

Working paper

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Understanding the Allocation of Public Personnel Across Government Health Facilities in Ghana

Binta Zahra Diop*, Koku Awoonor-Williams[†], Anthony Ofori[‡]
and Martin J. Williams^{§¶}

March 2019

Abstract

In order to deliver public services, governments must allocate scarce human and financial resources across their territories, yet there is little systematic evidence on the productivity of these inputs or allocative efficiency with which governments allocate them. We study this by leveraging a unique panel dataset of service delivery, health outcomes, and human and financial inputs in the universe of over 5,000 public health facilities in Ghana. Our research design allows us to estimate the marginal returns to health personnel and inputs, while controlling for unobserved heterogeneity across facilities. We document the roles and current distribution of the different types of health workers and facilities within the health system, and investigate the relationship between patient volume and the number of health workers in a facility. We discuss implications for optimal staffing allocations and further research.

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1 Introduction

Frontline public services are delivered by government officials working in facilities spread across the country. Government must therefore decide how to allocate these scarce human resources and complement them with financial inputs. Since paying these workers typically consumes a significant proportion of government expenditures, governments have an enormous financial stake in hiring the correct number and type of workers and distributing them efficiently across different areas and different types of facilities. While apparent allocational issues are widely noted and much debated, surprisingly little empirical evidence exists on variation in public worker productivity (and hence allocational efficiency) within countries.

This paper is an attempt to shed light on these issues, using a unique panel dataset of the universe of Ghana's public sector health facilities. We will show an overview of the countries facilities and focus on the Ashanti region. We aim to make two main contributions.

First, investigate the allocation of staff for each type of facility. Though mostly descriptive, this exercise is essential in order to be able to undertake deeper types of analysis. We are able to then understand the difference in staffing across different facility types, which in turn can be a stepping stone to an in-depth analysis of the staffing practices and matching efficiency of the health care system in Ghana.

Second, we describe how the average number of outpatients seen by a facility varies with its staff strength. We show this for different facility types and different types of health workers. To do so, we are using Ghana's District Health Information Management System II (DHIMS II), a database of health service delivery in all health facilities nationwide. The data in DHIMS II is rich: it contains hundreds of indicators of service delivery for all facilities nationwide, every month for the past several years, all collected and validated by GHS. It also contains information on the number of health personnel posted to each facility, and their revenues and expenditures.

This paper is the first step towards a larger body of work we hope to complete using these data. In addition to this descriptive piece of work, we hope to expand this work to first, estimate the marginal productivity of health workers with respect to the quantity and quality of health service delivery in Ghana. We would measure the impacts of these inputs on two types of dependent variables: the *quantity* of health services and health service *quality*. Second, we plan to investigate the productivity and allocation of non-salary financial resources. Estimating the causal impact of financial resources on health outputs and quality is more challenging, because the main sources of facility funding are both endogenous to quantity/quality and time-variant. Finally, we would estimate the overall allocative (in)efficiency

a non-OECD context, most of these studies are at the macro-level, and compare health-system across countries. Studies looking at health-care workers' quality are often done using survey data (Geldsetzer et al., 2018), on very small samples (Alhassan et al., 2013). Using administrative data, Goldstein et al. (2013) assess the impact of absenteeism on health outcomes in Kenya.

This study contributes to an existing body of literature that estimates returns to health inputs (Jensen and Morrisey, 1986; McGuire, 1987; Vita, 1990; Card et al., 2009; Weinstein and Skinner, 2010; Doyle, 2011; Santías et al., 2011; Romley and Sood, 2013). Whereas this existing literature is overwhelmingly focused on samples of a small number of large hospitals in OECD countries, we investigate these questions in the context of the universe of public facilities in a lower-middle income country. Our study is also related to studies of education production functions, class sizes, and teacher value-added Hanushek (2008); Hanushek and Rivkin (2010) (Muralidharan and Sundararaman, 2013), but differs in that we are focused primarily on allocational issues.

3 Context and Data

3.1 Institutional Context

Public health care in Ghana is delivered through the Ghana Health Service (GHS), which was established in 1996 under the Ministry of Health. GHS is organized across three main administrative levels - national, regional, and district - which correspond to Ghana's sub-national decentralization structure.¹ Health care is delivered through a network of over 6,000 public facilities that are managed at the levels corresponding to these sub-divisions. At the national level, GHS's council and national division directorates monitor facilities at the lower levels and directly oversee a small number of teaching hospitals. At the regional level, regional hospitals provide extensive curative services and some public health services. At the district level, slightly more limited curative services are provided by district hospitals. Within districts, curative and public services are provided by a range of facility types (polyclinics, health centers, clinics, maternity homes) as well as Community-Based Health Planning and Services (CHPS) facilities that provide basic public health services to geographic zones of approximately 5,000 people each, and which are the most numerous type of facility. While

¹Formally, Ghana's districts are classified as either Metropolitan, Municipal, or District Assemblies, depending on their size and degree of urbanization. However, these distinctions have little impact on health service delivery, and so for brevity we refer simply to "districts" throughout. GHS has two additional administrative levels - sub-district and community - that operate below district level, but in most cases these levels do not have their own staff and are not operational as decision-making structures.

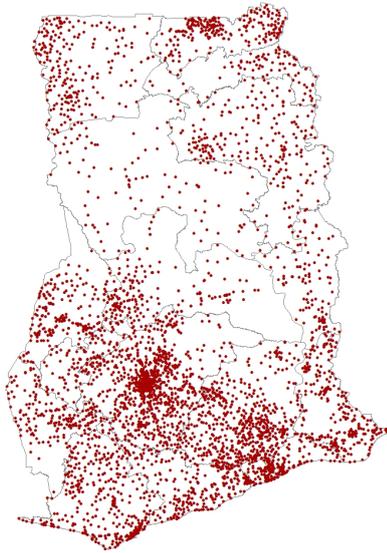
some CHPS facilities have a physical compound, others are simply geographic zones with roving health workers.

All these facilities, along with privately owned and ran facilities make-up a network of nearly 10,000. The majority of these are public facilities operated by the Ghana Health Service. While these facilities vary in size and functions, most are small (<10 personnel) and some (CHPS zones) do not have a physical structure.

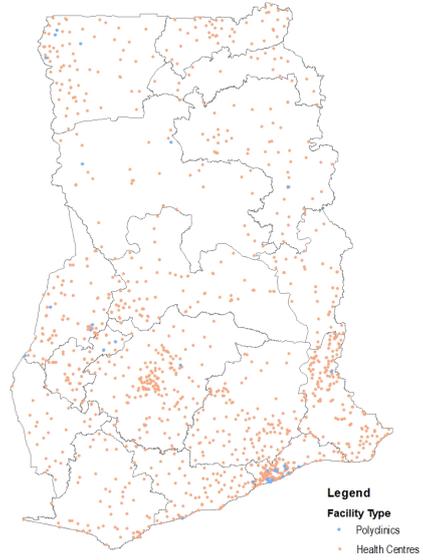
In addition to this network of public facilities managed by GHS, there are also about 1,500 non-GHS health facilities operated by private operators or non-profit organizations such as the Christian Health Association of Ghana. According to one estimate, approximately half of individuals use private health facilities, with the use of private facilities higher in urban than rural areas Saleh (2012). While these private facilities are registered with GHS and thus appear in our dataset, unfortunately the completeness of the input and health output/quality data is much more limited than for public facilities, and so we exclude private facilities from our main analysis.

Allocations of personnel to these facilities occurs through a centralized process, in levels that correspond to Ghana's decentralization structure: GHS's national headquarters allocates personnel to the ten regional governments; each regional government allocates these personnel across its districts; and each district then allocates them across its various facilities. All salaries are paid directly by the central government from the general budget. Thus the staffing level of each public facility is determined by the district, not by the facility itself (with the exception of non-clinical staff, such as cleaners and guards, which some facilities hire themselves), while the overall number of health workers of each type is determined at the national level. While there exist formal staffing norms for some facility types and efforts are made to ensure some degree of balance across facilities , in practice districts have a significant degree of discretion with staff allocation. While staff do not formally have a say in where they are posted, in practice they can formally or informally request or lobby for postings, with positions in urban areas typically being more desirable and relatively fewer staff willing to work in rural areas . Staff interests thus represent a partial constraint on districts' ability to allocate staff to facilities, although GHS retains the final decision in all cases.

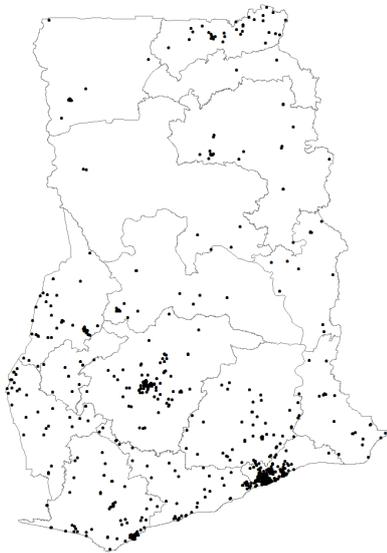
Facilities have four sources of funds for non-personnel recurrent expenditures: 1) insurance reimbursements, overwhelmingly from the tax- and subscription-funded National Health Insurance Scheme (NHIS) which reimburses facilities for procedures conducted; 2) internally generated funds (IGF) from fee-for-service cash payments; and 3) financial or in-kind subventions from government or 4) donors (Akortsu and Abor (2011), Republic of Ghana 2015).



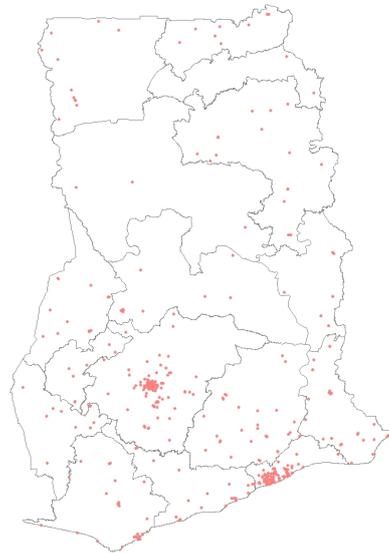
CHPS



Health Centers and Polyclinics



Clinics



Hospitals

Figure 1: Geographic Distribution of Health Facilities in Ghana

The funds received from NHIS and IGF are endogenous to the quantity of services delivered. Since not all facilities receive government or donor subvention regularly, NHIS and IGF constitute the majority of the operating budget of most facilities. All facilities except CHPS have their own bank accounts and are responsible for managing funds and undertaking their own procurement of most supplies. The accounts of CHPS are managed by larger facilities within their district, which also conduct bulk procurement and distribute the supplies directly to CHPS facilities.

	Hospital	Health Centers (rural) Polyclinic (urban) Clinic	CHPS
Description administrative level most common staff in-patients surgeries	Distr./Region/Nation All Yes Yes	District Nurses and midwives Sometimes (Polyclinics) Sometimes (Simple ones)	Sub-District Nurses No No
Services offered curative public health	Yes Limited	Yes Yes	No Basic
Personnel Allocation medical & admin. staff other staff	GHS allocates staff to regions, then regions allocate staff to regional hospitals and districts, then districts allocate staff to district level facility and sub-district administration and sub-districts facilities At the discretion of the facility		N.A.
Finance subventions salaries NHIS claims external (donors)	Not regularly disbursed and varies in size Paid by the ministry of health to medical staff. This source of financing is independent of the services offered by the facility or the type of facility Facility submits claims via districts to NHIS, which reimburses the claims it deems legitimate. Not regularly disbursed, varies in size and very targeted		No

Table 1: Facility Characteristics

The NHIS scheme, rolled out beginning in 2003, covers the costs of hospitalizations, outpatient doctor visits, basic laboratory testings and certain medication for enrolled participants (Mensah et al., 2010). Individuals enroll through payment of an annual premium, except for pregnant and nursing mothers for whom enrollment is free. For NHIS participants, medical care is free at the point of service. Facilities across the country bill the NHIS monthly for patients that utilize health care services under their insurance. The NHIS then issues reimbursements through the regional level GHS administration, which forwards the reimbursements on to regional health care facilities and to the districts. GHS administration at the district level then forwards the reimbursements back to the originating facilities. All facilities do still operate a pay-for-service system for individuals who are not insured, known colloquially as “cash-and-carry”, with the funds from this and other services not covered by NHIS forming the facility’s IGF revenue.

Delays in the payments of services billed through the NHIS as well as delays in the disbursement of subsidies by the central government are common and there is anecdotal evidence that these put financial strain on facilities that then struggle to provide adequate health care services to its client pool. (Akortsu and Abor, 2011). The component of this delay that results from delayed processing by other bureaucracies (external to the originating facility) is independent from facilities’ performance, and thus plausibly exogenous. In particular, because reimbursement and subvention payments have to be channelled through the different levels of the decentralized governing systems, from national to regional to district to facility level, there is likely to be correlation in facility-level delays in receiving funds that is exogenous to facility performance, and thus a potential instrumental variable. However, the extent to which delays in fund receipt translate into actual operational shortfalls is unclear, and there is anecdotal evidence that some facilities use formal or informal supplier credit agreements to cushion the impact of these delays.

GHS's definitions (Ministry of Health (2011))

Community health nurses

“The provision of personal public health service like immunizations, growth monitoring and Vitamin A supplements distribution is the responsibility of the Community Health Nurse (CHN) in both rural and urban areas. Some CHNs are based in health centres and organize outreaches to provide services into communities. However, in the CHPS programme, Community Health Officers, usually made up of Community Health Nurses are stationed in hard to reach communities to deliver ‘close to client’ services mainly through home visits. Other public health services like sale of food and iodated salt are through the markets. ”

Enrolled nurses

“Provide basic nursing care for people who are in need of such care due to effects of ageing, illness, injury, or other physical or mental impairment. They implement care, treatment and referral plans established by medical, nursing and other health professionals. Occupations included in this category normally require formal training in nursing services. Occupations included in this category normally require completion of tertiary- level education in theoretical and practical midwifery.”

Professional nurses

“Plan, manage, provide and evaluate nursing care services for persons in need of such care due to effects of illness, injury, or other physical or mental impairment, or potential risks for health. They work autonomously or in teams with medical doctors and other health workers. They may supervise the implementation of nursing care plans, and conduct nursing education activities. Occupations included in this category normally require completion of tertiary- level education in theoretical and practical nursing.”

3.2 Data

We use administrative data aggregated at the facility level. The main data source is the District Health Information Management System II (DHIMS II) system nationwide, operated by GHS. DHIMS II includes detailed data on: procedures undertaken and services rendered, such as the number of patient consultations, births delivered by a skilled attendant, etc.; selected health outcomes, such as morbidity rates; and disease patterns (GHS n.d.). The data covers all public facilities nationwide at monthly intervals from 2008 to present, and is frequently audited and checked for accuracy by GHS.

DHIMS II also has biannual data on the number of staff of different types (doctor, nurse, midwife, accountant, etc.) for each facility, as well as monthly financial data on revenue from different sources and expenditure on different classes of recurrent expenditure (e.g. office supplies, different types of medical supplies). Both data sources are also at facility level from 2016 to present.

In addition, we worked with GHS and the Centre for Remote Sensing and Geographic Information Systems (CERSGIS) at the University of Ghana to complete the digitization of the locations of the 8,883 public and private health facilities in Ghana, in order to aid in identifying potential spillovers across clinics. Previously under half of facilities were geolocated; we were eventually able to attach coordinate data to 94 percent of facilities.

The human resource (HR) data available in DHIMS II contains the number of health workers of each type assigned to the facility, however, the HR data in DHIMS II is not as thoroughly audited because it is also collected by the HR division of the ministry of health. For that reason, the data is incomplete for many facilities. We therefore obtained human resource data from one regional health office the Ashanti region for the period spanning between January 2016 and January 2019.

From the DHIMS II data we identify variables that allow us to measure the quality and the quantity of services offered to patients who use the Ghanaian health care system. We identify a suite of variables that are generally measuring the output of the production function; those include the total number of patients who chose to go to public health care providers, the total number of patients who are repeated users of the system.

4 The Measurement and Allocation of Health Inputs and Outputs

Having discussed the institutional context and data associated with health service delivery in Ghana, we now turn to the issue of the measurement of health inputs and outputs in Ghana. Measuring both of these is challenging, both for conceptual reasons and practical ones. We first discuss the measurement of personnel inputs across different facility types, showing that accurately measuring inputs requires a detailed understanding not only of the roles of different worker types in different facilities, but also how staff are distributed in

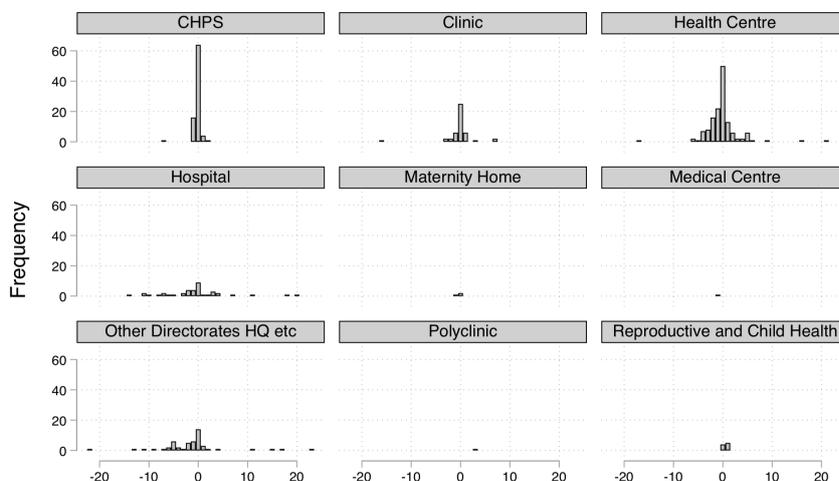


Figure 2: Changes in Number of Nurses between 2017 and 2018

practice and how this is captured in the data. We then examine the relationship of these staff allocations to the most basic measure of quantity of health service delivery, the quantity of outpatients seen.

4.1 The Measurement and Distribution of Personnel

Table A1 shows the median, mean, and maximum number of each type of health workers posted to each facility, by facility type. Note that doctors work almost exclusively in hospitals, midwives work mainly in hospitals and health centres and (poly-)clinics, and nurses (of slightly different types) are present across all facilities.

Table A1 also illustrates one limitation of the data: DHIMS codes all missing variables as zeroes, which is the likely reason why the median hospital appears to have no doctors. To deal with this, in our analysis below we typically restrict the sample and variables to those for which we expect non-zero values to minimize the scope for measurement error. In addition, we plan to impose missing values on all variables for facility-months in which we observe multiple variables for which we expect non-zero values.

Figure 2 presents a histogram of the changes in number of nurses from January 2017 to January 2018. There is a significant amount of variation in the size of the staff in all the different types of facilities. This means that there are expansions and contractions of the labor force in all facility types. Those are quite promising for our planned analysis on the marginal impacts of of staff on the quality and quantity of staff.

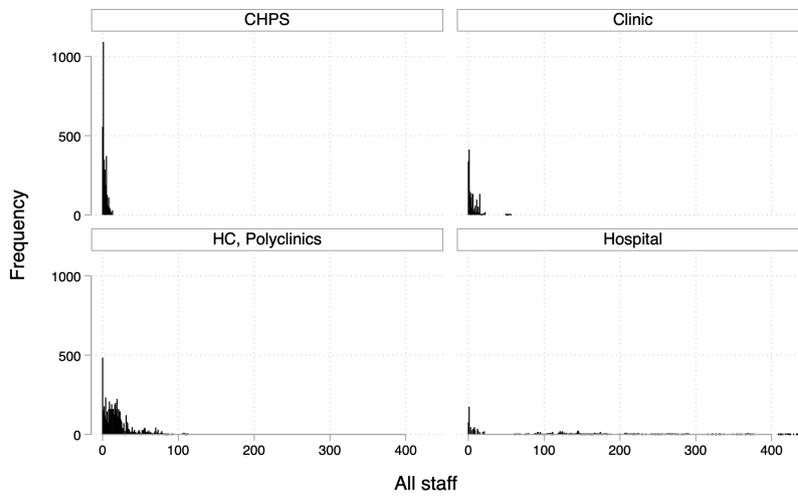
Insured INP				
	Hospitals	HC, PolyClinics	CHPS	Clinic
median	351	0	0	0
mean	393.96	1.25	0	.29
max	3333	587	0	67
New Non-Insured OPD				
	Hospitals	HC, PolyClinics	CHPS	Clinic
median	188	19	0	0
mean	265.24	54.14	4.19	19.07
max	6790	4123	5564	2907
New-Insured OPD				
	Hospitals	HC, PolyClinics	CHPS	Clinic
median	773	84	0	0
mean	1081.44	160.56	14.32	65.31
max	13528	3498	2638	2564
Not-Insured INP				
	Hospitals	HC, PolyClinics	CHPS	Clinic
median	56	0	0	0
mean	69.48	.32	0	.82
max	733	172	0	151
Old Non-Insured OPD				
	Hospitals	HC, PolyClinics	CHPS	Clinic
median	61	5	0	0
mean	182.55	27.1	1.57	41.55
max	4920	2178	856	5787
Old-Insured OPD				
	Hospitals	HC, PolyClinics	CHPS	Clinic
median	1958	113	0	0
mean	2113.56	244.77	16.1	97.3
max	17969	24362	3577	2714
N	92	670	3311	86

Table 2: Average Monthly Patients Seen, By Facility Type in 2018

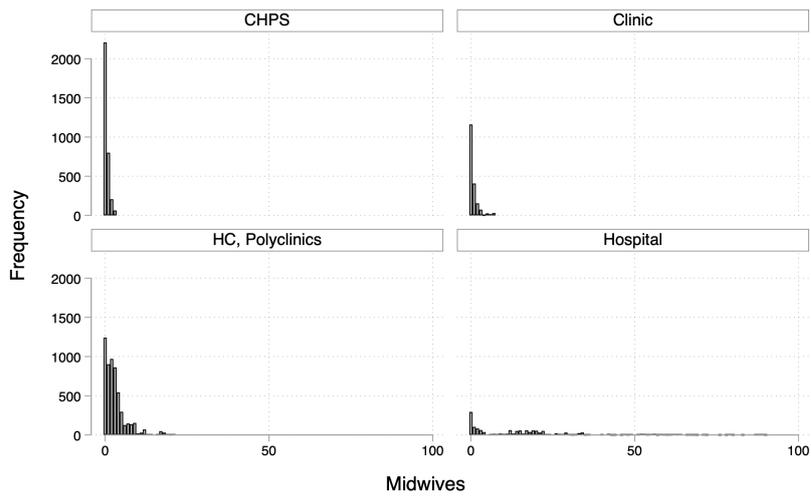
Table 2 presents descriptive statistics of the median, mean, and maximum number of outpatients (OPD) and inpatients (INP) per facility per month. DHIMS distinguishes between “new-insured” outpatients (first-time insured patients) and “old-insured” (repeat insured patients) outpatients and inpatients.

Figure 4, 5 and 6 respectively show the distribution of all staff, community nurses and enrolled nurses of each given type of facility in the Ashanti region.

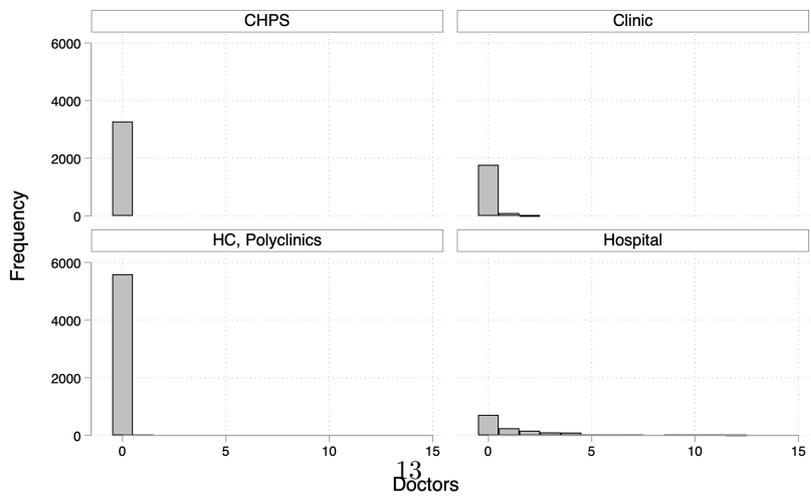
In Figure 4, we show the distribution of the total number of staff in the Ashanti health care



Graphs by Facility type



Graphs by Facility type

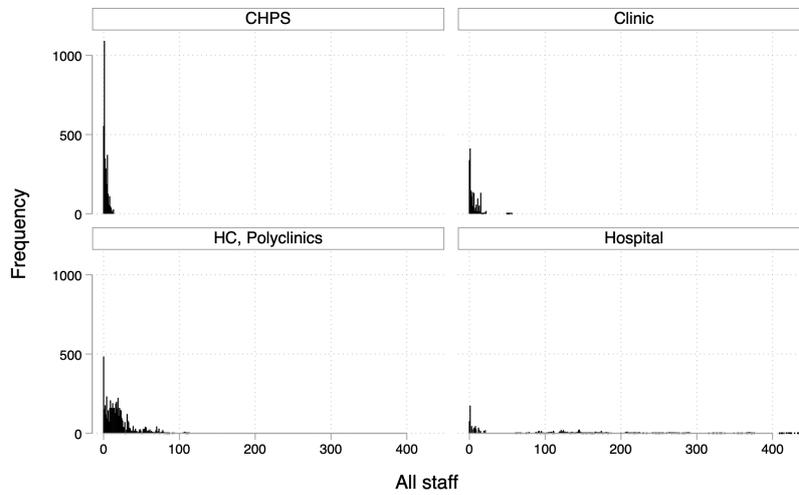


Graphs by Facility type

Figure 3: Ashanti, staff by facility type

Community	Enrolled						Total
	0	1	2	3	4	5	
0	1	93	91	5	25	0	215
1	486	512	99	18	7	2	1,124
2	451	308	412	18	74	2	1,265
3	118	113	45	7	6	3	292
4	153	34	222	4	86	1	500
5	13	17	15	3	4	1	53
Total	1,222	1,077	884	55	202	9	3,449

Table 3: CHPS: Nurses ratio



Graphs by Facility type

Figure 4: Ashanti region: All staff

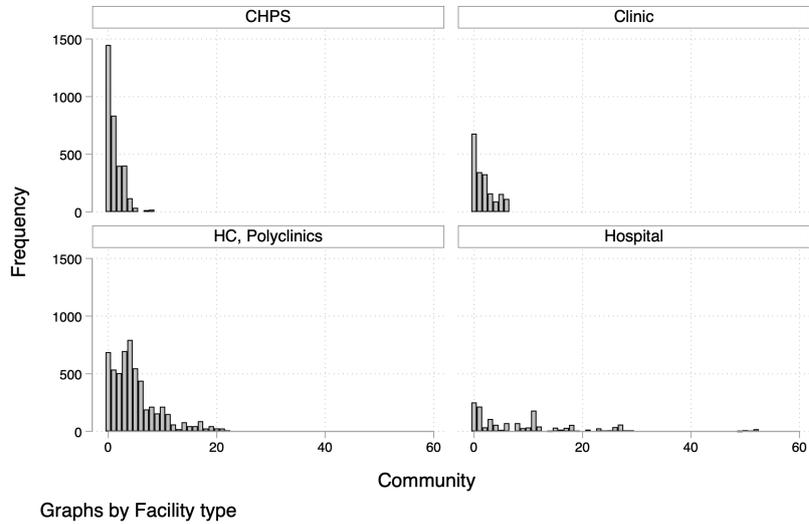
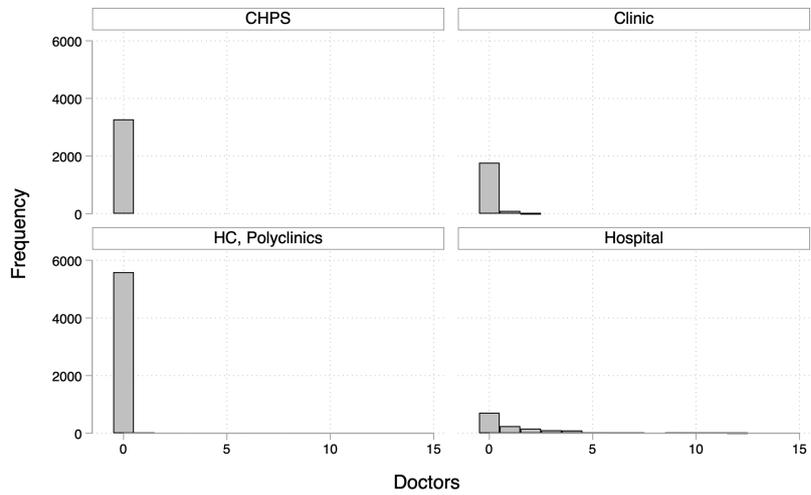


Figure 5: Ashanti region: Community nurses

system. We use data from the Ashanti region’s human resource (HR) data system to allow for a more precise description of the data. The HR data from DHIMS II is not audited in the same way as health information in the DHIMS II, for that reason, using the HR’s system data would yield a more complete picture of the staffing of facilities. We however believe that the issue with the DHIMS II data is mostly about completeness rather than accuracy, this means that some facilities would chose not to report their data but when they do, they report the correct tally.

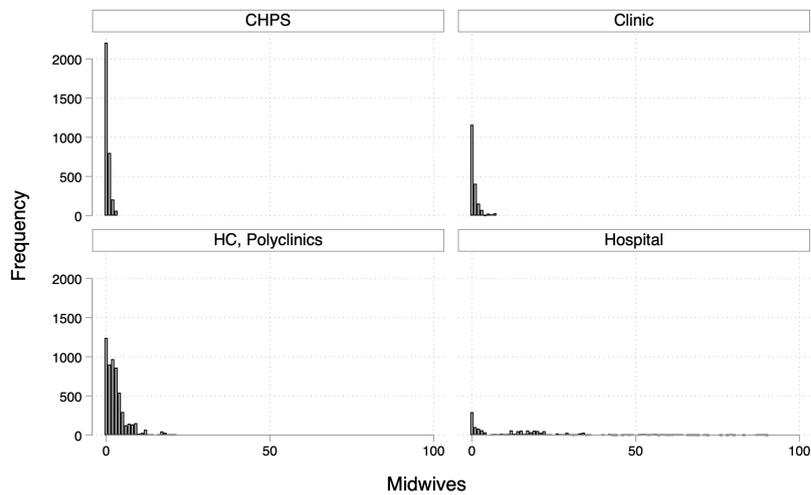
As expected, CHPS are the smallest organizations (figure 4) with mostly a single medical staff running each facility. We see that the most common type of staff in CHPS are community nurses, with a mode at one community nurse.

The second and third smallest organizations, are clinics, and health centers (lumped with polyclinics). These have by design enrolled nurses, and midwives as pivotal staff (see figures 6 and 7). The number of community nurses is also surprisingly large in health centers and polyclinics despite them specializing in CHPS-specific services.



Graphs by Facility type

Figure 6: Ashanti region: Physicians



Graphs by Facility type

Figure 7: Ashanti region: Midwives

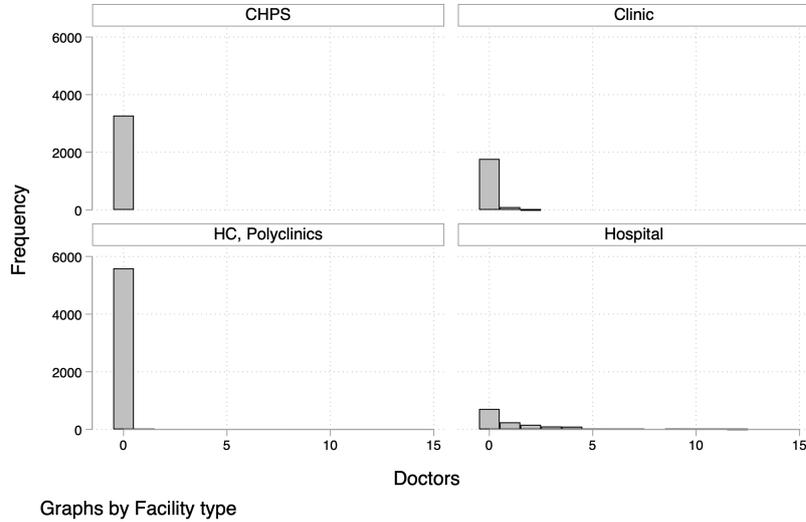
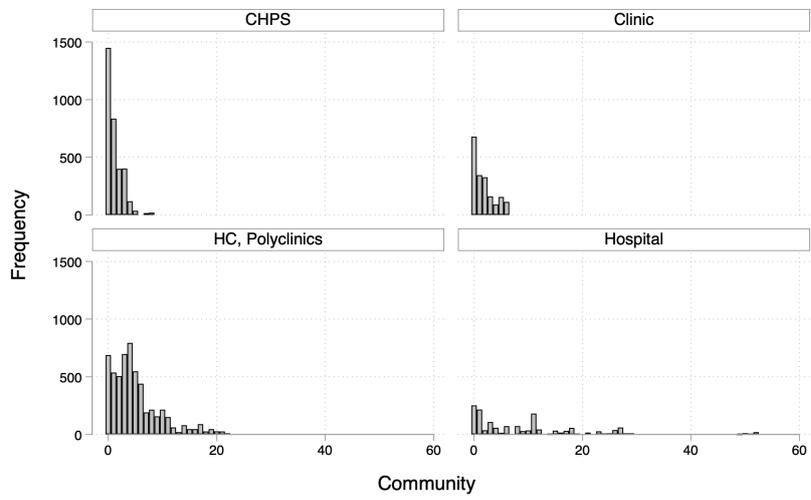


Figure 8: Ashanti region: Doctors

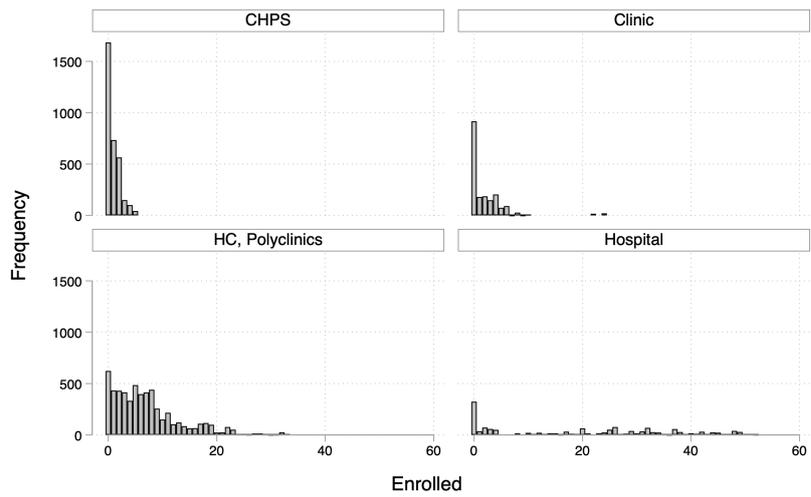
4.2 Descriptive Statistics on Output measures

Figures 10, 11, 12 are attempts at understanding how staff levels are related to health service delivery. For simplicity, we plot separately each type of facilities, and plots the number of staff present against the average monthly outpatient visits we chose to only show outpatient visits because CHPS and most health centers do not offer inpatient care. It is important to emphasize that the relationships these figures reveal are not necessarily causal, as there may be other unobserved facility-level factors that are correlated with the number of personnel as well as the volume of outpatients seen. While we will attempt to establish a causal relationship in future work, for this working paper we aim simply to document these associations.

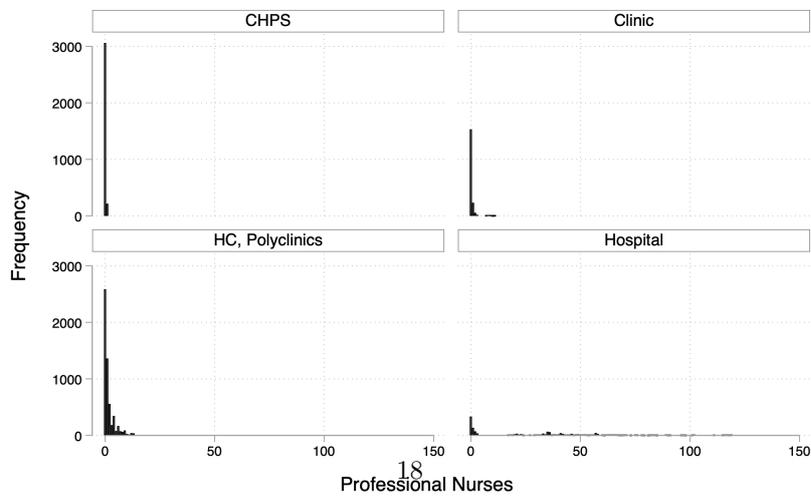
If the marginal return of an extra nurse were constant, we would expect to see a linear relationship between the number of staff and the number of outpatients; that is that every extra medical staff add the same amount of outpatients. In Figure 10, we see that for CHPS, only community nurses display that pattern, and that only for the first three nurses. After the fourth nurse the confidence interval is quite large because typically, CHPS are designed to operate with less than four community nurses. For the other types of nurses, we see that the picture is less consistent, because those nurses are typically not trained to be staffing CHPS. We see in Table 3 that most enrolled nurses who are operating in CHPS zones, are paired with at least one community nurse, this implies that Figure 10 is best to measure average outputs for community nurses rather than other types of nurses. Puzzlingly, higher numbers



Graphs by Facility type



Graphs by Facility type



Graphs by Facility type

Figure 9: Ashanti, community, enrolled and professional nurse by facility type

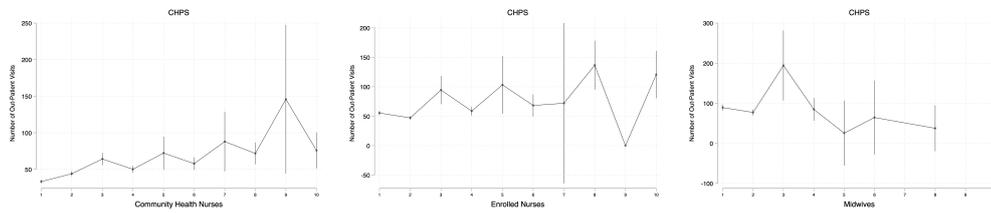


Figure 10: CHPS: average monthly number of out-patients per staff number

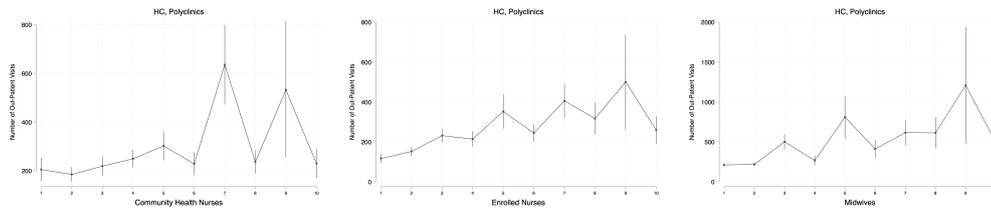


Figure 11: HC, Polyclinics: average monthly number of out-patients per staff number

of midwives seem to be associated with a diminishing average number of outpatients. While this relationship is not necessarily a causal one, it is an intriguing pattern and warrants further investigation.

Hospitals are the only facilities that host a large number of all staff, including community health nurses who are not trained to operate in hospitals. Given this apparent misallocation, we should expect to see low levels of productivity for those nurses in an environment for which they are not trained. We hope to answer this question in the next iteration of our paper. Doctors are also present in large numbers in hospitals. Unlike other types of staff, doctors are present in virtually no other types of facility than hospitals.

Figure 11 depicts changes in outpatients visits as it relates to the number of nurses and midwives in health centres and polyclinics. While the relationship between community nurses and outpatient numbers or midwives and outpatient numbers are relatively noisy, we see a steady, quasi-linear relationship between the number of enrolled nurses and the number of outpatients. This reflects quite well the fact that enrolled nurses are the biggest contingent of medical staff in health centers and polyclinics.

In hospitals across the country (figure A4) the average number of outpatients per number of medical staff is roughly the same regardless of the number of staff, whether it be professional nurses, enrolled nurses, midwives or physicians; with professional nurses displaying the most variation at numbers beyond twenty nurses. This suggests that improvements from having more staff don't stem from having higher number of outpatients but potentially from having

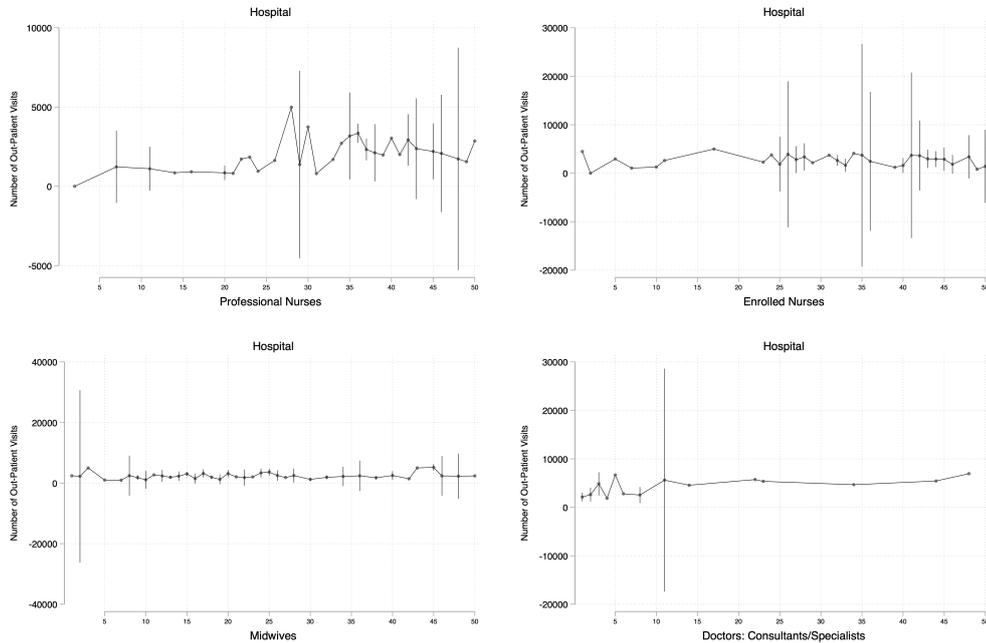


Figure 12: Hospital: average monthly number of out-patients per staff number

better quality of care or more challenging compositions of patients. To address this, in further work we will leverage the panel aspect of the data to hold these time-invariant factors constant and isolate the marginal impact of adding an additional health worker to a given facility.

5 Discussion and Next Steps

We have highlighted the vast differences in staffing choices of the health care system in Ghana. First there is a vertical diversity of services offered in each type of facility. To illustrate this, CHPS which are the smallest units of the health care system in Ghana offer outreach and minor curative services to citizens in remote and poorly accessible areas of the countries. These facilities, operated by community nurses, address the basic needs of patients and are meant to cover all corners of the country. They additionally refer more complicated cases to facilities with higher levels of expertise staffed by medical staff trained to address these more complicated cases. In some instances these CHPS operate without a physical location, and are operationalized by staff from nearby health centers or hospitals.

The second tier of facilities are health centers in rural areas and polyclinics in urban and peri-urban areas. These facilities offer a broader array of services, more complex procedures than CHPS and can have doctors in their roster. In a third tier there are district, regional, national, and teaching hospitals, which offer advanced to state-of-the-art care to its patients. Any effort to estimate or improve the productivity and allocation of these workers needs to take this into account.

In addition to this vertical layering of facilities there is also geographic differentiation. The main distinction here is the urban-rural divide (although this is actually a spectrum rather than a binary). Urban facilities tend to find it easier to attract and retain staff and typically have wealthier patient populations, although there is significant variation. With a limited number of medical staff graduating each year from medical, and nursing school each year, the Ghana Health Service faces a rather complex problem of optimal allocation of staff across these multiple dimensions. Are nurses more needed in top notch facilities, or are they more needed in outreach facilities? Alternatively, are nurses more needed in sparsely populated rural areas, deprived of facilities or are they more needed in densely populated areas, with an already high concentration of health facilities?

While it is often therefore assumed that there is a need to re-deploy staff from urban to rural areas, it is not necessarily the case that the marginal productivity of health workers is higher in rural than urban areas. While there are other considerations than efficiency in deciding how to allocate resources across the health system, more evidence of this type would nonetheless enable more informed decisions to be taken. These are important policy questions that we are set to answer in the medium run with continuous partnership with the Ghana Health Service. To answer these question, the next step for our research collaboration is to rigorously estimate the marginal productivity of staff across these different types of facilities and different areas in order to be able to estimate the potential gains from a more efficient allocation.

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Doctors				
	Hospitals	HC, PolyClinics	CHPS	Clinic
median	0	0	0	0
mean	.93	.01	0	0
max	24	5	3	1
Professional Nurses				
	Hospitals	HC, (Poly-)Clinics	CHPS	
median	7	0	0	0
mean	26.52	1.01	.03	.42
max	275	101	6	32
Enrolled Nurses				
	Hospitals	HC, (Poly-)Clinics	CHPS	
median	25	2	0	2
mean	27.32	3.36	.66	1.87
max	105	74	16	29
Community Nurses				
	Hospitals	HC, (Poly-)Clinics	CHPS	
median	2	2	1	1
mean	4.87	3.04	1.2	1.87
max	30	65	49	15
Midwives				
	Hospitals	HC, (Poly-)Clinics	CHPS	
median	11	1	0	1
mean	13.85	1.33	.18	.85
max	76	45	11	21
N	92	670	3311	86

Table A1: Descriptive Statistics By Facility

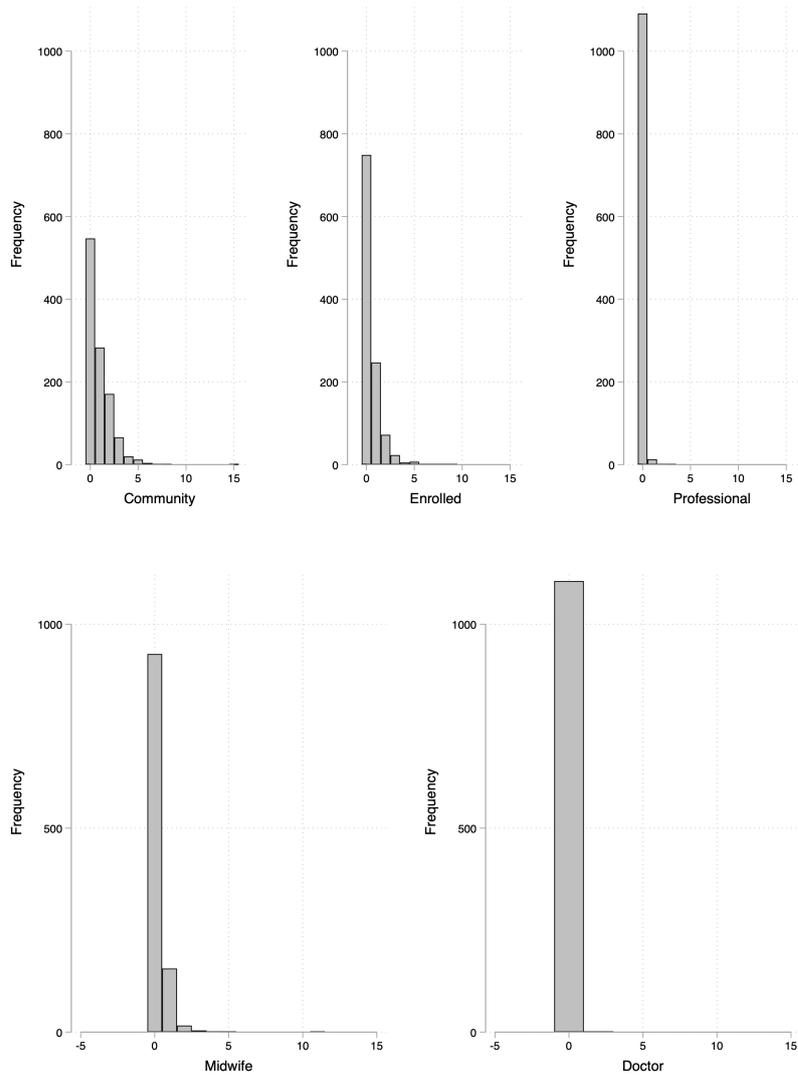


Figure A1: CHPS: Distribution of the number of nurses

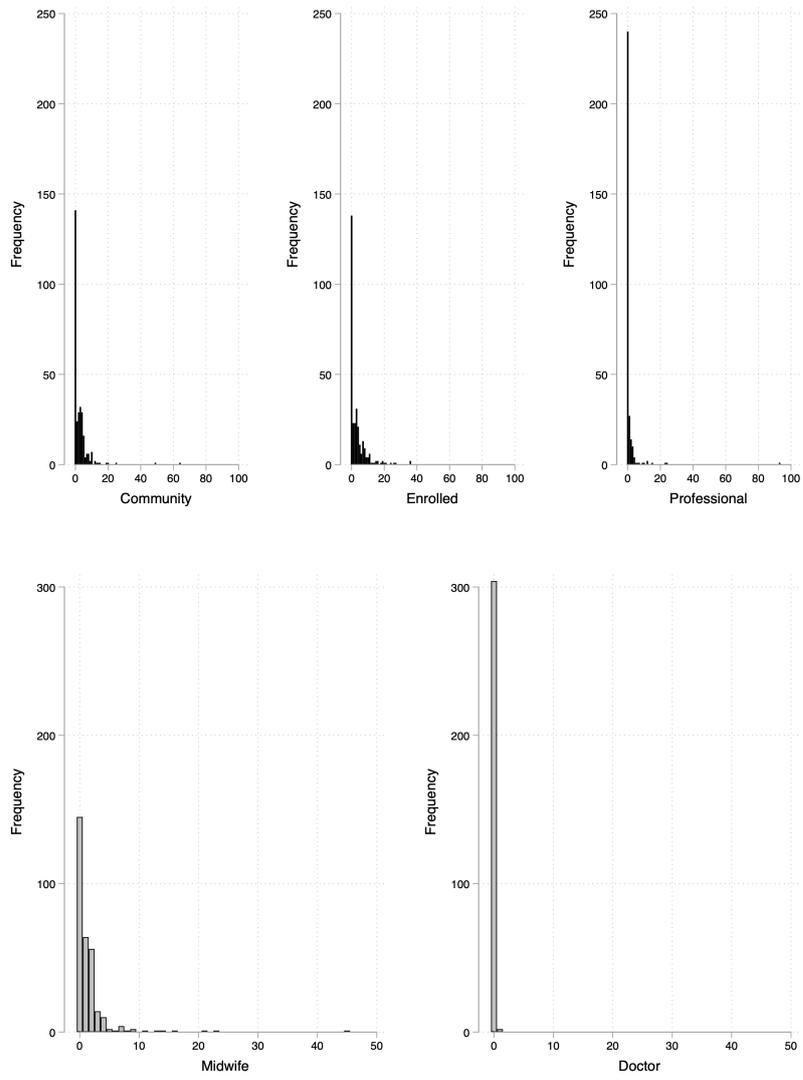


Figure A2: HC, Polyclinics: Distribution of the number of nurses

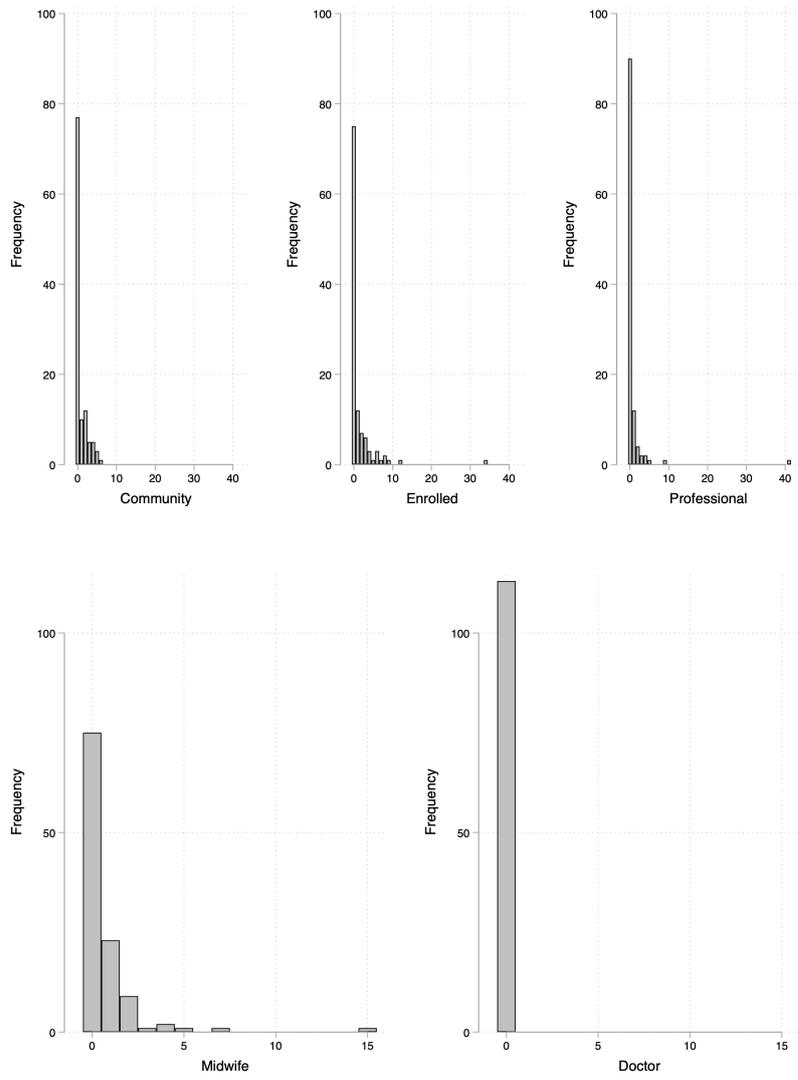


Figure A3: Clinics: Distribution of the number of nurses

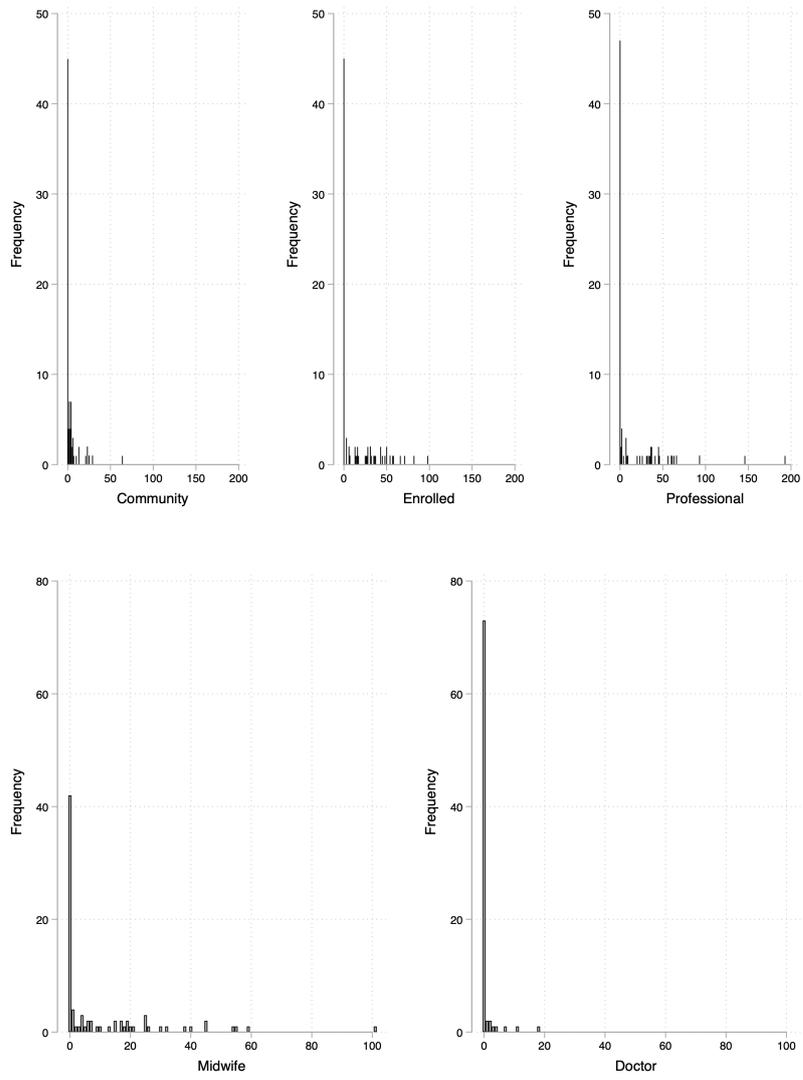


Figure A4: Hospitals: Distribution of the number of nurses

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