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EVIDENCE FROM A FACILITY SURVEY

DISCUSSION PAPER

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What Drives Utilization of Primary Care Facilities in Vietnam? Evidence from a Facility Survey

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Abstract:
Objective: This analysis aims to assess the association between commune health station (CHS) service readiness and health service utilization to inform the design of a World Bank project and policies to strengthen primary health care in Vietnam.

Method: Using data drawn from the 2015 Vietnam District and Commune Health Facility Survey (DCHFS), a series of multivariate negative binomial regressions was estimated to measure the association between domains of service readiness and CHS utilization rates (average number of visits per capita).

Findings: First, the average number of CHS visits per capita is highest in the more remote and disadvantaged areas, that is, Zone 3 (1.04 visits per capita per year, 95% confidence interval [CI] [0.8,1.3]) and substantially lower in the urban / peri-urban Zone 1 (0.39 visits per capita, 95% CI [0.7, 1.0]). However, there is substantial variation in the average number of CHS visits per capita within each zone. Second, among the domains of service readiness explored, the difference across zones is starkest for infrastructure, with only half of the CHSs in Zone 3 meeting the standards, compared to almost four-fifths in Zones 1 and 2. Third, three domains of service readiness are significantly associated with higher CHS utilization rates: health infrastructure (whether the building area and number of rooms in the facility meet national benchmark standards), basic equipment availability (facility has at least 70 percent of surveyed equipment), and capacity to deliver services for noncommunicable diseases (hypertension and diabetes). Fourth, simulations suggest that if all three statistically significant modifiable CHS characteristics were to be improved from their current level, and the assumptions of the model are correct, then the predicted utilization rate of the CHS could be 3.3 to 3.7 times (depending on the CHS zone) as high as current levels.

Recommendations: Investments in improving facility infrastructure (especially ensuring that facilities have the mandated number of rooms and building area), making available essential equipment items, and enabling the CHS to provide hypertension and diabetes services, whether made independently or together, would all likely increase CHS utilization. Investment in CHSs in Zone 3 and Zone 2 should be prioritized over investments in Zone 1, since investments in the former would result in the highest utilization rates.

Keywords: Vietnam, negative binomial regression, service readiness, primary health care, commune health stations, noncommunicable diseases, health service utilization, grassroots.

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Table of Contents

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INTRODUCTION

Rapid socioeconomic and demographic change, including rapidly rising living standards, increased technological sophistication, an aging population, and an increase in the burden of noncommunicable diseases (NCDs), means that the Vietnamese people both need and expect more and better care. The hospital-centric delivery model is under strain, with hospitals suffering from overcrowding as they provide curative care services for common conditions and see patients whose health needs could be better served at the primary care level, at lower cost to the health system and greater convenience to the patients. Also, many people's health care needs are not being met, especially with respect to knowledge of disease prevention and health promotion, early detection, and management of chronic disease and childhood illnesses. This is because hospitals focus on the treatment of acute episodes of illness without integrating health promotion, disease prevention, and disease management advice and interventions into the care they provide.

Commune health stations (CHSs) are intended to be the first point of care in the government health care system, the key primary curative care provider for the low-income population (especially in remote areas), and the main site for the delivery of preventive and promotive health programs. CHSs exist in nearly all of Vietnam's 11,162 commune-level administrative units,[1] each providing primary health care services to an average catchment population of 7,000 to 8,000 people [1]. With a team of about five staff led by a doctor or assistant doctor, CHSs have the potential to provide continuity of care, ensuring both horizontal and vertical integration of services for the families in their community. CHSs are financed primarily through state subsidies to cover payroll and basic operating costs, with some minor health insurance reimbursements and out-of-pocket payments of user fees for basic curative care services (such as clinical exams, removal of sutures, and use of nebulizers, among others).

However, while some CHSs are busy and have many patients every day, others are quite underutilized. As part of the implementation of the Grassroots Masterplan, and financed by national, provincial, and donor funding sources, the government of Vietnam is planning large investments in CHS facilities, equipment, and staff competencies to improve CHS service readiness. However, will improved service readiness increase people's utilization of CHS services for common medical conditions? What domains of service readiness should be prioritized for investment, and in what types of localities should investment be made to achieve the greatest increase in service utilization increases? These are some of the questions that this paper attempts to address.

Conceptual and empirical models of health services utilization include a complex and multidimensional range of factors. Environmental factors that influence utilization include health care delivery system characteristics and external environment factors like road transport network and community-level enabling variables [2]. In modeling individual health-care–seeking behavior, three factors are considered important: the individual's propensity to use services, ease of access to services, and severity of the health problem. Finally, at a health system level, characteristics that could have considerable effects on utilization include policies, resources, organization, and financial arrangements

1. Commune-level units include rural communes, urban wards, and district capitals.

influencing accessibility, availability, and acceptability of medical care services [3]. Among these factors, this paper focuses on the association of service readiness and the remoteness of the facility, which can be considered internal and external environmental factors, respectively, with service utilization.

Service readiness refers to the capacity of health facilities to provide health services. It can be operationalized in empirical work as the availability of the various domains of inputs, such as infrastructure, human resources, basic equipment, medicines, and medical consumables, required to provide a specific service or sets of services [4]. Previous studies in Vietnam have focused on describing CHS service readiness, encompassing infrastructure, medical equipment, pharmaceutical products, and human resources, and find that CHSs across the country still vary significantly in their service readiness [5,6]. Empirical analysis in Vietnam has not yet sought to identify which domains of service readiness are associated with higher population utilization of commune-level primary curative care services. Such analysis would be useful in guiding decisions about appropriate investments in the CHS, especially with a view to increasing utilization of needed services at this more cost-effective lower level of care, that is, addressing both unmet need and efficiency goals.

This paper aims to quantify the variation in curative care service utilization and service readiness across CHSs in different geographical areas of Vietnam, as well as to examine the association between different CHS service readiness domains and the rate of health service utilization in their catchment communes.

ANALYTICAL APPROACH

DATA

The 2015 Vietnam District and Commune Health Facility Survey (DCHFS) was conducted by the Health Strategy and Policy Institute of the Ministry of Health (MOH) in partnership with the World Bank [7]. It includes five modules: (a) facility questionnaire, (b) health worker interviews, (c) patient exit interviews, (d) clinical vignettes, and (e) clinical observations. The development of the instrument was informed by the questionnaires used in the Service Delivery Indicators (SDI) project [8], the World Health Organization (WHO) Service Availability and Readiness Assessment (SARA) [9], and the 2001–2002 Vietnam National Health Survey [10]. The development of the questionnaire, its scope, sampling methodology, and construction of indicators is described in more detail elsewhere [6].

Sample design consisted of multistage stratified random sampling. In the first stage, six provinces, representing the six geographic regions of Vietnam, were purposively selected, to ensure the selected province had provincial per capita income and poverty rate typical of the region. In the second stage, stratified random cluster sampling was used to choose enumeration areas (villages/blocks within communes/wards) with probability proportional to size (PPS), based on the sampling frame of enumeration areas from the 2014 Intercensal Population and Housing Survey [11], with stratification by rural/urban area. The CHS located in the commune containing the sampled enumeration area was included in the sample. The sample size, that is, the number of CHSs included in the analysis, was 246.

Commune population information was not collected in the survey and had to be obtained from other sources. We derived the 2014 commune population estimates by taking Census 2009 commune population estimates [12] and inflating them by the commune-specific population growth rates between 2009 and 2014, estimated from the Intercensal Population and Housing Survey [11]. Population growth rates were only available by strata, that is, by urban/rural location within each province, so the same growth rate was applied to population estimates for all communes within the same strata.

MEASUREMENT

The dependent variable, CHS utilization rate, is measured as the average number of primary curative care visits (including visits for the management of chronic disease) at the CHS per capita. It is calculated as the number of reported curative care visits to the CHS in the year preceding the 2015 DCHFS, based on information collected from the CHS's records during the survey (numerator) divided by the total (estimated) commune population in 2014.

Remoteness is an important environmental factor that can influence CHS utilization due to degree of proximity and lack of alternative sources of care. This factor is proxied by a categorical variable, with CHSs classified into Zone 1, 2, or 3 (based on the zone definitions in the MOH's Decision 4667) [13], where level of remoteness increases with

zone number.[2] We created this categorical variable using three variables in the DCHFS data, corresponding to definitions of zones in Decision 4667: (a) distance from the CHS to a district hospital, (b) province name, and (c) geographical area (rural/urban).

The independent variables are proxy variables for five different domains of CHS service availability and readiness, coded based on responses to relevant questions in the DCHSF, and defined as closely as possible to national commune health benchmarks (MOH's Decision 4667).

1. *Availability of infrastructure* is measured as a binary variable capturing whether the CHS meets government benchmarks (standards) for *both* building area and the number of rooms for patient care and facility administration (as defined in the Ministry of Health's Decision 4667). Specifically, CHSs in Zone 1 should have at least 150 square meters (m^2) of built-up area, while CHSs in Zones 2 and 3 should have a minimum of 250 m^2. CHSs in Zone 1 should have at least five rooms; Zone 2, at least seven rooms; and Zone 3, at least nine rooms. [3]
2. *Availability of basic medical equipment/instruments* is measured as a binary variable capturing whether a CHS has at least 70 percent of the 16 pieces of equipment for which information was collected in the DSCF.[4]
3. *Availability of basic medicines* is measured as a binary variable capturing whether the CHS has at least 70 percent of the 30 basic medicines that were checked in the DSCF.[5]
4. *Availability of human resources* is measured as to whether the CHS has a contracted/permanent medical doctor.
5. *Availability of NCD services* is measured using two discrete score variables, with a higher value representing a more comprehensive service readiness.
    - *Availability of hypertension-related services*: The score ranges from 0 to 4 and is a simple count of the number of the following service elements

2. The MOH's Decision 4667 categorizes facilities into three zones, largely based on geography and distance, as follows: Zone 1 for urban locations or rural delta and midland communes with the distance between the CHS and higher-level care less than 3 km; Zone 2 for communes in mountainous or remote, isolated, border and maritime areas with distance between the CHS and higher-level care less than 5 km, and delta and midland communes with distance between the CHS and higher-level care from 3 km to below 15 km; Zone 3 for communes in remote areas with distance between the CHS and higher-level care of 5 km or more, or delta and midland communes with distance between the CHS and higher-level care of 15 km or more.
3. Patient care and facility administration rooms include rooms for clinical examination; first aid; immunization; postimmunization observation; traditional medicine services; delivery/family planning services; pharmaceutical dispensing; administrative activities; information, education, and communication (IEC); and so on. However, rooms such as the toilet or storage shed would not be included.
4. The 70 percent threshold is the benchmark in Decision 4667. The list of equipment in the survey includes adult, child, and newborn weighing scales, thermometer, stethoscope, pinard horn to hear fetal heartbeat, blood pressure cuff, oxygen tank, bulb syringe, gastric lavage instrument set, gynecology/obstetrics table, mucus suction machine, instrument sterilization equipment, refrigerator, cold chain box, and microscope. For this variable and the variable on medicine, different cut-off points were also tested at 50 percent, 60 percent, 70 percent, and 75 percent.
5. The 70 percent threshold is the benchmark in Decision 4667. The list of drugs in the survey includes antibiotics (7), hypertensive drugs (6), diabetes drugs (4), nonsteroidal anti-inflammatory drugs (NSAIDS) and pain medication (4), drugs for cholesterol control (2), sedative/anti-depressant/epilepsy drugs (3), medicine for diarrhea or parasites (2), acid reflux medication (1), and medicine for asthma/chronic obstructive pulmonary disease (COPD) (1).

currently available at the CHS: (a) community-based hypertension screening, (b) management of cases identified as being at risk of hypertension (but who may not yet have elevated blood pressure), (c) management and monitoring of treatment for confirmed hypertension cases, and (d) regular medicine dispensing to hypertensive patients.

- *Availability of diabetes-related services*: The score ranges from 0 to 4 and is a simple count of the number of the following service elements currently available at the CHS: (a) community-based screening, (b) management of cases identified as being at risk of diabetes (but who may not yet have elevated blood glucose levels), (c) management and monitoring of treatment for confirmed diabetes cases, and (d) regular medicine dispensing to diabetic patients.

Other variables to proxy the above domains were explored but not used in the final analysis for various reasons. In particular, we explored several options for variables that could represent different aspects of human resources at the CHS, including the capacity of staff measured through information gathered from vignettes, the total number of permanent/contracted staff at the CHS, whether the CHS had a contracted/permanent specialist, whether the CHS had a contracted/permanent medical doctor, whether the CHS had a contracted/permanent female medical doctor, and the total number of nurses at the CHS. In early testing of the model, none of these proxy variables were significantly associated with the study outcome. However, since human resource availability is an important domain from a theoretical perspective, we retained a variable reflecting the presence of a medical doctor in the final model. Some other theoretically important variables such as availability of water and sanitation, electricity and internet, and availability of child health care services were excluded from the final model because they were present in nearly all CHSs and, therefore, lacked sufficient variation.

STATISTICAL APPROACH

The dependent variable—CHS utilization rate—can be assumed to follow a Poisson distribution; it expresses the probability of a given number of events occurring in a fixed interval of time or for a given population. However, the actual distribution exhibited overdispersion (that is, the presence of greater variability in a data set than would be expected based on a given statistical model). If a Poisson regression were used in such a situation, the standard errors would be underestimated, and we might conclude that a variable has a significant effect when it does not. Consequently, we use a Poisson mixture model, specifically the negative binomial model.

Five progressively more complex models were used to examine the association between indicators of service readiness and CHS utilization. In model 1, the effect of health infrastructure was tested. In subsequent models, the availability of equipment (model 2), availability of medicines (model 3), availability of human resources (model 4), and readiness to delivery hypertension and diabetes services (model 5) were incrementally added. In all models, the remoteness of CHSs (measuring by CHS zone) was included as an important confounder. Results are presented as rate ratios (RRs) with their associated confidence intervals (CIs). Rate ratios compare the rate of the group of interest to that of the reference group. In our model, the rate ratio can be interpreted as the multiple of the CHS utilization rate when a specific CHS feature is present versus when it is absent, or

when the NCD service availability scores increase by one point, or when the CHS is in Zone 2 or 3 compared to the reference category of Zone 1.

FINDINGS

GEOGRAPHIC VARIATION IN HEALTH SERVICE UTILIZATION

The more remote the geographic zone, the higher the CHS utilization rate. Results indicate significant differences in CHS utilization rates between Zone 3 (remote rural areas) and Zone 1 (urban / peri-urban), and between Zone 2 (rural, less remote) and Zone 1. However, the difference in CHS utilization rates between Zones 2 and 3 is not significant. The overall CHS utilization rate was 0.62 visits per capita per year. The rate was highest in the most remote Zone 3 (mean: 1.04; 95% CI [0.80, 1.29]), compared with Zone 2 (mean: 0.83; 95% CI [0.69, 0.97]) and Zone 1 (mean: 0.39; 95% CI [0.32, 0.46]) (see Table 1). Median values follow the same pattern. The mean number of CHS visits varied significantly not only across the three zones but also within each zone, as can be seen by the relatively high coefficient of variation, particularly in Zone 1 and Zone 3.

Table 1: CHS Utilization Rates per Year by CHS Zone

	Overall	Zone 1	Zone 2	Zone 3
Summary definition	All 3 zones	Urban and peri-urban	Rural not remote	Remote rural
Mean	0.62	0.39	0.83	1.04
Standard deviation (SD)	0.60	0.43	0.56	0.78
95% confidence interval (CI) around the mean	[0.55,0.70]	[0.32, 0.46]	[0.69, 0.97]	[0.80, 1.29]
Median	0.41	0.25	0.75	0.98
Observations	246	137	66	43

Source: Authors' own calculations

CHS SERVICE AVAILABILITY AND READINESS

CHS input availability for service provision varies across geographic zones. Overall survey results indicate that 73.6 percent of CHSs satisfied government regulations with respect to infrastructure requirements. However, only 51.2 percent of CHSs in Zone 3 (remote rural) meet these standards. Some 91.5 percent of commune facilities had at least 70 percent of surveyed equipment in place, but only 17.1 percent of facilities had all required equipment in place. An extremely small share of CHSs (2.8 percent) had 70 percent or more of surveyed medicines in stock. Only a little over half (57.7 percent) of CHSs had a medical doctor present (Table 2).

NCD service availability is quite limited at the CHS. More than a quarter of CHSs do not provide even the most basic level of screening for hypertension (28.5 percent) and diabetes (29.7 percent). The proportion of CHSs providing complete management of hypertension and diabetes (including screening, monitoring of people with risk factors, management and monitoring of treatment, and dispensing of medicines) reached only 9.8 percent and 24.4 percent, respectively.

Table 2: CHS Service Availability and Readiness

		Percentage of CHSs			
Domain	**Variable definition/category**	**Overall (*n* = 246)**	**Zone 1 (*n* = 137)**	**Zone 2 (*n* = 66)**	**Zone 3 (*n* = 43)**
		%	%	%	%
Health infrastructure	Building area and number of rooms meet Decision 4667 benchmarks	73.6	78.1	78.8	51.2
Basic equipment/ instruments	Have at least 70% of surveyed equipment at time of survey	91.5	89.8	95.3	90.7
Medicines	Have at least 70% of surveyed medicines at time of survey	2.8	2.2	4.5	2.3
Human resources	Have a contracted or permanent general doctor	57.7	56.9	60.6	55.8
		Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Service readiness scores (range from 0 to 4)	Hypertension service availability	1.99 (1.57)	1.86 (1.61)	2.10 (1.86)	2.21 (1.52)
	Diabetes service availability	1.67 (1.35)	1.61 (1.35)	1.82 (1.40)	1.65 (1.25)

Source: Authors' own calculations
Note: SD = Standard deviation.

RELATIONSHIP BETWEEN CHS SERVICE READINESS AND CHS HEALTH SERVICE UTILIZATION

Table 3 present the results of the five incremental models examining the relationship between CHS service readiness and CHS utilization rates. The coefficients and level of significance of each variable are relatively stable across models as additional domains of service readiness are introduced.

In all the models, the remoteness of the CHS was a significant confounding variable affecting overall level of CHS utilization rates. CHSs in Zone 2 and Zone 3 had significantly higher utilization rates compared to the reference category of Zone 1. In the final model, CHSs in Zone 3 had 2.9 times as many visits per capita than those in Zone 1, whereas CHSs in Zone 2 had 2.2 times as many visits per capita as those in Zone 1.

Of the five domains of service readiness examined in the models, four variables in three domains were significantly associated with increased CHS utilization rates. These were CHS infrastructure meeting national standards, availability of equipment, hypertension service availability score, and diabetes service availability scores. The other two variables examined—presence of a medical doctor and availability of medicines—were not significantly associated with CHS service utilization.

In the final model (model 5), visits per capita were 1.36 times as high when the CHS met the government's infrastructure standards, and 1.80 times as high when equipment availability met the 70 percent threshold than when it did not. Beyond infrastructure and equipment, the availability of NCD-related services is also positively associated with CHS utilization. Total CHS visits per capita is 1.15 times as high for each additional service

element provided in the hypertension package, and 1.11 times as high for each additional service element provided in the diabetes package.

Table 3: Incremental Negative Binomial Models to Measure the Association between Service Readiness Domains and CHS Service Utilization

Explanatory variables	Model 1			Model 2			Model 3			Model 4			Model 5		
	RR	**95% CI**	***p*-value**	**RR**	**95% CI**	***p*-value**	**RR**	**95% CI**	***p*-value**	**RR**	**95% CI**	***p*-value**	**RR**	**95% CI**	***p*-value**
CHS Zone 2 vs. Zone 1	2.18	[1.65, 2.88]	0.00	2.18	[1.66, 2.86]	0.00	2.14	[1.63, 28.2]	0.00	2.13	[1.62, 2.80]	0.00	2.22	[1.74, 2.85]	0.00
CHS Zone 3 vs. Zone 1	3.11	[2.21, 4.38]	0.00	2.86	[2.04, 4.02]	0.00	2.85	[2.03, 3.99]	0.00	2.83	[2.02, 3.98]	0.00	2.87	[2.13, 3.88]	0.00
Infrastructure	1.51	[1.14, 2.01]	0.00	1.39	[1.05, 1.84]	0.02	1.39	[1.05, 1.85]	0.02	1.38	[1.04, 1.84]	0.03	1.36	[1.06, 1.75]	0.02
Equipment				2.11	[1.37, 3.25]	0.00	2.07	[1.35, 3.18]	0.00	2.07	[1.34, 3.18]	0.00	1.80	[1.22, 2.65]	0.00
Medicines							1.67	[0.83, 3.36]	0.15	1.65	[0.82, 3.33]	0.16	1.25	[0.66, 2.36]	0.50
Medical doctor										1.08	[0.85, 1.37]	0.53	1.13	[0.91, 1.39]	0.28
Hypertension service availability score													1.15	[1.06, 1.24]	0.00
Diabetes service availability score													1.11	[1.01, 1.22]	0.02

Source: Authors' own calculations

Note: RR = Rate ratio; CI = Confidence interval.

SIMULATIONS OF POTENTIAL CHS UTILIZATION RATES FOR DIFFERENT INVESTMENT SCENARIOS

Five variables were significantly associated with higher CHS utilization rates. Of these, four can be modified through investment (by government or donor-funded projects or communities) to improve CHS readiness, whereas the geographic zone where the CHS is located cannot be changed. This section quantifies the potential CHS utilization rates that could be achieved through investments in improving service readiness. However, it is important to keep in mind that these estimates are subject to some uncertainty, given the limitations of the model using cross-sectional data.

The first scenario is the hypothetical worst-case scenario, where all values are set to the worst level. In this scenario, the average number of CHS visits per capita would reach only 0.1 in Zone 1 and 0.28 in Zone 3. The second scenario is the baseline scenario, where all CHS values are set to the average of that CHS's zone. In this scenario, the simulated utilization rate would be 0.17 in Zone 1, rising to 0.55 in Zone 3. The third scenario examines what would happen if investments were made to bring the infrastructure and equipment in each facility to the benchmark level (that is, the building area and number of rooms meet government standards, and at least 70 percent of surveyed equipment is available), holding NCD service availability at zonal averages. This scenario doubles the CHS utilization rates compared to what would be obtained with current average levels of service readiness in each zone. The utilization rate would increase to 0.36 in Zone 1, 0.85 in Zone 2, and 1.10 in Zone 3. The fourth scenario looks at what would happen if investments are sufficient to ensure not only infrastructure and equipment availability, but also that CHSs can provide all four service elements for both hypertension and diabetes. Compared to the baseline (zonal average) scenario, CHS utilization rates could potentially increase by a factor of 3.6 in Zone 1 (to 0.62), by a factor of 3.7 in Zone 2 (to 1.39), and by a factor of 3.3 in Zone 3 (to 1.80). Compared to the worst-case scenario, where all CHSs have insufficient infrastructure and equipment and lack capacity to deliver any NCD service, the utilization rate in communes where infrastructure is sufficient, equipment is available, and the CHS is fully able to manage hypertension and diabetes is potentially more than six times as high in all zones (6.2 as high in Zone 1, 6.6 as high in Zone 2, and 6.4 times as high in Zone 3).

Table 4: Simulated CHS Utilization Rates for Different Hypothetical Service Readiness Scenarios

Scenario	Zone 1	Zone 2	Zone 3
Worst cases (no CHS meeting infrastructure standard, less than 70% of equipment, and no services for hypertension and diabetes)	0.10	0.21	0.28
Current average levels of each variable in each zone	0.17	0.38	0.55
All CHSs in zone meet infrastructure standards and have 70% of equipment on list	0.36	0.85	1.10
All CHSs in zone meet infrastructure standards, have at least 70% of equipment on list, and offer full set of NCD (hypertension and diabetes) services	0.62	1.39	1.80

Source: Authors' own calculations

DISCUSSION AND RECOMMENDATIONS

DISCUSSION

This study exploited secondary data from the 2015 Vietnam DCHFS to examine the rates of primary curative care service use at CHSs in different geographic zones and the relationship between various domains of CHS service readiness and service use. The findings are important not only for informing the design and location of investments in the CHS but also, more generally, for strengthening primary health care in Vietnam.

CHSs are the appropriate level and type of facilities to provide people-centered care that integrates basic curative, preventive, and promotive services and serves as a first point of contact and care coordinator within the health system. For those requiring more complex care, the CHS can help ensure that patients are referred to the most appropriate level and place to obtain care. However, the finding that the patient load at CHSs is, on average, low at 0.62 CHS visits per capita in 2014, indicates that CHSs are not currently fulfilling this role. Moreover, these data do not reflect the effects of the policy change that came into effect in January 2016, allowing the population free choice of any district and lower-level facility when seeking care, essentially eliminating higher insurance copayments as a deterrent to seeking primary health care in a hospital setting.[6] Anecdotal evidence suggests that this policy has further reduced the population's reliance on the CHS for primary curative care.

Results also show that CHS service utilization varies significantly across geographic zones. Whereas the average number of CHS visits per capita in 2014 was only 0.39 visits for CHSs in more urban settings (Zone 1), for CHSs in remote rural areas (Zone 3), this figure was 1.04. The difference in patient load across CHSs in different geographical areas can be explained by the fact that in remote areas it is typically very difficult (for example, in mountainous areas) or very far for patients to travel to the district hospital, and there are also fewer private services. This means that CHSs are more likely to be used as the first, or even only, point of contact with the health care system. By contrast, in Zone 1 (typically urban areas where CHSs are very close to the district hospital), patients can easily bypass CHSs to go directly to district hospitals or, alternatively, use private health care services for basic and effective primary care—which is also available at the CHS—for responding to common medical conditions. From a health system's perspective, this bypassing behavior is costly. Moreover, since hospitals and private services focus mainly on curative care, people who bypass the CHS level also potentially miss out on the promotive and preventive services (including opportunistic screening) that they can obtain at the CHS.

When simultaneously examining five domains of service readiness in the final model, we find that three domains of service readiness have a significant association with CHS health services utilization: sufficiency of health infrastructure, availability of basic equipment, and ability to deliver services related to NCDs. CHSs whose building area and number of rooms for patient and facility administration met the benchmark requirement in the Ministry of Health's Decision 4667 had utilization rates 1.4 times as high as rates in those that did not meet these benchmarks (RR = 1.36). Interpretation of this finding requires some

6. The new policy is stipulated in Health Insurance Law Revision and Amendment 2014, Clause 3, Article 22.

caution, as data are limited to a cross-section of CHSs at one point in time, making it impossible to rule out potential temporal bias or reverse causality. Our interpretation is that the larger building area and number of rooms of the CHSs that meet the benchmarks make them better able to provide services and, therefore, more attractive to patients, resulting in higher utilization rates. However, it is also possible that CHSs with higher patient loads receive more resources, or that their staff have more motivation, to upgrade their building area to meet the benchmark requirement. The data are inadequate for us to determine the direction of causality.

The importance of having adequate equipment and instruments to provide quality health care services has been emphasized in the literature [14]. In fact, all the conceptual frameworks for health care delivery that were reviewed in the preparation of this paper include adequate equipment and medicines as key determinants of service utilization [2, 3,15]. The results of this study support the following theory: CHSs that have at least 70 percent of surveyed equipment have rates of services utilization that are 1.80 times as high as CHSs that have less than 70 percent of the equipment. One limitation is that the DCHFS collected information on only 16 equipment items. While the survey team considered these items to be representative of those items that the CHS are required to have to provide basic services, the complete list of equipment recommended by the MOH is much longer.[7] However, since most CHS primary curative care services rely primarily on basic clinical exams for which limited equipment is required, it is reasonable to think that even this more limited equipment list could be important in terms of a visible signal of adequacy of service quality and, thus, an important determinant in deciding whether and where to seek care.

While the disease burden in Vietnam has shifted such that, in 2017, NCDs accounted for 79 percent of total deaths and 74 percent of the disease burden [16], the health system is not yet able to provide a comprehensive package of NCD services, including both curative and preventive care. We find a significant association between the availability of hypertension/diabetes services and CHS utilization; the more elements of the hypertension and diabetes service packages that are available, the higher the intensity of service use. This finding is important because it shows that if the CHS could provide a comprehensive set of NCD services, the number of visits to the CHS would likely increase. The higher utilization rates could result from a more comprehensive scope of services being interpreted by people as a signal of overall service quality (and, would, therefore make the CHS more attractive to people regardless of the type of care they are seeking). Higher utilization could also result from the fact that these types of diseases, if managed properly, require monthly visits to a health care provider. From a health system's perspective, if CHSs were able to play a stronger role in providing outpatient services for NCDs, they would also reduce the burden of NCD management at the higher, less convenient, and more expensive levels of care.

While only three domains of service readiness were found to be significantly associated with CHS utilization, it does not necessarily follow that the other domains not significantly associated with CHS utilization are not important areas for future policy intervention. Rather, the lack of a statistically significant association could stem from insufficient statistical power to detect an effect with a sample size of 246 CHSs or could arise if the

7. MOH Decision 1020/2004/QĐ-BYT, issuing CHS design standards.

variables used are inadequate proxies for the concepts that they are supposed to measure. For example, the availability of medicines was proxied by only 30 medicines, despite the much longer list of medicines stipulated in regulations. If the proxy variable used for medicine availability inadequately reflects the availability of drugs needed by patients using the CHS, this could explain the failure to find a statistically significant association for medicine availability. The fact that only a small share of CHSs (2.8 percent) exceeds the 70 percent threshold of medicines availability may also explain the nonsignificant association between the availability of medicines and health service utilization.

Although the sampling procedure (used to collect the data in the original study) was intended to select a typical province for each region and allow comparison between more urbanized areas and more rural areas, the selection of only six provinces may be insufficient to ensure the generalizability of the findings to all provinces in Vietnam. While the selected six provinces were considered by the survey team to be “representative” of their regions and sufficiently varied in their socioeconomic conditions, and within each province the CHSs were selected using stratified randomly sampling, generalization to all 63 provinces of Vietnam should be made with caution.

This secondary data analysis enabled us to examine a broad range of CHS characteristics in the model. Results highlighted some significant associations between modifiable CHS characteristics and service utilization, which suggest that investments in CHS infrastructure, CHS equipment, and the capacity of CHSs to deliver NCD management services (specifically hypertension and diabetes) would likely increase patient utilization at this level of the health care system. However, all the results should be interpreted considering the limitations, including the sample size and representativeness, possible measurement issues, and cross-sectional nature of the data.

RECOMMENDATIONS

From a policy, program, and project perspective, the results of this analysis suggest that investments in CHSs in Zone 3 and Zone 2 should be prioritized over investments in CHSs in Zone 1. The service improvements resulting from such investments are more likely to be used due to the higher CHS utilization rates in these communes. The investments would increase the capacity of the communes to address a large share of unmet health needs and help the population avoid the higher costs of seeking care in distant higher-level facilities. In addition, because the population in these zones tends to be socioeconomically disadvantaged relative to those in Zone 1, such targeted investments can also help achieve equity objectives.

Second, the analysis confirms the importance of investing in facility infrastructure and equipment, by establishing a strong, positive, and significant association between the adequacy of these investments and service utilization. Although such physical investments are unlikely to be a sufficient condition to improve the technical effectiveness of CHS services (although they may contribute to it, for example, through better workflow and conditions), they are a highly visible sign to people that the CHS has been strengthened and, as such, these improvements are likely to boost trust in CHS services and encourage utilization.

Expanding the availability of NCD screening and management services, particularly for hypertension and diabetes, should be another priority if policy makers wish to increase CHS utilization rates. Not only does this increase convenience for people, it also reduces the financial burden on patients (and the health insurance fund). Moreover, it facilitates better integration of care, where disease monitoring and drug dispensing can be provided as part of a more holistic package of care that can also include lifestyle counseling. Expanding availability of these comprehensive care packages is likely to require a number of complementary policies and interventions, for example, to ensure the availability of appropriate drugs, allow for health insurance reimbursement, adequately train CHS health workers (including to work as a team and in collaboration with village health workers), and revise remuneration policies to compensate for the higher intensity of work.

Any future rounds of the Vietnam DCHFS should consider the multiple purposes the data can be used for, including analysis related to factors influencing CHS utilization rates. Also, if follow-up surveys were to be conducted in the same CHSs, it would be possible to create a panel data set with greater capacity to identify causal effects. A follow-up survey, including with a panel data structure, would also permit the examination of the impacts of recent changes in the functions and roles of the CHS (Circular 33/2015/TT-BYT), the new basic health services package policy (Circular 39/2017/TT-BYT), and the revised health insurance law that removed financial incentives for patients to seek care at the CHS level for primary health care. Further qualitative and quantitative research is also needed to better understand why people opt out of using the CHS.

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This analysis aims to assess the association between commune health station (CHS) service readiness and health service utilization to inform the design of a World Bank project and policies to strengthen primary health care in Vietnam. Using data drawn from the 2015 Vietnam District and Commune Health Facility Survey (DCHFS), a series of multivariate negative binomial regressions was estimated to measure the association between domains of service readiness and CHS utilization rates (average number of visits per capita). First, the average number of CHS visits per capita is highest in the more remote and disadvantaged areas, that is, Zone 3 (1.04 visits per capita per year, 95% confidence interval [CI] [0.8,1.3]) and substantially lower in the urban / peri-urban Zone 1 (0.39 visits per capita, 95% CI [0.7, 1.0]). However, there is substantial variation in the average number of CHS visits per capita within each zone. Second, among the domains of service readiness explored, the difference across zones is starkest for infrastructure, with only half of the CHSs in Zone 3 meeting the standards, compared to almost four-fifths in Zones 1 and 2. Third, three domains of service readiness are significantly associated with higher CHS utilization rates: health infrastructure (whether the building area and number of rooms in the facility meet national benchmark standards), basic equipment availability (facility has at least 70 percent of surveyed equipment), and capacity to deliver services for noncommunicable diseases (hypertension and diabetes). Fourth, simulations suggest that if all three statistically significant modifiable CHS characteristics were to be improved from their current level, and the assumptions of the model are correct, then the predicted utilization rate of the CHS could be 3.3 to 3.7 times (depending on the CHS zone) as high as current levels.

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