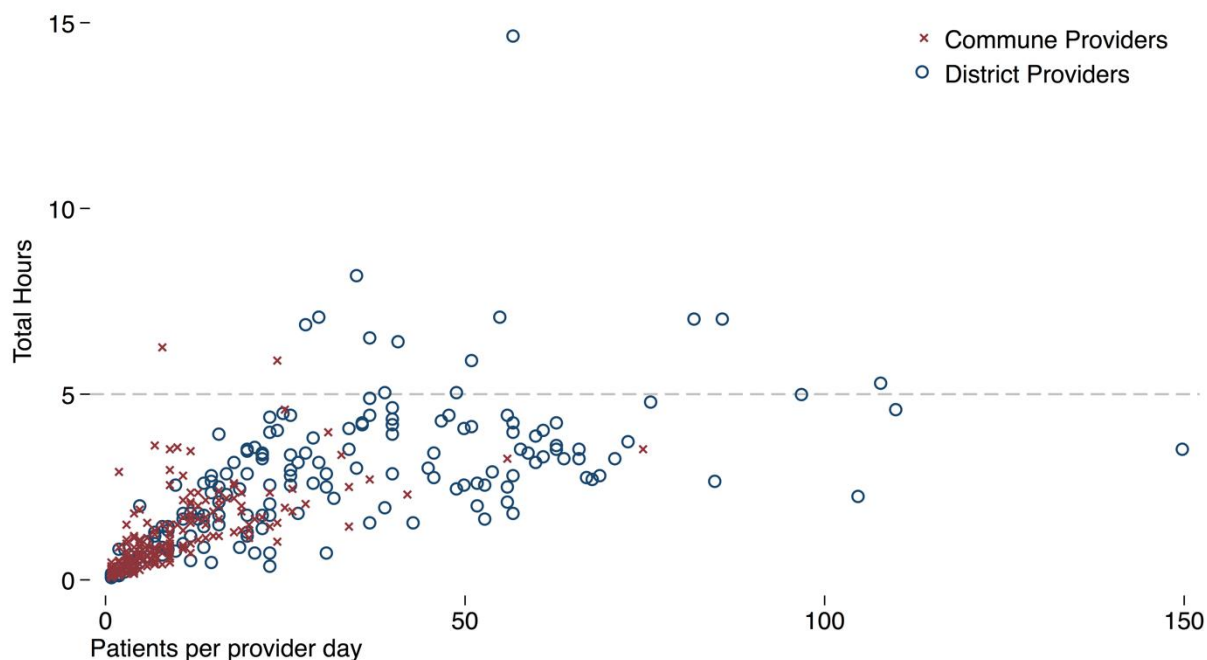
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Notes: Dashed reference line shows 5 hours per day.

155. **Another way to consider workload is by comparing number of patients per day and time spent with each patient.** Figure 5.6.2 shows the number of patients per day on the x-axis and the time spent with each patient on the y-axis. The dashed black line shows the number of minutes that providers would spend with patients if they spent exactly 5 hours a day seeing patients and evenly divided up the number of patients across those 300 minutes.

Figure 5.6.2. Time spent with each patient and total workload
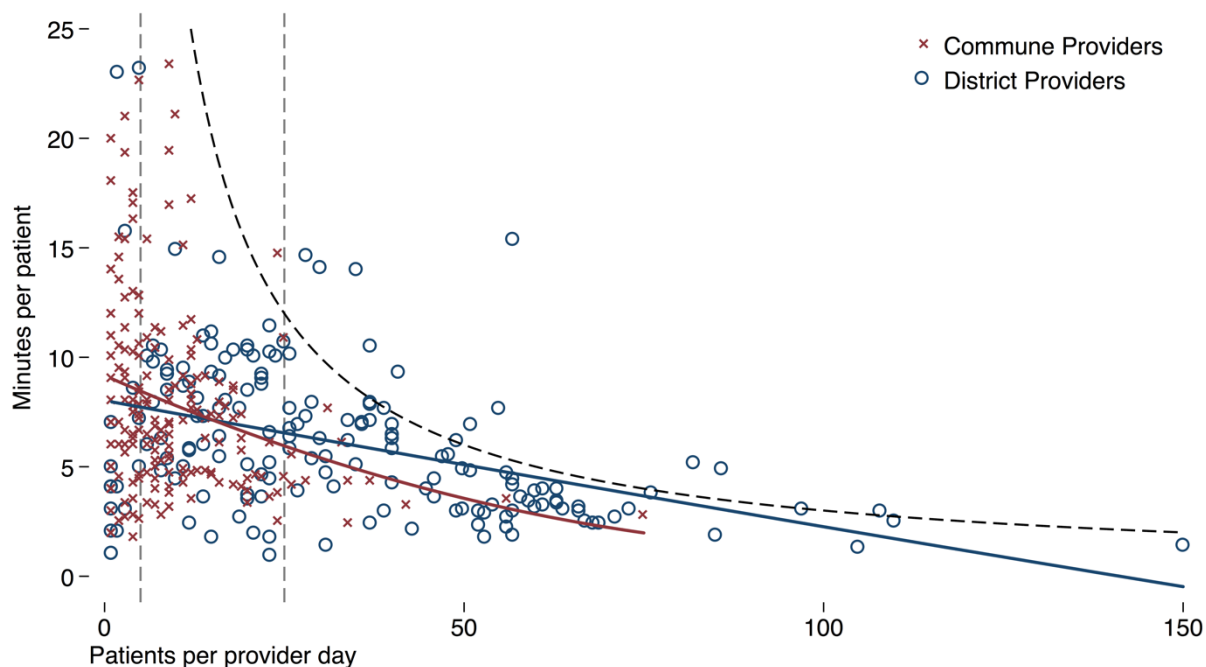
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Notes: Curved reference line illustrates an even spread of five hours among all patients at all levels of workload.
Dashed lines indicate 5 and 30 patients per day.

156. **In rural health posts, the majority of providers see very few patients, but they do not use the opportunity to increase effort with their patients.** There are a small number of providers with fewer than ten patients who spend 15 minutes or more with every patient (with ten patients that is 150 minutes in total), but the vast majority spend less than 10 minutes and many even spend less than 5 minutes per patient. A similar pattern is seen in other developing countries.

157. **Most district hospital providers see more than 10 patients a day.** Until the provider has around 50 patients, there is ample room to spend more time with patients, but most choose not to do so. This is seen in the solid blue linear trendline that lies significantly below the full time-utilization hyperbola until about 50 patients. After 50 patients, many more providers are close to the 5-hour limit line, but nearly always below it. There are 10 providers in district hospitals who are *above* the hyperbola, and they are spread out along a wide caseload, ranging from 30 to 160. In short, even though district hospitals see more patients than communes, virtually no provider in the sample in district hospitals either sees sufficient patients or spends sufficient time with the patients that they do see to "max out" their 5 hours

5.7. The quality impacts of low effort: The know-do gap

158. **The impact of low effort can be evaluated using analysis of clinical observations of doctor treatment for two tracer conditions: diarrhea and cough/cold.** For these

conditions, the observers specifically noted whether the provider completed key checklist items including questions and examinations. For diarrhea, for instance, the observer noted whether the provider asked about fever, vomiting and nature of stool, which are all necessary questions to assess the degree of dehydration and whether the diarrhea has a bacterial or viral origin. The observer also checked whether the provider examined the patient's temperature, pulse rate, and respiration rate among other exams. In the medical vignettes, the diarrhea tracer condition also checked whether the provider asked these questions and completed the exams, allowing us an exact match between what the providers said would do and what they actually did when faced with a similar patient in the clinic. For cough/cold, the match is less exact. In observations, we note whether the patient had a cough or cold while in the vignettes, the tracer condition used was pneumonia. Since the majority of cough and colds are viral in nature and hence self-resolving, we may expect larger antibiotic use in the vignettes than in real life. Nevertheless, the questions that observers noted (chest congestion, expectoration and fever) as well as the exams should match fairly well.

159. **What doctors actually did when faced with a patient with diarrhea differed substantially from what the same doctors said they would do in the vignettes.** This comparison is shown in Figure 5.7.1. (A comparison for cough/cold are included in the appendix.) We have a sample of 44 providers in communes and 79 in district hospitals who we can match between observations and vignettes. There are large gaps between what doctors say they would do (in blue) and what they actually do. Further, the gaps are larger in district hospitals for most actions, except for specific tests that are not available in commune health posts. Providers in the clinic are much less likely than in the vignettes they were to ask necessary questions, less likely to perform key exams like checking the temperature or pulse and less likely to suggest blood, urine and stool tests.

Figure 5.7.1. Know-do gap for matched clinical and vignette diarrhea cases

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

160.   **The most striking gaps are in treatment.** When asked, 94% of providers said they would give ORS to the patient. In practice, only 40% did so in commune health posts and only 27% in district hospitals. Equally surprising is the dramatic increase in use of antibiotics. In the communes, 9% said they would give antibiotics while 33% gave them in practice. In district hospitals, a *larger* number (24%) appeared to believe that the patient *should* receive antibiotics and an even larger number (36%) used them in practice. There are large gaps between knowledge and practice, and these gaps are larger in the district hospitals than the communes. The gaps in the district hospitals are so large that even though the providers are medically more knowledgeable, their low effort implies that the ultimate quality of care that they deliver for this case is lower overall.

161.   **The know-do gap implies that the benefits of further training may be quite small.** To see this, suppose that knowledge if is a function of training and quality is a function of knowledge. We know from the previous chapter that moving from intermediate qualification to primary specialist training correlates with increased knowledge by 0.5 standard deviations. The usual assumption is that therefore training will also improve quality. But this depends critically on how quality increases with knowledge.

162.   **Comparison of observed clinical behavior and vignette responses shows a large "do-know" gap.** Figure 5.7.2 plots a comparison of the percentage of the checklist providers completed in the vignettes with the percentage they completed in the clinical observations, for diarrhea and cough/cold cases. If knowledge translates fully into quality, we

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would observe all points to lie along the 45-degree line—providers are doing all that they know to do. In fact, for most of the range of the knowledge variable, the curve lies far below the 45-degree line, and as knowledge increases, so does the gap. The slope of the line is only 0.14, so that combining the two derivatives suggests that 4 full years of training will increase practice by 0.07 standard deviations.

Figure 5.7.2. Vignette checklist completion versus clinical checklist completion for matched providers–diarrhea and cough/cold cases
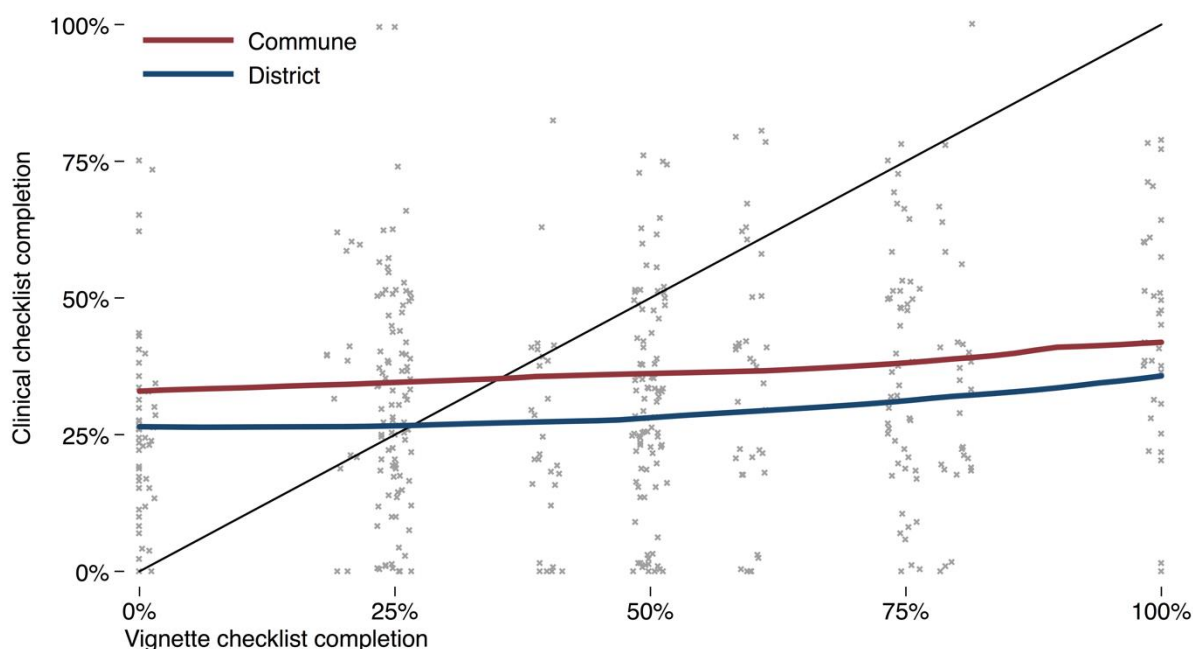
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Notes: Scatter plot shows actual observed values with random offset to show density. Black line shows perfect correspondence between vignette and clinical checklists with identical items.

5.8. Putting it together

163. **Like most health systems, the Vietnamese system is intended to provide health care through a multi-stage process.** First, the system uses a less-qualified cadres of medical professionals working at commune health posts to provide appropriate primary care at low cost, both task-shifting the caseload away from expensive highly trained doctors and restricting the use of laboratory diagnostic tests. Then, district hospitals provide high quality care with testing as required for patients referred up the chain, and these are staffed with highly trained providers. In this model, the commune health posts also serve a gatekeeping function—they see a large number of outpatients, and providers triage the ones who require more complex care to district hospitals. Unfortunately, no health system works the way it is supposed to because both doctors and patients, like all humans, tailor their behavior to the incentives and options that they face.

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A summary of the portrait of the Vietnamese health system provided by the analysis is as follows:

- As planned, the most highly trained providers work in district hospitals. They also see more patients than in commune health posts.

  - However, the effort of these providers is very low and significantly lower than in commune health posts. For the cases where we can directly check, their delivered quality is *lower* than in the commune health posts.
  - They also provide a large number of medicines, antibiotics and (especially) laboratory tests, which inflate the final cost to patients.

- Providers in commune health posts are less knowledgeable and less trained, but they see *very few* patients overall. This means that the public cost per patient in commune health posts tends to be quite high.

  - Effort in commune health posts is higher, but the quality of care they provide in practice is still lower than what their knowledge levels would allow.
  - Although tests are prohibited, significant medication and antibiotic use leads to higher costs and could contribute to antimicrobial resistance in the future.

To the extent that health systems are trying to provide access to quality at a reasonable cost, we can also use the data to provide some estimates of the cost per patient in district and commune health posts. The table below provides a breakdown.

Table 5.8.1. Total cost breakdown of clinical visits

	Cost to Government	Cost to Insurance			Cost to Patient	Total Cost
	Salary cost of provider, per patient	Testing	Medicines	Other reimbursed costs	Average out-of-pocket expenditure	
Insured patients						
District	9,609	Unknown	Unknown	Unknown	21,276	**>30,000**
Commune	34,055	0	Unknown	Unknown	5,234	**>39,000**
Uninsured patients						
District	7,677	0	0	0	213,910	**>221,000**
Commune	51,266	0	0	0	53,429	**>104,000**

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Notes: Salary cost per patient calculated at the provider level as self-reported monthly salary times twelve months, divided by 250 working days, divided by the daily number of patients seen by the provider during patient observation. [17]

164.   **As is clear from the table, non-salary costs are higher in district hospitals.** It would be ideal to obtain data on the costs reimbursed by insurance for each of the patients we observed; in the absence of these data, the out-of-pocket expenditures provide a potential approximation. This approximation suggests that these other costs may be more than VND200,000 per patient which would make district hospital visits significantly more expensive to the health system in total than commune health posts. On the other hand, salary costs per patient are much higher in commune health posts relative to district hospitals, primarily due to the very small patient load in such places. In fact, we have 4 commune facilities were the single provider's per-patient salary costs exceed VND400,000 per patient (see Figure 5.8.1).

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[17] The table is incomplete since we have not costed the tests provided, the medicines given or the other costs of the interaction that are reimbursed through insurance. Neither does it include the salaries of other staff at the institution; including all of these will considerably inflate the cost estimates that we provide here. One way to see this is to look at the total costs for uninsured patients, who will bear directly the costs of all medicines and tests, and we present this in the last two rows of the table.

Figure 5.8.1. Per-patient salary costs by provider workload
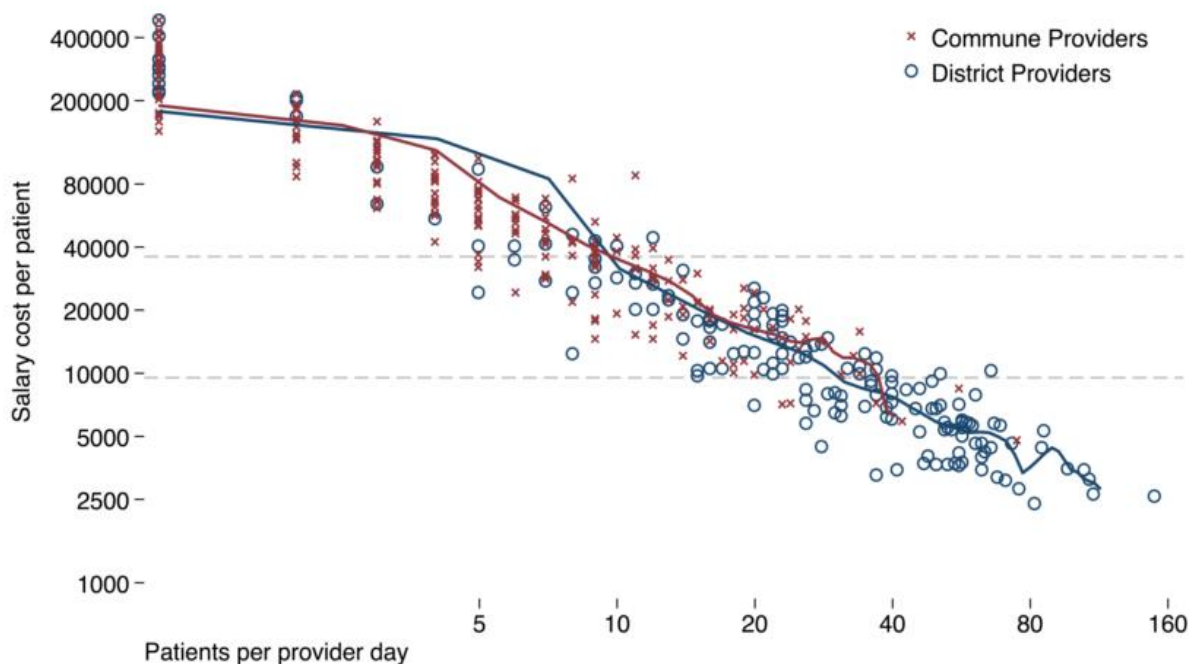
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: Horizontal reference lines indicate average per-patient salary costs.

165.   **One reason for the low patient loads (and hence high salary costs) in commune health posts is that they are located in remote rural regions and therefore are of value who cannot travel easily to district hospitals.** While this is the case in specific instances, in our sample it appears that commune health posts and district hospitals cluster close to each other. For instance, we computed the distance from each commune to the closest district hospital and find that 50% of commune health posts are within 3Km of district hospitals and 75% are within 5.5Km. In general, only a few commune health posts (<5%) are more than 12Km from a district hospital. That commune health posts are seldom the first contact for primary care can also be seen from referral rates which are *twice as high* in district hospitals (10%) compared to commune health posts (5%). Although we do not have data from household choices, all indications suggest that patients are actively bypassing commune health posts to go directly to district hospitals, inflating the per-patient average costs in the communes and increasing the cost of the visit through greater testing and insurance reimbursables in district hospitals.

166.   **It is striking that the quality that they receive for the two tracer conditions we are able to directly assess is also *lower* in district hospitals.** This suggest that either patients value the tests that they receive very highly or value the option value of other services at the district hospital that they cannot receive at the commune. It could also be that the quality difference varies by tracer condition, and for more severe conditions, the district hospital is a better bet. These are questions that we currently cannot answer, but that studies using standardized patients can help with in the future.

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Annexes

Annex A. Methodology
Instrument

The 2015 Vietnam health survey consists of 5 components including: (1) facility questionnaire; (ii) health worker interviews; (iv) exit patient interviews (iv) clinical vignettes; (v) clinical observation. Except clinical observation, the core instruments of four remaining modules were modelled along the Service Delivery Indicators (SDI), with the integration of the Service Availability and Readiness Assessment (SARA) and 2001-2002 Vietnam National Health Survey tools, and adapted to Vietnam contexts (1; 29; 30). The module clinical observation, specifically, used Generalizable Reducible Metrics (GRM) method which was based on direct observation of clinical practice. The clinical observation analysis was mostly based on data collection instrument tools implemented successfully in other settings including India and Tanzania (23; 31). Table 1 describes contents of these five modules.

Table AA.1: Outline of the health facility survey questionnaire

Module	Key respondent	Description
1.Facility Questionnaire	Administrative staff in charge/hospital director/most senior medical officer in charge/facility financing senior staff in charge	Collected general information about the health facility, utilization, waste management, facility infrastructure, availability of equipment, materials, drugs and supplies, offered laboratory and diagnostic services.
		Collected revenues and expenditure by source, information on clinical audits, supervision visits, availability of guidelines.
2. Health worker interviews	Health workers	Collected data of district hospital doctors' and commune health station all staff's characteristics, training opportunities, income, dual practices, satisfaction, and policy suggestions.
3. Clinical vignettes	Doctors/assistant doctors	Assessed the clinical knowledge of doctors and/or assistant doctors using medical vignettes.
4. Clinical observations	Doctors and/or assistant doctors	Assessed the practices of doctors and assistant doctors. Collected information on consultation time, number of history questions, performance of examinations, prescribed medicines, given treatments, given tests.
5.Exit patient interviews[a]	Facility service users	Collected information on patient experience (waiting time, services of receive, procedures carried out, payments, etc.), socio-economic characteristics, source of health financing, and

provider preferences and expectations (reason for choosing facility.)

Sampling strategy

The 2015 Vietnam health quality survey was conducted in the same locations with the 2015 household survey (which was simultaneously conducted to collect information on demand side of Vietnam health system) to ensure the linkage in analyzing the relationship between the health seeking behavior and the quality of local providers (the sampling design and calculation of the household survey is described in Annex B.)

The study consists of six provinces locating in six geographical regions of Vietnam: Dien Bien, Hanoi, Binh Dinh, Dak Lak, Dong Nai, and Dong Thap. Four and a half provinces (Binh Dinh, Dak Lak, Dong Nai, Dong Thap, and the new half of Hanoi which was the "formal Ha Tay"[18]) were selected as a "typical" of their corresponding regions based on criteria of provincial average income per capita and provincial poverty rates. To assess the equality of healthcare services, one poor and ethnic minority province (Dien Bien), and a major city (the original half of the capital Hanoi[1]) were also included.

Sampling design and sample size

The sample of the health facility survey were commune health stations and district hospitals locating in the communes and districts that were corresponding with the selected enumeration areas (clusters) in the household survey. Specifically in urban areas of Hanoi, where multiple central level hospitals concentrate, some districts do not have district hospitals. In this case, the corresponding city level hospitals or polyclinics were selected. In each facility, besides facilities' overall information, data of a sample of doctors and inpatients and outpatients were collected. The table below describes the sample size of each module.

Table AA.2: Sample size information of all modules

Module	District Hospital	Commune Health Stations
1.Facility Questionnaire	All district hospitals or replacements locating in the districts selected in the household survey.	All commune health stations locating in the communes selected in the household survey.

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[18] Hanoi is the capital of Vietnam and the country's second largest city. In 2008, another province in the same region (Red River Delta) Ha Tay and one district of Vinh Phuc and four communes of Hoa Binh were merged into the metropolitan areas of Hanoi. Hanoi after 2008 approximately was doubled in size of population. Therefore, Hanoi can be considered as "two provinces": (i) the original half that had been the capital of Vietnam since a thousand of years ago; (ii) the second half ("formal Ha Tay") that can "represent" for Red river delta in term of annual income per capita and poverty rate.

	Total sample size: 78 district hospitals.	*Total sample size: 246 commune health stations.*
2. Health worker interviews	At most 10 randomly selected doctors per facility. *Total sample size: 749 doctors.*	All commune health stations' health workers including doctors, assistant doctors, midwives, nurses, pharmacists, and others. *Total sample size: 1688 health workers.*
3. Clinical vignettes	At most 10 doctors per facility (the same doctors participated in the module 2 "Health workers interviews".) These included 2 doctors[1] selected in the clinical observation module and 8 randomly selected from the doctor list. *Total sample size: 749 doctors.*	1-2 doctors/assistant doctors responsible for patient examination/consultation per commune health station[3]. *Total sample size: 251 doctors/assistant doctors.*
4. Clinical observations	2 randomly selected doctors[1] among whom provided outpatient examination services per district hospital. *Total sample size: 171 doctors (6063 outpatients[2].)*	1-2 doctors/assistant doctors who are responsible for patients' examination and treatments per commune health stations[3]. *Total sample size: 214 doctors/assistant doctors (1961 outpatients.[3])*
5. Exit patient Interviews	Inpatients: 12-16 randomly selected inpatients (who exit on the survey) per facilities. Outpatients: all outpatients examined by 2 selected doctors in the clinical observation module. *Total sample size: 948 inpatients; 4989 outpatients.*	Inpatients: No inpatient care services at almost all commune health stations. Outpatients: all outpatients examined by doctors/assistant doctors in the clinical observation module. *Total sample size: 1759 outpatients.*

Note: (1) Averagely, each district hospital has 3-5 doctors performing outpatient examinations per working day. In this study, to capture the diversity of patient population, two tables (one doctor per table) were selected. In general, one adult and one pediatric examination tables were randomly selected. In case the patient examination separation was on health insurance utilization basis instead, one health insurance and one non-health insurance examination tables were randomly chosen; (2) In the clinical observation module, despite doctors were the objects to be observed for practice assessment, the analysis unit was interactions between doctors and outpatients; (3) At commune health stations, mostly there is one doctor in each commune health station. For commune health station do not have any doctor, there is an assistant doctor playing "doctor" role for examination. In this study, these doctors (assistant doctors) were selected to participate in both clinical vignettes and clinical observation modules.

Annex B. Sampling Design of the Vietnam Household Survey.

The 2015 Vietnam household survey was implemented simultaneously with the 2015 Vietnam health facility survey. This provides a chance to look at the relationship between health utilization patterns and the quality of local health services. Despite this relationship has not been explored in this report, the close linkage in sampling design of these two survey components are acknowledged. The 2015 Vietnam health facility survey comprised commune health stations and district hospitals for all communes and districts selected in the sample that the household survey was implemented. The sampling design and sample size estimation of the household survey was described below.

Sampling Design

Multi-stage sampling method with 3 stages was used in this survey:

Stage 1: Province selection. Six provinces Dien Bien, Hanoi, Binh Dinh, Dak Lak, Dong Nai, Dong Thap were selected as a "typical" of their corresponding regions based on criteria of provincial average income per capita and provincial poverty rates.

Stage 2: Cluster selection using the Probability Proportional to Size (PPS) method. The sample clusters were selected based on the sampling frame of six provinces used in the 2014 Intercensal survey (stratified by rural/urban for each province.) The household lists and maps were checked, reviewed and updated to use in this survey.

Stage 3: Household selection using the Systematic Randomly Selection (SRS) method. In each cluster, 25 households were systematic randomly selected from the list of households.

Sample size estimation

The sample of the 2015 Household Survey was based on the sampling frame of the 2014 Intercensal survey. The sample was ensured to be representative for urban and rural areas, as well as for six geographical regions. Sample size was calculated follow as:

$$n = \frac{4 \times r \times (1-r) \times deff}{(RME \times r)^2 \times pb \times Hsize \times RR}$$

In which:

 • n   : The estimation for needed sample size, it's shown by number of households based on the key indicator.

 • 4   : Factor for 95% statistical significance.

 • r   : Estimated ratio for the key indicator.

 • deff   : Design effect

 • RME*r : Error limits are allowed with a 95% confidence level; 0.13 (13%) (to guarantee the reliability in the conditions shortage of resource)

 • pb   : Proportion of population will be used to calculate for r

 • Hsize   : Household size (the average members per one household).

 • RR   : Estimated respondent percentage.

The key indicator used in the study was "*the percentage of the illness/diseases/injuries among population in last 4 weeks*". According to the data of Vietnam Living Standards Survey 2008, the proportion of sickness/injury in 4 weeks preceding the survey was 16.34%. Using the above formula (deff=8; respondent percentage=90%; household size=3.8 persons; RME=0.13), the sample size needed for each domain (urban and rural) was 2800 households (Table B.1.)

For the clusters numbers calculation, to increase the reliability, the number of selected clusters was increased in regions with low population and decreased relatively in high population- regions. For this adjustment, the formula used to estimate the number of clusters in urban and rural domains for six regions was:

$$n_{ij} = N_i \times \frac{\sqrt[3]{H_{ij}}}{\sum\limits_{j=1}^{6} \sqrt[3]{H_{ij}}}$$

In which:

n_{ij} (j=1÷6) : The number of clusters allocated for area i (i=1 (urban), 2 (rural)), region j

N_i : The total number of sample clusters needed of domain i (i=1 (urban), 2 (rural))

H_{ij} : The total number of households of domain i, region j (j=1÷6)

In this study, the purposes of sampling were not only to select a "representative" province for each region, but also to compare the access to and use of health services between big cities and other socioeconomic regions. Due to this objective, Hanoi was included in the sample. Hanoi now comprises the former Capital Hanoi with 3.2 million inhabitants and "formal Ha Tay" province with 2.7 million people (32)[19]. "Formal Ha Tay" was considered as the "average" province of the Red River Delta region (in terms of poverty rate and income per capita.) In the study sample, 44 sample clusters (22 urban and 22 rural clusters) was selected in "formal Ha Tay". To increase the reliability of the estimation for the "new" Hanoi, 22 clusters (25 households per cluster), including 15 urban and 7 rural clusters were added. With this addition, the final sample size was 246 clusters (66 clusters in Hanoi) with 6150 households (Table B.1 and B.2.)

Table AB.1: The distribution of sample households according to urban-rural and 6 socio-economic regions

| | Total | Regions (6 socio-economic regions)[1] | | | | | |
		1	2	3	4	5	6
Sample size of Clusters							
Total	224	33	44	41	27	40	39
Urban	112	15	22	20	13	24	18

[19] Data source: GSO projection 2007. 2007 was the last year before Ha Tay was merged into Hanoi.

Rural	112	18	22	21	14	16	21
Sample size of households							
Total	5600	825	1100	1025	675	1000	975
Urban	2800	375	550	500	325	600	450
Rural	2800	450	550	525	350	400	525

Note: (1) 1=Northern mountain and Midlands (selected province= Dien Bien); 2=Red River Delta (selected province=Ha Noi"); 3=North Central and Coasted Central (selected province=Binh Dinh); Central Highland (selected province=Dak Lak); South East (selected province=Dong Nai); Me Kong River Delta (selected province=Dong Thap).

Table AB.2: The distribution of sample clusters according to urban-rural and 6 socio-economic regions

Region	Clusters/HHs	Total	Regions (6 socio-economic regions)[1]					
			1	2	3	4	5	6
Urban	Number of clusters	127	15	37	20	13	24	18
	Number of households	3175	375	925	500	325	600	450
Rural	Number of clusters	119	18	37	20	13	24	18
	Number of households	2975	375	925	500	325	600	450
Total	Number of clusters	246	33	66	41	27	40	39
	Number of households	6150	825	1650	1025	675	1000	975

Note: (1) 1=Northern mountain and Midlands (selected province= Dien Bien); 2=Red River Delta (selected province=Ha Noi"); 3=North Central and Coasted Central (selected province=Binh Dinh); Central Highland (selected province=Dak Lak); South East (selected province=Dong Nai); Me Kong River Delta (selected province=Dong Thap).

Annex C. Definitions of Selected Indicators in the Report.

Table AC.1. Definitions of Health Service Delivery Indicators

Chapter 1: Facility Service Readiness	
Clean water	"Clean water" was defined as piped water or water from a protected well.
Waste water treatment system	A facility was considered to have waste water treatment system if the waste water was processed by the concentrated sewage treatment system or laboratory sewage treatment.
Solid waste treatment system	A facility was considered to have solid waste treatment system if its medical solid waste was processed by specialized incinerators or sanitation companies.
Electricity access	A facility was considered to have electricity access if its power source was national grid power.
Toilet access	A facility was considered to have toilet access if septic or semi-septic toilet(s) was (were) available for patient utilization.
Caseload	A surrogate "caseload" variable was estimated based on the number of patients per doctor on the survey day. Despite the data we actually collected was only from one day, this visited day was selected randomly based on the study planning team.
Occupancy rate by actual number of beds	Occupancy rate was calculated as the number of inpatient days for a given period divided by number of actual beds and number of days in the period.
Chapter 2: A profile of health workers	
Satisfaction score	Satisfaction scores were calculated as the mean of ten satisfaction indicators: salary, allowance, training opportunity, promotion opportunity, occupational safety, hospital security, working environment, availability of medicines, availability of equipment, working pressure, having enough staff. These ten satisfaction indicators were measured by a Likert scale with 5 levels from very dissatisfied (1) to very satisfied (5).
Chapter 3: Patient experiences	
Satisfied with the facility	This indicator was estimated using the data from the question "are you satisfied with the services of facility for this visit?". Among five scales of this question (from "very dissatisfied" to "very satisfied"), one patient was considered as "satisfied with the facility" if she answered "satisfied" or "very satisfied".
Chapter 4: How good is your doctor? Assessment of doctor availability	
Doctors' ability	This aggregate indicator was generated using item response theory (IRT) to produce a ranking or distribution of doctors by levels of ability. The IRT methodology used maximum likelihood methodology to estimate the underlying "ability score" of providers based on their performance during the medical vignettes exercise. This score quantified doctors' propensity to ask the history questions and perform the physical examinations

	that were graded as minimum or essential by the medical expert committee based on Ministry of Health technical guidelines.
Correct diagnosis	Doctors' correct diagnosis was estimated based on their diagnosis performance during five cases of vignettes exercise (acute diarrhea without dehydration, child pneumonia, tuberculosis, diabetes, and hypertension.) For each case, doctors' diagnosis was graded into three categories: fully correct, partially correct, and incorrect. The grading process was done following Ministry of Health technical guidelines and through multiple rounds of consultations with Vietnam medical experts.
Correct treatment	For every cases of the vignette exercise, doctors' correct treatment was graded into three categories: completely correct, partially correct, and incorrect. The grading process was done following Ministry of Health technical guidelines and through multiple rounds of consultations with Vietnam medical experts.
Harmful and unnecessary treatment	Doctors' harmful and unnecessary treatment was estimated based on the treatments given by doctors during the vignette exercise. It was graded into three categories: harmful, unnecessary, and not harmful and unnecessary. The grading process was done following Ministry of Health technical guidelines and through multiple rounds of consultations with Vietnam medical experts.
Supplemental and optional treatment	This indicator was also derived from the vignette exercise. It was graded into three categories: supplemental, optional, not supplemental and optional. The grading process was done following Ministry of Health technical guidelines and through multiple rounds of consultations with Vietnam medical experts.
Chapter 5: Knowledge and practice: clinical observation and the know-do gap	
Doctors' effort index	The effort index of doctors was developed based on three variables collected during the survey day: consultation time, the number of questions asked, and the number of physical examinations completed. This index was normalized so that the mean effort in the overall sample is zero.

Annex D. Tables of Medical Vignettes

Table AD.1. Medical vignettes

Box 1B	Child Diarrhea	Child Pneumonia	Tuberculosis	Diabetes Type 2	Hypertension category 1	Provider's action	Analysis output
Introduction	The mother of a 15-month old child takes the infant to the clinic as her child has had diarrhea for two days and the condition does not go away after the child took medicine at home	A 3.5-year child has cough and fever for three days and has been given medicines bought from a private drugstore but did not get better. The mother takes him in for examination and care	A 37-year old male patient, with sporadic cough and fever for the last three weeks, fatigue and weight loss, came in for check-up. The patient said that sometimes he had mild fever during the day.	A 58-years woman has signs of fast weight loss recently (3kg loss within 2 months) and frequently feel emery less hungry despite eating more than normal. She doesn't know why. So she came for the check-up	A 65- year male patient, who sometimes has headache and burning face, came to your clinic for check-ups	Provider asks questions	**IRT Score**
Basic information	The child looks lethargic fatigue, slow to react. The mother said her child still drinks breast mild but less than normal	Seeing that the child wheezes and is in fatigue, what steps of physical examination will you take?	The patient has been smoking for 10 years. Recently, the fever has occurred often in the afternoon and evening. Cough and sputum contains simply blood	The patient does not have cough, fever and she look bulky. She has headache, dazzle and dizzy	Asking results with normal answers. Headache sometimes happens during 1 last month. Medical history is healthy	Provider describes physical examination	
Examinations	When you examine the child, he conscious, but shows signs of fatigue, negative meningeal syndrome, negative infection syndrome and skin fold retracts immediately	Examination indicates the child's temperature is 39⁰C; no signs of chest indrawing; respiratory rate is 42 beat per minutes; inspiratory crackles and moist rales sporadically exist	Physical examination shows no special symptoms	The patient has blood pressure measurement of 130/80 mmHg, pulse of 80 strokes per minute.	The patient has pulse rate of 80 beats per minute, blood pressure of 155/95 mmHg. Other organs are normal	Provider orders tests	Testing grading
Testing	With all information you have, how do you diagnose this cases?	With all information you have, how do you diagnose the patient?	X-ray shows opaque sections at the top of the right lung. What presumptive diagnosis would you give?	The indicated tests result with normal value of complete blood count, blood glucose (random test) at 8.6 mmol/l, normal ECG, normal straight cardiopulmonary X-ray. What presumptive diagnosis would you give	Testing results are normal. What presumptive diagnosis would you give?	Provider gives diagnosis	Diagnosis grading
Treatment	If your hospital/CHS is not able to do stool testing in this case, how will you treat the child?	Given that bacteriology or antibiotic susceptibility testing is not available at grassroots level, what medication do you choose for the patients	With diagnosis as pulmonary TB, how will you treat the patient?	With diagnosis diabetes type 2, what medication will you give the patient?	With diagnosis as hypertension category 1, what initial medication would you give (please specify)	Provider describes treatment	Treatment grading

Note: the medical vignettes were constructed consistently with 5 stages (history questions, physical examinations, tests, diagnosis, and treatments) across 5 cases. The vignettes were designed in the "stage structure". This means the respondents did not know about the next question until they completed their answers for the previous one.

Table AD.2. Answer keys of clinical vignettes for the diagnosis section

Case	Answer keys			Reference source[1]
	Completely correct	Partly correct	Incorrect	
Child's acute diarrhea	Acute diarrhea without dehydration	Acute diarrhea, Level A dehydration OR Acute diarrhea	Not completely and partly correct	Decision no. 4121/QĐ-BYT dated 28/10/2009
Child's pneumonia	Pneumonia	Bronchopneumonia OR Mild pneumonia	Not completely and partly correct	Decision no. 101/QĐ-BYT dated 09/01/2014
Pulmonary Tuberculosis	Pulmonary Tuberculosis	Suspected chronic obstructive pulmonary disease (COPD) OR Suspected lung cancer	Not completely and partly correct	Decision no. 979/QĐ-BYT dated 24/03/2009
Diabetes type 2	(Suspected) diabetes type 2	Prediabetes OR Disorders blood glucose intolerance OR Fasting glucose disorders	Not completely and partly correct	Decision no. 3879/QĐ-BYT dated 30/09/2014
Hypertension category I	(Suspected) hypertension category I	(Suspected) hypertension	Not completely and partly correct	Decision no. 3192/QĐ-BYT dated 31/08/2010

Note: (1) The answer keys were developed based on the Ministry of Health technical guidelines and were gone through three rounds of clinical experts' consultations.

Table AD.3. Answer keys of clinical vignettes for the treatment section

Case	Answer keys		
Correct treatment			
	Completely correct	Partly correct	Incorrect
Child's acute diarrhea	Oresol	Offset orally dehydration and electrolytes loss that are not oresol AND No oresol *if there is oresol in treatment, coded as "completely correct"*	No completely and partly correct treatments
Child's pneumonia	Only 01 antibiotic among: - Amoxicillin - Amoxicillin + acid clavulanic - Clarithromycin - Erythromycin AND Paracetamol	Cephalosporin or co-trimoxazol AND Paracetamol or ibuprofen	No completely and partly correct treatments
Pulmonary Tuberculosis	One of two below options: - Diagram 1 - Referral to specific departments or hospitals	None	No completely and partly correct treatments
Diabetes type 2 *Note:* *A: consulting about diet, living regime and physical activities* *B: scheduling periodic re-examinations* *C: Using orally antihyperglycenmic drug (alone)*	One of two below options: - A + B - A + B + C	One of below options: - Only A - Only B - Only C - A + C - B + C	No completely and partly correct treatments
Hypertension category 1 *Note:* *A: consulting about diet, living regime, and physical activities*	One of two below options: - A + B - A + B + C	One of below options: - Only A - Only B - Only C - A + C - B + C	No completely and partly correct treatments

B: guiding patients how to measure blood pressure daily
C: only 01 of following medicines:
- *ACE inhibitors*
- *Long-activing calcium channel blockers*
- *Beta blockers*

Harmful and unnecessary treatment			
	Harmful	Unnecessary	Not harmful and unnecessary
Child's acute diarrhea	At least one of below options: - Antibiotics - IV	- Vitamin and/or paracetamol - (and/or) Hidrasec or smecta AND No harmful treatment *if there is any harmful treatment, coded as "harmful"*	No harmful and unnecessary treatments
Child's pneumonia	Corticoid	One of below options: - Antibiotics that are not "correct" or "partly correct" treatments - Combination of at least two types of antibiotics - Salbutamol - Aceylcystein (mucomyst, exomuc, ACC,…) AND No harmful treatment *if there is any harmful treatment, coded as "harmful"*	No harmful and unnecessary treatments
Pulmonary Tuberculosis	At least one of below options: - Antibiotic - Corticoid	One of below options: - Diagram 2 - Diagram 3 AND No harmful treatment *if there is any harmful treatment, coded as "harmful"*	No harmful and unnecessary treatments
Diabetes type 2	At least of below options: - Combination of more than one antihyperglycemic medicines at the same time - Insulin	Consulting patients to take blood glucose test again AND No harmful treatment *if there is any harmful treatment, coded as "harmful"*	No harmful and unnecessary treatments

Hypertension category I	Combination of more than one antihypertensive medicines at the same time	At least one of below options - Cerebral circulation medicines - Analgesic - Lipid lowering medicines AND No harmful treatment *if there is any harmful treatment, coded as "harmful"*	No harmful and unnecessary treatments

Supplemental and optional treatment

	Supplemental	Optional	Not supplemental and optional
Child's acute diarrhea	Consultation	At least one of below options: - Digestive ferment - Zinc AND No consultation *If there is "consultation" in treatment, coded as "supplemental"*	No supplemental and optional treatments
Child's pneumonia	Consultation	At least one of below options: - Alphachymotripsin - Vitamin AND No consultation *If there is "consultation" in treatment, coded as "supplemental"*	No supplemental and optional treatments
Pulmonary Tuberculosis	Consultation	At least one of below options: - Paracetamol - Vitamin AND No consultation *If there is "consultation" in treatment, coded as "supplemental"*	No supplemental and optional treatments
Diabetes type 2	Consultation	Vitamin AND No consultation *If there is "consultation" in treatment, coded as "supplemental"*	No supplemental and optional treatments
Hypertension category I	At least one of below options: - Consultation - Aspirin 81mg	At least one of below options: - Neuroleptics - Vitamin AND No "supplemental" treatment *If there is "supplemental" treatment, coded as "supplemental"*	No supplemental and optional treatments

Note: The answer keys were developed based on the Ministry of Health technical guidelines and were gone through three rounds of clinical experts' consultations. The Ministry of Health technical guidelines were listed as below:
- Child's acute diarrhea: Decision no. 4121/QĐ-BYT dated 28/10/2009
- Child's pneumonia: Decision no. 101/QĐ-BYT dated 09/01/2014
- Pulmonary Tuberculosis : Decision no. 979/QĐ-BYT dated 24/03/2009
- Diabetes type 2: Decision no. 3879/QĐ-BYT dated 30/09/2014
- Hypertension category I: Decision no. 3192/QĐ-BYT dated 31/08/2010

Annex E. Additional Tables and Figures

Table AE.1. Percent commune health stations having set of equipment

	Dien Bien	Dak Lak	Binh Dinh	Dong Thap	Dong Nai	Rural Hanoi	Urban Hanoi	Total
< 25%	0%	0%	0%	0%	0%	0%	0%	0%
25-49.99%	0%	0%	0%	0%	0%	0%	0%	0%
50-74.99%	18%	4%	24%	8%	3%	0%	0%	9%
75-100%	82%	93%	73%	90%	63%	58%	71%	74%
100%	0%	4%	2%	3%	35%	42%	29%	17%

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

Figure AE.1. Average share of recommended history question and physical examinations asked by doctors ability quintile

(a) History questions
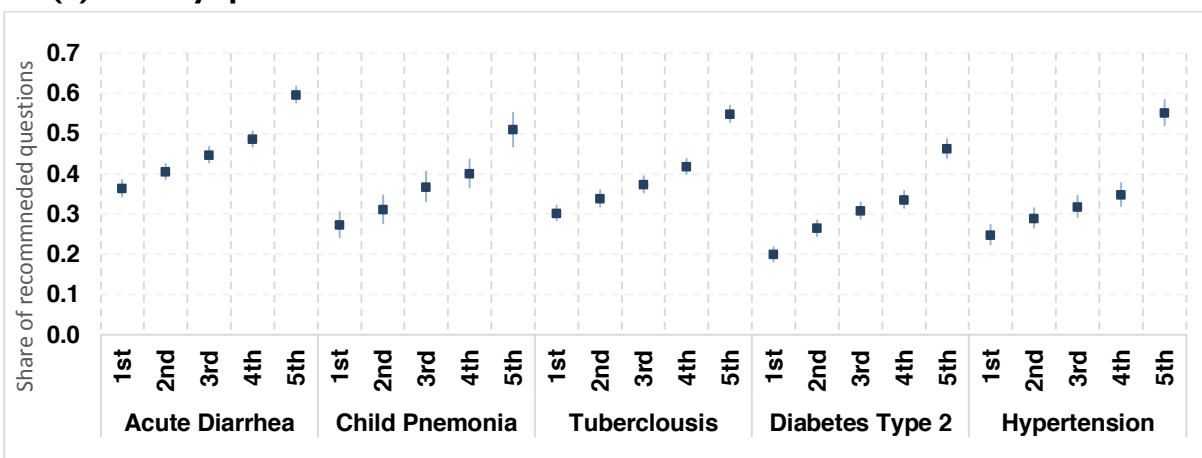
(b) Physical examinations
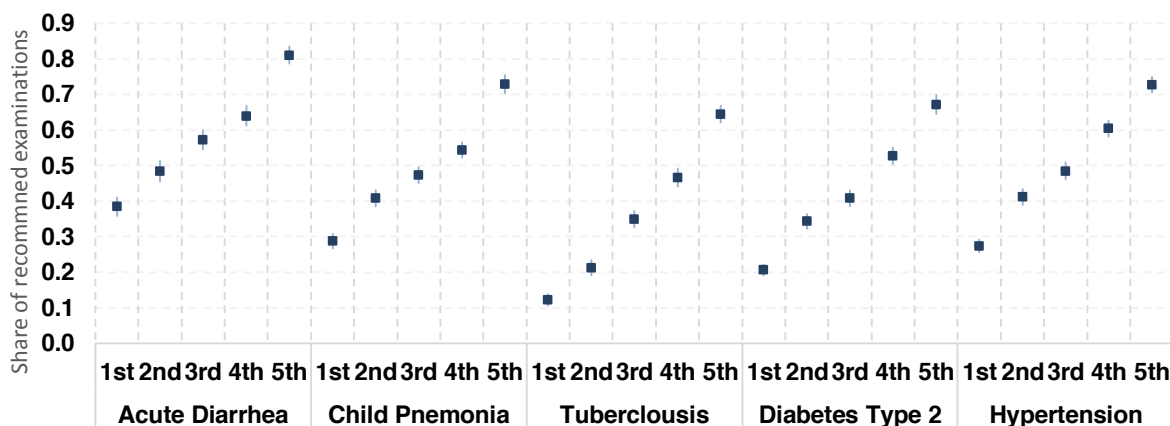
Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Notes: 95% confidence intervals shown

Table AE.2. Percent of district hospitals having selective equipment

	Dien Bien	Dak Lak	Binh Dinh	Dong Thap	Dong Nai	Rural Hanoi	Urban Hanoi
Essential Equipment							
Adult scale	100	100	100	100	100	100	100
Child scale (250g gauge)	70	80	91	82	56	83	44
Infant scale (100g gauge)	90	90	82	100	100	100	33
Thermometer	100	100	100	100	100	100	100
Stethoscope	100	100	100	100	100	100	100
Pinard horn	100	100	91	100	100	100	89
Sphygmomanometer	100	100	100	100	100	100	100
Vaccine cold chain (refrigerator, vaccine flask)	100	100	100	91	78	94	67
Emergency and resuscitation care equipment							
Monitor	90	100	100	100	100	100	56
Portable oxygen concentrator	90	90	100	64	56	78	38
Medical ventilator	70	100	91	91	100	100	56
Child ventilator	30	70	27	27	44	78	33
Infant incubator	60	100	82	45	67	100	33
Anesthesia machine	80	100	100	73	78	94	50
Defbrillator and pacemaker	90	90	55	91	89	89	44
ECG device	100	100	100	100	100	100	78
C-section toolkit	70	100	91	73	89	100	22
Diagnostic imaging/probe testing							
X-ray machine	90	100	91	100	100	100	89
Ultrasound	100	100	100	91	100	100	100
CT scanner	0	20	27	18	44	11	56
ECG	30	50	73	73	78	72	89
Laboratory testing equipment							
Blood analyzer	90	100	100	91	100	100	100
Bloog biochemical analyzer	90	100	100	91	100	100	100
HbA1C testing[1]	20	20	27	55	89	50	50

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015). Note: (1) For HbA1C testing, the facilities answered "Yes" if they have equipment and capacity to provide this test.

Table AE.3. Percent of commune health stations having selective equipment

	Dien Bien	Dak Lak	Binh Dinh	Dong Thap	Dong Nai	Rural Hanoi	Urban Hanoi
Adult scale	58	59	76	54	53	71	67
Child scale (250g gauge)	79	89	78	74	70	82	71
Infant scale (100g gauge)	70	81	54	59	80	89	67
Thermometer	76	93	85	87	70	93	90
Stethoscope	79	44	78	82	72	69	62
Pinard horn	55	74	76	69	65	69	76
Sphygmomanometer	61	70	73	74	57	64	62
Oxygen canister	3	15	32	59	82	49	48
Ambu bag	85	44	37	69	63	47	48
Stomach Cleansing toolkit	67	74	39	64	47	47	33
Delivery/natal care table	76	48	54	64	45	69	52
Oral fluid ventouse	52	81	71	64	70	64	57
Antiseptic autoclave/oven	48	74	61	72	72	71	67
Refrigerator	55	70	73	44	47	71	62
Ice box	85	74	59	79	70	64	43
Microscope	6	89	49	5	63	91	90

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

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Table AE.4. Percent of district hospitals having selective services

	Dien Bien	Dak Lak	Binh Dinh	Dong Thap	Dong Nai	Rural Hanoi	Urban Hanoi
Obstetric care services							
Attended vertex presentation normal delivery	100	100	100	100	100	100	22
Attended childbirth with twins or more	100	100	91	73	67	89	22
First C-section	70	90	91	73	67	100	22
Second C-section	60	90	73	64	67	100	22
Neonatal resuscitation	80	100	100	100	89	83	44
Hepatitis B vaccination for infants within the first 24 hours after birth	100	100	91	100	89	94	33
Obstetric complications care services							
Management of uterine rupture risk and uterine rupture	80	100	91	91	67	100	44
Emergency management of placental expulsion phase metrorrhagia	90	100	100	100	100	100	44
Emergency management of postpartum infection	80	100	100	100	100	100	44
Emergency management of eclampsia	80	100	100	91	100	100	44
Emergency management of neonatal tetanus	80	100	82	82	56	67	44
Child care services							
Removal of airway foreign body	70	60	55	91	56	78	67
Respiratory advanced cardiac life support	90	100	100	100	100	94	89
Anti-shock resuscitation	100	100	100	100	100	94	89
Diabetes care services							
Management and treatment of diabetes Type II	60	90	82	82	78	100	100
Insulin dependent diabetes care	60	90	73	100	89	83	56
Insulin dependent diabetes management	60	60	55	65	67	78	56
Hypertension care services							
Treatment of hypertension with complications	70	100	100	100	100	89	78
Ambulatory hypertension management	70	60	100	82	67	83	100
Appendicitis care services							
Appendicitis operation	80	90	91	73	89	100	44

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

Table AE.5. Percent of commune health stations having selective services

	Dien Bien	Dak Lak	Binh Dinh	Dong Thap	Dong Nai	Rural Hanoi	Urban Hanoi
Obstetric care services							
Antenatal care and pregnancy management	100	100	100	100	100	98	100
Tetanus vaccination for pregnant women	100	100	100	97	97	98	100
Attended vertex presentation formal delivery	70	52	78	90	55	89	5
Hepatitis B vaccination for infants within the first 24 hours after birth[1]	45	26	34	36	17	58	0
Child care services							
Child acute diarrhea diagnosis and treatment	70	89	93	100	97	96	100
Child pneumonia diagnosis and treatment	70	93	88	100	95	93	95
Diabetes care services							
Involvement in community based screening	70	33	32	49	40	40	38
Management of risk groups on papers	85	48	24	87	53	71	48
Care management and observation	64	41	17	90	45	42	33
Periodical drug dispense	0	7	10	56	13	7	14
Hypertension care services							
Involvement in community based screening	82	52	24	49	35	62	29
Management of risk groups on papers	85	63	24	79	55	78	43
Care management and observation	79	63	22	92	45	49	24
Periodical drug dispense	39	63	15	64	33	18	19
Vaccination services							
Hepatitis B vaccination	56	56	49	72	55	84	67
Rubella vaccination	100	100	100	100	100	100	100
Diphtheria – Pertussis – Tetanus vaccination	97	100	100	100	100	100	100
Cholera vaccination	12	7	12	18	3	33	10
TB vaccination	100	100	100	100	100	98	100
Oral polio vaccination (OPV)	100	100	100	100	100	100	100
Japanese encephalitis vaccination	100	93	100	100	100	100	100
Typhoid vaccination	42	7	12	64	3	9	14
DPT-VGB-Hib vaccination	100	96	100	100	100	100	100

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).

Note: (1) The service "Hepatitis B vaccination for infants within the first 24 hours after birth" is only surveyed for facilities having service "Attended vertex presentation formal delivery".

Table AE.6. Percent of district hospitals having selective pharmaceuticals[1]

	Dien Bien	Dak Lak	Binh Dinh	Dong Thap	Dong Nai	Rural Hanoi	Urban Hanoi
Albendazole (200mg, capsule)	0	0	64	0	33	6	0
Altorvastatin (20mg, capsule)	10	20	55	91	100	11	0
Amitriptyline (25 mg, capsule)	10	10	27	36	0	0	22
Amlodipine (5mg, capsule)	100	80	82	100	100	83	100
Amoxicillin (500 mg, tablet)	90	30	100	100	100	94	78
Amoxicillin powder for oral suspension sachets (Sachet 250mg)	70	30	64	36	67	22	22
Atenolol (50 mg, capsule)	10	10	36	73	89	17	22
Captopril (25 mg, capsule)	40	50	64	100	100	28	22
Ceftriaxone injection (1 g/vial)	0	10	36	27	44	56	56
Cephalexin (500 mg, tablet)	70	70	91	82	100	94	78
Ciprofloxacin (500 mg, capsule)	80	70	91	91	100	78	78
Co-trimoxazoles suspension (40+200mg/5ml)	10	0	9	0	0	11	0
Diazepam (5 mg, capsule)	90	90	82	100	100	78	89
Diclofenac (50 mg, capsule)	20	40	64	73	89	17	67
Enalapril (10 mg, capsule/tablet)	10	30	91	27	56	17	33
Furosemide (40 mg, capsule)	90	90	91	100	100	83	78
Glibenclamide (5 mg, capsule)	0	0	36	9	22	6	0
Gliclazide (80 mg, capsule)	30	40	36	82	100	67	44
Ibuprofen (400 mg, capsule)	10	10	18	36	44	11	22
Insulin (100UI/ml, vial 10ml)	20	40	55	91	33	67	44
Metformin (500 mg, capsule)	80	40	73	91	78	72	100
Metronidazole (250 mg, capsule)	60	60	82	73	78	94	78
Nifedipine Retard (20 mg, capsule)	20	10	73	82	78	67	89
Omeprazole (20 mg, capsule)	70	90	100	73	56	94	78
Oresol (Sachet 1 liter)	40	20	64	55	44	50	67
Paracetamol (500mg, capsule)	100	90	100	91	100	100	100
Paracetamol Suspension (24 mg/ml (120mg/5ml), syrup)	40	20	64	55	33	39	44
Salbutamol inhaler (100mcg/dose)	70	40	9	82	78	67	56
Simvastatin (20 mg , capsule)	10	0	36	9	22	28	33
Valproic acid (200 mg, capsule)	0	0	9	0	0	0	11

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: (1) This list of pharmaceuticals were developed based on SARA.

Table AE.7. Percent of commune health stations having selective pharmaceuticals[1]

	Dien Bien	Dak Lak	Binh Dinh	Dong Thap	Dong Nai	Rural Hanoi	Urban Hanoi
Albendazole (200mg, capsule)	24	15	6	47	28	20	5
Altorvastatin (20mg, capsule)	5	0	0	5	21	2	0
Amitriptyline (25 mg, capsule)	5	0	0	15	15	22	0
Amlodipine (5mg, capsule)	46	52	42	82	77	33	14
Amoxicillin (500 mg, tablet)	95	70	64	88	92	98	67
Amoxicillin powder for oral suspension sachets (Sachet 250mg)	32	33	30	53	67	53	43
Atenolol (50 mg, capsule)	2	0	0	25	59	2	0
Captopril (25 mg, capsule)	66	48	0	80	90	16	10
Ceftriaxone injection (1 g/vial)	5	0	0	0	0	20	0
Cephalexin (500 mg, tablet)	78	59	42	95	92	91	52
Ciprofloxacin (500 mg, capsule)	66	30	33	78	85	64	43
Co-trimoxazoles suspension (40+200mg/5ml)	0	4	6	13	8	13	14
Diazepam (5 mg, capsule)	17	11	48	15	49	31	14
Diclofenac (50 mg, capsule)	44	37	30	90	97	49	52
Enalapril (10 mg, capsule/tablet)	34	19	0	17	62	2	14
Furosemide (40 mg, capsule)	29	7	15	38	79	60	10
Glibenclamide (5 mg, capsule)	5	0	0	5	10	0	0
Gliclazide (80 mg, capsule)	7	4	0	33	82	2	5
Ibuprofen (400 mg, capsule)	12	0	0	40	74	13	5
Insulin (100UI/ml, vial 10ml)	2	0	0	0	5	0	0
Metformin (500 mg, capsule)	10	0	0	28	85	4	5
Metronidazole (250 mg, capsule)	63	59	64	82	79	71	33
Nifedipine Retard (20 mg, capsule)	61	11	3	68	59	44	38
Omeprazole (20 mg, capsule)	80	67	42	75	51	67	19
Oresol (Sachet 1 liter)	80	44	48	80	85	82	86
Paracetamol (500mg, capsule)	93	70	73	97	95	91	90
Paracetamol Suspension (24 mg/ml (120mg/5ml), syrup)	20	33	21	55	59	49	48
Salbutamol inhaler (100mcg/dose)	2	0	3	7	21	36	67
Simvastatin (20 mg , capsule)	5	0	0	0	0	0	0
Valproic acid (200 mg, capsule)	0	0	0	15	0	2	0

Source: Calculations from the Vietnam District and Commune Health Facility Survey (2015).
Note: (1) This list of pharmaceuticals were developed based on SARA.

Table AE.8. Provider Vignettes IRT Score

	Bivariate Correlations		Multivariate Regression	
	Estimate	Standard Error	Estimate	Standard Error
Commune	-1.299***	(0.095)	-0.580***	(0.102)
District	1.299***	(0.095)	.	.
Poverty rate	-0.003	(0.002)	0.003	(0.003)
Age	-0.014***	(0.004)	-0.018***	(0.004)
Ethnic Minority	-0.587***	(0.121)	-0.322***	(0.103)
Male	0.188**	(0.081)	-0.022	(0.060)
Private Practice	0.369***	(0.070)	0.128**	(0.058)
Intermediate	-1.934***	(0.146)	-1.673***	(0.412)
College	-1.338*	(0.711)	-1.316*	(0.782)
Bachelors	0.127*	(0.077)	-0.434	(0.382)
Primary/Intern Specialist	0.287***	(0.097)	-0.527	(0.378)
Specialist level 1	0.533***	(0.072)	-0.213	(0.365)
Specialist level 2	0.519	(0.350)	.	.
Masters	0.524***	(0.081)	-0.199	(0.382)
PhD	0.709***	(0.050)	.	.
Binh Dinh	-0.062	(0.163)	0.038	(0.189)
Dak Lak	-0.250*	(0.137)	-0.058	(0.222)
Dien Bien	-0.415**	(0.188)	-0.137	(0.271)
Dong Nai	-0.078	(0.113)	0.035	(0.181)
Dong Thap	0.225**	(0.087)	0.175	(0.171)
Rural Hanoi	0.326***	(0.111)	0.256	(0.168)
Urban Hanoi	0.061	(0.168)	.	.
Formal Education	-0.101	(0.082)	0.089	(0.126)
Twinning Programs	0.131	(0.080)	0.146	(0.127)
Direct Entry	-0.156	(0.127)	.	.
Satisfaction – Salary	-0.200***	(0.037)	-0.045	(0.034)
Satisfaction – Allowance	-0.142***	(0.037)	-0.018	(0.041)
Satisfaction – Training Opportunity	-0.032	(0.035)	-0.002	(0.032)
Satisfaction – Promotion Opportunity	-0.030	(0.037)	0.019	(0.036)
Satisfaction – Occupational Safety	-0.010	(0.038)	0.035	(0.034)
Satisfaction – Hospital Security	-0.121***	(0.033)	-0.046	(0.030)
Satisfaction – Working Environment	-0.060	(0.041)	0.013	(0.038)
Satisfaction – Availability Of Medicines	-0.159***	(0.039)	0.016	(0.034)
Satisfaction – Availability of Equipment	-0.180***	(0.037)	-0.037	(0.038)
Satisfaction – Working Pressure	-0.115***	(0.038)	0.035	(0.041)
Satisfaction – Adequate Staffing	-0.188***	(0.037)	-0.029	(0.035)
Constant	.	.	1.071	(0.510)
Number of Observations	.	.	963	.

Table AE.9. Provider Average Clinical Effort

	Bivariate Correlations		Multivariate Regression	
	Estimate	Standard Error	Estimate	Standard Error
Commune	0.505***	(0.109)	0.754***	(0.139)
District	-0.505***	(0.109)	.	.
Poverty rate	-0.003	(0.002)	0.000	(0.004)
Age	-0.001	(0.005)	-0.010	(0.007)
Ethnic Minority	-0.316**	(0.148)	-0.367**	(0.182)
Male	-0.291***	(0.110)	-0.226**	(0.112)
Private Practice	-0.270**	(0.118)	-0.099	(0.129)
Intermediate	-0.087	(0.140)	-1.054**	(0.446)
College	0.039	(0.488)	-0.447	(0.603)
Bachelors	0.219**	(0.105)	-0.441	(0.401)
Primary/Intern Specialist	-0.093	(0.133)	-0.569	(0.411)
Specialist level 1	-0.217	(0.141)	-0.463	(0.414)
Specialist level 2	0.230	(0.338)	.	.
Masters	-0.285***	(0.083)	-0.313	(0.458)
Binh Dinh	-0.521***	(0.137)	-0.856***	(0.243)
Dak Lak	-0.203	(0.160)	-0.474*	(0.259)
Dien Bien	-0.020	(0.172)	-0.243	(0.367)
Dong Nai	0.149	(0.197)	-0.414	(0.262)
Dong Thap	-0.130	(0.134)	-0.666***	(0.229)
Rural Hanoi	0.336***	(0.127)	-0.183	(0.222)
Urban Hanoi	0.436**	(0.198)	.	.
Formal Education	-0.201*	(0.112)	.	.
Twinning Programs	0.234**	(0.115)	0.092	(0.130)
Direct Entry	-0.183	(0.268)	0.025	(0.249)
Satisfaction – Salary	-0.004	(0.050)	0.028	(0.072)
Satisfaction – Allowance	-0.041	(0.050)	-0.108	(0.072)
Satisfaction – Training Opportunity	0.013	(0.048)	0.038	(0.055)
Satisfaction – Promotion Opportunity	0.022	(0.055)	0.021	(0.067)
Satisfaction – Occupational Safety	-0.011	(0.047)	-0.009	(0.056)
Satisfaction – Hospital Security	-0.054	(0.044)	-0.015	(0.049)
Satisfaction – Working Environment	0.020	(0.051)	-0.009	(0.058)
Satisfaction – Availability Of Medicines	0.024	(0.050)	-0.031	(0.061)
Satisfaction – Availability of Equipment	0.070	(0.053)	0.031	(0.060)
Satisfaction – Working Pressure	0.047	(0.056)	0.068	(0.063)
Satisfaction – Adequate Staffing	0.152***	(0.046)	0.050	(0.056)
Constant			1.368	(0.558)
Number of Observations			365	

Table AE.10. District-Commune Differences - Hawthorne Effect Check

	(1)	(2)	(3)	(4)	(5)
	All patients				
	Overall Mean	**Commune Mean**	**District Mean**	**District - Commune Difference**	**Controlled Difference**
Interaction Effort	0.02	0.39	-0.11	-0.50***	-0.24***
Time with Doctor (Minutes)	5.48	7.37	4.81	-2.56***	-1.43***
Number of Questions	6.78	7.47	6.54	-0.93***	-0.41***
Number of Exams	2.11	2.39	2.01	-0.38***	-0.17***
Test Ordered	38%	4%	50%	0.46***	0.46***
Patient Satisfied	75%	83%	72%	-0.12***	-0.11***
Referral	9%	5%	10%	0.05***	0.08***
Price	24,354	8,823	29,794	20,970***	11,646***
Number of Medications	3.31	3.31	3.30	-0.00	0.06
Antibiotics	41%	45%	39%	-0.06***	-0.08***
Number of observations	6,745	1,757	4,988		

	(6)	(7)	(8)	(9)	(10)
	Excluding first 5 patients				
	Overall Mean	**Commune Mean**	**District Mean**	**District - Commune Difference**	**Controlled Difference**
Interaction Effort	-0.11	0.21	-0.18	-0.39***	-0.15***
Time with Doctor (Minutes)	4.82	6.27	4.49	-1.78***	-0.95***
Number of Questions	6.42	6.92	6.30	-0.62***	-0.21
Number of Exams	2.05	2.33	1.98	-0.35***	-0.11**
Test Ordered	0.39	0.03	0.47	0.44***	0.40***
Patient Satisfied	0.74	0.84	0.71	-0.13***	-0.11***
Referral	0.09	0.04	0.10	0.06***	0.08***
Price	24,852	5,951	29,143	23,192***	11,595***
Number of Medications	3.35	3.43	3.33	-0.09*	0.09
Antibiotics	0.41	0.46	0.40	-0.06***	-0.08***
Number of observations	5,247	971	4,276		

As a check on the Hawthorne effect in the direct observation data, we can examine how effort changes after the 5 patients. The comparison in the above table provides the mean of overall effort and effort after 5 patients for districts and communes respectively (note that some communes are not in this sample due to the low patient load). When we exclude the first 5 patients, effort declines by 0.1 standard-deviations overall, but more so in the commune (0.18sd) than the district (0.07sd). Consequently, the district-commune difference in clinical effort, which is one of our key coefficients of interest, reduces from -.50sd to -0.39sd (unadjusted) and from -.24sd to -.15sd (adjusted). The table also shows other key outcomes of interest, with similarly small or zero changes. Note that this alters the sample as in some communes, providers did not see 5 patients and these are therefore excluded entirely. To the extent that even without a Hawthorne effect, effort is higher in these communes, the difference in coefficients reflects both the difference in sample composition and the Hawthorne effect, which cannot be identified separately.