

# Measuring Health Workforce Productivity: Application of a Simple Methodology in Ghana

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August 2009





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## Health, Nutrition and Population (HNP) Discussion Paper

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## Measuring Health Workforce Productivity: Application of a Simple Methodology in Ghana

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**Abstract:** In this report we apply a very simple analytic method to measure workforce productivity in the health sector at the district level in Ghana. We then describe how the productivity analysis can be potentially used to inform staffing decisions. Specifically, in this paper we (i) develop an aggregate measure of workforce productivity that can be monitored regularly at the district level in Ghana and could be applied in other data-constrained settings (ii) explore factors that are correlated with workforce productivity at the district level (iii) examine trends in workforce productivity over time (iv) provide recommendations on further work, particularly on improvements in data collection.

**Keywords:** human resources for health, health workforce productivity, Ghana

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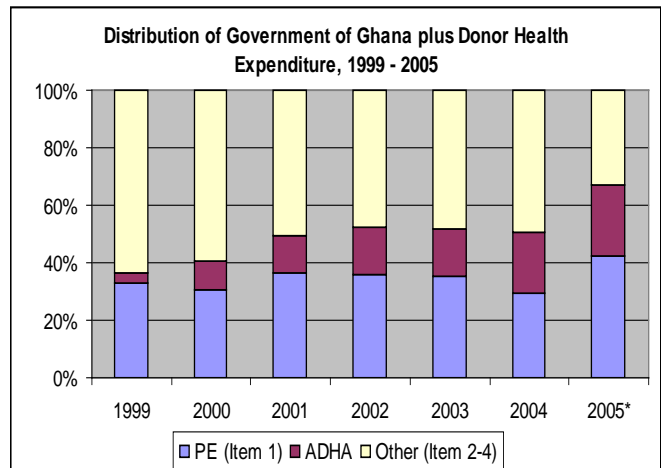
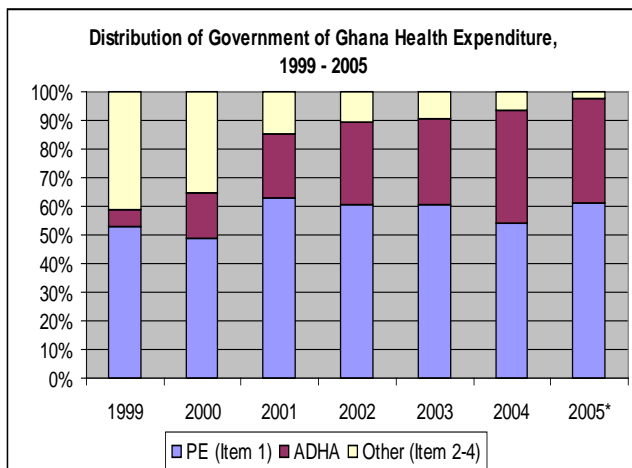
## **Acknowledgement**

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# 1.0 Introduction

## 1.1 Background

Human resource for health (HRH) are employed in order to provide health care services such as physician visits, supervised deliveries, immunizations, bypass surgery etc. to the population. While pharmaceuticals, infrastructure, diagnostic equipment and other inputs are also necessary in order to produce health care services, human resources are often viewed as the most significant input since health care remains a very labour intensive industry with wages accounting for the largest component of health sector spending in both low and high-income countries. In Ghana over 80% of recurrent expenditure is devoted to salaries of health workers.



With the current emphasis on cost containment for human resources for health in Ghana, the Ministry of Health has made it a priority to begin monitoring health workforce productivity (Ghana Ministry of Health, 2007; Ghana Ministry of Health and Ghana Health Service, 2005; Ghana Health Service, 2004). It is important to understand what additional health care services are provided to the population when additional resources are placed into the health system to either increase remuneration levels or increase the number of health workers. As noted, in Ghana the health wage bill has increased significantly in recent years. It is also important to explore the factors explaining the variations in productivity so that

facilities or districts with lower staff productivity can benefit from lessons from better performers. In an environment of fiscal restraint, these issues are extremely relevant.

## **1.2 Objectives**

This report builds on initial analytic work on mapping workforce productivity in the health sector that was carried out by the Ghana Ministry of Health, The World Bank, and the Ghana Health Service in March 2006. The objectives of this report are to test a preliminary methodology for measuring workforce productivity in the health sector that can inform staffing decisions. Specifically, the objectives are:

- To develop an aggregate measure of workforce productivity that can be monitored regularly at the district level in Ghana
- To explore factors that are correlated with workforce productivity at the district level. This will inform future analytic work.
- To examine trends in workforce productivity over time in Ghana
- To provide recommendations on further work, particularly on improvements in data collection and quality

## **2.0 Methodology**

### **2.1 Measuring Productivity**

There is no accepted 'gold standard' measure of health workforce productivity in the literature. Health worker productivity has been measured in a variety of ways including levels of absenteeism from health facilities (Chaudhury and Hammer, 2004) or the share of time health workers spend on clinical care activities during working hours (Kurowski et al, 2007). Other measures include the number of health services provided – usual doctors visits or inpatient days – by a particular type of health worker, usually per doctor or nurse (Courtright et al, 2007; Vujcic

et al, 2009). In Ghana, the Ministry of Health was interested in developing a more comprehensive measure of health worker productivity – one that incorporated a large basket of services and included a comprehensive measure of the number of health workers. Aggregate labor productivity is usually defined as the amount of output produced for a given level of labor inputs used in a production process. In the context of health workforce productivity, this would involve aggregating the total number of health care services provided to the population into a Composite Services Index (CSI) and aggregating the relevant labor inputs into some a composite human resources for health measure (CHRH). In other words:

$$productivity = \frac{CSI}{CHRH}$$

To generate a measure of workforce productivity the following steps are required:

1. Define the Service Unit
2. Define the Categories of Health Services to Include as Outputs in the Numerator
3. Determine a Method of Aggregating Different Categories of Health Services into a Composite Service Indicator
4. Define the Categories of Human Resources to Include as Inputs in the Denominator
5. Determine a Method of Aggregating Different Categories of Human Resources for Health into a Composite Staffing Indicator

### ***Step 1 – Define the Service Unit***

Workforce productivity can be measured at the national, sub-national, facility or department level and it is necessary to decide on which of these service units to examine. This decision is often driven by the policy issue that is being explored through workforce productivity analysis (e.g. how to allocate resources across districts, the efficiency of a surgical ward over time) and the availability of suitable

data. For example, it may be of great interest to compare workforce productivity in all hospitals but data may not be available on services provided, or it may be collected and stored in a way that makes such an analysis very time consuming.

### ***Step 2 – Define the Categories of Health Services to Include as Outputs in the Numerator***

There are several important elements to guide the selection of services. First, the services captured in the output measure should be those that are provided by the categories of health workers captured in the input measure. For example, hospital services should not be included in the service output measure if hospital staff are not included in the input measure. Second, the choice of services will differ depending on the policy question of interest. For example, if it is important to track workforce productivity in the health care system in general, the broadest selection of health services (and health workers) should be considered. However, if only public health services are of interest or if the performance of, for example, a new cadre of community health workers is of interest, then only the services produced by these staff should be included in the output measure. Third, the availability of data on utilization of specific health services should guide the decision. Routinely collected data is often quite aggregate and is not detailed enough to isolate the utilization of specific services.

In practice, two of the broadest indicators of health care services commonly used are inpatient days (IPD) and outpatient visits (OPD). These are often used because they are comprehensive measures of health care service delivery and are relatively easy to construct from administrative databases

### ***Step 3 – Determine a Method of Aggregating Different Categories of Health Services into a Composite Service Indicator***

A simple method of aggregating health services into a single Composite Service Indicator (CSI) is to take a weighted sum of the volume of various categories of services produced in a service unit:

$$CSI_i = \sum_j \alpha_j S_{ij}$$

$CSI_i$  = Composite service indicator for service unit i

$S_{ij}$  = Volume of service j in service unit i

$\alpha_j$  = Weight assigned to service j

The key step in aggregation is the selection of weights to assign to each service category. There are several approaches in selecting weights, all of which imply a normative value judgment. Weights might be chosen to reflect the relative priority of different services to the population. For example, if infant mortality is the major contributor to disease burden, services that address infant mortality (e.g. ante-natal care, nutrition) may receive a much higher weight than inpatient surgical services. In this case, the weights might be calculated based on the proportion of the total burden of disease that the category of health services addresses.

A second approach is to select weights to reflect the relative resource intensity of health services. For example, outpatient visits on average require less staff time, equipment and other resources than inpatient days. One approach that has been used previously – including in Ghana – has been to combine inpatient days and outpatient visits into Equivalent Patient Days (EPD) using a weighting of three outpatient visits equivalent to an inpatient day (Doyle, 2005; Zambia Ministry of Health, 2002; Center for Health Information Management, 2005). This gives a formula of:

$$EPD_i = \frac{1}{3} OPD_i + IPD_i$$

$EPD_i$  = Equivalent patient days in service unit i

$OPD_i$  = Number of outpatient visits in service unit i

$IPD_i$  = Number of inpatient days in service unit i

With a larger set of health services that need to be aggregated, weights could be chosen based on the total staff time required to provide the service. For example, an immunization might require on average 7 minutes of a nurses time to complete whereas an outpatient visit might require 20 minutes. Weights can be set based on these time figures which are often available in the literature.

***Step 4 – Define the Categories of Human Resources to Include as Inputs in the Denominator***

Several different categories of health workers contribute to the provision of health services. Which of these to include in the input calculation should be guided by the set of health services included in the output calculation. All categories of staff that contribute to the provision of the relevant health services should be included in the input calculation. Therefore, typically, it will be appropriate to include all categories of staff except in rare cases when the service unit is very narrow (e.g. surgical ward).

Staffing categories should be defined according to the categories used in the unit of analysis. In general, these will include: Medical, Nursing, Specialties (e.g. surgery), Laboratory, Pharmacy, Diagnostics, Support Staff, and Administration.

***Step 5 – Determine a Method of Aggregating Different Categories of Human Resources for Health into a Composite Staffing Indicator***

There are several possible ways of combining different staffing categories into a single unit. Similar to the composite service indicator, it is necessary to determine weights to assign to different categories of staff:

$$CHRH_i = \sum_k \beta_k HRH_{ik}$$

CHRH<sub>i</sub>= Composite human resources for health indicator for service unit i

HRH<sub>ik</sub> = Number of health workers of category k in service unit i

$\beta_k$  = Weight assigned to health worker type k

There are several approaches in selecting weights, again with implicit value judgments. Weights could be chosen to reflect the relative contribution of each health worker category to the provision of the relevant health services. The calculation of weights in this method could be guided by data on the amount of time each staff category requires in order to provide a service. Alternatively, the weights could be based on the average years of schooling of each category of health worker as a proxy for skill.

A second approach is to use salary levels for each health worker category as weights. This approach places the greatest weight on the highest paid health workers and will generate a human resources for health input measure that is equal to total salaries paid out to all health workers. Therefore, it is extremely useful for measuring services delivered per unit of salary expenditure and for making cost-effectiveness comparisons across service units.

There are several more complex weighting schemes that incorporate full-time equivalent status by controlling for part-time status, total hours worked per year etc. However, it is rare that data are available to calculate these more complex weights in developing country settings.

## ***2.2 Data Source and Analysis in Ghana***

### ***Data Sources***

The data used in the analysis were extracted from the routine health information system. The data for this study consist of clinical service data (i.e. outpatient visits, inpatient days), public health service data (i.e. antenatal care, supervised delivery, and immunization), and human resource data (i.e. staffing, and wages).

Data on outpatient visits and inpatient days were collected from the Centre for Health Information Management (CHIM). Data on public health service were collected from the reproductive and child health unit and the EPI program of the Ghana Health Service. Human resources for health data were collected from the accountant general monthly payroll file.

Data were collected from 2004 and from 2006. After adjusting for incomplete data, the sample size is 116 districts.

### ***Analysis***

The unit of analysis is the district. This is for two reasons. First, data on staffing levels and services provided can not be accurately disaggregated to the sub-district level. Second, districts are the ones that place requests for additional staff to the central ministry of health in Ghana and the center then makes allocations of new staff to districts. Thus, district level measures of productivity (rather than facility level) are most useful for informing staffing decisions of the central ministry.

The health services included in the output measure and their weights are listed in the table below. The services were selected because they are classified as 'priority services' and because they account for a large proportion of overall services (Centre for Health Information Management, 2005). The weights were drawn from the literature and from focus group discussions with the Policy Planning, Monitoring and Evaluation unit and the Centre for Health Information Management. We found that different weighting schemes produced different results (e.g. rankings of districts) indicating that further work need to be done on choosing weights and sensitivity analysis.

<b>Service Category</b>	<b>Weight</b>	<b>Rationale</b>
# of Inpatient days (IPD)	3	Used by CHIM, literature
# of Outpatient visits (OPD)	1	Used by CHIM, literature

# of Antenatal care visits (ANC)	1	Similar to outpatient service
# of Supervised deliveries (SD)	3	Similar to inpatient service
# of Family planning visits (FP)	1	Similar to outpatient service
# of Immunizations (Imm)	0.5	Less time requirement than outpatient services

Therefore, the composite service index (CSI) – the numerator in the workforce productivity index – in a given district is:

$$\text{CSI} = \text{OPD} + 3 \cdot \text{IPD} + \text{ANC} + 3 \cdot \text{SD} + \text{FP} + 0.5 \cdot \text{Imm}$$

The composite human resources for health index – the denominator – is the total wage bill (in millions of cedis) for all staff mapped to the health sector in a given district. In Ghana this includes salaries of all clinical staff, plus support staff such as orderlies, gardeners, drivers, security guards, since none of these services are contracted out. It does not include staff working in a regional health office or central administration within the Ghana Health Service. This is because these staff can not be mapped to any particular district.

$$\text{CHRH} = \text{Total Wage Bill} / 1,000,000$$

Note that this method is equivalent to weighting each staff member by the average salary for that particular cadre of staff.

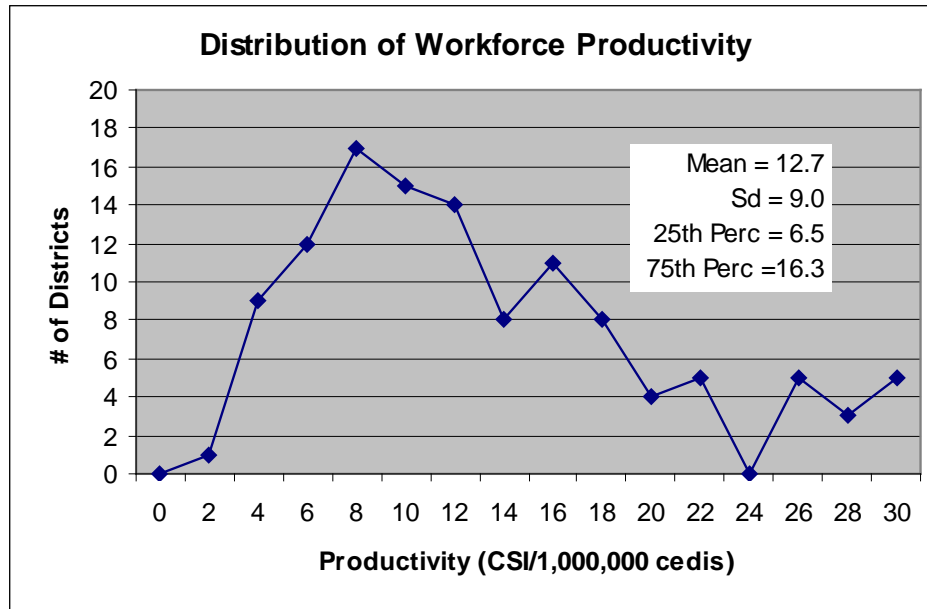
Therefore, the workforce productivity index (WPI) in district *i* is:

$$WPI_i = \frac{CSI_i}{CHRH_i}$$

### 3.0 Results

Region	WPI
WESTERN	20.7
CENTRAL	17.4
BRONG AHAFO	16.9
ASHANTI	13.7
NORTHERN	10.3
UPPER WEST	9.7
UPPER EAST	9.0
EASTERN	8.9
VOLTA	6.8
GREATER ACCRA	6.3
GHANA	12.7

The average productivity level in Ghana is 12.7 CSI per 1 million cedis of salary expenditure, with quite a large variance – even at the regional level. At the district level, the 25<sup>th</sup> and 75<sup>th</sup> percentile values are 6.5 and 16.3 respectively and the distribution is also skewed to the right, indicating a small number of districts with very large workforce productivity levels.

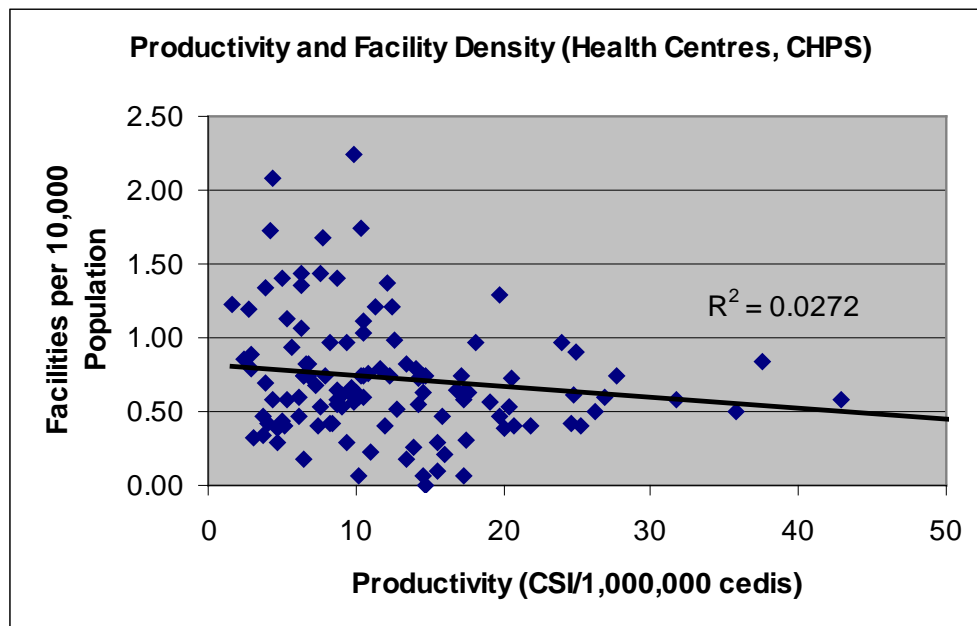


A key interest of the ministry of health is to shed light on factors that are associated with different levels of workforce productivity. For example, it is useful to know whether different skill mixes are systematically associated with different workforce productivity levels. It may also be useful to know if different types of districts have different average productivity levels. For example, rural districts or districts with lower levels of medical equipment or drugs may not be able to attain the same levels of workforce productivity as other districts, in which case productivity norms might be adjusted for availability of equipment if benchmarking is to be done.

Several factors might explain variations in workforce productivity across districts. These include the availability of complementary inputs such as equipment and drugs, the staff skill mix, the acuity of patients and the quality of the services provided, absenteeism (i.e. staff salaries are counted but staff are not physically there), and the demand for services (i.e. productivity is low because patients do not seek services when sick). Due to serious data constraints during the research and writing period of this report, not all of these relationships could be tested, but we nevertheless present some preliminary results.

There appears to be no relationship between workforce productivity and skill mix (not shown). Several different measures of skill mix were tested, including nurse to doctor ratio, support staff per clinical health worker<sup>1</sup>, nurse to total staff ratio all with similar results.

In terms of complementary inputs, a more refined analysis will be possible once data from the Service Availability Mapping (SAM) database could be linked to the data used in this report. This is left as future analysis. In the mean time a very crude measure of the availability of complementary inputs used is the number of hospital beds (for hospital availability) and the number of health centres and community care compounds, CHPS, (for other facility availability). There does appear to be a weak negative correlation between the availability of facilities and workforce productivity. This suggests that districts with many clinics have lower workforce productivity – perhaps reflecting a ‘crowding out’ of patients – but the correlation is very weak.



<sup>1</sup> Clinical categories include: Medical, Specialist, Nursing, Pharmacy, Laboratory, Radiography. Support categories include: Administration, Cooks, Cleaners, Drivers etc. For a specific classification of occupations into the various categories see the data appendix.

No suitable measure for case complexity or quality of services was found with our data. If health services are homogenous across districts with respect to the amount of effort required from health workers, then the CSI index already controls for variations in case complexity across services. This is controlled through the weights applied to the service categories. If, however, inpatient days are not homogenous across districts then the CSI needs to be adjusted for case complexity. This is left for further work with more suitable data. It may be that the district level is a high enough aggregation to smooth out any variability in the complexity of inpatient days, outpatient visits, supervised deliveries etc. But it may not be. Further analysis using morbidity data should be carried out to confirm this. Similarly, quality of services may be fairly consistent across districts (but certainly not facilities) but we found no suitable data on this.

The analysis has shown that workforce productivity at the district level is not correlated with skill mix or the availability of health infrastructure. For factors such as case complexity, quality of care and staff absenteeism, there is no suitable data on this. It might be that these factors are fairly consistent across districts – which implies that they would not explain the variation in productivity. But they may not be, so future work should explore this.

Overall, none of the input variables for which suitable data are available can explain the variation in productivity across districts.

We now turn to the patient side. It is useful to examine the relationship between workforce productivity and the staff-to-population ratio. Suppose that in a given district a fixed share of the population gets sick and seeks care each year and this is the same for all districts. Then, the more health workers there are to share this fixed patient case load, the lower will be productivity<sup>2</sup>. According to this hypothesis, one would expect to see no relationship between health services per

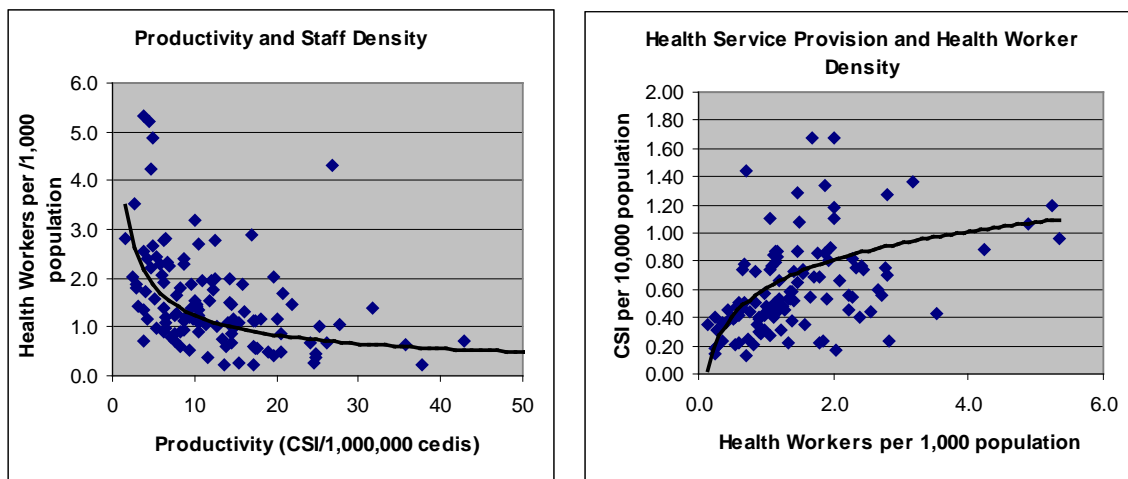
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<sup>2</sup> Note that we are assuming there is no supplier induced demand.

capita and health workers per capita and a negative relationship between health workers per capita and workforce productivity.

Alternatively, more health workers might increase the uptake of health services – in other words demand is not fixed. According to this second hypothesis, one would expect to see a positive relationship between health services per capita and health workers per capita. Depending on the level of ‘supplier induced demand’ there would then either be no relationship or a negative relationship between health workers per capita and workforce productivity.

In Ghana we observe a negative relationship between health workers per capita and workforce productivity. Therefore, this provides no information to help distinguish between these two hypotheses.

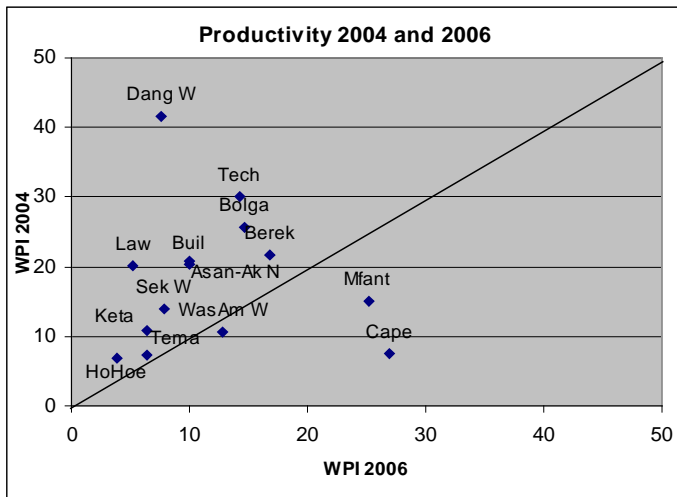


The analysis thus far has not succeeded in identifying factors that explain the observed variation on health workforce productivity across districts. The correlations – even if they were stronger – only suggest avenues down which to carry out further analysis. They do not in and of themselves indicate any sort of causality. Therefore, further work is required in this area with a focus on three fronts:

- Collect data on the hypothesized predictors for which data were not available for this report (e.g. equipment availability)
- Further explore the role of the demand for services as a predictor of health workforce productivity. Hypotheses need to be generated and data examined for consistency with these hypotheses.
- Carry out more rigorous statistical analysis using regression techniques.

Looking at trends in workforce productivity over time suggests that on average, there has been a slight decrease, but there are too few data points to make any strong conclusions. Data on public health services are available for both 2004 and 2006 for only 20 districts. Productivity increased in only 3 districts (those below the 45 degree line) and decreased or remained the same in 17. As further analysis it would be useful to collect public health data for 2004 for all other districts so that a robust analysis of changes over time can be carried out. Such data would also allow for a regression analysis of differences which would control for district-level characteristics that are not captured in any of the explanatory variables and would improve the modeling of productivity.

To identify the factors accounting for the change in productivity, two outlier districts were analyzed in detail – Cape Coast which had the largest increase and Dangbe West which had the largest decrease. In both cases, the change in productivity was a result of drastic changes in outpatient visits. Over a two-year period, this magnitude of change likely indicates data quality issues rather than a real change in service delivery levels. This highlights significant data reliability issues and a major impact of this report has been a serious effort in Ghana to improve HMIS data.

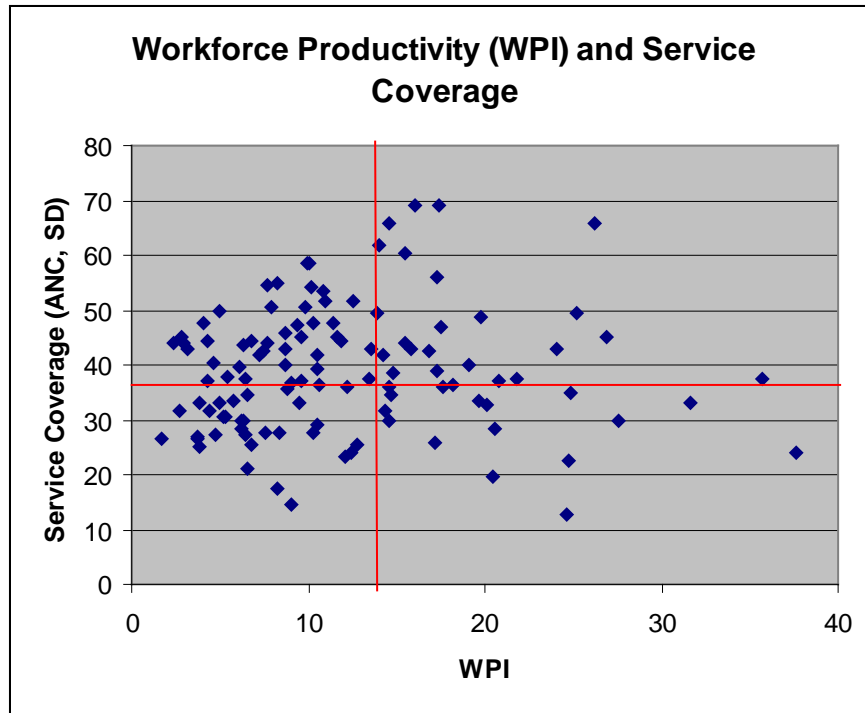


	WPI		Staff	
	2004	2006	2004	2006
Dange West	42	9	119	109
Cape Coast	7	32	619	578
	OPD		IPD	
	2004	2006	2004	2006
Dange West	240117	28134	0	0
Cape Coast	6437	183339	55477	30596
	SD			
	2004	2006		
Dange West	1162	698		
Cape Coast	4134	2729		

## 4.0 Using Workforce Productivity Analysis to Inform Staffing Decisions

Comparing workforce productivity against a measure of service coverage – in this case, the percent of the target population that received (i) antenatal care and (ii) supervised deliveries<sup>3</sup> – provides a convenient tool for human resources for health policy. We mapped districts into four separate groups according to coverage (above average or below average service coverage levels) and workforce productivity (above average or below average).

<sup>3</sup> We took the average coverage level for these two services.



Districts that have high workforce productivity and high service coverage can be thought of as good performers (GROUP 1).

District that have high workforce productivity but low service coverage (GROUP 2) are those where the workforce is functioning well (i.e. each worker is providing an above-average number of services) but much of the population does not receive care. In these districts, coverage is unlikely to increase without additional staff. Health workers are already working a lot. But more facilities may also be needed, if it is the case that the population does not have access to facilities and this is why they are not using services.

Districts that have low productivity and low coverage (GROUP 3) are those where the workforce is not functioning well and the population is not receiving adequate health care. Within this group, staffing levels are likely to be adequate to increase coverage of services. The one caveat, is that in rural, sparsely populated districts within this group, higher coverage may not be feasible with current staffing levels. In other words, for a given level of health service

coverage, health workforce productivity is expected to be much lower in sparsely populated districts compared to urban districts.

Districts that have high coverage and low productivity (GROUP 4) may potentially be overstaffed. This judgment depends in part on the population density of the district. As noted above, sparsely populated districts are expected, all else equal, to have lower workforce productivity than densely populated districts for a given service coverage level. Sparsely populated districts in this group are likely to have adequate staffing levels while densely populated districts in this group are likely to be overstaffed.

**Using Workforce Productivity Mapping to Guide Staffing Policy**

	<b>Low Workforce Productivity</b>	<b>High Workforce Productivity</b>
<b>High Health Service Coverage</b>	<p><b>Overstaffing</b> (if densely populated area)</p> <p><b>Adequate staffing level</b> (if sparsely populated area)</p>	<b>Good Performers</b>
<b>Low Health Service Coverage</b>	<p><b>Adequate staffing level</b> (if densely populated area, do not need more staff to increase coverage)</p> <p><b>Understaffing</b> (if sparsely populated area, need more staff to increase coverage)</p>	<b>Understaffing</b> (need more staff in order to increase coverage)

As the summary table shows, low productivity can be associated with overstaffing, understaffing, or adequate staffing depending on health care service coverage and population density. Further analysis is required to determine which factor is most relevant in each district. But the main message is that a preliminary comparison of workforce productivity against service delivery coverage helps identify which districts potentially have serious staffing issues (over or under staffing). The analysis provides policy makers with a mapping of where more information needs to be collected.

## 5.0 Conclusion

### ***Key Findings***

The main findings from the analysis of the Ghana data are:

- District-level workforce productivity indicator can be constructed from the current administrative data maintained in various agencies within the Government of Ghana. However, the database architecture makes this task extremely time consuming. It would be virtually impossible to carry out a similar analysis at the facility level with the current data environment.
- The distribution of health workforce productivity is skewed right, indicating that there are a small group of districts with very high levels of workforce productivity
- Different weighting schemes have a large impact on the composite service indicator measure of service output. Specifically, the relative performance of districts is affected by the choice of weights. The current weighting scheme is based largely on subjective assessments and therefore, is open to debate. Further work is needed to develop a more sophisticated weighting scheme.
- Workforce productivity does not seem to be correlated with any of the variables examined in this report that *a priori* are thought to be important predictors. However, data was collected on only a limited set of these variables – skill mix, the availability of facilities – and further scope remains to expand this analysis.
- Preliminary analysis of 20 districts suggests that health workforce productivity decreased slightly between 2004 and 2006. However, a decomposition of the change revealed findings that are difficult to believe and which suggest data quality issues in the utilization data that require further examination.

## ***Limitations***

There are missing data either due to non-reporting or incomplete records. This may affect results, but a data completion rate of 84% is still fairly high, suggesting that this may not be such a concern.

Even when district level data are complete, however, there is evidence that the values may be inaccurate. This is particularly true for the routinely collected outpatient and inpatient data.

The fact that routinely collected data that is compiled by different branches of the Ministry of Health does not have a consistent method for coding variables (in this case, district and facility fields) presents a major challenge in routinely carrying out this type of analysis. We had to aggregate different variables to the district level and then manually link the datasets. Often, district names were even spelled differently in different data sets. There is considerable scope to come up with a unique facility level identifier to make the productivity analysis much less time consuming.

Only the correlations between different variables and workforce productivity were explored in this report. While this provides some information on interesting relationships between variables, causal links were not modeled in this report. Further regression analysis is required to expand this, but this can not be done unless that data systems are improved.

## ***Recommendations***

This report did not find any systematic relationship between workforce productivity and the variables examined. The report has succeeded in defining a simple methodology for constructing workforce productivity indicators that is useful for policy decisions. But the main conclusion is that there is a clear need to carry out further analysis in Ghana to determine the predictors of health

workforce productivity if productivity is to be used as a basis for resource allocation. To expand the analysis the following recommendations are made:

### ***Data***

1. Collect data on variables that might explain health workforce productivity variation that were not examined in this report. These include: availability of complementary inputs such as equipment and drugs (SAM data), the complexity of care (morbidity data or household surveys), quality of care (household surveys) absenteeism (currently no source)
2. Collect data on public health utilization from 2004 to expand the time trend analysis of health workforce productivity.

### ***Methodology***

3. Lessen the subjectivity of the health service weights in the CSI by examining the literature further. There are several documents that contain estimates of the time it takes to provide certain health services based on time and motion analysis (Kurowski and Mills, 2006; Shipp, 1998). This information can be used to generate new health service weights. The GHS is currently carrying out such an analysis as part of its work on workload indicators of staffing need (WISN).
4. Examine outlier districts to verify data and carry out more thorough analysis of workforce productivity, perhaps including interviews and site visits to facilities.
5. Once additional data become available, carry out regression analysis to examine the determinants of workforce productivity, focusing in particular on the role of demand for health services on the part of the population.

### ***Policy***

6. Work closely with the human resources directorate of the Ghana Health Service to explore using workforce productivity analysis as a decision

making tool for i) allocating financial resources to districts and ii) posting new staff to regions. The Ghana Health Service is developing a workload indicators of staffing need (WISN) tool to be used for identifying staffing norms for particular facilities that are adjusted for service delivery volumes.

## 6.0 References

Centre for Health Information Management (2005) "Information for Action: Using Data for Decision-Making," Ghana Health Service, Accra.

Chaudhury, N. and J. Hammer "Ghost Doctors: Absenteeism in Rural Bangladeshi Health Facilities" World Bank Economic Review 18(3), 2004.

Courtright, P, L Ndegwa, J Msosa, J Banzi "Use of Our Existing Eye Care Human Resources: Assessment of the Productivity of Cataract Surgeons Trained in Eastern Africa" Archives of Ophthalmology 25(5), 2007.

Ghana Ministry of Health (2007) "Human Resource Policies and Strategies for the Health Sector, 2007-2011," Ghana Ministry of Health, Accra.

Ghana Ministry of Health and Ghana Health Service (2005) "Restructuring the Additional Duty Hours Allowance: Volume I, Main Report," Ghana Health Service and Ghana Ministry of Health, Accra.

Kurowski, C., K. Wyss, S. Abdulla and A. Mills "Scaling up priority health interventions in Tanzania: the human resources challenge" Health Policy and Planning 22(3):113-127, 2007.

Kurowski, C. and A. Mills. "Estimating human resource requirements for scaling up priority health interventions in Low income countries of Sub-Saharan Africa: A methodology based on service quantity, tasks and productivity" Health Economics and Financing Program Working Paper 01/06, London School of Hygiene and Tropical Medicine, 2006.

Lex W. Doyle "Evaluation of Neonatal Intensive Care for Extremely Low Birth Weight Infants in Victoria Over Two Decades: II. Efficiency" Pediatrics 113(3), 2004.

Shipp, P (1998) "Workload Indicators of Staffing Need: A Manual for Implementation," World Health Organization, Geneva.

Vujcic, M., S. Sparkes and S. Mollahaliloglu "Health Workforce Policy in Turkey: Recent Reforms and Issues for the Future," Health, Nutrition, and Population Discussion Paper, The World Bank, Washington, 2009.

Zambia Ministry of Health (2002) "Financial Management: An Overview and Guide for District Management Teams," Government of Zambia, Lusaka.





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