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Institution and Public Health Care Facility Cleanness in Nigeria: A Principal-agent Approach

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Abstract: There are several reasons (clinically and public health wise) to believe that the level of cleanliness adequately reflect the performance of service delivery actually received by the populace. This study extend the research of Gupta-Das on the analysis of health facility cleanliness by using the Principal-agent theory and the accountability framework to answering questions as regards whether accountability framework elements such as voice and client power/compact affect positively the health care facilities cleanliness in Nigeria. The study made use of the available QSDS data of the World Bank in Nigeria in 2004 and complemented it with Focus Groups Discussion (FGDs). Instrumental variable probit model was used for the data analysis. The results show that accountability framework elements do affect positively the health service delivery in Nigeria. Specifically, client power explains the level of cleanliness of health facility in Kogi and Lagos States. In addition, the staff skill is another key factor that drives cleanliness positively in health facility in the two states. Therefore, the key policy issues to be targeted are in the area of promoting positive community participation in health facilities in order to enhance cleanliness in health facilities in Nigeria.

Key words: Service delivery, health facility cleanliness, principal-agent, accountability framework, Nigeria

INTRODUCTION

According to Gupta-Das *et al.* (2004), Nigeria is one of the few countries in the developing world to systematically decentralize the delivery of basic health and education services to locally elected governments. However, the public health care service system in the country is delivered through a tiered package of facilities. At the lowest rung of the tier are the type 1 facilities, known as health posts/clinics. These are village level facilities, typically staffed by a junior paramedic and an assistant with the most basic amenities. The type 2 facilities known as primary health centers are larger facilities with a more diverse complement of staff and amenities. Type 3 facilities called community health centers are intended to be equipped and staffed as mini-hospitals and to serve as referral centers for the facilities below them. The Gupta-Das *et al.* (2004) study on decentralized delivery of primary health service in Nigeria indicates that the Local Government owns the great majority (71%) of public health care facilities in the regions sampled. The private sector is the other major player, owning 25% of all facilities. The state owned <3% of all facilities while the federal government owned <1%. The study further shows that locally elected governments indeed do assume responsibility for services provided in primary health care facilities in Nigeria. The issue of cleanliness of public health care facilities was also a key finding of the Gupta-Das *et al.* (2004) study. Findings revealed that about 33% of Lagos State public health care facilities were classified by respondents as dirty/very dirty. In all, about 50% of all public health care facilities in the two states sampled (Lagos and Kogi States) were rated dirty/very dirty. There are several reasons (clinically and public health wise) to believe that the level of cleanliness adequately reflect the performance of service delivery actually received by the populace.

According to Gupta-Das *et al.* (2004) study, there are variations between states with respect to level of cleanliness of their public health facilities. The pertinent question here is; what explains these variations? The Gupta-Das *et al.* (2004) study did not, however, handle properly the issue of cleanliness which is one of the major outcomes of the health care service delivery in developing countries. One of the key gaps in terms of cleanliness analysis in this study is the use of Ordinary Least Square (OLS) to analyse factors that drives cleanliness of health care facilities using cross sectional data. This type of analysis clearly assumes away that the problem of endogenity does not exist. Contrary to the Gupta-Das *et al.* (2004) study which used the robust OLS to estimate the impact of community participation on cleanliness, researchers used an instrumental variable probit model to account for endogeneity that could be brought in to the model at different status of facility cleanliness as it is a concept difficult to measure. This study also correct for heteroscedasticity arising from population clustering. Another major gap in terms of analytical framework is that the study did not make use of accountability framework in analyzing cleanliness. This

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research therefore aims at answering questions as regards whether accountability framework elements such as voice and client power/compact affect positively the health care facilities cleanliness in Nigeria? In addition researcher based the study on two mains hypotheses: First, community participation, bargaining power and quality of staff do not affect the level of cleanliness of the facility and secondly, endogeneity exist with level of skill being an explanatory variable in the model.

Theoretical (analytical)/conceptual framework and literature review

Theoretical (analytical)/conceptual framework: Accountability is an institutional relationship which enables successful service delivery by giving interdependent actors the proper incentives. Accountability is defined as a relationship with five features: Delegation, finance, performance, information about performance and enforceability (World Bank, 2004a). Problems such as leakage of funds and absenteeism can result from a failure in any one of the key relationships of accountability. Public funds may be captured to fund the political machinery, beneficiaries may be kept in the dark about their entitlements or there may be no incentives or monitoring. An important way to strengthen the accountability relationships in service delivery is by reducing information a symmetry among parties in the service provision system. Collecting information on activities of agents increases the principal's (citizens) bargaining power and control through improved monitoring and disciplining of policy makers and providers. In a democratic political setting, evidence suggests that accountability could be improved when voters share information about political responsibility for certain key outcomes (Ferejohn and Kuklinsky, 1990). Khemani (2004) finds evidence of the impact of information on service provision in India through election cycles. It was observed that when elections are approaching, state governments in India tend to increase expenditures on public investments that are easily observable by voters and reduce them on more broad-based public services.

Increasing client power over service providers can increase efficiency and control in the system. The framework of accountability developed by the World Bank (2004a) which refers to the relationship between three broad categories of actors encompassing both basic services and their supporting systems is described as follows:

Policy makers: These are those who together with politicians, exercise the power of the state by setting the rules of the game and deciding the level and quality of services to be offered.

Service providers: These are those who deliver basic services. There are organizational providers which include a variety of public, private and civil society actors such as the ministry of education, autonomous public hospitals, religious schools, small community run schools and so on and frontline providers who come in direct contact with clients such as teachers, doctors, nurses, engineers, etc.

Citizens: These are both the consumers of the services and the constituents of the policy makers. They include individuals and households, who hope to get clean water, have their children educated and protect the health of their family. Arising from the three earlier described categories of actors encompassing both basic services and their supporting systems, there exist two main layers of accountability relationships in the multi-level principal agent relationship of service delivery (World Bank, 2004b). These are:

Citizens hold policy makers accountable for allocating resources for service delivery and providing appropriate incentives for performance. Ahmad *et al*. (2005) affirm that citizens, especially the poor might be unable to hold politicians accountable for resource allocation decisions, leading to biases toward the rich in public spending. In some countries, this could be due to the absence of electoral democracy. In other cases, there may be a functioning electoral system but because of important information a symmetries or social polarization, the outcome may still be biased against the poor (Keefer and Khemani, 2005). Also even if poor citizens could hold politicians accountable, politicians in turn may not be able to hold the providers accountable for bad performance.

Policy makers hold provider organizations accountable for delivering proper services. In most African countries, there is a crucial lack of information at various levels in the public organizational structure, particularly at the central level, regarding resource use and transfers through the service delivery supply chain. Furthermore, information problems are also acute at lower levels of the hierarchy as decentralized administrative units are often unaware of the budgetary resources to which they are entitled. The sequential process of accountability has been referred to as the long route (also referred to as voice) of accountability as opposed to the short route which involves direct accountability of providers to clients, a situation typically encountered in the private competitive sector. Inadequate service delivery could, hence, be associated with failures in one or both of the links along the long route of accountability as well as with failures in the short route of accountability. The long route and short route accountability framework provide the theoretical guide in deciding on the independent variables to be used for this study.

Aspects of accountability: Accountability can be horizontal, vertical or a hybrid of the two. Detailed description of aspect of accountability is provided as follows:

- Horizontal accountability is embodied in the checks and balances internal to a state. It is carried out by state institutions and agencies which are designed to oversee and sanction other state institutions. These institutions might include the judiciary, parliament, anticorruption and human rights commissions and ombudsmen
- Vertical accountability is embodied in mechanisms used by citizens and other non-state actors to hold their representatives to account. Elections are the most obvious form of vertical accountability. Other forms include direct civic engagement, lobbying and mass mobilization
- Social or hybrid accountability relies on civic engagement to build accountability. Social accountability mechanisms enable citizens, civil society organizations and communities to hold government officials and service providers accountable. Examples of social accountability mechanisms include participatory planning and budgeting, public expenditure tracking, citizen monitoring of service delivery, lobbying and advocacy campaigns (Bulgaria, 2008)

In addition, accountability can be upward, downward or outward:

- Upward accountability occurs when administrators or service providers who are upwardly accountable are answerable to higher-level authorities (e.g., local administrators who are answerable to line ministries)
- Downward accountability on the other hand, entails accountability of higher level authorities to lower levels of authority including the accountability of elected officials and administrators to citizens. Often the chain of accountability is upward, not downward with officials answerable only to their higher ups, not to those they are supposed to serve
- Outward accountability occurs when domestic actors including governments are answerable to external donors or development actors. In some contexts there appears to be a strong drive toward external rather than internal accountability (Goetz and Gaventa, 2001; O'Neil and Foresti, 2007)

Voices, compact, client power and services: There are three key set of actors in the delivery of services which are:

- Citizens/clients individuals and households are simultaneously citizens and clients of services (e.g., health care, education, electricity)
- Politicians/policy makers; politicians are elected or unelected officials who regulate, legislate and tax while policy makers implement and enforce these rules of the game
- Providers can include public line ministries, departments, agencies or bureaus; autonomous public enterprises; non-profits (e.g., religious schools) or for-profit organizations (e.g., bus companies, private hospitals)

Frontline providers are those who come into direct contact with clients (e.g., teachers, doctors, police and engineers). Ideally, these actors are linked in relationships of power and accountability as follows:

Politicians regulate, legislate and tax while the policy makers (civil servants) implement the rules. Both politicians and policy makers are subject to horizontal accountability (judicial review, parliamentary scrutiny, etc.).

Policy makers have compacts with organizational providers they set and enforce the rules of the game for the provision of services. Organizations manage frontline providers who ensure that goods and services are delivered. Member of PHCMC number of visit to facilities was used as the only compact variable in the model used for analyzing cleanliness in this study since frequency of visits of members of Primary Health Care Management Committee (PHCMC) to facilities will allow government to enforce rules of provision of robust health services.

Citizens exercise voice vis-a-vis politicians through a long route of accountability. They use elections, lobbying, information campaigns and other forms of social accountability to monitor and sanction elected leaders. They do so individually or through organized groups, coalitions and civil society (e.g., NGOs, labour unions, business associations). The dummy variable describing whether community contribute in taking disciplinary action against staff is tagged as voice in the model used for this study since data shows that this is the way community members make complain about the health facilities through lobbying to government authority.

Finally, clients exercise client power with frontline providers through a short route of accountability. In this situation, providers are held to account for their actions by their clients (the individuals and communities) to whom they are supposed to provide a service. Client power is most obvious in situations where individuals can exit they can choose a different service provider. In practice, however, there is often little choice available. In

these circumstances, clients must look to voice mechanisms to influence providers including community monitoring and user groups. Variables such as community working with facility, community head attending facility meeting and member of community association number of visit to health facility other than treatment are tagged as client power and serves as independent variables used in the model to analyse data for this study. This is so since these three variables explains how community, i.e., the client of the health facilities hold them responsible for service they render to them.

Furthermore, for the accountability relationship to work, all five features of accountability must be present. Relationship is initiated with delegation agents are given the means to perform the delegated task with finance if the policy maker has enforceability but not information about performance, he cannot make a credible threat to punish the provider for non-performance as he does not know when to carry it out. Having knowledge of this, the provider has no incentive to perform. To create the four relationships of accountability, all the five features (of delegation, finance, performance, information about performance and enforceability) are needed.

Strengthening accountability and voice in service delivery also fundamentally matters for poverty reduction and human development. Powerlessness (the inability of individuals to express their views or to have them heard) is integral to poverty and marginality. As a result, responsive governments and service providers and enhanced citizen voice can contribute directly to empowerment and poverty reduction (O'Neil and Foresti, 2007). From a human rights perspective, improved accountability and voice reinforces the ability of rights holders to claim their rights. Equally, it increases the likelihood that duty bearers meet their obligations.

Accountability and voice can also contribute indirectly to poverty reduction. More accountable systems of governance and service provision tend to be more efficient and effective. If services are demand driven, (they are shaped by local needs, preferences and priorities) they are more likely to meet the needs of clients and citizens. Citizens must not only have voice, the state and service providers must be receptive to their views and be willing and able to modify their actions accordingly. Amplifying citizen or client voice can often stimulate greater accountability. However, voice is not sufficient, in and of itself, to ensure accountability. Without responsive and capable governments and service providers, voice can go unheard or have limited impact on decision making or service provision (Bulgaria, 2008). Some of the aspect of accountability discussed above and issues on voices, compact, client power and services provides a good basis in understanding service delivery as well as key actors of service delivery.

Principal-agent Model: This is a model used to analyze service delivery in public economics literature. Economists have developed the Principal-agent Model as a framework for analyzing accountability. The model can be applied to many different contexts and provides an essential organizing tool. It emphasizes the principal-agent relationships between citizens, politicians and service providers. Citizens (clients) delegate responsibilities to elected officials (state) to provide public services and pay taxes to fund them. Politicians in turn delegate service delivery to provider organizations by creating incentives and appropriating budgets. Clients have different ways of influencing providers such as school boards or health clinic management committees. This network of principal-agent relationships presents numerous incentive problems. The model stipulates two layers of agency problems between the citizens and elected officials and between elected officials and service providers. The role of intermediary agent played by the state in the principal-agent relationship creates a situation where it is difficult for the principal (citizens) to evaluate and control the actions of the decentralized agent (service provider) (World Bank, 2004a). With perfect information shared among parties, citizens would be able to evaluate actions taken on their behalf by governments and service providers and to exercise control over agents behavior. However in practice, citizens have a weak capacity to exercise control through this process as information is imperfect and asymmetric, agents objectives do not coincide with those of the principal (citizens) and enforcement is inadequate. This leads to situations where agents will put forth less effort than citizens would wish (shirking) or will be able to divert some resources to their own ends (rent extraction). The difficulty faced in the Principal-agent Model in public service delivery is presented.

Multi-tasking considerations: Evaluation is difficult when service providers are involved in multiplicity of tasks.

Difficulty of measuring performance: Citizens (clients) cannot easily measure the person responsible for what they observe; they only get to observe the aggregate 2333 output of the production process. Also, the overall objective of service providers is often imprecise. When performance measures are noisy, incentive structures sensitive to these measures are inefficient and subject workers to unnecessary risks (Dixit, 2002; Besley and Ghatak, 2003). In most public organizational settings because of the prohibitive cost (or non-feasibility) of gathering information about each agent action and input in the production process, the principal will tend to use

aggregate measures to evaluate agents success and contribution. This is especially true in public services as these outputs often do not have a market equivalent and are consequently hard to appraise.

Presence of multiple principals: There are several actors who are directly affected by the actions of an agent in the provision of public services. Different principals might have different preferences concerning various tasks carried out by the agents (Besley and Ghatak, 2003). Since, each principal would like to induce the agent to put more effort into activities that he cares more about if the incentive schemes are not chosen to maximize the joint payoffs of the principals there will be inefficiencies (Dixit, 2002).

Presence of multiple agents: In public administration, there are multiple agents engaged in a joint production process. Responsibilities are shared between several decision-making levels, often following a Central Provincial Local Authority pattern. Functional interdependence between agents potentially gives rise to specific problems, in particular related to the difficulty of dissociating the individual contribution of the different levels of agents (Radner and Marschak, 1972). Most of the times, joint outcomes are measured and moral hazard which arises in situations where individuals are shielded from bearing all the costs of their actions because of the difficulty of observing their private actions, is then reinforced in teams.

Figure 1 shows the institutions and service delivery framework (Principal-agent Model) (accountability framework) that will guide this study is presented as follows:

Literature review: Lindelow and Serneels (2006) made use of focus groups to examine health workers' performance and human resource problems in the health sector in Ethiopia. They identified a series of problems that related to the transition to a more competitive health sector, the HIV/AIDS crisis and an inadequate policy and regulatory environment. Combined with weak enforcement mechanisms, these problems have created new incentives and reduced trust and professionalism among health workers.

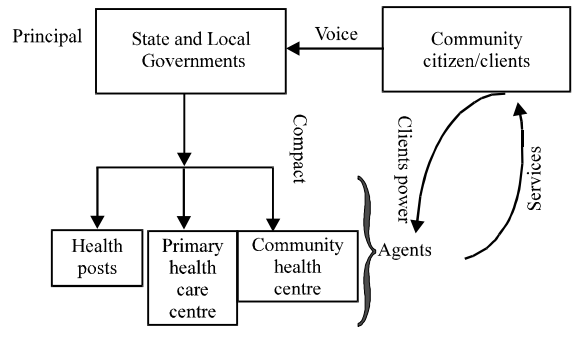

Fig.1: The institutions and service delivery frame work (Principal-agent Model) (accountability frame work)

Serneels *et al.* (2005) reported on focus group discussions in Ethiopia and Rwanda. Their objective was to understand and explore institutions and policies and examine how they are perceived by health workers and users and how they affect absenteeism. They observed that health workers in religious health centers seem to have lower absenteeism levels than other workers. In their attempt to build an enriched model of absenteeism, they also identify intrinsic motivation, job mobility and health risk as being correlated with absenteeism, variables not typically included in standard models. For frontline workers, QSDS was extensively used to study absenteeism.

A large multi-country study was carried out to determine absence rates of teachers and health workers (Rogers *et al.*, 2004; Chaudhury and Hammer, 2004; Chaudhury *et al.*, 2006). QSDS-type surveys was made in which enumerators made unannounced visits to primary schools and health clinics in Bangladesh, Ecuador, India, Indonesia, Peru and Uganda and recorded whether they found teachers and health workers in the facilities. Averaging across the countries, about 19% of teachers and 35% of health workers were absent. The survey focused on whether providers were present in their facilities but since many providers who were at their facilities were not working, even these figures may present too favorable a picture. For example, in India, one quarter of government primary school teachers were absent from school but only about one-half of the teachers were actually teaching when enumerators arrived at the schools. The study analyzed the high absence rates across sectors and countries investigated the correlates, efficiency and political economy of teacher and health worker absence and considered implications for policy.

Lindelow *et al.* (2003) examined the question of efficiency in Ugandan health clinics using QSDS data. They made use of an output weighted index similar to the one used in Mozambique to measure health workers output for different categories of facilities. They noted very important differences in outpatient-equivalent service units per workers across facilities in the country (in a 50-1 ratio). Important differences in output per worker are also observed across ownership cate gories with lower levels observed among non-profit facilities.

A QSDS-type survey was conducted in Bangladesh where unannounced visits were made to health clinics with the intention of discovering what fraction of medical professionals were present at their assigned post (Chaudhury and Hammer, 2004). The survey quantified the extent of this problem on a nationally representative scale. The first notable result is that nationwide, the average number of unfilled vacancies for all types of providers is large (26%). Regionally, vacancy rates were generally higher in the poorer parts of the country. Absentee rates for medical providers in general were quite high (35%) and these rates were particularly high for doctors (40% at lower levels of health facilities, the absentee rate for doctors increased to 74%). Determinants of staff absenteeism observed in the area are closeness of the medical provider's residence to the health facility, their access to road and electricity.

In Nigeria, a survey of 252 primary health facilities and 30 local governments was carried out in Kogi and Lagos States. Both qualitative and quantitative data were collected at the facility level through interviews of facility staff and directly from facility records. Facility-level data was linked to data collected from local governments on the governance environment and financing arrangements. The conduct of the study was specifically designed to promote evidence-based policy dialogue in Nigeria by engaging the active participation of the overarching government agency in the country responsible for monitoring and supervising outcomes in primary health care service delivery the National Primary Health Care Development Agency (NPHCDA). It was exclusively on the performance of public health facilities, focusing explicitly on the supply side of the determinants of actual outcomes that is, improved health indicators. The study showed the problem of leakage and accountability and that the greater the extent of non-payment of salaries, the higher the likelihood that facility staff behave as private providers as they provide more services outside the facility through home visits, transfers conditional on actual improvements in service delivery. In Lagos State, public delivery by local governments is influenced by availability of private facilities and nearness to referral centers in the state. However, in Kogi State, whose population largely lives in rural areas and depends heavily on public institutions of service delivery, communities were active in participating in health service delivery. This is significantly associated with greater productivity per staff in providing inpatient deliveries, immunizations and out-patient consultations. In addition, results revealed that the incentives of frontline service providers are typically blunt as there is no discernable local discretion to reward good performance. Furthermore, user fee policies are neither established nor transparent thus communities are exposed to the risk of overcharging by staff for public service that ought to be subsidized (Gupta-Das *et al*., 2004).

Dehn introduced a quantitative approach to evaluating the delivery of public services. They combined a general discussion of the main features, strengths, limitations and potential uses of tracing studies and Quantitative Service Delivery Surveys (QSDSs). The emphasis was on the process of survey design and implementation. They attested to the fact that unless carefully planned, surveys of service delivery can easily fall prey to the very same problems which they set out to measure. The key lesson drawn was that QSDSs and tracing studies require considerable time, commitment and adequate funding as well as careful consensus building among in-country stakeholders.

In Honduras, a combination of PETS-QSDS was used to diagnose moral hazard with respect to frontline health and education staff (World Bank, 2001). It was demonstrated that when salaries and non-wage funds reach frontline providers, certain staff behaviours and incentives in public service have an adverse effect on service delivery in particular absenteeism and job capture by employees. Migration of posts (due to capture by employees) was considered a major problem. The system of staffing in Honduras assigns posts to the central ministry not individual facilities. As the central ministry has discretion over the geographic distribution of posts, frontline staffs have an incentive to lobby for their posts to be transferred to more attractive locations, most often to urban areas. This implies that posts migrate from rural areas and primary level to cities and higher levels of health care schooling which are neither efficient nor equitable.

Studies reviewed on QSDS showed absenteeism of staff, problem of leakage and accountability, migration of posts (Gupta-Das *et al*., 2004; Chaudhury and Hammer, 2004; Serneels *et al*., 2005; Chaudhury *et al*., 2006); focus group discussions were employed to source information (Serneels *et al*., 2005; Lindelow and Serneels, 2006) also, both education and health sectors were involved in the various studies.

MATERIALS AND METHODS

Sampling technique and data collection: This study made use of the available QSDS data of the World Bank in Nigeria in 2004. This was complemented with the Focus Groups Discussion (FGDs). These additional surveys would helped updating complement the information provided by the 2004 data. Detail description of the QSDS data and the FGDs are provided as.

The 2004 World Bank survey: The World Bank (2004a, b) data collection revolves around extensive and rigorous survey work, at the level of the primary/public health care facilities and the local governments. Two basic survey instruments of primary data collection were agreed upon, based on collecting information from government officials and public service delivery facilities:

- Survey of primary/public health care facilities including interviews of facility managers and workers as well as direct collection of data on inputs and outputs from facility records
- Survey of local governments (under whose jurisdiction the health facilities reside) including interviewers of local government treasurers for information on budgeted resources and investment activity and interviews of primary health care coordinators for roles, responsibilities and outcomes at the local government level

The facility level survey instruments were designed to collect data along the following lines:

- Basic characteristics of the health facility; who built it, when was it built, what other facilities exist in the neighborhood, access to the facility, hours of service, etc.
- Type of services provided; focusing on ante-natal care, deliveries, outpatient services with special emphasis on malaria and routine immunization. Availability of essential equipment to provide the above services
- Availability of essential drugs to provide the above services
- Utilization of the above services, referral practices
- Tracking and use of epidemiological and public health data
- Characteristics of health facility staff professional qualifications; training, salary structure and whether payments are received in a timely fashion informal payments received fringe benefits received do they have their own private practice; time allocation across different services; residence; place of origin
- Sources of financing who finances the building infrastructure and its maintenance; who finances the purchase of basic equipment who finances the purchase of drugs what is the user fee policy; revenues from user fees; retention rate of these revenues; financing available from the community
- Management structure and institutions account-ability; activities of and interaction with the local government and with the community development committees

The local government survey instruments were designed to collect data along the following lines. Basic characteristics:

- When was the local government created, population, proportion urban and rural, presence of an urban center, presence of NGOs and international donors
- Number of primary health care facilities by type (Types 1 and 2) and ownership (Public-Local Government, State and Federal Government; private-for-profit; private-not-for-profit)
- Supervisory responsibilities over the general functioning of the primary health care centers
- Health staff; number of staff by type of professional training and civil service cadre; salary
- Monitoring the performance of health staff; how is staff performance monitored and by whom; Is staff rewarded for good performance or sanctioned for poor performance and how?; instances when local government has received complaints; what disciplinary action was taken?
- Budget and financing; data on actual LGA revenues and expenditure from available budget documents
- Management structures; functioning of the Primary Health Care Management Committee (PHCMC), the Primary Health Care Technical Committee (PHCTC) and the community based organizations the Village Development Committee (VDC) and the District Development Committee (DDC)
- Health services outputs at the Local Government level: records of immunization and environmental health activities

A multi-stage sampling process was employed where first 15 local governments were randomly selected from each state; second, 100 facilities from Lagos and 152 facilities from Kogi were selected using a combination of random and purposive sampling from the list of all public primary health care facilities in the 30 selected LGAs that was provided by the state governments; third, the field data collectors were instructed to interview all staff present at the health facility at the time of the visit, if the total number of staff in a facility were ≤ 10. In cases where the total number of staff were >10, the field staff were instructed to randomly select 10 staff but making sure that one staff in each of the major ten categories of primary health care workers was included in the sample.

Health facilities were selected through a combination of random and purposive sampling. First, all facilities were randomly selected from the available list for 30 LGAs. Between 1-3 facilities were then randomly selected from these LGAs and an equal number of facilities were

randomly dropped from over-represented LGAs, defined as those where the proportion of selected facility per LGA is higher than the average proportion of selected facilities for all sampled LGAs. A list of replacement facilities was also randomly selected in the event of closure or non-functioning of any facility in the original sample. An inordinate amount of facilities were replaced in Kogi (27 in total), some due to inaccessibility given remote locations and hostile terrain and some due to non-availability of any health staff. The local community volunteered in these cases that the reason there was no staff available was because of non-payment of salaries by the LGA.

The Focus Group Discussion (FGDs): The FGDs were carried out both in the two states namely Lagos and Kogi State. Two local governments were randomly selected. These include Agege and Ikorodu local government Lagos State and Lokoja and Ajaokuta local government area for Kogi State.

In Agege LGA, 2 primary health care, 2 community health posts and 1 community outreach were sampled while 2 primary health care and 2 communities outreach were sampled in Ikorodu Local Government. In Lokoja, 5 primary health care centers were sampled while three were sampled in Ajaokuta. In total, 4 local governments, 12 primary health care, 2 community health posts and 2 communities outreach were used. A Focus Group Discussion (FGD) was used to collect data from respondents in each facility sampled. Staff members and a maximum of fifteen clients (users) in a group were interviewed.

Model specification: The probit model will be used to estimate factors affecting level of cleanliness. The specification is given by equation1 as follow:

$$Y_i = \alpha_0 + \alpha_1(\text{community participation}) + \alpha_2(\text{bargaining power}) + \alpha_3(\text{quality of staff working in the facility}) + \varepsilon_i \quad (1)$$

where, Y_i is the level of cleanliness offer by the health manager which varies between (not clean and clean). According to Gupta-Das *et al.* (2004), condition of facilities in terms of cleanliness were rated by respondents as dirty/very dirty, clean/very clean and cleanliness unspecified. This study, therefore, specified the rating of respondents in terms of dirty/very dirty as not clean, clean/very clean as clean while discarding the cleanliness unspecified from the analyses. The community participation is a measure of the community involvement in staff disciplinary decision and whether the community association work with facility. The bargaining power has to do with the level of income in the community and the distance of private clinic to LGA. Whether the staffs in the facility are qualified or not is another factor that should be considered. This will explain quality of staff in the facility.

The measure of community income is determined using budget allocation to the Local Government each facility belongs to. However, the quality of staff based on qualification of the staffs presents a certain level of endogeneity problem as it is not possible to observe directly the staffs' quality. Here, we could also envisage the case of reverse causality between health service facility cleanliness and staff quality in deregulated public health care sector where medical doctors are free to choose the health care facility where they would like to render service. However, in the case of Nigerian public health care facilities, the choice of the health care facility where a doctor will render service is done by government and medical doctors only obey. This situation makes the bi-causality nonplausible. For this reason, an endogeneity test (using Wald test) will be carried out after the estimation (Baum *et al.*, 2003). This makes the estimates of ordinary linear probit inadequate; hence the use of an instrumental based probit model instead of the ordinary linear probit model. In case of rejection of the hypothesis of non endogenity, a set of covariates (instruments) will be used to control for the endogenity. These include age and gender of the staff, his educational level and his year of experience. We also acknowledge the problem of heteroschedasticity due to the different groups pooled together in the dataset used for the study. While, the instrumental variable probit model will be used to solve the endogeneity problem on one hand, the use of robust standard error in the estimation will be used to handle the heteroschedasticity or clustering problem on the other hand (Angrist and Pischke, 2009).

The model is summarized to a single continuous endogenous regressor in a Binary Outcome Model. Researchers considered the following Linear Latent Variable Model in which Y_{1i}^* is the dependent variable in the structural equation representing the cleanliness status and Y_{2i} is an endogenous regressor in this equation representing the (quality) skill level of the staff. These two endogenous variables are modeled as linear in exogenous variables X_i (since they are independent from the error term), Z and S_i that is:

$$Y_{1i}^* = \alpha_0 + \sum_{i=1}^{i=7} \alpha_i X_i + \gamma Z + \delta Y_{2i} + u_i \quad (2)$$

$$Y = \delta_0 + \sum_{i=1}^{i=6} \delta_i S_i + v_i \quad (3)$$

where, X_i is a 7×1 vector of community participation variables made up by voice, client power and compact variables community association work with facility (X_1) = Dummy variable which take 1 if community work with the facility and 0 otherwise (client power); total number of member in the community association (X_2) number of meeting by the community association/annum (X_3); community association head attendance to facility meeting (X_4) = Dummy variable which take 1 if the community head attend to meetings and 0 otherwise (client power); member of community association number of visit to health facility other than for treatment (X_5) (client power); member of PHCMC number of visit to facilities (X_6) (compact) disciplinary action against staff (X_7) = Dummy variable which take 1 if the community contribute in taking disciplinary action against staff and 0 otherwise (voice).

Z representing the bargaining power of the community here measured by the internally generated revenue by local government of states considered in the study and S_i is a 6×1 vector of additional Instrumental Variable (IV) that affect the level of staff's skill (Y_{2i}) but can be excluded from Eq. 2 as they do not directly affect (Y^*_{1i}).

Gender of the staff is dummy variable which take 1 if the staff is male and 0 otherwise (S_1); number of years spent in the health facility (in years) (S_2); indigene is dummy variable which take 1 if the staff is an indigene of where is situated the health facility and 0 otherwise (S_3); time spent to get to the health facility by the staff (in hours) (S_4); primdummy is dummy variable which take 1 if the staff has primary education level and 0 otherwise (S_5); secondummy is dummy variable which take 1 if the staff has secondary education level and 0 otherwise (S_6). These S variables are suitable instrument since they affect the quality of staff but do not affect the quality of cleanliness directly.

The variable Y^*_{1i} is latent and hence is not directly observed. Instead, the binary outcome Y_1 is observed with $Y_1 = 1$ if $Y^*_{1i} > 0$ and $Y = 0$ if $Y^*_{1i} \leq 0$.

Quality or skill of workers are operationalised such that if a worker is skilled (being a doctor, nurse, technologist and so on) he is classified as skilled or classified as high quality staff and such class of staff takes up the value1 while others that are not skilled (e.g., cleaners takes up the value 0).

Equation 2 may be referred to as structural equation. This structural equation is of the main interest and the 2nd equation, called a 1st-stage equation or reduced form equation, only serves as a source of identifying instruments. It provides a check on the strength of the instruments and on the goodness of fit of the reduced form. The reduced-form Eq. 3 explains the variation in the endogenous variable in terms of strictly exogenous variables including the IV S_i that is excluded from the structural equation. These excluded instruments are essential for identifying the parameters of the structural equation. Given the specification of the structural and reduced-form equations, estimation can be simultaneous (i.e., joint) or sequential. The sequential is the one adopted in this study.

As specified, the model assumed that (u_i, v_i) are jointly normally distributed, i.e., (u_i, v_i) ~ N (0, ϵ) where; $\epsilon = (\sigma_{ij})$. In the binary probit model, the coefficients are identified up to a scale factor only; hence, by scale normalization, $\sigma_{11} = 1$. The assumptions imply that $u_i/v_i = \rho v_i = \epsilon_i$ where E (ϵ_i/v_i) = 0. A test of the null hypothesis of erogeneity of Y_{2i} is equivalent to test of H_0: $\rho = 0$ because then u_i and v_i are independent.

RESULTS AND DISCUSSION

This study deals with the presentation of the result of the analysis and the discussion of the results. The descriptive statistics of variables used in the subsequent analysis is first presented following by the estimation of factors affecting the level of cleanliness in the pooled sample, in Kogi and Lagos State, respectively.

Descriptive statistics of variables used: Descriptive statistics of variables presented in Table 1 shows that about 78% of respondents reported that their health facilities were clean, about 74% reported that community association works with the health care facility, 78% affirmed that community association head attends to health care facility meetings. About 85% of respondents attest that the community contributes in taking disciplinary action against staff. In addition, majority of staff (about 69%) were female while only about 16% of them have less than tertiary education level.

The average number of members in the community association was found to be 120 people. The community association holds an average number of 2 meetings per annum and in average, members of the community association and PHCMC make in average 3 visits each to health facility other than for treatment, the average age among staff is 40 years and they have spent 14 years in average in the health facility and they spent about 1 h on the average every day to reach their offices.

Table 1: Descriptive statistics of variables used in the analysis

Variables	Operationalization	Mean	SE
Cleanliness	Level of cleanliness offer by the health manager which take the value 0 if not clean and 1 if clean	0.782	0.028
Community association work with facility	Dummy variable which take 1 if community work with the facility and 0 otherwise	0.741	0.03
Total number of member in the community association	Continuous	119.073	20.071
Number of meeting by the community association/annum	Continuous	1.877	0.118
Community association head attendance to facility meeting	Dummy variable which take 1 if the community head attend to meetings and 0 otherwise	0.782	0.028
Member of community association number of visit to health facility other than for treatment	Continuous	2.109	0.129
Member of PHCMC number of visit to facilities	Continuous	2.195	0.118
Disciplinary action against staff	Dummy variable which take 1 if the community contribute in taking disciplinary action against against staff and 0 otherwise	0.85	0.024
Bargaining power of the community	Measured by the internally generated revenue by local government	1.86e	1557143
Gender of the staff	Dummy variable which take 1 if the staff is male and 0 otherwise	0.314	0.031
Age	Continuous	40	0.502
Number of years spent in the health facility	Continuous	13.786	0.485
Indigene	Dummy variable which take 1 if the staff is an indigene of where is situated the health facility and 0 otherwise	0.341	0.032
Time	Time spent to get to the health facility by the staff in (hours)	0.581	0.057
Primdummy	Dummy variable which take 1 if the staff has primary education level and 0 otherwise	0.055	0.015
Secondummy	Dummy variable which take 1 if the staff has secondary education level and 0 otherwise	0.095	0.02

Estimation of factors affecting the level of cleanliness: The maximum likelihood results of the factors affecting the level of health facility cleanliness are presented in this study. Researcher considered three different estimations. One when combining the two states together and two when considering states individually.

Estimation of factors affecting the level of cleanliness using the pooled sample: Table 2 shows the results of the factor affecting the level of health facility cleanliness when considering the pooled sample (i.e., the two states considered for the study). The output includes a test of the null hypothesis of exogeneity which has a p-value of 0.36>0.05, the null hypothesis (H_0[3] states that: there is no endogeneity in the model) is therefore not rejected at the 0.05 level. This means that the problem of endogeneity has been corrected through the use of instrumental variable and the model is identified. In addition we used the robust standard error to tackle the problem of clustering associated with the cross section data. The estimated sigma coefficient is positive (1.04) indicating a positive correlation between u and v. This means that the unmeasured factors that make it more likely for a staff to have a higher skill also make it more likely that the facility should be maintained clean, condition on other regressors included in the equation. Also, the Log pseudolikelihood of -432.69 and its Wald χ^2 of 15.15 significant at 1% level express the good fit of the model.

However, the results show that only the staff's skill significantly and positively explain the level of cleanliness of the health facility at 0.05 level. In fact increase in the staff's skill leads to increase of the probability of the facilityofbeing clean. The bargaining power of the community was not significant but has the expected sign as increases in internal revenue to the local government will lead to high probability of the facility to be clean. The community participation variables were not statistically significant however, they have expected signs.

Estimation of factors affecting the level of cleanliness in Kogi State: When the sample is restricted to Kogi State alone, the diagnostic statistics shown in Table 3 are similar to that of the full sample in term of the Wald test for exogeneity and the rho statistics. The Log pseudolikelihood of -265.30 and its Wald χ^2 of 17.14 significant at 1% level express the good fit of the model. However, for this case two variables are significant and positively related to the level of cleanliness in the structural equation at 0.05 level. These include the number of meeting organized by the community association/annum and whether the community contributes in taking disciplinary action against staff or not. This means that as the number the community meetings increase during the year, the probability of the health facility being clean increases also. Similarly, the probability of health facility cleanliness also increase when member of the community contribute in decision taking when a staff has to be disciplined. The implication of this finding is that client power is a key to cleanliness of facilities in Kogi State.

Table 2: Endogenous probit using IV probit maximum likelihood estimate for full (pooled) sample

Attributes	Coefficient	Robust SE	z-statistics
Cleanliness			
Staff's skill	0.06**	0.03	2.14
Community work with facility	0.20	0.26	0.77
Total number of member on the community association	-0.00	0.00	-0.78
Number of meeting by the community association/annum	0.13	0.09	1.35
Community head attendance to meeting	0.26	0.31	0.83
Member of committee number of visit other than for treatment	-0.01	0.07	-0.20
Member of PHCMC number of visit	-0.00	0.05	-0.07
Disciplinary action against staff	0.01	0.27	0.04
Bargaining power	0.00	0.00	0.60
Constant	-0.79	0.73	-1.08
Staff's skill			
Comunity work with facility	-0.15	0.20	-0.76
Total number of member on the community association	0.00	0.00	1.15
Number of meeting by the community association/annum	-0.07	0.06	-1.25
Community head attendance to meeting	0.07	0.15	0.48
Member of committee number of visit other than for treatment	0.01	0.03	0.20
Member of PHCMC number of visit	0.00	0.04	0.02
Disciplinary action against staff	-0.19	0.19	-1.00
Bargaining power	-0.00**	0.00	-2.24
Gender	0.18	0.16	1.12
Age	-0.00	0.01	-0.29
Number of years spent in the health facility	-0.03*	0.02	-1.86
Indigene = Dummy variable which take 1 if the staff is an indigene of where is situated the health facility and 0 otherwise	-0.13	0.11	-1.17
Time spend to get to the health facility by the staff	0.41**	0.18	2.36
Primdummy = Dummy variable which take 1 if the staff has primary education level and 0 otherwise	-12.05***	0.15	-78.67
Secondummy = Dummy variable which take 1 if the staff has secondary education level and 0 otherwise	-6.23***	0.11	-57.41
Constant	18.93***	0.67	28.42
/athrho	-0.09	0.10	-0.92
/lnsigma	0.04	0.15	0.27
Rho	-0.09	0.09	-
Sigma	1.04	0.16	-
Log pseudolikelihood	−432.69	-	-
Wald χ^2 (9)	-	15.15	-

Wald test of exogeneity (/athrho = 0): χ^2 (1) = 0.85 Prob>χ^2 = 0.36

Table 3: Endogenous probit using IV probit maximum likelihood estimate for Kogi State

Parameters	Coefficients	Robust SE	z-statistics
Staff's skill	0.04	0.04	1.01
Community work with facility	-0.08	0.34	-0.23
Total number of member on the community association	-0.00	0.00	-1.20
Number of meeting by the community association/annum	0.49***	0.17	2.91
Community head attendance to meeting	0.27	0.52	0.51
Member of committee number of visit other than for treatment	-0.19	0.12	-1.61
Member of PHCMC number of visit	-0.08	0.09	-0.93
Disciplinary action against staff	0.62*	0.36	1.73
Bargaining power	0.00	0.00	0.85
Constant	-0.91	0.94	-0.97
Staff's skill			
Comunity work with facility	-0.07	0.23	-0.32
Total number of member on the community association	0.00*	0.00	-1.78
Number of meeting by the community association/annum	0.06	0.08	0.84
Community head attendance to meeting	0.07	0.17	0.41
Member of committee number of visit other than for treatment	0.08	0.06	1.28
Member of PHCMC number of visit	0.04	0.04	1.08
Disciplinary action against staff	-0.09	0.10	-0.86
Bargaining power	0.00	0.00	-1.58
Gender	0.33	0.21	1.56
Age	-0.01	0.01	-1.57
Number of years spent in the health facility	-0.04**	0.02	-2.26
Indigene = Dummy variable which take 1 if the staff is an indigene of where is situated the health facility and 0 otherwise	-0.18	0.11	-1.64
Time spend to get to the health facility by the staff	0.20	0.14	1.40
Primdummy = Dummy variable which take 1 if the staff	-11.89***	0.19	-62.42
Secondummy = Dummy variable which take 1 if the staff has secondary education level and 0 otherwise	-6.21***	0.13	-49.11
Constant	19.03***	0.57	33.66
/athrho	-0.09	0.12	-0.80
/lnsigma	-0.12	0.20	-0.58

Table 3: Continue

Parameters	Coefficients	Robust SE	z-statistics
Rho	-0.09	0.12	-
Sigma	0.89	0.18	-
Log pseudolikelihood	−265.30	-	-
Wald χ^2 (9)	17.14	-	-

Wald test of exogeneity (/athrho = 0): χ^2 (1) = 0.63 Prob >χ^2 = 0.43

Table 4: Endogenous probit using IV probit maximum likelihood estimate for Lagos State

Parameters	Coefficient	Robust SE	z-statistics
Staff's skill	0.12*	0.07	1.74
Community work with facility	1.28*	0.73	1.75
Total number of member on the community association	0.00	0.00	-0.23
Number of meeting by the community association/annum	0.09	0.15	0.65
Community head attendance to meeting	1.26**	0.47	2.70
Member of committee number of visit other than for treatment	0.11	0.13	0.85
Member of PHCMC number of visit	-0.01	0.11	-0.07
Bargaining power	0.00	0.00	0.07
Constant	-2.74	1.72	-1.59
Staff's skill			
Comunity work with facility	0.11	0.30	0.37
Total number of member on the community association	0.00**	0.00	2.11
Number of meeting by the community association/annum	-0.08	0.07	-1.02
Community head attendance to meeting	-0.08	0.23	-0.35
Member of committee number of visit other than for treatment	0.00	0.05	-0.07
Member of PHCMC number of visit	0.00	0.06	-0.07
Bargaining power	0.00	0.00	-0.51
Gender	-0.25	0.21	-1.22
Age	0.01	0.03	0.39
Number of years spent in the health facility	0.00	0.03	0.03
Indigene = Dummy variable which take 1 if the staff is an indigene of where is situated the health facility and 0 otherwise	-0.16	0.23	-0.67
Time spend to get to the health facility by the staff	0.54**	0.25	2.15
Primdummy = Dummy variable which take 1 if the staff has primary education level and 0 otherwise	-12.25***	0.32	-37.79
Secondummy = Dummy variable which take 1 if the staff has secondary education level and 0 otherwise	-6.29***	0.30	-20.67
Constant	17.75***	1.01	17.52
/athrho	0.12	0.43	0.28
/lnsigma	0.15	0.22	0.67
Rho	0.12	0.43	-
Sigma	1.16	0.25	-
Log pseudolikelihood	−139.45	-	-
Wald χ^2 (9)	20.41	-	-

Wald test of exogeneity (/athrho = 0): χ^2 (1) = 0.08 Prob>χ^2 = 0.78

Estimation of factors affecting the level of cleanliness in Lagos State: When the sample is restricted to Lagos State alone, the diagnostic statistics shown in Table 4 are similar to that of the full sample in term of the Wald test for exogeneity and the rho statistics. In addition, the Log pseudolikelihood of -139.4 and its Wald χ^2 of 20.41 significant at 1% level show that the model is well fited.

However, three variables are significant in the structural equation at 0.10 level. These include staff's skill, community work with facility and community head attendance to meeting. This still emphasize the importance of staff's skilled and the client power in the process of making the health care facility clean.

CONCLUSION

This research attempted to answering whether accountability framework elements such as voice and client power/compact affect positively the health care facilities cleanliness in Nigeria using data collected by the here we could also envisage the case of reverse causality between health service facility cleanliness and staff quality in deregulated public health care sector where medical doctors are free to choose the health care facility where they would like to render service. However, in the case of Nigerian public health care facilities, the choice of the health care facility where a doctor will render service is done by government and medical doctors only obey. This situation makes the bi-causality non-plausible and a quick survey carried out by us in 2010 to complement the 2004 dataset. Researchers employed the accountability framework in analyzing cleanliness and the instrumental variables probit model in analyzing the data while correcting for heteroscedasticity arising from population clustering in survey data. Researchers based the study on two mains hypotheses: First, community participation, bargaining power and quality of staff do not affect the level of cleanliness of the facility and secondly, endogeneity exist with level of skill being an explanatory variable in the model.

From the foregoing, researchers conclude that the two null hypotheses of the study should be rejected and

the alternatives be accepted. These mean that accountability framework elements do affect positively the health service delivery in Nigeria and the IV probit model have corrected for endogeneity which was brought in the model by staff's skill being an explanatory variable. Specifically, client power explains the level of cleanliness of health facility in Kogi and Lagos States. Also, the staff skill is another key factor that drives cleanliness positively in health facility in the two states. Therefore, the key policy issues to be targeted are in the area of promoting positive community participation in health facilities in order to enhance cleanliness in health facilities in Nigeria.

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