

Impact of Health Purchasing Methods on the Quality of Health Services in Public Hospitals: The Case of Amana Hospital, Tanzania

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ABSTRACT

This paper analyses the impact of health purchasing methods on the quality of health services delivered by public hospitals in Tanzania. It examines the effect of fee for services methods used by the health insurance fund and user fees used by non members to purchase services, on the quality of services rendered by government hospitals. The resource use intensity in treating patients was used as a proxy for quality of health services delivered.

In analyzing the effect of health purchasing methods on the quality of health services, delivered by public hospitals, primary data from Amana district hospital were used. Econometric methods were adopted to estimate the hospital total recurrent cost function and coefficient of elasticities for fees for services and user fees for the outpatients and inpatients groups. In addition, the marginal costs for specific groups of patients were estimated to determine resource use intensity for treating patients in hospitals.

The results suggest that fee for services method led to low recurrent costs for outpatient group but resulted in higher total recurrent costs for inpatients. Furthermore, the results revealed that average cost for insured outpatient and inpatient were less than the marginal costs. This implies hospitals are either inefficient in delivering services to patients or are adjusting costs according to payment specific methods. Thus, it is recommended that a mixture of health insurance reimbursement methods be used to improve the quality of services. It is also recommended that non members be encouraged to enroll in health insurance schemes to minimize the adverse selection and to help in overcoming poverty in Tanzania.

Keywords: Health Insurance, health insurance reimbursement, fee for service user fees, Tanzania

INTRODUCTION

This paper analyses the effect of health insurance purchasing methods on the quality of health services in public hospital. The paper examines the effect of the fees for service method used by the National Health Insurance Fund (NHIF) to pay for health services for its members and user fees paid by non members on the hospital total recurrent cost. User fees and fees for service methods were introduced

following health sector reforms in 1993 and 2000 respectively. The government has also continued to provide budget subvention to public hospitals for financing health services. The budget subventions are mainly for salaries for hospital staff members, purchase of equipment and physical expansion of hospitals. Various health financing arrangements introduced following the reforms had aimed at enhancing Tanzanians access to health care services.

The implementations of the reforms led to the introduction of the cost sharing as well as health insurance schemes. Tanzania Health Sector Strategic Plan III of 2009-15 and the

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proceeding one have emphasized equity in accessing health care service among the Tanzanians. This has led to the establishment of the Community Health Funds (CHF) and National Health Insurance (NHIF) as well. In addition, the Strategic Plan aims at having 30 percent of Tanzanians being covered by insurance by 2015. The enrollment of the individuals in the scheme shall enhance resource pool for treating patients and overcoming poverty in the country.

This paper uses experiences and data from the Amana hospital that belongs to the government to analyze the effect of health purchasing methods on the quality of health services. There have been a number of complaints from members of health insurance on the quality of health services delivered by Amana hospital and other public hospitals as well. More than often, patients who are members of the NHIF had been required to buy medicines and other medical supplies in the episodes of illness.

In addition, patients who are members of NHIF spend more time to get treatment compared to non members for the same diseases they suffer (Mwananchi, 2013, 2009a, 2009b, Guardian, 2007a; Nipashe, 2013, 2007). Such a situation is contrary to the objectives of health sector reforms, which aimed at ensuring individuals access to quality health services and the improvement in the financing of health system.

In this paper, the purchasing of health services refers to means, the government, health insurance funds and individuals pay for curative health services delivered by public and private health service providers (Johnsons-Lan, 2006). The methods involve payment of money or its equivalent in return to the health service delivered to patients in the episodes of illness. There is a number of health insurance methods used purchase services from hospitals. The methods entail either paying the health services providers in advance or reimbursing the health care providers after they had delivered the services to patients, who are the members of health insurance. Four methods are widely used to reimburse health service providers. They are fee for service,

capitation and diagnostic related group methods, as well as global budget.

Fees for service method is one of the mode of payment used by health insurance firms. In such a mode, health services are unbundled and paid for independent of the quantity of care. In such a situation the method provides an incentive to physicians (Yin-Wen et al. 2005). Moreover, in case there is no cost sharing by health insurance, patients also have an incentive to overuse medical services. This methods is commonly used in developing countries.

Capitation method is another health insurance reimbursement method. It entails payment of contracted rate for treating each member assigned, commonly referred “per member per month” regardless the number or nature of services provided (Andrew 2006). The contractual rate are adjusted for age, gender, illness and regional difference. Some developing countries have adopted this method.

Diagnostic related group is another health insurance reimbursement method. It is widely used in developed countries. The system classifies hospital cases into groups of services offered by hospitals. It identifies the products that hospitals provides. The system was developed to replace the two cost based reimbursement methods mentioned earlier. The diagnostic related group are assigned by the groups or programme based on international classification of diseases diagnoses, procedures, age, sex discharge status and presence of complications or comorbidities.

Global budget refers to a fixed maximum expenditure set by the government for a defined set of health care service to be provided. The size of the budget is determined by projected health care services needs or as a proportion of GDP. Institutional providers such as hospitals are given individual budget each year, and required to work with them. Further details on the four methods that has been defended are presented in section 2.

The quality of health service refers to efforts by hospitals to reach excellent standard of service delivery. The quality of health care is achieved through accreditation or inspection of standards that ensure that proper procedures in delivering health services and staffing ratios are met. In particular, the quality of health care services is measured through waiting time in hospitals, availability of medical supplies, intensity of treatments and the length of appointment time (Andrew, 2006, Yi-Wen et. al., 2005).

Following the health sector reforms, public district hospitals were assigned more administrative and fiscal responsibilities (Hutchinson 2002). Moreover, the government introduced user fees for individuals with no health insurance cover, when visiting public hospitals in the episodes of illness (URT, 2005). This allowed public hospitals to use revenue from user fees to improve drugs availability and other medical supplies. In public hospitals, user fees contribute 42 per cent of their recurrent revenue. The government also provide budget subvention to public hospitals.

The Tanzanian government has been allocating 10 percent of its budget for health services in the past decades. The budget is below the set target of 15 per cent of total budget as per Abuja Resolution of 1988 (Haddad and Fומר, 1995). The public hospitals have been receiving between 50-60 percent of their funding requirements from the government (NBS and Macro International Inc., 2007; Citizen, 2013). Thus, there is a number of funding sources from which public hospitals can meet expenses of treating patients.

As pointed out before, following the health sector and financial reforms, the government allowed the establishment of both public insurance scheme that is NHIF and private insurance firms as well. This suggests demonstrate that the market for health insurance is segmented. Such a situation has an impact on the quality of health services hospitals deliver to patients.

Members of NHIF pay annual premiums and in return they get service from accredited hospitals. The benefit package includes diagnostic and treatment for outpatients and inpatients. However, in Tanzania, only 15 percent of the populace are members of health insurance schemes. The introduction of the health insurance entailed the shifting of all financial risk to health services providers. This needed the separation of purchasing from provision of health care services. The expected outcome of such arrangement was the improvement in the delivery of quality health services by public hospitals.

Public hospitals are the main provider of health services to a large part of the populace in the country. They constitute 64 percent of all health service facilities (McIntyre et. al., 2008, NBS 2012). It is estimated that 93 percent of the populace lives within the radius of 10 km of a public health facility, thus, individuals can easily access health services in the episodes of illness. In addition, the public health facilities are the main providers of services to members of the NHIF. The facilities account for 86 percent of total NHIF accredited health service facilities (McIntyre et. al. 2008).

Regarding provider payment methods, the NHIF had adopted the fees for service methods and for some cases capitation method had been used for a while. The fee for service method covers the costs for consultations, generic drugs, and basic diagnostic services. The capitation method was used to cover the cost of treating patients for those services not covered by fees for services method. However, NHIF has stopped using capitation method to reimburse hospitals.

The quality of health services delivered by public hospitals to NHIF members and non members is an issue of concern to patients, the government and the insurance fund. In particular members of the NHIF have registered complains on the quality of services provided by the public hospitals (Hertz 2013, Vaina, Mwananchi, 2013, 2009, 2009a, 2009b, Guardian, 2007a; Nipashe, 2007). For example, the members of NHIF have been advised to buy prescribed drugs from the

private pharmacies, and were not refunded (Mwananchi, 2013, 2009a, 2009b Nipashe, 2007, Guardian, 2007). Furthermore, they spend 4-5 hours to get service in public hospitals, when sick, but non-members use 2-3 hours to get treated for similar diagnosed diseases.

The hospitals have also occasionally, complained about lack of funds for purchasing the necessary medical supplies (Guardian, 2007b). The hospitals had also complained about the delays in getting medical supplies from Medical Stores Department and in receiving the reimbursement of the funds from NHIF (The Citizen, 2014, Nipashe, 2007; Mwananchi 2009a; 2009b). This highlights the challenges that public hospitals face, in delivering health services.

However, health sector reforms as well as national health policy have aimed at improving the delivery of quality health services to individuals and households as well as its financing in Tanzania. The introduction of health insurance aimed at improving the households and individuals accessibility to quality health services and the financing of service delivery in the country. As a result of the health service reforms and establishment of the health insurance schemes, new methods of purchasing health services were introduced. The methods used by health insurance firms to pay hospitals for the services delivered to insured patients, influence the behaviour of health services providers (Dor and Farley 1996, Schneider and Hanson 2006, Crownwell, 2011, AHCRC, 2012).

Furthermore, hospitals are multi-products firms, which provide services to insured and uninsured individuals. The hospitals as firms also experience the increase in cost of service delivery because of the increase in the volume of services provided (Schneider and Hanson, 2006; Dor and Farley, 1996). The increase in costs is linked to the quality of health care services public hospitals deliver. In addition, for hospitals attending members of health insurance high costs are expected. The reason is that moral hazard and adverse selection effect inherent in health insurance.

Moreover, the increase in cost for a particular group of patients may be a result of resource intensity shifting given the different health purchasing methods. Such behaviour also affects the delivery of quality health services. However, given the number of the methods used for purchasing health services, hospitals were expected to deliver, quality health services. Little is known about the factors associated with the low quality of health services delivered by public hospitals after introduction of the health insurance. This paper seeks insights into the association between health services purchasing methods and the quality of health care services in public hospitals in Tanzania.

A number of studies have examined the implementation of the health insurance schemes and insurance market in Tanzania (Minja et. al. 2008, McIntyre et. al. 2008; URT 2008, 2005; DFID 2002). In particular, DFID (2002) examined whether health insurance resulted in increased risk sharing and efficient health service purchases in Tanzania and other African countries. Little evidence was found to suggest health insurance improved the financing of health facilities in Tanzania.

Previous studies on the financing of the health system in Tanzania had also examined the impact of health insurance on financing health services in Tanzania. However, there is little knowledge about the effect of the fees for service and user fees methods on the behavior of the health service providers and the quality of service they deliver to patients. This is the gap this study seeks to fill.

Thus, the specific objectives of this paper are as follows; firstly, to examine the effects of health purchasing methods on the total recurrent costs of public hospitals and secondly to analyze the effect of health purchasing methods on resource intensity in delivering health services to patients in public hospitals.

The paper is organized as follows: after this introduction, Section two provides literature review on the health insurance reimbursement methods and the implications on the quality of health services. Section three provides details

on the framework of analysis and methodology followed by section four on estimation results and the discussion of the findings. The last section is the conclusion.

Literature review-health insurance reimbursement and quality of health care

In developing countries, health sector reforms had led to the adoption of the performance based approaches for purchasing health service and reimbursing service providers (Eicher, 2000; Bitran and Yip, 1998). They had also aimed to enhance efficiency in delivery of quality health services (Bitran and Yip, 1998). In order to achieve the objective of the reforms, the financial risks in the delivering of health services has been shifted to hospitals. This has been facilitated by the introduction of the health insurance, an entity that purchases health insurance.

The new methods for purchasing or reimbursing the health service providers have had an effect on the behaviour of public hospitals. The insight into the behaviour of public hospitals is understood through the principal agent theory. "The principal" refers to government, insurers or private payers of health services. The "agents" referred to health care providers that include hospitals diagnostic centres and pharmacies (Thomas and Maurice, 2007).

The principal-agent theory states that, the principal cannot perfectly monitor activities of the agents because she lacks perfect information about what is being purchased (Thomas and Maurice, 2007; Eicher, 2000). Also, the principal may not be certain whether the agent is providing quality services and that the sum paid to the agent are efficiently used. In such a situation, the principal needs to institute monitoring mechanisms. However, the monitoring of the health service providers may be a difficult and costly task (Eicher, 2000).

As an attempt to overcome the monitoring problem, the health insurance firms enter in a contract with health service providers so that

they provide quality services to its members (Eicher, 2000). The contract between the two parties provides details on the performance parameters that the principal values and the financial incentive to health providers for achieving the defined performance targets. One of the targets is to deliver quality health service to patients.

Furthermore, the agency relationship and information asymmetry inherent in the payment methods influence the conduct of hospitals in delivering services to patients. This is particularly, when the hospitals seek to maximize profit at an acceptable level of income. Similar behavior is expected from the public hospitals in Tanzania, when attending patients who are members of health insurance.

The hospitals may either deliver quality health services or reduce resources use intensity to minimize costs of treating patients (Dor and Farley, 1996; Schneider and Hanson, 2006). This may lead hospitals to compromise the quality of health services when the level of control and monitoring of health systems is inadequate. In addition, the hospitals are able to compromise the quality, if there is a number of methods for purchasing health services they deliver. Such a behaviour may be revealed by the total recurrent cost function for hospitals. This is expected to be happening in Tanzania as well.

The performance of hospitals and the quality of services delivered are determined by the characteristics of the purchasing methods among other things (Watters and Hussy, 2003). The payment mechanisms that put greater risk on hospitals such as fees for services, capitation, global budgeting and Diagnostic Related Group (DRG) methods may lead public hospitals to be cost conscious in treating patients and to compromise the quality of health care services provided.

The purchasing methods are broadly categorised as retrospective and prospective health insurance methods. The methods provide incentives to public hospitals to deliver services by adjusting treatment intensity within the medically acceptable range or provide low quality of services (Dor and

Farley, 1992). The details on the different reimbursement or health purchasing methods and their probable outcomes on the quality of health service are provided below.

Fee for service

As pointed out earlier, Fee for service is one of the retrospective payment methods used to pay hospitals for treating members of health insurance. The method involves making payment for each service the hospitals deliver to patients. Payments are calculated and paid after services are delivered to patients (Andrew, 2006; Robisons, 2001). All developing countries, that have undertaken health sector reforms, had introduced fees for service method because it is easy to adopt and does not need sophisticated administrative machinery. For this reason, the NHIF had adopted fees for service method to purchase health services for its members, in the country.

The use of fees for service methods to reimburse hospitals provides incentive to service providers to either reduce expenditure per person or a number of stays in hospitals (Yin-Wen et. al. 2007). In a number of studies in both developed and developing countries, it had been observed that fees for service method lead to higher marginal and average costs per patient compared to other reimbursement methods (Dor and Farley 1996, Long, 2008). This could be associated with poor health service delivery in some public hospitals in Tanzania as well, since a number patients have complained about low quality of services delivered to them.

Furthermore, Minja et. al. (2008) observed that although the fees for service method provided hospitals with the incentive to deliver quality health services, it limited proceeds providers were getting. Such a situation encourage hospitals to deliver low quality services. Thus, as noted by Long and Masi (2008) and Hertz (2012), the fee for service payment method is inadequate, if the delivery of quality of health of services is to be achieved.

Capitation method

In most countries, fee for service methods had been followed by the capitation method. Through the capitation method, health insurance funds pay hospitals a fixed amount per person per year. The capitation method is ideal for making payment to primary health service providers. In developing countries, including Tanzania, primary health service providers are the main service providers.

The advantages of the capitation method include easiness in adjusting the amount paid to providers, taking into account the health status of the members of health insurance fund, the length of waiting list and working conditions. It also allows health service providers to deliver a better mix of service that is economical and efficient (Andrew, 2006). The method also helps to guarantee the delivery of quality health services. It is easily administered and the cost of care can be determined in advance. NHIF adopted the capitation method for a while but later on it was abandoned. The method requires a well established administrative machinery to manage it.

Diagnostic Related Group (DRG) method

Diagnostic Related Group is another payment method used to reimburse hospitals. The payment method is widely used in developed countries. Developing countries or middle income countries that have experienced rapid economic growth have also adopted it (Yi-Wen et. al., 2005; Bitram and Yip, 1998; Anderw, 2006; Gottiet et. al., 2006). Tanzania has not yet adopted the DRG method, probably because it has not yet developed the necessary institutional capacity to administer it.

Global budget

Global budget is another payment methods used by health insurance funds to pay hospitals for treating the members when sick. The method entails the calculation of costs and effecting payment before the delivery of services is done (Andrew, 2006). The method does not provide hospitals an incentive to provide quality services.

Apart from the types of the methods adopted to purchase health services, the health service market structure affect the quality of health services delivered to patients who are members of health insurance fund. Barnum et. al. (2006) highlighted that to implement fee for service, capitation and case based reimbursement methods, the health market needs to be competitive. However, in Tanzania, both the health insurance as well as health service markets are not yet competitive and they are segmented. Such a situation has impact on the quality of health services delivered by various hospitals.

Furthermore, the health purchasing methods may result in the acceptable quality of health service delivered in countries, which health service spending is largely pooled, life expectancy is high and institutional capacity is strong (Bitran and Yip, 1998). However, in Tanzania the pooling of the health spending is low because at present only 15 per cent of Tanzanians are members of NHIF. In addition, the life expectancy is 52 years. Such a situation may limit the effect of health insurance reimbursement methods in promoting the delivery of quality services in hospitals.

In order to deal with the undesirable responses of hospitals to incentives inherent in the health purchasing methods and to improve the quality of services delivered, several measures have been suggested. They include the provision of drug list as well as the regulation of length of stay in the hospitals (Meng et. al. (2004). Other measures include stipulation of the re-admission rate and the expected quality of health services.

In Tanzania, NHIF has provided the drug price list. However, the prices are low and are not regularly revised. For example, in 2009, the price of quinine injection was Tshs 500 as per the prices list of NHIF, but in private hospitals or pharmacies, it costed Tshs 5,000. The public hospitals were reimbursed Tshs 2,500 for quinine syrup prescribed to patients who are members of NHIF. In such a situation, there is little incentive to public hospitals to deliver quality services. However, there is a

little monitoring of the public hospitals compared to that of the private hospitals.

The health sector reforms had also brought about the decentralization of decision making and the funding of health services (McIntyre et. al., 2008). As a result, the public hospitals are now more autonomous. Autonomy and decentralization of responsibilities provide public hospitals an incentive to deliver quality health services. But for some public hospitals such an incentive is not there, probably because either of the limited fund they get from a particular health purchasing method or they are able to adjust resource intensity, when treating patients.

User fees and the quality of health services

User fees charges paid by individuals or households for the service they get when visiting public health facilities. It is paid on each of the visit a patient is making to a particular health service facility. The user fees payments are made at the point of service use. It is a non risk sharing method (WHO 2008). In a number of countries in Africa user fees were introduced as part of adoption of Bamako Initiative in 1988 (Haddad and Fomer, 1995).

In literature, various scenarios in regard to user fees had been explored. They include the introduction of user fees, the reduction of user fees and the increase in user fees (WHO, 2008). The analysis has focused on the outcomes of user fees, in regard to the level of utilization and accessibility to health care services. In particular, user fees had effect on the availability of resources and motivation of the health personnel. The fees result in increased availability of drugs and diagnostic equipment leading to improved health service delivery. In that regard, a number of authors associate the user fees and the quality of health care services in public hospitals (Livalde and Bodart 1993, Shaw and Griffin 1995, WHO 2008).

Notwithstanding various arguments advanced, user fees may result in a quality health services delivery when used alone (Hertz, 2012; Crownwell, et.al. 2011). However, when used with other health purchasing methods, the

quality of health services may be compromised. In particular, the hospitals are able to adjust the use of health care services if multiple health purchasing methods exist. In Tanzania, health services are purchased using fees for services, user fees and government budget. In such situation, the adjustment of resource intensity may be possible. This may have effect on the quality of health services public hospitals deliver.

In sum, the health insurance reimbursement methods adopted together with institutional inadequacies may be among the reasons leading to low quality health services delivered by public hospitals in Tanzania. The use of multiple health purchasing methods such as user fees and government budget also provides an opportunity for hospitals to adjust resource intensity and provide low quality services to patients. However, few empirical studies have been undertaken to analyse the association between the quality of health services delivered by public hospitals and the payment method used in the country. This study seeks to fill in the knowledge gap.

Methods of analysis used in previous studies

Various methods have been used to examine the effect of the different health purchasing methods on the quality of health services delivered by hospital in a number of countries (Andrew, 2006 Schneider and Hanson, 2006, Yi-Wen et al., 2005, Dor and Farley 1996). In those studies, the hospital total cost functions were used to determine the marginal and average cost in respect to various outputs delivered by hospitals. The costs were also used to examine the behaviour of hospitals.

Furthermore, in various studies either user fees or fees for services or capitation purchasing methods were used to determine the cost functions and behaviour of hospitals. In addition, in empirical studies, length of stay in hospitals, medical services offered and drug prescriptions were used as proxies for the quality of health services (Schneider and Hanson, 2006; Yi-Wen et al., 2005; Dor and Farley, 1996; Frech III, 1996). The resources intensity for interventions in response to measured payment sources had also been used

as proxy for quality of health services (Dor and Farley 1996).

Various methods have been used to estimate proxies for the quality of health services delivered by hospitals. They include econometric and experimental methods (Schneider and Hanson, 2006) Yi-Wen et. al. 2005; Dor and Farley 1996). While Dor and Farley (1996) used econometric method to estimate cost function as well as marginal and average costs to ascertain the effect of reimbursement method on the quality of services, Yi-Wen et. al. (2005) used multivariate linear regression model. In addition, Yi-Wen et. al. (2005) used multiple regressions to examine the effect of changes from fee for services to capitation method for treating “hemorectomies”. The model used by Yi –Wen et. al. (2006) demands a lot of data, which may not be easily available in Tanzania.

Likewise, in most studies cross sectional data had been used (Schneider and Hanson, 2006; Yi-Wen et. al. 2005; Dor and Farley 1996). In particular, the authors used the cross sectional data to analyse the effect of health insurance reimbursement methods on the quality of health service delivered by hospitals. The estimated cost function is used to discern the effect of the user fees and capitation method on the quality of services delivered by health service providers.

However, in order to be able to compare the effect of different health insurance reimbursement methods on general medical practices, there is a need to take care of methodological problems. Kazuya (2006) pointed out that the effect of fees for services and capitation methods on medical practices need to be carefully compared with factual information. Only then can one definitely conclude that the reimbursement methods have effect on the quality of health services delivered. The issue is taken care of in this paper.

This paper uses the model adopted by Schneider and Hanson (2006) to examine the effect of health insurance reimbursement on the quality of health care services delivered by public hospitals in Tanzania. In contrast to

Schneider and Hanson (2006) who used capitation methods to estimate the costs function of health centres in Rwanda, this study uses user fees and fee for service methods and include the treatment of inpatients and outpatients to examine the behaviour of the public hospital. Also, in contrast to Schneider and Hanson (2006), in this paper monthly time series data are used.

Empirical studies on Tanzania

A number of scholars have analysed the implementation of the health insurance schemes in Tanzania. The focus of the studies was on the contribution of health insurance on the development of health sector and the quality of health service delivered (DFID, 2002 Humba 2005; URT 2008). For example, DFID (2002) analysed how health insurance can make useful contribution to health system development in Sub Saharan Africa, including Tanzania. The author examined the contribution of health insurance on revenue generation, risk sharing and improvement of health system through efficient purchasing.

DFID (2002) observed that health insurance did not help to increase revenue for health service in Tanzania. The reasons were weak economic structure, inappropriate institutional arrangement and unsatisfactory macroeconomic condition. A narrow tax base and the slow pace of increasing coverage of members of health insurance were also identified to affect revenue generation, for health insurance. This suggests that health insurance have limited impact on improving the quality of health care services delivered by public hospitals.

In regard to the quality of health care services delivered by hospitals in Tanzania, URT (2008) observed that, the NHIF and hospitals face a number of challenges. They both cannot control the rise of medical expenses because of the absence of regulatory authority for prices of health services and drugs. The other challenges were fraud, inadequate number of participating pharmacies and failure of some public hospitals to meet the standards (Guardian, 2007a; URT, 2005; Humba, 2005, Nipashe 2013).

In addition, public hospitals had experienced an increase in the cases of chronic illness such as diabetes, heart diseases and cancer. Other challenges include inadequate supply of drugs and other medical supplies necessary for providing health services to members of NHIF and non-members as well (Nipashe, 2007; Guardian, 2007a). Such challenges lead public hospitals to deliver low quality services, and adjust resource intensity in treating patients.

Notwithstanding the challenges identified that both NHIF and hospitals experience, some evidences that suggest the strategic behaviour of the health service providers in treating patients are available. For example, some public hospitals have often demanded patients to purchase medical supplies when visiting hospitals for treatment. In addition, some public hospitals give first priority to the patients paying cash in providing treatment in the episodes of illness (Mwananchi, 2013, 2009a, Mwananchi, 2009b; Guardian, 2007; Nipashe, 2007). The practice may be linked to the health service purchasing arrangements used by NHIF and user fees.

The preference of hospitals in treating a particular group of patients suggests that public health providers may be shifting costs for health service to either non-members or NHIF. Such a situation occurs when there is a number of a financier for health care services (Schneider and Hanson, 2006). In Tanzania, financiers are private patients, the government and health insurance funds. However, so far there is no empirical evidence to suggest the shifting of the costs to non-members. This paper seeks to find the truth of matter.

In sum, a number of studies have analysed the impact of the introduction of health insurance on revenue generation and service delivery by hospitals Tanzania (Minja et. al., 2008; URT, 2008; URT, 2005; Humba, 2005; DFID, 2000). However, there is little knowledge on the effect of the health purchasing arrangements on the behaviour of health care providers. Thus, this paper examines whether the quality of health service delivered to patients is associated with behaviour of public hospitals.

Furthermore, previous studies on the effects of the health insurance reimbursement methods and the health insurance market have adopted either cross sectional survey or case study approaches (Minja et. al., 2008; URT, 2008; URT, 2005; Humba, 2005). In contrast, this paper analyses the impact of health insurance purchasing methods on the quality of health services using the time series data from Amana hospital, as a case study.

Framework of analysis and methodology

As pointed out in Section 1, following the health sector reforms, the government introduced the National Health Insurance Fund (NHIF) to purchase health service for its members in the episodes of illness. The arrangement entails the shifting of the financial risk to public hospitals. This affects the behaviour of public hospitals when delivering the health services to patients, who are members of health insurance and non-members as well. While the expenses for health services delivered to the members of health insurance are covered by the NHIF, private patients pay the medical bills through out of pocket payments.

Given the different methods for effecting payments for health care services delivered to patients, the public hospitals had an opportunity to shift costs to private patients or the NHIF. Furthermore, in an attempt to minimize costs or shift costs to a particular group of patients, public hospitals may seek to reduce the intensity of resource use leading to the delivery of low quality services.

The behaviour of the public hospitals may be observed by the total recurrent cost function. Thus, this paper adopt a model from Dor and Farley (1996) and Schneider and Hanson (2006) to analyse the whether public hospitals reduce resource intensity in treating patients. Such behaviour is associated with the delivery of low quality services to patients by hospitals.

In health economics literature, the resource intensity use in treating patients is associated with the quality of health services. In this regard, this paper adopt the same approach. In particular, the hospital cost function show the

resource use intensity. In this regard, cost function is estimated to discern the resource use intensity and correspondingly the quality of health care services delivered.

From the estimated coefficient of the model, the marginal costs are estimated for each groups of patients for the public hospitals they attend. The group of patients referred to are inpatients and outpatients, who are either insured or uninsured. The estimation of the coefficients enables the determination of the average costs and the marginal costs for the services delivered to patients. The estimated costs allow the ascertaining of whether public hospitals behave in manners that result in the delivery of low quality health care services or not and suggest appropriate policy actions.

Model specification

Like any other economic agent, public hospitals are believed to behave in different ways in response to the incentives inherent in the payment methods for the services they deliver. As pointed out before, such a behaviour can be discerned from the total recurrent cost function (Dor and Farley 1996; Schneider and Hanson (2006)). In examining the effect of the purchasing methods on the quality of health services public hospitals delivered to patients, the underlying assumptions include:-

- i. Public hospitals seek to minimize cost by choosing input factors that enables them to produce health services at the minimum possible level (Schneider and Hanson 2006). In this respect, public hospitals have an incentive to minimize cost, given the different payment methods, that is, user fees, fee for services and government budget subvention,
- ii. Hospitals are aware of the cost implications of different treatment styles as well as the respective revenue situation,
- iii. The differential treatments are technically feasible and in this regard hospitals allocate resources in response to financial incentives (Dor and Farley, 1996, Schneider and Hanson, 2006).

From the above assumptions, the hospital cost model is specified taking into account that they are multi-product firms that provide services to insured and uninsured patients as well. It is also considered that total cost increases with the volume of service provided on a payer or patient specific basis (Dor and Farley, 1996, Schneider and Hanson, 2006).

Thus, the cost function for the public hospitals is specified as:

$$TC=C(X_iM_iQ_i)..... (1)$$

Where: X_i : is the number of services provided to patient and paid through a particular method “i”,
 M_i : is a proxy for a relative case mix adjustment index given the patients severity of illness
 Q_i : is quality proxy reflecting payer specific treatment intensity determined by a medical acceptable range.

In examining the payment specific effect on the total cost of public hospitals, curative consultations and inpatients, as well as deliverables and diagnostic tests are distinguished by the respective payment sources. Thus, the hospital cost model is presented as:

$$TC=\beta_0+\beta_1UNICS+\beta_2INSCS+\beta_3IPS+\beta_4PUFR+\beta_5PRHIF+\beta_6TRIPT+\beta_7TINSMEB+\mu... (2)$$

Where TC = is total hospital recurrent cost
 UNICS = Total number of outpatients uninsured (consultations and deliveries)
 INSCS = Total number of outpatients insured (consultations and deliveries)
 IPS = total number of inpatient services (deliveries and admission)
 RUFER = Total revenue from user fees (out of pocket payment for health services)
 PRHIF = Revenue from outpatients health insurance - fees for service method
 TRIPT = Revenue from health insurance for inpatients - fees for service
 TINSMEB = total number of health insurance members attended
 μ = is a random term

In order to simply the calculations on cost elasticity, equation (2) is transformed into a logarithmic function as follows:

$$LTC=\beta_0+\beta_1LUNICS+\beta_2LINSICS+\beta_3LIPS+\beta_4LPURF+\beta_5LPRHIF++\beta_6LTRIPT+\beta_7LTINSMEB+\mu..... (3).$$

The variables are as defined before. Econometric programme known as STATA version 11 is used to estimate the model. The estimation results are provided in Section 5.

Estimation of the marginal and average costs

In order to determine the effect of the provider payment methods on the quality of health service delivered, marginal and average costs are estimated. The costs are estimated for the consultations and deliveries for uninsured outpatients as well as insured outpatients and inpatients are estimated.

The estimated marginal and average costs take into account the number of uninsured consultations and that of health insurance members visiting the public hospitals and specific purchasing methods for each group of patients. The purpose of the analysis is to determine the effect of user fees and fees for service methods on the intensity of the resources use and economies of scale in delivering health services to patients in public hospitals. The estimated costs provide an insight into the impact of the health insurance reimbursement method on the quality of services delivered by public hospitals.

Given that public hospitals seek to minimize cost with respect to risk adjusted output, it is assumed that they determine the quality of care level “Q” where marginal cost of producing a given quality is equal to marginal effect on revenue from increased quality service delivered (Dor and Farley, 1996; Schneider and Hanson, 2006). Thus, a payer-specific marginal cost at a given quality level “Q” is provided by the following equation:

$$MC_i = \delta TC / \delta M_i C_i = C'(-)Q_i (4)$$

Dor and Farley (1996) and Schneider and Hanson (2006) highlighted that the payer specific marginal cost for consultation is a linear combination of payer-specific elasticities. Thereafter, average cost is determined for each group of patients.

Given equation (1) that represents total recurrent costs and estimated elasticities, the marginal costs shall be determined by using the formula

$$MC_i = \beta_i C_i / Y_i \dots \dots \dots (5)$$

Where

- MC_i = Marginal Cost
- (i) insured or uninsured patient
- β_i = elasticities of cost with respect to insured and uninsured service costs
- C_i = payer-specific total cost
- Y_i = payer specific number of consultations in public health care services.

The marginal cost “MC” measure the effect of a cost of the proportional increase in all inputs and outputs, while the level of output of all other product remain constant (Dor and Farley 1996). The marginal cost will also enable the determination of the intensity in resource use in providing health services to all groups of patients.

Study area

As pointed out before, this paper uses the Amana government hospital in Dar es Salaam region as nationally representative public health facilities n Tanzania. From 1990 to 2009, the facility was municipal hospital. However, in 2010, the hospital was upgraded to a regional referral hospital. It has 350 workers of different cadres and the same number of beds. The hospital offers inpatients and outpatients services. It also offers dental, laboratory services, surgery, eyes and radiology services to patients. The health facility serves a large number of people, whom 50 percent are poor. The hospital is used to examine the effect of health insurance reimbursement methods on the quality of health services delivered by public hospitals facilities in Tanzania.

Amana public hospital is among those accredited by the NHIF to provide health services to its members. The hospital is relatively better staffed compared with other public health facilities and is easily accessed by patients in the hinterland it serves. In addition, the district is chosen because it serves the largest number of members of the NHIF. The accessibility to the hospitals and availability of data also prompted the choice of the hospital.

Data and variables

This paper uses monthly primary data that covers thirty six months. The data were collected from Amana hospital and from the office of the district medical officer in 2009 and 2010. The variables for which data were collected include the total recurrent expenditure and revenue generated for specific services delivered to insured and uninsured groups of patients. The services delivered include consultation services, deliverables and diagnostic service. Other data collected were the expenses for insured inpatients who were admitted by the hospital.

The total number of service used by each patient registered as well as data on revenues collected from different provider payment methods, that is, fee for service and user fees were obtained from the hospitals, as well. In addition, data on the number and categories of staff members at the hospital were collected.

Data on the government budget allocation to the district hospital were obtained from the Director of the Ilala Municipal Council. Furthermore, interviews were held with a number of officials working with the hospitals. Interviews were made with the district hospital secretary, the staff members in the finance department and few medical staff members. The interviews were made in order to get insights into the delivery of health services and availability of resources for treating patients. In addition, documents which contains registered complains with regard to health services delivered to patients were reviewed.

Methods of estimation

As highlighted in Section 4.4, this paper uses monthly data from Amana hospital, to examine the impact of health purchasing methods on the quality of health services delivered. In particular, econometric methods are used to estimate the hospital total recurrent cost functions and the coefficients of equation (3). However, the severity of illness is not considered in the model. This is one of the limitations of this paper.

The estimated coefficients are then used to compare the effect of health service payment methods on the intensity of the use of resources in delivering health services to members of health insurance and non-members. The equation (3) in Section 3.3 specifies the effect of specific output costs,

that is, consultations, deliveries and diagnostic tests for both insured and uninsured outpatients and inpatients on the total recurrent costs of the public hospitals. Equation (5) is also estimated in order to determine marginal cost for each group of patients.

Estimation results

Descriptive statistics of data

Table 1 summarizes the descriptive statistics of the data series in levels. The Table shows the means, standard deviations, minimum, maximum, Jack Bera and P-Values. It shows that the variables satisfy the normality test. The low values of Jarque-Bera probability for some of the series can be attributed partly to structural change in data.

Table 1: Summary of descriptive analysis

Variable	Mean	Standard deviation	Minimum	Maximum	Jack Bera	P Value
LTC	17.73841	0.2415487	17.50439	18.03502	5.28821	0.0712
LUNICS	7.080232	0.1254025	6.806829	7.261225	3.5008	0.1737
LINSCS	10.19706	0.0761926	10.0731	10.43341	17.0459	0.0001
LPRHF	10.02374	0.2789393	9.769957	10.89674	28.4436	0.0000
LTRIPT	9.847351	0.2614258	9.433484	10.54326	12.4235	0.0020
LTINSMEB	8.497563	0.2576284	8.038512	8.942984	2.7477	0.2531

Unit root test results

Since the paper used time series data, it was necessary to do stationarity test, that is, the unit root test. The Augmented Dickey Fuller Test was used to test for stationarity of data. The test results indicated that for all variables for data series were non stationary. The results also showed that the variables needed to be differenced once in order to obtain stationary data series. The differenced data have been used to estimate the total recurrent cost function of the hospital.

Results and discussion

Various models with different specifications were estimated. However, only the model that provided better results is presented in this paper. Table 2 presents the results of estimating equation (3), with total recurrent cost as a dependent variable and uninsured outpatients, insured inpatients, revenue from the fee for service method and the total number of the members of health insurance as dependent variable. The estimated model indicates that the independent variables explain about 50 percent of the variation of the total hospital recurrent cost. The estimation of the equation enables the realization of the first objective of the paper.

Table 2: Results of estimating hospital cost functions in Amana public hospital
Dependent variable: LTC

Independent variable	Coefficient	Standard error	t-statistics	P> t
LUNICS	0.35	0.418	0.84	0.407
LPRHIF	-1.50	0.422	-3.55	0.001
LTRIPTF	1.57	0.407	3.85	0.001
LTINSMEB	0.38	0.170	2.27	0.031
Constant	-0.01	0.264	0.42	0.674
F-statistics	4.43			
Adjusted R Squared	0.47			
Number of observations	36			

Where;

TC = is total hospital recurrent cost

LUNICS =Total number of outpatients uninsured (consultation and deliveries)

LRHIF = Revenue from health insurance - fees for service method

LTRIPTF = Revenue from health insurance for inpatients - fees for service

TINSMEB = total number of health insurance members

μ = is a random term

The estimation results indicate that the cost elasticity for uninsured outpatients is positive and insignificant. This implies that the number of uninsured outpatient visits had no impact on the hospital total recurrent cost. The finding is similar to those of Danger and Frech III (1996) and that of Witter et.al., (2000). However, it contradicts the finding of Dor and Farley (1996). The probable explanations could be that the government is subsidizing the patients who are purchasing health services through user fee methods. It is equally possible that public hospitals shift the costs of uninsured patients to NHIF.

Table 2 also shows the estimated coefficient of elasticity for fees for service method for outpatients was negative and significant. The result suggests that a large number of insured patients reduced total recurrent cost. The increase in the number of insured outpatients raised the revenue pool for the hospital leading to low total recurrent costs. Given the methods used to purchase health services the results could be suggesting that hospitals are mitigating adverse selection and moral hazards over a large number of health insurance members.

Furthermore, Table 3 shows that the coefficient of elasticity for fees for services method for inpatients is positive and

significant. The result suggests that as the number of the insured patients increases the total recurrent costs also increases. The finding supports the observation of Hertz, (2012), and Crownwell, et.al. (2011). The result contradicts the findings of Schneider and Hansen (2006) who observed that an increase in a number of the insured inpatients reduced hospitals total recurrent costs. The results may be suggesting cost adjustment behavior of the public hospital that is, switching cost of uninsured to the insured inpatients. Equally possible, the result may be implying the absence of allocative and technical efficiency in public hospitals.

The estimation results also revealed that the coefficient for the number of insured persons was positive and significant. This indicates that as the number of patients who are members of health insurance increases the recurrent costs also rises. The result may be suggesting that the number of insured persons has not reached the threshold for the pool factor to have an impact on reducing the hospital total recurrent costs and public hospitals have to bear the burden of financial risk. In this regard, increasing the number of members of health insurance could be an advantage to public hospitals in reducing the total recurrent costs. In addition, the estimated coefficient suggests that as the number of

members of health insurance increases, the recurrent costs increases as well.

In sum, the estimated coefficient of elasticity suggests that the fee for service is associated with the low hospital costs for outpatients. In addition, the estimated coefficients of cost elasticity for uninsured as well as insured outpatients and inpatients are different. The use of fees for services methods to pay for health services for inpatients resulted in higher total recurrent costs.

In regard to cost structure analysis, marginal and average costs were estimated so as to examine whether the payer-specific utilization

of services for inpatients and outpatients affected the hospital total recurrent cost. Table 3 presents the estimation results of marginal and average costs. The estimation of the costs also enabled to realize the second objective of the paper.

The estimated marginal and average cost per unit output, that is, per outpatients and inpatients help to discern the scale economies as well as resource intensity in treating patients. Table 3 shows that marginal cost was less than average costs for insured outpatients, similarly for insured outpatients. The results contradict the finding of Schneider and Hanson (2008) and Elli and MCGuire (1993).

Table 3: Marginal and Average Cost by output categories in Ilala public hospital

Variable	Value
Marginal cost- consultation and services for insured outpatients	Tshs 29,554
Marginal costs - consultations and services for insured inpatients	Tshs 343,582
AC per insured outpatient	Tshs 19,702
AC per insured inpatient	Tshs 218,843
AC per uninsured patient	Tshs 1,003

The findings imply the presence of low treatment intensity in public hospitals and absence of economies of scale. This suggests inefficiency in the utilization of resources in public hospitals or the shifting of costs to patients belonging to NHIF. The results could be the outcome of the low pool of members of health insurance. This concur with the observation of Bitran and Yip (1998), who observed that low pooling of members and revenue led to high cost of treating patients. The results could also be associated with the use of fees for service methods as observed by the Hertz 2012 and Crownwell et. al. 2011). It was not possible to calculate the marginal costs for uninsured outpatients because the coefficient of elasticity for the groups of patients was insignificant.

Furthermore, the estimated average costs for insured outpatients and uninsured outpatients were different. The average cost for inpatients was higher than that for insured outpatients. In

addition, the lower average cost recovery for fees for service than that for user fee, suggests that hospitals adjust cost depending on the group of patients. In particular, they shift cost to insured patients and government.

CONCLUSION

The aim of this paper was to examine the effect of health purchasing methods on the quality of health services delivered by public hospitals in Tanzania. The paper examined the effect of the user fees and fees for service methods on the total recurrent cost. This was done by estimating the determinants of total recurrent cost.

The main findings are firstly, the cost elasticity of the insured outpatients and inpatients as well as that for uninsured outpatients differ. Secondly, the use of fee for services method for outpatients is associated with the low recurrent costs. This could be an

outcome of a large number of insured outpatients visiting public hospitals in the episodes of illness. Such a situation provides an opportunity to mitigate financial risk associated with moral hazards and adverse selection effects. Thirdly, the use of the fees for service methods to pay for inpatients resulted in higher total recurrent costs this may be associated with diseconomies of scale and ineffective utilization of hospital resources or resource intensity adjustment.

In order to examine the cost structure and to determine whether the payer-specific utilization of services at different output levels affects the hospitals' recurrent cost, marginal and average costs were estimated. The estimated results revealed that average cost for insured outpatient was less than the marginal costs. The same was observed for the insured inpatients. The average cost for uninsured patients was the lowest compared to both insured outpatients and inpatients. Such a situation also may be suggesting that hospitals are either inefficient in delivering services to patients or are adjusting costs in treating specific group of patients according to payment specific methods.

From the above findings, it is recommended that a mixture of health insurance reimbursement methods be introduced in order to discourage the behavior of shifting the resource use intensity between the user fees and other health purchasing methods. It is also recommended that a robust mechanism to control and monitor public hospitals delivery of services to patients be in place. In addition, it is recommended that individuals who are not members of health insurance be encouraged to enroll in insurance schemes so as to have a large pool of revenue and overcome the adverse selection and moral hazards effects that may be leading to high treatment costs to patients.

The results of this study need to be interpreted with caution. The reason is that the cost function was not adjusted to severity of illness of patients attending the public hospitals. Lack of information on the technical quality which may help to qualify the above findings is

another factor that needs to be considered in interpreting the results.

For future research, a study that covers a large number of the public hospitals needs to be undertaken to examine the adjustment of resource intensity in treating patients. This shall also enable ascertaining whether the behaviour of the hospital was a onetime response or had continued over a period.

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