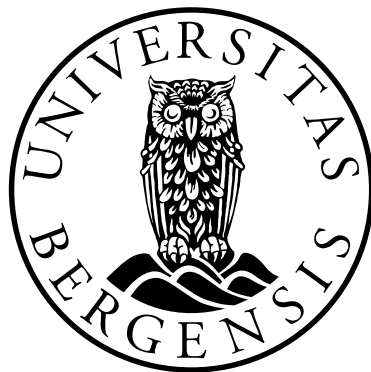


The unequal distribution of health workers in Tanzania

its magnitude, causes and remedies

Michael Aloyce Munga



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Dedication

To my wife *Rose* and my two daughters, *Doreen* and *Doroth*. To the late my parents.
My Mother Ansillar Aloyce Shembilu Munga and My Father, Mr. Munga Sr.

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Original papers

1. Michael A Munga and Ottar Mæstad: **Measuring inequalities in the distribution of health workers: the case of Tanzania.** *BMC Human Resources for Health* 2009, **7**:4.
2. Michael A Munga, Nils Gunnar Songstad, Astrid Blystad and Ottar Mæstad: **The decentralisation-centralisation dilemma: recruitment and distribution of health workers in remote districts of Tanzania.** *BMC International Health and Human Rights* 2009, **9**:9.
3. Michael A Munga, Gaute Torsvik and Ottar Mæstad: **The effectiveness of financial and nonfinancial interventions in attracting nurses to remote areas of Tanzania: a contingent valuation study** (*Submitted*).

Abbreviations

ART Anti Retroviral Treatment/Therapy

CV Contingent Valuation

DDHs Designated District Hospitals

DED District Executive Director

DMO District Medical Officer

DHRO District Human Resources Officer

FGDs Focus Group Discussions

HIV/AIDS Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome

HRH Human Resources for Health

LGRP Local Government Reform Programme

MDGs Millennium Development Goals

MoHSW Ministry of Health and Social Welfare (Tanzania)

NBS National Bureau of Statistics (Tanzania)

NGOs Non Governmental Organisations

NIMR National Institute for Medical Research (Tanzania)

RDPs Rural Development Programmes

TDHS Tanzania Demographic and Health Survey

WHO World Health Organization

Summary

Increasing recruitment of health workers in remotely located areas has recently become a crucial policy concern of many countries. There is currently a universal consensus that increasing access to health workers in such underserved areas will not only help countries address the imbalanced distribution of health workers but also improve the population's health outcomes based on the values, principles and approaches of primary health care which place emphasis on universal access to quality health care services. To date, there is no comprehensive measure that will suit country specific estimation of the nature and magnitude of the problem of unequal distribution of health workers. There is some evidence emerging in many low-income countries on what determines health workers' practice location choices. The importance of financial and non-financial interventions in attracting health workers to work in underserved remote areas of many countries has been extensively documented. However, there is lack of evidence on the effectiveness of financial and non-financial interventions that countries can implement to increase the share of health workers in underserved areas and thus reverse the growing trend of unequal distribution of health workers.

There is also a huge body of literature on health sector reforms and particularly decentralisation but very little is known about the implications of these reforms for recruitment and distribution of health workers in remotely located areas. In the light of these aspects, the present PhD research aimed to accomplish three objectives. The first was to describe the nature and magnitude of the problem, suggest and apply additional needs indicators in order to provide more sensible indicators of health care needs for the comprehensive measurement of the magnitude of distributional inequalities of health workforce in a resource limited setting (Paper I). The second objective was to describe and assess the organization of the recruitment processes (decentralised vs centralised) in relation to their implications for distribution and retention of health workers in remotely located health facilities of Tanzania (Paper II). The final objective was to analyse how strongly financial and nonfinancial incentives (housing and education) might affect health workers willingness to work in remote areas of Tanzania, and how strongly the level of financial incentives needed to attract health workers to work in remote areas is affected by health workers characteristics such as geographic origin, their intrinsic motivation and other personal characteristics (Paper III). The details of methodology regarding sampling, data collection and analysis are described in the respective papers attached in this thesis.

In Paper I the main finding indicates that there exist huge inequalities in the distribution of health workers between urban and rural districts of Tanzania. Inequalities are perceptible both when the conventional per capita norm is used and when under five mortality is used as an additional indicator of need. There are also skill-mix inequalities indicating that districts with fewer health workers per capita do also tend to have a fewer number of highly trained health workers such as doctors and specialists. Inequalities are also perceptible across urban and rural districts. Distributional

inequalities tend to be more pronounced when under-five deaths are used as an indicator of health care needs. Conversely, if health care needs are measured by HIV prevalence, the distributional inequalities tend to decline.

In Paper II it was shown that recruitment of health workers under a decentralised arrangement is characterised by complex and bureaucratic procedures, severe delays and sometimes failure to recruit the required health workers. This may further aggravate the existing inequalities in the distribution of health workers. The paper further indicates that recruitment of highly trained health workers in remote areas might not only be difficult but also expensive. In addition, decentralised recruitment was perceived to be more effective in recruiting and retaining lower cadre health workers from within the districts than the centralised recruitment arrangement. Conversely, centralised recruitment was perceived to be more effective (than decentralised recruitment procedures) in both recruiting highly skilled workers and balancing their distribution across remote and urban districts but not as effective in ensuring their retention.

Results from Paper III indicate that, without any interventions, 19% of nurses were willing to work in remote places. With provision of free housing, this share increased by 15 percentage points, while better education opportunities increased the share by 28 percentage points from the baseline. In order for a salary top up to have the same effect as provision of free housing, the top up needed to be between 80% and 100% of the base salary. Similarly, for salary top ups to have the same effect as provision of better education opportunities the top up needed to be between 120% and 140%. Nurses who have a very remote origin (i.e. his/her origin being more remote than the remoteness of the expected working place) had on average a 55 % ($p < 0.005$) lower reservation wage than others. This finding might suggest two things. Firstly, students with a strong remote background are more willing to work in remote areas than others. Secondly, students need to be picked from really remote places (more remote than the place that policy makers may want to send them) in order for this variable to have an impact on the reservation wage. Those classified with high intrinsic motivation had on average a 30% ($p < 0.000$) lower reservation wage than others. Having children was not significantly associated with the reservation wage, while having dependants other than children was associated with an 18% ($p < 0.06$) increase in the reservation wage.

The data presented in this thesis permits a number of conclusions. Firstly, relying solely on the conventional ways (using the per capita norm) of measuring imbalances tends to lead one into missing out a lot of relevant information for a comprehensive and a sensible estimate of the magnitude of the inequalities in the distribution of health workers. Population levels, although still useful as an indicator of health care needs in measuring distributional imbalances, is flawed for it makes the inherent assumption that disease burdens and thus health care needs are uniformly distributed. This is not the case in many settings (Paper I).

Secondly, since the recruitment systems (decentralised or centralised) have been shown to be a crucial factor that can hinder or facilitate the recruitment of health workers in underserved remote areas, combining the strengths of each system seem to add to the efforts of increasing recruitment of health workers in remotely located health facilities (Paper II). Finally, the thesis concludes that nurses' practice- location decisions in Tanzania are partly shaped by the effects of financial and nonfinancial incentives. Specific educational interventions are more effective in attracting nurses to remote areas than housing. Substantial top ups are needed in order for the salary factor to have the same effect as alternative interventions. In order for remote recruitment to be effective in reducing the need for incentives to attract nurses to remote areas, health workers need to be recruited from places that are more remote than the places supposed to be their work stations.

1.0: Introduction

The provision of quality health services depends on availability of well motivated health workers whose skills are appropriately mixed, and are fairly distributed relative to the needs for health care services. Thus, human resources for health are a critical input for a well functioning health system. In many countries 60-80 per cent of the recurrent expenditure of the respective ministries of health is set to cater for salary costs and other health personnel related benefits [1-3]. In addition, health workers are considered a crucial tool for realising the health related Millennium Development Goals [4-7]. The shortage, imbalanced distribution, inadequate and poor skill mix as well as poor performance have led many analysts to describe the overall health worker situation of many countries as a 'crisis'. It has been argued that the causes of the crisis are complex and have to do with insufficient production capacity, but also with an inability to attract and keep the workers that are being produced in the places where they are needed most [8].

Three arguments form the basis of this thesis. Firstly, in order to be able to address the problem of unequal distribution of health workers in low-income settings, there is a need to describe the extent and nature of inequality up front. Population levels have extensively been used to estimate and characterise the health worker distributional inequalities with the inference being made that inequalities are synonymous with the geographical variations of health workers per capita. The assumption has always been that disease burdens are evenly distributed across populations. This is an unsatisfactory position to hold both for research and planning purposes. Relying on population alone as a sole proxy for health care needs tends to lead to much relevant information being missed out in planning and estimating the magnitude of health workers distributional imbalances. In this thesis, under-five deaths and HIV/AIDS prevalence rates are proposed in addition to population levels in order to provide a more robust estimate of the magnitude of the problem in a low income and a high-disease burdened country.

Secondly and after having estimated the magnitude of the problem through refined measures, it is also important to understand the possible causes of this problem. It is argued in this thesis that health worker distributional inequalities can partly be understood by analysing the health systems' organisation (decentralised or centralised) in relation to recruitment, distribution and retention. Of particular importance is the identification and analysis of associated hindrances inherent in the manner that the recruitment system is organised and what implications it might have for recruitment and distribution of health workers to remotely located health facilities.

Finally, the deployment of workers to where they are needed most is a product of negotiations between the employers and prospective employees. The types and effectiveness of interventions needed to attract health workers to work in remote areas are a crucial factor in these negotiations. In addition, the characteristics of health workers and the way they respond to these interventions are equally important. Therefore, the identification and analysis of the effectiveness of the interventions aimed at increasing the share of health workers in remote areas is one of the crucial first steps towards addressing the problem of unequal distribution of health workers. In addition, seeking to understand what constitutes the main characteristics of the prospective health workers who are more likely to accept working in remote areas is an equally important aspect in increasing the effectiveness of these interventions and such knowledge may potentially reduce the cost of implementing such interventions.

In the last few years the distributional inequalities of health workers have been an important policy problem of nearly all health systems in the world. This international consensus has largely been due to the emerging research evidence that has established a strong association between availability and professional competencies of the health workforce and the health systems' capacity to deliver services to its population. A number of cross-country ecological studies have demonstrated a strong association between availability of appropriately trained, motivated health workforces with improved health outcomes [4, 5, 9, 10].

The World Health Report of 2006 has estimated a lack of more than 4 million (more than half of these in Sub-Saharan African countries) health workers worldwide if a minimum level of better health outcomes is to be achieved. Their distribution between and within countries is highly skewed in favour of high income countries and urban areas, respectively. It has been reported that the distribution of health workers is both an equity and efficiency issue [11]. It has equity implications related to populations' access to quality health care and efficiency effects related to under-provision of cost-effective health interventions where there are shortages and or mal-distribution of workers relative to the needs for health care services. In other words, an equitable distribution of health care personnel has implications for overall improvement of health care outcomes especially when the distributed (human) resources are put into cost-effective use [11].

1.1: Defining distributional imbalances

In this thesis ‘distributional inequality’ is in some instances used interchangeably with ‘imbalances’. In most cases, distributional imbalances of health workers have been related to spatial allocation relative to agreed upon norms (for example, population to physician ratio) [12, 13]. Under such an assumption, an imbalance is said to exist when, relative to needs for health care services, the allocation is higher in some administrative units (geographical locations) and lower in others [14]. According to this perspective and for the purpose of this PhD thesis, an imbalance can either be qualitative or quantitative. Qualitative imbalance relates to disparities between administrative/geographical units or facilities in terms of a ratio of certain cadre of health personnel (for example doctors) to another cadre of personnel (say nurses) needed to provide the required minimum package of health care services. It is also commonly referred to as skill mix imbalances [12]. Quantitative imbalance on the other hand relates to a situation whereby health facilities in some districts (or other administrative units) have higher/lower number of qualified personnel relative to their health care needs [12, 13]. In most cases the population levels (the per capita norm) has been used by planners to allocate health personnel and also used by researchers to estimate distributional imbalances relative to need. Notwithstanding its easiness to construct, interpret and its extensive use by researchers and planners, this approach has serious limitations. Among the major weakness of this approach is its use of simple assumptions that health care needs are homogeneous. This assumption does not hold water especially in settings where disease burdens are not homogeneous across populations and geographical units. In addition, it is not obvious that an equitable distribution of health workers would entail an equal number of health workers per capita across regions or districts. The need for health services per capita - and therefore the human resource requirements per capita - may vary across geographical entities due to differences in morbidity and mortality patterns. Furthermore, the composition of aggregate morbidity and mortality may differ according to area. This may have implications for health workforce planning if governments do not give equal priority to preventing and treating all conditions (e.g., by according higher priority to the health care needs of children compared to the elderly). Also, a higher number of staff per capita might be needed in areas with a lower population density.

1.2: Possible causes of imbalances: evidence from the literature

Studies done in both developed and developing countries indicate that possible explanations of spatial imbalances fall within demand and supply side factors of the health sector labour market [12, 13, 15]. These factors are said to affect the distribution of health personnel in terms of quality and quantity. The literature on geographical inequalities of health workers and particularly those addressing the difficulties in recruiting health

workers to work in remote health facilities, has identified a number of factors that are important to take into account in any discussion on this matter. These factors partly relate to the personal preferences of prospective job seekers and partly to the capacity of employers to recruit and distribute health workers to places where the health care needs are huge. Dussault and Franceschini have argued that imbalances are caused by a mixture of decisions by individuals, communities and governments [16]. These decisions are shaped by what most writers have grouped as personal, organizational, educational system, institutional environment (e.g., civil service reforms and decentralization) and the broader socio economical, political and cultural environment [8, 14, 17-22]. Related to personal or individual factors, it has been pointed out that the rural background of an individual and the presence of family and relatives in rural and remote areas are all associated with a higher probability of individuals accepting working in these areas [14, 22-25]. In addition women are less likely to accept rural jobs compared to men, while younger individuals with fewer family responsibilities are more flexible to move anywhere, including migrating to other countries [11, 22, 26, 27]. Following this understanding, the literature has proposed options such as targeted interventions that reflect as much as possible the characteristics of health workers and the manner in which these workers respond to the designed interventions [22, 24, 28-30].

The organizational environment as another set of factors, encompass such aspects as availability of equipment, supplies and appropriate facilities, management styles, incentives and career structures, salary scales, recruitment, posting and retention strategies [14, 22, 31]. In many low income countries such as Tanzania, unsatisfactory working conditions is the most cited reason for ineffective attraction, recruitment and retention of health workers in remote health facilities [20]. It is reported that in Pakistan, the major reason mentioned by medical students for not preferring to work in remote health facilities was the poor state (and/or lack) of equipment and supplies, and the generally unavailability of appropriate facilities for medical practice [32]. It is further argued that the role of national institutions such as civil service departments and ministries of finance (whose policy stances are shaped by a number of national and external influences) may also affect the trends in recruitment and distribution of workers in the health sector. For instance, the employment freeze during the early 1990s in Tanzania was a directive from the World Bank and the International Monetary Fund to the Ministry of Finance as a measure to reduce public sector expenditure on social services. This move has had serious implications on the Tanzanian health sector that needed many health workers to work; particularly in remote areas. There is no concrete evidence to support any claim as to the extent to which remote areas were disproportionately affected by the said employment freeze. It is however reasonable to believe that the freeze might have had some disproportionate impacts to remote areas compared to urban places since the remote areas are obviously not attractive; and there

were no effective interventions to attract health personnel to these areas. The usually unduly heavy involvement by central government in the affairs of local government administration, particularly the roles played by the and Civil Service Departments and ministries of finance of many countries, may serve as a illustrative case of the undue influence of non-health sector players in the recruitment and distribution of health workers [16, 33-35].

It has been reported that the organisation of the recruitment system may have some implications for the recruitment and distribution of health workers [3, 36, 37]. While decentralization has been credited for instituting responsive planning in the health sector, negative experiences regarding its implementation in relation to the management of health workers have also been documented. For example, in rural China, decentralization reforms had introduced stiff internal labour market competition whereby remote and socio-economically poor rural areas were disadvantaged in terms of attracting highly qualified health workers. Wang *et al* has highlighted similar experiences in other low and middle income countries. A recent study in Tanzania by Munga *et al* points to similar indications [37-39].

It has been shown for example that the location, structure and recruitment methods and the criteria used for recruiting students to medical schools, have a bearing on the choice of medical specialty and practice location of the prospective health workers [16]. In addition, access to social, cultural, educational and professional and economic opportunities is associated with health workers' higher willingness to work in a particular area, which is why the health workers' urban bias regarding practice location choice is not surprising [11, 23, 26, 40].

While the grouping of these factors is made to simplify understanding, it is critical to have a careful interpretation of their interactions because they do not influence employers' and health workers' decisions independently [8]. In the recent years, research that aimed to analyse factors related to health workers preferences in particular and distributional imbalances in general, have used a range of methods from qualitative in-depth interviews to more sophisticated quantitative methods such as discrete choice experiments [11, 26, 41, 42]. Most of these studies have identified what are thought to be the important factors in determining the health workers' practice location choices and they have suggested a range of policy responses for health systems to rectify distributional imbalances. It is reported, however, that in most cases the health systems' responses to imbalanced distribution of health personnel have not been aligned with factors that influence health workers choices to the extent that many interventions designed are classified as 'stop-gap measures,' unable to offer longer term and sustainable solutions [8]. While the evidence regarding which interventions are effective in attracting health workers to work in

remotely located health facilities is accumulating, evidence regarding the cost-effectiveness of the relevant interventions is lacking. This might partly explain why health systems of many low and middle income countries fail to adequately respond to the problem of failure to recruit health workers to remote areas.

1.3: The magnitude of inequalities in the distribution of health workers

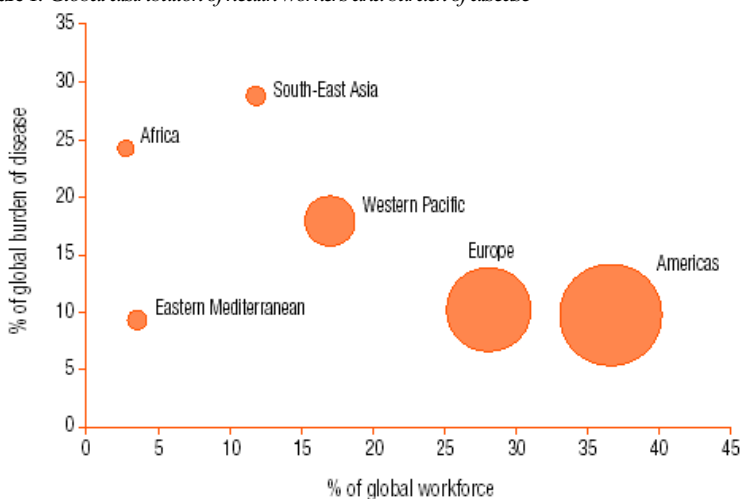
Imbalanced distribution of health workers takes many dimensions. It can be between countries or within countries. Within countries, different forms of imbalanced distribution may exist such as public versus private imbalances and rural versus urban imbalances [16]. The skill mix imbalance is a cross-cutting type of imbalance that can exist between and within countries; and between and within sectors [12, 14]. The in-country imbalanced distribution of health workers where the rural and remote places are disadvantaged indicates a comparable pattern with the global situation whereby low income countries are more disadvantaged than higher income countries. In many countries of the world, rural and remote places are characterized by insufficient numbers of health workers relative to their actual needs [8]. The United Nation's *World Urbanization Prospectus* of 2007 had estimated that the rural and urban populations of the world are the same (both constitute 50% of the population, respectively). However the recent data on distribution of health workers relative to population across the world has indicated that the world's rural population enjoys only 38% of nurses' distribution and 24% of physicians' distribution respectively compared to 62% of nurses' and 76% of physicians' distribution in urban areas [2, 43]. Whereas the burden of diseases borne by Europe and the Americas is relatively very low, more than half of the global health workforce is concentrated in these two land masses [44]. African countries which shoulder about 25% of the world's total burden of disease account for only 3% of total health workers [44]. Figure 1 graphically summarises the global distribution of health workers relative to need.

While the mal-distribution problem is a worldwide phenomenon, it is deeply entrenched in many low and middle income countries. It is reported that in the urban areas of Bangladesh where 15% of the country population live, there are about 30% of nurses and 35% of doctors working there [14]. In a similar manner in Brazil, there is a reported higher concentration of health workers in its richer urban regions compared to its poorer rural regions that have the fewest health workers per capita [14]. This pattern is consistent with the situation in other countries such as Mexico, Nicaragua and many sub-Saharan African countries [16, 44]. In Ghana in 1997, 87.2% of general practitioners worked in its urban regions although 66% of the country's population lived in the rural areas. In Tanzania there have been reported inequalities in the distribution of health workers between rural and urban districts with rural districts having a fewer number of health workers per capita than do urban districts [45]. In many low income countries, rural-urban inequalities in the distribution of health workers (especially that

of highly skilled workers) is associated with a higher concentration of such workers within the higher levels of the health care system which are mainly located in urban areas [46]. Even the skill-mix imbalances in these countries follow more or less a similar pattern as the case happens to be in Tanzania [45]. Many existing estimates of the extent of rural-urban inequalities in the distribution of health workers tend to be biased. They do not exclude health workers who are found in geographical units with higher-level health facilities (referral and tertiary hospitals). A study in Tanzania has shown however that, even after excluding health workers who are working in the higher level health facilities, the pattern of inequality remained the same [45].

The unequal distribution of health workers between public and private sectors is more pronounced in countries with highly developed health care markets, for example, in Europe and North America as well as in some few middle income countries. In Africa, one country may serve us an illustrative example: South Africa. In South Africa in 1998, Padarath *et al* (no date) has reported that about 53% of all general practitioners and 76% of all specialists were working in the private sector [46]. The South African private sector is said to consume about 58% of the country's total health expenditure which is accessed by only 20% of the population [46].

Figure 1: *Global distribution of health workers and burden of disease*



Source: WHO, 2006 [47].

It is important, therefore, to understand the nature and magnitude of the imbalanced distribution of health workers (in all its facets) in order to design effective strategies necessary to reverse its potential negative outcomes. It has been argued that the imbalanced distribution of health personnel can contribute to great

disparities in health outcomes between the rural and urban population [14]. In Mexico, life expectancy for the rural population is 55 years, while in urban areas it is 71 years. In the wealthier northern part of the country (Mexico), infant mortality is 20/1000, compared to 50/1000 in the poorer southern states [14]. In Tanzania, the districts with fewest health workers per capita are the same with the highest under-five mortality [45]. This may imply that interventions which are meant to alleviate distributional inequalities of health workers might at the same time help to address inequities in health outcomes. In addition, the policy option of equally distributing health personnel (relative to need) has the potential for increasing coverage in the delivery of the already known cost-effective health interventions, which may imply efficient use of resources and improved health outcomes. However, shortage of health workers particularly in poor remote areas of many low-income countries remains to be a critical challenge for improved coverage of health services use and better health outcomes [4, 5, 48].

1.4: Interventions employed to address the problem: evidence from literature

The interventions used to address the problem of recruiting health workers to work in remote areas in particular and those addressing distributional imbalances in general, have variously been grouped. They have commonly been categorised as selection, education, coercion and incentives (financial and nonfinancial) [8, 40].

In designing effective interventions to attract health workers to work in remote areas, the literature has suggested factors that are necessary to make the interventions effective and potentially reduce the cost of their implementation. A review by Dunbabin and Levitt in higher income countries, had documented the importance of characteristics such as 'rural origin' and 'rural medical exposure' to be crucial factors in attaching health workers in undeserved areas of USA, Canada and Australia [17]. Similarly, Talley and Rabinowitz have concluded that students who grew or got their training in rural settings were more likely to locate their practice in rural areas of USA [24, 49].

Regarding the effectiveness of selection-based interventions, an evaluation study of a programme that was meant to enrol students with rural backgrounds to pursue medical studies at the University of Tromsø in Norway has yielded interesting results. It has shown that ten years after the start of the programme 82% of those who grew up in the rural areas (the north) and who got their training at the university of Tromsø were still practicing in rural and remote areas; this was 5-10 years after their graduation [50]. Several other studies have similarly indicated that individuals with a strong rural background are 2.5 to 3.9 times more likely to accept remote jobs than those without this characteristic [19, 23-25, 30, 40, 51, 52].

Financial and non financial incentives have also been applied in different countries to attract health workers in remote areas. In many low income countries, health worker salaries are markedly low and this arguably makes good remuneration one of the important strategies for attracting and retaining health workers in rural areas. Although the use of financial incentives has been a common approach in countries such as Philippines, Thailand, Zambia, Kenya, to mention a few, evidence indicate that implementing them as stand alone interventions often has limited impacts and thus should be combined with other interventions such as nonfinancial initiatives [53]. Findings reported by Lehman *et al* from a study done in Ghana has indicated that the most frequently cited reason for students not to prefer rural medical practice was lack of decent accommodation [54].

There are few studies done in low and middle income countries on the factors influencing health workers accepting remote job postings and the effectiveness of interventions designed to attract health workers in remote areas. Studies done in Indonesia and Ethiopia have indicated that interventions such as provision of a good working environment as well as financial and non-financial inducement (or lack of them) have impacts on health workers' practice location preferences [11, 26, 55].

A report by the World Health Organization has argued that "the question of *what works* and *why*, is neither simple nor evident" [8]. This is because the factors determining effective rural recruitment and distribution of health workers are many and complex. Moreover, sustainability of the few identified successful (single) interventions is also questionable as many of these interventions start as pilot schemes in particular areas or targeting specific cadre(s) of health workers with little capacity for being scaled up and being sustained [8]. Thus, it is suggested that since implementing single interventions has proven ineffective as the factors affecting attraction of health workers to remote places are complex and intricate, an optimal solution should be to implement 'bundled interventions'[8]. In Thailand for example, a number of interventions have been combined into one bundle and after 30 years of implementation there has been reported declines in the differences of health worker density between rural and urban areas, with the number of health workers being increased in remote areas. The combined interventions were: compulsory contract of three years working in rural areas after graduation, development of rural infrastructure coupled with financial incentives, rural recruitment and training in rural health facilities, development of community medicine and improvement of personnel management systems [8]. Whether this successful approach can be extrapolated in other countries such as Tanzania or not, will require to be verified by sound evidence. The current PhD thesis analyses the effectiveness of financial

(salary premium) and nonfinancial (free housing and better educational opportunities) interventions in attracting health workers to work in remote areas in Tanzania.

2.0: The context and setting

The data for the three sub-studies forming this thesis were collected in the United Republic of Tanzania at different time periods (between 2002 and 2009). Tanzania has a unique post-colonial history of early implementation of socialist reform policies following the Arusha Declaration of 1967. From 1980s through 1990s, the country had undergone a number of socioeconomic and political reforms ranging from ‘technically’ denouncing the Arusha Declaration in 1985, to the re-introduction of private sector activity through Liberalization policies and the re-introduction of multiparty democracy in the 1990s. All these major reforms were initiated partly in response to pressures from both national and international players.

Tanzania has an area of 363,950 square miles, being the largest country in the East African Region. The country is divided into mainland Tanzania and the Zanzibar islands and has a population of 37.4 million [56]. It is one of those countries in Sub Saharan Africa with the highest levels of poverty. The health system consists of the public, the private for profit, and the voluntary agency sectors. The public health system is organised in a referral structure that has a pyramidal form. The lowest level consists of health posts and dispensaries. Above the dispensary level, there are health centres and district hospitals. In districts without a district hospital owned by the government, voluntary agency hospitals serve as Designated District Hospitals (DDH). Above the district level are the regional hospitals. There are four tertiary hospitals at the highest level, which serve the four zones of the Ministry of Health and Social Welfare. These are: Muhimbili National Hospital serving the Eastern zone, Bugando Medical Centre the serving the Lake zone, Mbeya Referral Hospital serving the Southern zone and the Kilimanjaro Christian Medical Centre that serves the Northern zone.

In all plausible measures, the health worker situation in Tanzania is described to have reached crisis proportion both in terms of shortages and inequalities in their distribution. There is shortage of health workers in all cadres but that for skilled health workers is more acute. The shortage is further compounded by an increasing attrition rates due to HIV/AIDS related illnesses, low morale leading to low productivity and an emerging trend of migration to developed countries and some Southern African countries [20, 57-61]. The mal-distribution is reflected both in terms of quantity and skill mix, and in both cases, the rural and remote areas are enormously disadvantaged [45]. According to the health worker census of the Ministry of Health and Social Welfare (MoHSW), Tanzania has a total of 48,508 health workers [62]. The country has 0.02 physicians per 1,000 inhabitants, the lowest in the world [44]. The public sector employs 70% of the health workforce with about

40% of these health workers being unskilled [45]. A study recently conducted in Tanzania indicates huge inequalities in the distribution of health workers between rural and urban districts, ranging from 0.3 health workers per 1,000 inhabitants in a typical remote district to 12.3 health workers per 1,000 inhabitants in an urban district [45]. Roughly, more than 70% of the Tanzanian population lives in rural areas but health workers are concentrated mainly in urban affluent districts.

While this is the case in point, the health system in Tanzania is grappling with disappointing health outcome indicators amidst a slow pace towards realising the health related Millennium Development Goals (MDGs). The average life expectancy at birth is 45.6 years [56, 63]. The latest Tanzania Demographic and Health Survey (TDHS) revealed poor health indicators with infant and under-five mortality estimated at 68 and 112 per 1,000 live births, respectively [63]. The trend analysis of under-five mortality indicate that between 1999 and 2004/2005 the under-five mortality had declined from 147 to 112 deaths per 1,000 live births [64]. Data from the 2004/2005 TDHS show that pregnancy related mortality had not improved over the previous twenty years [65]. The current maternal mortality rate for Tanzania is 578 deaths per 100,000 live births, with about half (43%) of all births in the country being attended by skilled attendants [63]. These figures are comparable to the maternal health situation in the other East African countries.

As is for many health systems in low income countries, several initiatives have been used to try to address the distributional imbalances of health workers in Tanzania. For example, right after independence (1960s) to 1980s, compulsory bonding has been used as a strategy to ensure that health workers in the public sector are deployed in all places including remote places. The implementation of a compulsory bonding policy was done at the same time as the country was implementing Rural Development Programs (RDPs) which were at the core of the post independence policies of 'Socialism' and 'Self reliance' of the Arusha Declaration of 1967. Anecdotal evidence suggests that neither the bonding strategy to recruiting health workers in remotely located places nor the RDPs were successful in realising their original goals. These failures were partly attributed to lack of resources (financial and human) and institutional support systems that would have ensured their effective implementation. In addition, corruption and nepotism in the implementation of the bonding policy are cited as important reasons which made the strategy unpopular and ultimately, a failure [33, 34].

Since her independence in 1961, Tanzania had gone through a number of health systems' policy shifts and twists which have of late, had profound implications both for health sector organizational structure in general and

recruitment and distribution of health workers in particular. The post-independence experimentation of socialist reforms following the proclamation of the Arusha Declaration in 1967 was the early attempts to re-organise the government to be able to effectively implement social development programmes (including health) to its population. From 1980s, the country put in place a ground work for implementing decentralisation reforms in the health sector following pressures from within and outside the country [34]. The Tanzanian parliament passed six pieces of legislation which created the legal framework for the implementation of local government decentralisation reforms [66-71]. The actual implementation of the decentralisation reforms started in the early 1990s within the framework of the Local Government Reform Programme (LGRP). The LGRP was charged with (among other tasks) ensuring that districts have relevant and capable structures of governance to manage their own affairs including decentralising to the local government authorities such management functions as staff recruitment, development and disciplining [34, 72].

In relation to the management of health workers, the decentralisation reforms were expected to make recruitment and distribution of health personnel more responsive to local needs through better utilisation of local information and stronger accountability mechanisms. In addition, decentralisation was expected to reduce delays in planning and executing plans through less overload and congestion in the channels of administration and communication, and through simpler bureaucratic procedures [39]. Ultimately, access to quality public health services may be assured and delivered more effectively [34, 37, 73, 74].

While the above outcomes have remained the rationale for implementing decentralisation reforms in many countries, evidence indicate that implementation of decentralisation reforms might lead to unintended consequences especially related to the management of health workers [3, 34, 37, 38, 73, 75, 76]. In Tanzania, the implementation of the decentralisation policy in the health sector came with a number of challenges. Among the challenges, was one related to the recruitment and distribution of health workers. The poor and remote districts seemed (and still seems) to have little capacity to enjoy the potential benefits offered by the decentralised recruitment system. Hence in 2006, government of the United Republic of Tanzania partly re-instated the central recruitment system of health workers in order to address the identified problems of recruiting health workers in underserved areas. The implication of this policy change for recruitment and distribution of health workers in remote areas of Tanzania was not known, hence the need to generate such evidence needed for improved effectiveness in the recruitment and distribution of health workers (Paper II).

3.0: Rationale

Apart from the generally low number of health workers which apparently forms a substantial part of the health worker crisis in Tanzania, an associated problem is the health worker distributional inequalities with remote districts of the country being mostly disadvantaged. The remote districts are disadvantaged in terms of low numbers and inadequate skill mix. There is little evidence in Tanzania on factors that hinder improved recruitment of health workers in remote areas. In addition, there is lack of evidence on the appropriate and effective interventions that if implemented can increase recruitment of health workers to work in remotely located health facilities and ultimately alleviate their imbalanced distribution. In order to propose relevant interventions, there is a need to first describe the nature and extent of inequalities in the distribution of health workers. Secondly, it is important to understand the organisation of the recruitment process, procedures and the factors hindering / enabling recruitment of health workers in remote areas of Tanzania. Finally, the evidence on the effectiveness of financial and nonfinancial interventions in attracting health workers to work in remote areas and how responsive workers are to these interventions, are equally crucial aspects. Thus, the focus of this thesis is to contribute to the on-going discussions on how these policy challenges can be addressed in order to propose recommendations relevant for the Tanzanian health care labour market and the labour markets of other low income countries.

4.0: Objectives

The main objective of this thesis is to contribute to our understanding of the problem of inequalities in the distribution of health workers in settings of extreme resource scarcity with a view to suggesting appropriate interventions for its alleviation. The specific objectives are:

- To describe the nature and magnitude of the problem, suggest and apply additional needs indicators for a more sensible measurement of the magnitude of distributional inequalities of health workers in resource-limited settings.
- To describe and assess the organization of the recruitment processes and procedures (decentralized vs centralized) in relation to their implications for effective recruitment and distribution of health workers in remote districts of a low-income country.
- To analyse how strongly financial and nonfinancial incentives (housing and education) might affect health workers' willingness to work in remote areas of Tanzania.
- To analyse how strongly the level of financial incentives needed to attract health workers is affected by health workers' geographic origin, their intrinsic motivation and other personal characteristics and;
- To provide evidence-based policy recommendations for attracting health workers in remote areas and ultimately reverse the growing problem of health worker distribution inequalities

5.0: Methodology

5.1: Study design and methodological approaches

The data presented in this thesis originate from three cross-sectional sub-studies involving both quantitative and qualitative methods of data collection and analysis. Lorenz and concentration curves; and their corresponding Gini and concentration indexes were used to analyse the nature and magnitude of inequality in the distribution of health workers relative to need (Paper I). Paper II employed qualitative methods, mainly in-depth interviews, to analyse the implications of decentralisation reforms for the recruitment and distribution of health workers in remote districts of Tanzania. In paper III, a Contingent Valuation (CV) methodology was used to elicit the preferences over job locations for 362 nursing students. Three main choice scenarios were created and were distinguished by their level of non-financial incentives for taking a remote job. The choice scenarios were (1) No non-financial incentives, (2) free housing, and (3) improved educational opportunities. Detailed descriptions of the methodology for each sub-study are presented in the subsequent sections and the respective papers attached in this thesis.

5.2: Description of methods and data

Measuring inequalities in the distribution of health workers (Paper I)

The starting point in any attempt to characterise and measure inequalities or alternatively ‘imbalances’ in the distribution of health workers, is to accentuate the fact that an equitable distribution of health workers can be achieved by allocating health workers relative to the needs for health care. Most of the relevant literature on the characterisation and measurement of distributional imbalances of health workers have traditionally and implicitly relied on *population levels* as the major criterion for measuring need [12, 14]. Apparently, measuring *need* is not a trivial exercise [45]. However, population levels have come to be a popular indicator of need in many practical applications implying that inequalities in the distribution of health workers is typical of inequalities in the number of health workers per an arbitrary number of inhabitants in a particular geographical unit. Population levels (per capita norm) has been the preference of many planners and analysts because it is simple to construct, easy to interpret and does not require too much information [16, 77-80]. This thesis argues that population levels may not be a sufficient measure of health care needs if disease patterns vary among locations and thus suggest the design and use of more sensible indicators of health care needs in the context of health workforce planning in low income settings.

In relation to the pointed inadequacies of using population levels as the sole criterion in estimating needs for health care and thus human resources requirements, some studies in developed countries have proposed to substitute population levels with crude death rates, the arguments being that a high death rate is an indication of higher proportion of an elderly people with high health care needs [81-83]. It is argued in this thesis that the use of crude death rates as a proxy for health care needs in low income countries may not provide a suitable proxy for health care needs because these countries typically have little or no resources set aside for health care needs of the elderly population. In addition, low income countries like Tanzania are characterised by higher fertility rates and therefore a small proportion of elderly people. It is proposed that, under five deaths and HIV/AIDS prevalence rate may provide more sensible additional proxies for measuring needs. The use of these two, albeit incomplete, serves as illustrative tools in strengthening the argument that different needs indicators and therefore inequality measures may produce different inequality estimates with different implications for policy and practice [84]. Other studies have indicated that other disease burden measures can as well serve as proxies for health care needs [81, 83]. However, evidence to support their use in estimating health worker distributional inequalities in low income countries is not available.

In relation to under five deaths as a proxy for measuring need, it is reported that 30% of annual deaths in low income countries is accounted for under five deaths compared to only 1% in high income countries [85]. A large share of these deaths can be prevented by the already known cost-effective interventions delivered through the health system [86, 87]. In Tanzania, the under-five mortality ratio varies by a factor of 6 between the worse-off district and the relatively better-off [64]. In recent years, the government of the United Republic of Tanzania has designed a financial resources allocation formula whereby under five mortality is one of the formula's ingredients, others being population levels, poverty levels and remoteness [88]. It is thus reasonable to assume that the same wisdom used to input under-five mortality in the financial resources allocation formula might as well be adapted in the health workers allocation formula.

With regard to HIV/AIDS, available evidence concludes that it imposes huge burdens on the health workforce in many low income countries largely due to increased workload for attending many and complex opportunistic infections [89]. One study in Tanzania has indicated that the duration and frequency of admission of HIV/AIDS patients was double that of other diseases. Moreover, the need to implement a rapid roll-out of the Anti Retroviral Treatment (ART) has added to new demands for the health workforce [90]. Amidst these emerging challenges, HIV/AIDS has also been linked to increased health worker absenteeism and decreased productivity among

health workers [58, 61, 91]. Moreover, the justification of using HIV/AIDS prevalence as an additional (proxy) indicator of health care needs is backed by the fact that, as is for many countries, there are large variations of HIV/AIDS prevalence rates in Tanzania; from 1.5% in Manyara region to 15.7 in Iringa Region [92]. This variation of HIV/AIDS burden might indicate different needs for health care workers as well as for other resources.

A quite valid criticism to the proposed additional proxies may be that high burden of disease may be attributed to low number of health workers [4]. That is, if for instance all the variation in under-five mortality was due to unequal distribution of health workers, it would appear redundant to allocate health workers based on the differences in the number of under-five deaths across geographical locations. In this thesis, however, it has been shown that the number of health workers per capita can potentially explain only a small share (about 20%) of the variation in under-five mortality rates. With HIV/AIDS prevalence rates, there is so far no evidence which has convincingly established that health worker per capita is strongly associated with the variations of HIV/AIDS prevalence patterns across geographical units.

The Lorenz curves and the Gini index

Borrowing largely from economics literature on the measurement of inequality in the distribution of income, the Lorenz curves were used in order to characterise the distribution of health workers per capita [93]. The Lorenz curve shows the cumulative share of health workers against the cumulative share of the population when the different locations are ranked from lowest to highest number of health workers per capita (see Figure 2).

The Gini index was used as a measure of the aggregate level of inequality in the distribution of health workers. The Gini index takes the values between 0 and 1, where 0 indicates absolute equality and as one move towards 1, the extent of inequality increases. The Gini index is simply an area enclosed by the Lorenz curve and it is graphically presented as $A/(A+B)$ in Figure 2. For discrete distributions (in this case, the distribution of health workers per capita across districts) and when the observations have been ranked from below, the Gini index was calculated as:

$$G = \frac{\sum_{i=1}^n (2i - n - 1)X_i}{n^2 \mu}$$

where G is the Gini index, n is the number of observations, X_i is the number of health workers in the i th location and μ is the mean number of health workers.

The concentration curves and concentration index

Concentration curves, which have been extensively used in order to characterise socio-economic inequalities in health, were used in order to characterise the need for health workers [93]. Thus, concentration curves in this sub-study were used in order to plot cumulative expressions of need (i.e., the cumulative proportions of inhabitants, under five deaths, and HIV+ cases) against cumulative proportion of health care workers. They were also used in order to compare the inequality in the distribution of specific cadres with the inequalities in the overall distribution of health workers. This was crucial for estimating inequalities in distribution of health workers both in terms of numbers and in terms of skill mix.

In contrast to the Lorenz curves, concentration curves are constructed by ranking observations by some external variable. By using the number of health workers per capita as the external variable it was possible to superimpose the concentration curves in the same diagram as the Lorenz curve (see Figure 2). It thus became possible to make statements such as “50% of the inhabitants of a certain geographical area have access to x% of the health workers while their need would represent y% of the aggregate need”

The interpretation of concentration curves depends on the measure of ‘need’ for health care that is used to construct them. For instance, if need is expressed by the number of inhabitants, the concentration curve is simply the diagonal as in Figure 2. Conversely, when need is expressed through other variables, the concentration curve may run both below and above the diagonal.

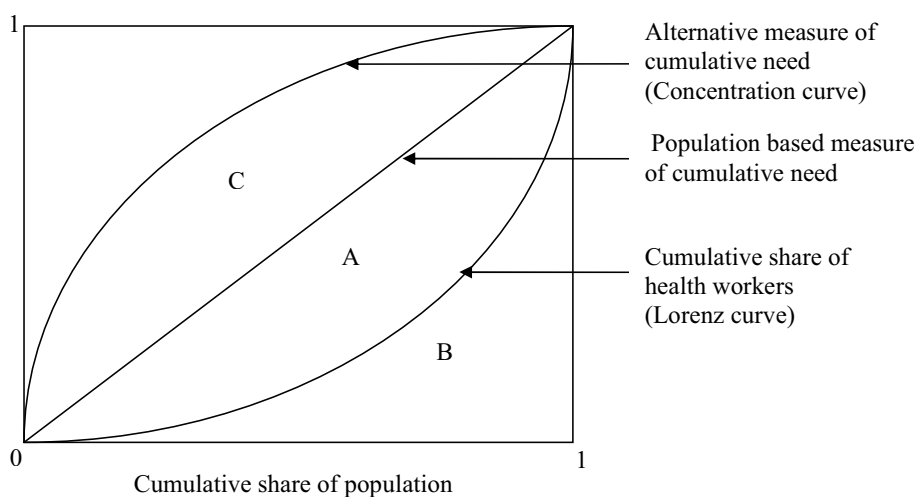
Concentration indices were calculated in order to measure whether inequalities on average were increased or reduced by replacing the number of inhabitants with alternative measures of need. Technically, the concentration index is computed in the same way as the Gini index, and graphically, the concentration index is the area $C/(A+B)$ ¹ in figure 2.

The concentration index takes values between -1 and +1. When the index is 0, it means that the alternative measure of need does not affect the aggregate level of inequality, compared to the case when need is measured by the number of inhabitants. When the index is negative, which would be the case if the concentration curve lies everywhere above the diagonal, health care needs per capita are on average larger in the districts with the fewest health workers per capita. Hence, the inequalities are larger when we use the alternative measure of need. The

¹ When the concentration curve lies above (below) the diagonal, the area C is assigned a negative (positive) value.

opposite is true when the concentration curve lies everywhere below the diagonal, which would imply a positive concentration index. Several existing studies have confined themselves to the analysis of distribution of single cadres such as general practitioners and nurses [9, 10, 94]. In this sub-study (paper I), the decision to superimpose concentration curves in the same diagram as the Lorenz curve (see Figure 2) presents a novel way of decomposing the inequalities in the distribution of health workers both at aggregate and at the cadre levels.

Figure 2: The Lorenz curve and the concentration curve



The data for estimating health worker distributional inequalities were from three main sources. Firstly, the recent Human Resources for Health (HRH) survey by the Ministry of Health and Social Welfare (MoHSW) provided data on numbers of health workers in Tanzania who are employed by public and private sectors [62]. This data was collected at the health facility level. The data covers all districts in mainland Tanzania. At the time of the survey, the total number of districts was 113 (as a result of government re-organisation, some districts have been split later on). Twenty two of the districts were classified as urban districts. The urban districts consist of the regional capitals in 19 regions in addition to the three districts of Dar es Salaam region. One region (Manyara)

has a regional capital (Babati district) which is classified as 'rural' in the country's official statistics. It was thus included in the list of rural districts.

The second source of data for this sub-study was the National Bureau of Statistics (NBS) where under five mortality data was obtained. The data was based on the 2002 population and housing census and was collected by asking questions of the birth history to women of reproductive age of between 15 and 49 years [95]. Finally, the data on HIV prevalence was based on the HIV/AIDS indicator survey of 2003-2004 [96]. This data has been estimated only at a regional level. The analysis that utilises HIV prevalence rates in relation to distribution of health workers was therefore conducted up to the regional level only.

Qualitative methods (Paper II)

Qualitative research involves a systematic collection, organization and interpretation of textual data derived from observations, in-depth interviews or Focused Group Discussions (FGDs). It is used in the exploration of meanings of a social phenomenon as experienced or perceived by the individuals in their natural contexts reflecting historical, socioeconomic, cultural and political realities surrounding their day to day lives and interactions in their communities or work organisations [97, 98]. It is emphasized that a qualitative researcher always attempts to make sense of or interpret social phenomena in terms of their 'meanings' that informants bring forward. In addition, a phenomenon is not studied as if it exists in isolation of the contexts that shape the informants' and the researchers' real life, but it is embedded in the context in which the informants' and researchers' experiences and knowledge are shaped [99]. In the present study, the issue under investigation was how the organisation of health system (decentralised vs centralised) may have implications for recruitment and distribution of health workers in remotely located health facilities; and how these implications can be interpreted by considering the socioeconomic, political, historical and cultural contexts of the Tanzanian health system.

The study of health sector decentralisation reforms and its implications for health worker recruitment and distribution is a highly complex phenomenon. This is especially so in a country such as Tanzania with a long history of centralised planning which captures the experiences of pre-colonial, colonial and post independence period of implementing 'socialist' policies. In relation to the management of health workers in the public sector, it is even more complex when the practice of health worker recruitment has seen continuous shifting of policy directions from centralization (pre-1982), to decentralisation (1982 to date) and a partial 're-centralisation in the context of decentralisation introduced in 2006 [39]. Therefore, in order to capture important issues surrounding

the organisation of health worker recruitment system in the situation of twisting policy contexts, it was necessary to employ qualitative method which involved in-depth questioning and probing in order collect information on the implications of implementing decentralisation reforms for recruitment and distribution of health workers in a low income setting, Tanzania.

Compared to other techniques in qualitative methods, in-depth interviewing is believed to be more effective in addressing complex and sensitive issues while persuading people to freely talk about their personal feelings, opinions and experiences [100]. One of the main foci of this sub-study was to compare and contrast the informants' experiences on the two recruitment systems (centralised vs decentralised) in relations to distributing and retaining health workers in remotely located health facilities.

The essential feature of In-depth interview as a technique in qualitative methodology is its approach; the '*grounded theory approach*' [97-99]. In this approach, the researcher starts without any pre-defined hypotheses or themes but through an inductive line of reasoning, explanations and theories are derived from the textual materials rather than from the researcher's prior theoretical view points. It is believed that such an approach facilitates flexibility and ability to adjust to new and unexpected findings [101].

Qualitative methods and especially in-depth interviews, recruit its participants through purposive sampling [97, 98]. That is, rather than seeking to achieve statistical generalisability or representativeness which is a common rule in quantitative methods, it usually aims to reflect in-depth understanding of diverse views within the studied population. Specific to this study, the informants were chosen purposefully to benefit from their knowledge based on their strategic positions in human resource management and health workforce planning. In total, 21 informants were involved in the sub-study. The national level informants were recruited from the central government, the NGO sector, academia, and foreign development partners with a stake in the health sector. Six interviews were conducted at this level. The informants at district level (fifteen informants) included the District Medical Officer (DMO), the District Human Resources Officer (DHRO) and the District Executive Director (DED). The informants were recruited from five underserved districts in terms of having the fewest health workers per capita as per the recent Ministry of Health and Social Welfare census in conjunction with the Population and Housing census of 2002 [62, 95]. The study initially planned to involve 18 informants from six districts, and a total of 10 informants were to be recruited at the national level. However, "data saturation" was

achieved after interviewing a total of 21 interviews; 6 from the national level and 15 interviews at the district level.

An interview guide with open-ended questions was employed consistently throughout the data collection process. New and important issues to the study that emerged in the course of the interviews were added to the guide and were further explored in the subsequent interviews. Except for one interview with an informant from an international organisation, all the interviews were carried out face to face in Swahili, the official language of the United Republic of Tanzania. Audio-taping and note-taking were used to record the information.

Analysis of data from in-depth interviews was done by employing a thematic content analysis procedure and it was approached in an iterative manner. Familiarization of the data material was done through repeated reviews of transcripts and field notes. In order to counter the possibility of introducing the subjective judgements of individual researchers in the interpretation of data, 'multiple coding' was employed. 'Multiple coding' entails a process whereby creation of codes and their interpretation is carried out by different researchers [98]. In this study, three researchers were involved in the process. This process was carried out in order to create codes and categories that as closely as possible reflected the content of the data rather than the concepts and questions pre-designed in the interview guide. Multiple coding has also been credited of being capable of off-setting the potential influence of the individual researchers' prior theoretical view points in attaching meaning to the data, and hence, bias [98].

Contingent Valuation methodology (Paper III)

Stated preference Contingent Valuation (CV) methodology was used to find the reservation wage at which nurses would be willing to work in remote health facilities. The stated preferences were elicited by constructing hypothetical choice situations. It is only recently that a few studies had employed the CV method in studying health workers' practice location choices in low income settings [11, 26, 55]. Economists have generally emphasised the importance of looking at actual choices or revealed preferences rather than stated preferences. The revealed preference approach has however some serious limitations in this context. The main reason revealed preference techniques could not be used in this study is the lack of variation of the main variables of interest. Moreover, even if there was some variation in these variables, it is suggested that the variation must be large enough to provide reliable estimates of the effect of large changes in policies [102]. Finally, co-linearity among attributes is common in revealed choice data with the potential of affecting the confidence intervals

(precision) of the generated coefficients and therefore making it difficult to separate the effects of specific attributes on the respondents' choices [102-104].

In this sub-study, differentiation of the hypothetical choice scenarios was done at two levels. The first level described a set of fixed location variables of the two job postings. The second level described the levels of three attributes; namely salary, free housing and education opportunities in the two jobs. In all choice scenarios, the salary for an urban job was fixed at the official starting salary for a nursing officer in Tanzania. For the remote job, the starting salary was increased step by step to create nine discrete choices which were presented to each respondent. This procedure was repeated for the case when the remote job offered free housing (Scenario 2) and for the case when better opportunities for further education were offered (Scenario 3).

In scenario 1 (the baseline) results were interpreted by looking at how the salary increase impacts on the share of nurses who are willing to accept remote job postings. The share of nurses willing to work in remote areas at various levels of wage premiums was calculated in each respective scenario in order to ascertain and compare the impact of financial and nonfinancial incentives. In scenario 2 and 3, the findings were interpreted by looking at how effective nonfinancial interventions were in increasing the share of nurses (from the baseline) who will be willing to work in remote health facilities. Then, the results in scenario 1 were compared with those in scenario 2 and 3 in order to see how strongly financial interventions may influence nurses willingness to accept remote jobs compared to alternative (nonfinancial) interventions. A detailed description of the choice scenarios and differentiation of the attributes for the two jobs are presented in the respective paper (III) attached in this thesis.

In order to understand the association between nurses' personal characteristics and the reservation wage for nurses to accept remote job postings, an interval regression was used because the discrete choice alternatives only allow the analysis to determine an upper and lower bound of the reservation wage. This procedure also accounts for the fact that the reservation wage of those who preferred to work in the remote location at baseline might have a reservation wage below the current official wage level. The dependent variables were log-transformed in order to generate coefficients which could be interpreted as percentage change attributable to the independent variables. The independent variables of interest for this analysis were nurses' remote background and intrinsic motivation. The regression analysis was fitted to make it possible to control for age, gender, marital status, and whether a respondent had children or dependants (other than own children). Through a nursing school *'fixed effect'* specification, nursing schools' observable and non-observable characteristics were also controlled.

5.3: Ethical considerations

Ethical clearance to conduct the three sub-studies forming this thesis was obtained from the National Institute for Medical Research (NIMR), Tanzania. For the first sub-study (paper I), there had not been serious ethical challenges since all the data was from secondary sources. However, introduction letters explaining the methods and aims of the study were sent to respective authorities who were vested with the custody of the data. For the qualitative and the Contingent Valuation studies (paper II & III), verbal and written consents were respectively sought from prospective interviewees after explaining the aims and methods of the study, subsequently informing them of the research ethical principles of voluntary participation, the right to withdrawal, and the principles of anonymity and confidentiality. A consent form (for Paper III) was prepared and interviewees were requested to sign on it if they agreed to participate in the study. A copy of this form is attached in the appendix section.

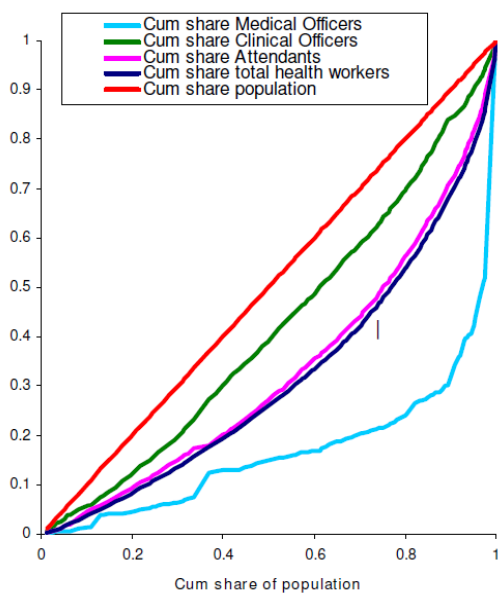
6.0: Study findings

6.1: Paper I: Measuring inequalities in the distribution of health workers: the case of Tanzania

Inequalities in the distribution of health workers have often been described by comparing the number of health workers per capita across districts or other local geographical and administrative units. In many practical applications, population levels (per capita norm) have been used as a proxy for health care need in planning and estimating health worker distributional inequalities. This has been so because it is simple to construct, interpret and does not demand too much information.

It is shown in this paper that districts with fewer health workers per capita are also the ones characterised by having low numbers of skilled health workers. In addition, the skill mix for the disadvantaged districts is characterised by a relatively larger number of clinical officers. In rural districts, clinical officers are more equally distributed than in urban areas. There is however no cadres for which the disadvantaged districts have a larger share of health workers than is suggested by their relative population levels. The concentration curves in Figure 2 below highlights the distribution of health workers by cadres (in all districts).

Figure 2: Distribution of health workers by cadre in all districts



The study has indicated that inequalities in the distribution of health workers per capita are huge and rural districts are the most disadvantaged in terms of numbers of health workers and skill mix. On Average, rural districts account for only 1.1 (range from 0.3 to 3.0) total health workers per 1,000 compared to 1.4 (range from 0.6 to 3.2) per 1,000 population in urban districts. The population quintile with the fewest health workers per capita has only 8% of all health workers while the quintile with most health workers has 46% all health workers. Inequalities were found to be pronounced when under five mortality was used as a proxy for health care needs. However, it was not so when HIV/ AIDS prevalence was used as a proxy measure for health care needs.

For skill mix distribution, some cadres (such as clinical officers) are more equally distributed than others and districts with smaller shares of total health workers have the fewest number of highly trained health workers. This indicates that rural districts are disadvantaged by having fewer health workers per capita and a poorer skill mix. This has implications for failure of rural populations in accessing quality health care services that potentially may negatively affect their health outcomes.

The paper concludes by observing that population is a useful indicator of health care needs in measuring distributional inequalities of health workers. However, in case of non-uniform distribution of disease burdens there is a need to consider more indicators of health care needs. Employing more indicators of health care needs may help analysts to capture more relevant information for a more meaningful and comprehensive measurement of health worker distributional inequalities than what is possible with population levels alone.

6.2: Paper II: The decentralisation-centralisation dilemma: recruitment and distribution of health workers in remote districts of Tanzania

Recruitment and distribution of health workers to work in underserved remote areas have recently become a major challenge in many health systems in low and middle Income countries. While the factors that contribute to these challenges are many and complex, the emerging body of evidence indicate that the health sector organisation (centralised or decentralised) might have huge implications for recruitment and distribution of health workers. In Tanzania, there have been difficulties that have recently been reported regarding the recruitment of health workers among the remote districts, as well as difficulties that accompanied the implementation of the decentralisation policy. These difficulties resulted in the government of Tanzania to partially re-instate the centralised recruitment of health workers in the context of ongoing decentralisation reforms.

An exploratory qualitative study was conducted to understand the implications of the decentralisation vs centralisation policies for the recruitment and distribution of health workers in remote districts of Tanzania. The different historic periods in Tanzania that contrasts the decentralised recruitment system with a more centralised one were juxtaposed. In this way the, the study was able to offer new insights on the existing knowledge base regarding how health sector organisation and the complexities surrounding the recruitment procedures may set districts far apart in terms of their competitive advantages in attracting their needed health workers.

The study has indicated that decentralised recruitment system is more responsive to district specific health care needs. Moreover, the findings suggest that decentralised recruitment is more effective in recruiting lower cadre health workers from within the districts or nearby districts. Decentralised recruitment procedures were however perceived to be less effective in recruiting highly skilled health workers. While decentralised recruitment of health workers was thought to offer promising solutions towards planning health workers according to need, a number of problems were cited to be associated with it being ineffective in recruiting health workers in underserved remote districts. The first relates to limited power and authority vested to district managers to handle such complex issues as recruitment of health workers. It is however important to note that the analysis involved only remote and underserved districts. A more comprehensive study (where urban and better off districts are included) will be needed in order to conclude whether remote districts were more affected (than urban districts) by limited powers and authority decentralised from the central government. Secondly, decentralisation in general, not least that part pertaining to decentralised recruitment, took place amidst weak institutions of governance that could easily be manipulated by local politicians who might use these loopholes to marshal their ill-motivated interests, including threatening district managers to recruit unqualified workers and their relatives. The third problem was mentioned to be bureaucratic constraints associated with long processes of requesting employment permits. Unnecessary bureaucracy was said to cause delays in recruiting health workers which sometimes led to additional costs of recruiting health workers in remote districts especially when the process has to be repeated. The paper showed that under decentralised system, the recruitment process had to sometimes be repeated due to failure of the recruited workers to show up and the generally high turn over which characterise most of the remote districts in Tanzania. This might partly be explained by the remote districts' weak competitiveness in recruitment management as compared to advantaged urban districts.

The identified problems could well be due to the fact that the decentralisation reforms in Tanzania were partially implemented. The signals for partial decentralisation were indicated by the respondents' claims of *limited powers*

and authority to manage human resources issues under decentralised arrangement. In addition, unnecessary interference from a number of central government organs might well indicate that during the design and implementation phases of the decentralisation reforms, there was no clear intention to fully decentralise management authority and resources to the local government levels. According to the interviewed respondents, centralised recruitment was perceived to be effective in recruiting highly qualified health workers and was perceived to be capable of distributing them across districts relative to the identified needs. This is perhaps because of the fact that the central government apparently has more authority and control over resources. In this way it can more easily manage the recruitment processes than the decentralised local government units.

The paper concludes that for effective recruitment of health workers in remotely located health facilities, a hybrid model that combines the benefits of partial- decentralisation and partial centralisation might provide a promising approach towards addressing critical shortages of health workers in remote, underserved districts of Tanzania. It is suggested that without encroaching too far into the legitimate powers and authority vested on decentralised local governments in managing human resources for health, the central government can play a facilitator role. This can only happen if careful balancing that defines the central-local government relationships in the management of health workers is worked out.

6.3: Paper III: The effectiveness of financial and nonfinancial interventions in attracting nurses to remote areas of Tanzania: a contingent valuation study

The main findings of this paper indicate that without any intervention (baseline), 19% of nurses said they would be willing to work in remote health facilities. With provision of free housing, the share of nurses willing to chose a remote job increases from 19% to 34%. With better education opportunities, the share increases from 19% to 47%. When the salary was doubled the share of nurses willing to work in remote areas increases from 19% to 40%. When free housing and better educational opportunities are coupled with a 100% salary increase, the share of nurses willing to work in remote areas increases by 37 and 47 percentage points respectively from the baseline. A substantial top-up (wage premium) should be added on the baseline salary in order for the salary to have the same effect as provision of free housing and provision of better education opportunities. Our calculations from the underlying data has shown that in order for the salary to have the same effect as provision of free housing, it should be raised by between 80% and 100%. Similarly, for salary to have the same effect as provision of better education opportunities it should be raised by between 120% and 140% from the current starting salary of a nursing officer.

In addition, those who grew up in very remote areas (>100kms from rural district capital) have on average a 55% ($p = 0.005$) lower reservation wage than others for accepting a remote job². This finding indicates that nurses who have a very remote background are much more willing to take up remote job postings than others. In our context, this means that remote recruitment can be quite effective in reducing the need for incentives, but only if people are recruited from places that are more remote than the place where you want to send them. In the context of this sub study, the remote job alternative was specified as 50km-100km from the remote district headquarters. The results further indicate further that nurses with high intrinsic motivation have around a 30 % ($p < 0.001$) lower reservation wage than others. This association is robust to the inclusion of the various control variables, including the nursing school fixed effect.

The results also show that those who reported to have one or more dependants have an 18% ($p = 0.06$) higher reservation wage than others for accepting a remotely located job. However, having children has only a small and insignificant association with willingness to accept a remotely located posting. Older students have on average 4% ($p = 0.010$) lower reservation wage than younger ones in order for them to accept working in remote areas.

² Strictly speaking, the coefficients cannot be interpreted as percentage changes unless we are talking about marginal changes in the underlying variables. In this case, the real percentage change will be somewhat bigger than the estimated coefficients.

7.0: Discussion

This thesis has presented the results of three cross-sectional sub-studies carried out in Tanzania at different times between 2006 and 2009. Issues regarding the estimation of the magnitude of health worker distributional inequalities, the causes of and possible remedies for distributional inequalities of health workers have been discussed. Given the fact that it is the remote areas of Tanzania that are acutely disadvantaged by the existing imbalances in the distribution of health workers, four issues were considered crucial before the execution of the three sub-studies. The first issue was related to the understanding of how large were the inequalities. The second was whether population level (the per capita norm) is an adequate needs indicator for estimating the magnitude of human resources distributional inequalities in a low income setting, given the heterogeneity of health care needs in Tanzania as it is for many low income countries. Thirdly, since the central government and decentralised districts are the main employers of health personnel in the public sector, understanding the implications of their involvement for the recruitment and distribution of health workers in underserved remote areas of a low income country was also considered crucial. Finally, since individuals' choices to participate in the labour market is dependent on matching the decisions by employers and employees (decisions which are also shaped by a multitude of other factors), it was crucial to understand what interventions are effective in attracting health workers to work in rural and remote districts' health facilities. Related to the above aspect, it was also considered important to understand what characteristics of health workers make them more likely to positively respond to the interventions designed to attract them to work in remote areas.

The aims of addressing the above issues were to shed light on the understanding of the size of the problem, the possible factors associated with its magnitude and suggest appropriate interventions for alleviating it. This section of the thesis discusses the methodological issues, the policy and research implications of the major findings and the relevant conclusions to be drawn from results of the three sub-studies that form the basis of this thesis.

7.1: Discussion of the methods

Study design

The data for this thesis was derived from three sub-studies namely, two cross-sectional quantitative studies (paper I and III) and one qualitative study (paper II). Using cross-sectional data is not flawless. In any attempt to establish causal relationships or associations, cross-sectional study designs are known to be unable to demonstrate causal relationships between independent variables (potential factors associated with difficulties in recruiting health workers in remote areas) and outcome variable (difficulties in rural staffing and hence, imbalances). However, the employed design is appropriate in the current Tanzania situation where there are no sufficient data to estimate the magnitude and the analysis of the growth of health personnel distributional imbalances in the health sector.

Validity

The validity of the study is, literally, the absence of systematic error. It refers to the adequacy with which the study had accurately measured what it intended to measure [105]. Different types of study validity may be affected by a number of factors that may render difficulties for the study findings to be generalized. Two types of validity are worth discussing for paper I. These are *internal validity* and *external validity* which are common aspects in assessing the generalisability of findings from quantitative studies. The Gini coefficient used in analysing inequalities in the distribution of the total health workers and the concentration index used to measure the cadre-specific inequalities and estimate the level of inequalities when alternative needs indicators are used, are all point-estimates of (in)equality at a certain time. They tend to ignore life-span changes in overall distribution of health workers both in terms of numbers and skill mix. In addition, compared to other measures of inequality (for example coefficient of variation, Atkinsons index, Theil index), the value of Gini index is more sensitive to the changes in the middle of the distribution than to changes in the lower or higher tails of the same distribution. It is hence important to apply several measures of inequality to a data set when measuring distributional inequality because different value judgements underlie every measure [106]. Another problem related to paper I is that the analysis did not utilise data below the district level, hence, large within district inequalities might not be revealed. This might have affected the internal validity of the study findings presented in paper I.

In paper III, two issues are important with respect to validity. The first relates to whether the instrument of measurement or the contingent valuation scenario represents the object of measurement adequately [107]. An attempt was however made to ensure that this requirement is met by presenting the respondents with the true characteristics of a remote job and those of an urban job, the characteristics that reflect the true context of Tanzania. The second aspect relates to whether the measurement used represents the behaviour in the market. An attempt was made such that respondents were presented with question on willingness to accept remote jobs in relation to the actual official starting salary for a nursing officer in Tanzania. A clear definition of what one was to expect from a rural and remote job in a Tanzanian context was provided before the respondents answered the questions. In addition, the stated preference CV technique is a directly obtaining method with a series of iterated questions as it is done in the bidding game whereby an auction process is simulated. According to Klose, this process is closer to the market situation whereby respondents are asked on whether they are willing to pay a given amount in order to consume a particular good or service [107]. In most cases the good or service is either not yet ready in the market or its monetary value is not known. The amount may be lowered or raised depending on respondents' answers until the maximum willingness to pay is achieved.

Based on the above discussions, the findings of this sub-study might be concluded to have a reasonable *internal validity* because the tools and methods used to estimate willingness to accept remote job postings have attempted to measure what was intended to measure. However, for external validity, it is difficult to generalise the findings to other

settings because of the potential danger of ecologic fallacy, a characteristic most common to many cross-sectional studies which attempt to ascertain causal associations (refer to regression analysis in paper III). It may be possible that the labour market characteristics in other settings may cause health workers to provide quite different willingness to accept estimates from what is presented in this thesis. That is, the characteristics of a remote job in Tanzania and the incentive structures, for example, might be quite different from other countries.

Reflexivity and transferability

Reflexivity and transferability are common concepts in qualitative studies although they more or less denote what the quantitative researchers will respectively call 'internal and external validity' [97]. Reflexivity (or confirmability) is defined as an attitude of attending systematically to the context of knowledge construction, especially to the effect of the researcher at every step of the research process [97]. In order to ensure this, all the researchers involved in this sub-study (Paper II) tried as much as possible to limit their established assumptions and theoretical pre-conceptions (presumably originating from their backgrounds) during the design stage, at the time of data collection, analysis and reporting. During designing of the study and development of interview guides, different people with different backgrounds and from different academic disciplines were consulted. The data collection was done by a qualified researcher in qualitative-in-depth interviewing. Data transcription was done by a sociologist who was not involved both in the prior processes and in the analysis/ reporting stages. Multiple coding by different researchers with different backgrounds was employed during analysis in order to ensure that as closely as possible, the generated codes and themes reflected the contents of the respondents views and experiences rather than what was written in the interview guide [98]. Researchers' bias, which is common in almost all qualitative research designs, was thus slightly avoided by employing multiple coding. Common to many qualitative research designs, a 'complete' replicability of this sub-study is difficult due to a wider flexibility which was in-built in the study design, particularly during asking questions to the informants. Unlike in quantitative study designs, questioning in qualitative research is not pre-determined to follow a strict chronological order. Instead, they are subject to the ways in which informants respond to the questions.

With regard to *transferability*, it should be noted that the purposive sampling approach used to recruit informants made it possible to include only those who held strategic positions in health human resources planning at national level and districts with the fewest number of health workers per capita. This approach of recruiting informants yielded a too small number of informants to be representative of the general population of the policy stakeholders within the Tanzanian context and beyond. The data drawn from these informants was, however, useful to uncover relevant insights for the underserved remote districts regarding the difficulties in recruiting health workers. Thus, the contextual information presented in this thesis is subject to readers' judgments and interpretations regarding its usefulness and applicability in other settings. As it is for many findings from qualitative research designs, the applicability of the conclusions drawn from this sub-study is in principle meaningful to the specifics of Tanzania and particularly, in the

settings where the study was conducted. However, the findings produce a strong in-depth knowledge base regarding the decentralisation-centralisation implications on recruitment and distribution of health workers in a typical low income country. The issues raised can further be explored qualitatively in other settings and hypotheses can be developed and tested quantitatively.

Bias

Bias has been defined as the deviation of results or inferences from the truth, or processes leading to such deviation [105]. Three common forms of bias might have affected the findings presented in this thesis. The first one is *recall bias*. Recall bias (or reporting bias) is a type of systematic bias which occurs mostly if the respondent's answers are affected not just by the correct answer(s) but also by the respondent's memory [105]. In paper I, the potential recall bias could have originated from the under-five mortality data which was collected by asking questions of birth history from mothers of reproductive age (15-49 years). The reliance on questions of birth history was due to lack of data on vital statistics in Tanzania, a phenomenon common to many developing countries. Given the fact that urban and rural districts both lack a reliable system of registering vital statistics, there is no reason to expect that there might be any systematic variation between urban and rural districts in the estimated measure of interest. The second possible bias in this sub-study (paper I) is related to inclusion of health workers from regional and tertiary hospitals which are all in urban areas and according to the Tanzanian staffing norms, the regional and tertiary hospitals enjoy quite a huge share of health workers compared to lower level health facilities. This might have led to the inequality estimate to have been upward biased, showing too much inequality if they are included as they are in most of the analysis prior to the current one (paper I). An unbiased analysis would thus exclude only those workers that are needed for the regional and tertiary referral services and not all workers as was done in the analysis. However, even after reanalysing the data by excluding the health workers at these levels, the same pattern of inequality was maintained, although with a different magnitude, showing that there was a bias in the measurement of interest. The final possible bias (in paper I) could be one caused by the potential causal association between under-five mortality and the number of health workers per capita. An econometric multi-country study by Anand and Bamighausen has indicated that low number of health worker per capita causes increased under five mortality [4]. A multivariate regression analysis on the Tanzanian data set used for paper I shows, however, that health worker density can potentially explain a small share of the variation in under five mortality across districts in Tanzania [45]. This indicates that other factors other than health worker density are relevant in explaining a major share of variation in under five mortality in Tanzania.

Another possible form of bias is *selection bias*. Selection bias stems from an absence of comparability between groups being studied [105]. However, the selection of informants from underserved districts (Paper II) only was meant to gather context specific, in-depth information that reflect the diversity and similarities of views within underserved remote districts of Tanzania regarding the informants' experiences and opinions in relation to decentralised vs

centralised systems of recruitment of health workers and their implications for distribution and retention within and across districts.

Information biases might also undermine the validity of some findings presented in this thesis. Information bias is the distortion in the measure of association caused by inaccurate information that may result from the ways questions are designed and asked; and also by high levels of recall bias [108]. For paper III, there might be a potential for existence of *starting point bias* (a form of information bias) which may also lead to systematic error of the reported salary threshold for which nurses will be willing to accept remote jobs.

To correct for this potential bias, the study used the official starting salary for nursing officers in order to have a consistent starting points for all respondents. The salary threshold was raised up to a maximum of Tanzanian Shillings 650,500 per month. It was thought that this range was reasonable and realistic of Tanzanian macroeconomic context. For those who were not willing to work in remote health facilities even with the maximum pay, they were asked an open-ended question to state the minimum amount of salary they would need in order to accept working in remote health facilities. This type of open-ended question has, however, the potential of introducing another form of information bias called *hypothetical bias* [107]. Hypothetical bias which is common in many stated preference CV studies may be as a result of ‘*strategic responses*’ whereby the respondents might have overstated the amount of salary they will need to accept remote jobs with the expectation that they would influence future pay reforms.

To control for information biases in paper III, the literature has shown that the use of self-administered questionnaires compared to other forms of collecting information has a potential for lowering the chances of biased responses, and ensuring greater validity and accuracy of the information provided [109]. Given the fact that the respondents had high levels of literacy, as well as high level of familiarity with the issues contained in the questionnaire, it is reasonable to expect that the study does provide relevant baseline data that future research may utilise to generate more accurate, valid and unbiased estimates of health workers’ willingness to work in remote health facilities.

7.2: Discussion of the main findings

The main findings of this thesis have a number of theoretical and policy implications relevant for informing current practice in human resources planning and for future research on the recruitment and distribution of health workers in resource poor settings. In relation to the measurement of distributional inequalities of health workers (as discussed in Paper I) it is argued that in order to identify and analyse the possible major factors for the imbalanced distribution of health workers, the first starting point should be to meaningfully and appropriately analyse the nature and magnitude of the problem. This thesis has attempted to measure the magnitude of the distributional inequalities by using the conventional per capita norm (population levels) and by additional two indicators of health care needs namely, under

five mortality and HIV/AIDS prevalence. The proposed additional indicators are obviously partial but they serve to illustrate the need for identification of more meaningful and comprehensive indicators for measuring need and distributional inequalities of health care workers

In Paper 1, it has been argued that although population level is still a useful indicator of need, it is not sufficient in capturing meaningfully the inequalities in the distribution of health workers especially in settings where disease burdens are heterogeneous. Researchers have recently proclaimed the futility of using the health workers to population ratios and have emphasized that, 'head-counting' is not sufficient in describing the nature and magnitude of health worker distribution inequalities. Thus, it is important for the future direction of research in this area to go beyond counting heads and to begin to address, in a much more comprehensive manner, the complex inter-relationships between physician availability, utilization and health status [80, 94, 110]. It is strongly suggested that distribution of health workers relative to need should not be an end in itself; it should rather be a means towards better access to quality health services and better health outcomes for all rural and urban residents.

It has been shown that inequalities in distribution of health workers are huge by both using the health worker to population measures and by alternative measure of need for health care namely, under five mortality. In addition, when under-five mortality is used as an indicator of need, inequalities in the distribution of health workers are still perceptible and they become more pronounced than when measured by the use of conventional per capita norms. This is consistent with the suggestions made by Pong and Pitblado [110]. It is thus suggested in Paper I that in settings where disease burdens are not uniformly distributed, relying solely on population as a measure of health care needs may lead to missing out on much relevant information useful in accurately measuring the relevant health need and consequently a more sensitive distribution of health workers relative to need. In addition, the findings suggest that the implications for degrees of inequality may differ depending on the type of measure used in determining the need for health care services.

By using The HIV/AIDS prevalence data the distributional inequalities has shown a declining tendency. However, the data used for this analysis was only disaggregated up to the regional level and it was thus not possible to conduct a district level analysis (or below district analysis). For these two reasons, the HIV/AIDS prevalence as an alternative indicator of need do not provide us with a strong policy implications for measuring distributional inequalities of health workers. Like the under-five mortality, the HIV/AIDS prevalence is obviously an incomplete measure of health care needs.

Another crucial finding as presented in paper I is skill mix distribution. Differences in skill mix across geographical or administrative health areas may lead to differences in the quality of health workforce which may in turn affect the

quality of health care services. This suggests that, inequality in the access to quality health care services is likely to be even higher than suggested by the inequality in the distribution of the total health workforce. It is interestingly shown in Paper I that, even the least skilled health workers (medical attendants) do not constitute a higher share of the health workforce in the disadvantaged rural districts [45]. It has however been shown that some cadres, such as clinical officers, are more equally distributed across districts and thus skill mix in the disadvantaged districts is characterised by a high share of clinical officers (medium level skilled workers) and fewer highly skilled health workers such as physicians and medical specialists.

Paper II and III have attempted to bring forth the possible factors that may be associated with inadequate recruitment and the effectiveness of interventions for increasing the share of health workers in remote health facilities of Tanzania. In Paper II for example, the health system organisation structure and its implications for recruitment and distribution of health workers are analysed. Ideally, and as firmly held by proponents of health sector reforms, decentralisation of health services to the autonomous local government institutions is believed to have the potential for increasing efficiency and effectiveness in planning leading to context specific and relevant local priorities [34, 36-38, 74, 111-115]. Related to management of the recruitment of health workers at the decentralised levels of governments, decentralisation reforms are believed to be able to reduce delays in planning and executing plans through less overload and congestion in the channels of administration and communications and through simplified bureaucratic procedures and in this case, provision of public health services will ultimately be improved [38, 68, 73, 116]. Despite these glowing expectations that are thought to arise from the implementation of decentralisation reforms, evidence has shown that decentralisation reforms as it is related to management of health workers has the potential of heightening the competition for this scarce resources; and the remote poor districts are at the verge of losing out in this competition. In relation to this aspect, Gong *et al* have argued that despite the overall increase in the production of western medicine doctors, the phenomenon of imbalanced distribution of trained doctors has persisted throughout China and was exacerbated by decentralisation reforms as part of the major country's public sector economic and social service reforms [38].

It is thus proposed that in any attempt to analyse the impact of decentralisation and compare it with centralised form of health system organisation, a crucial aspect that needs to be taken into account is the amount of discretion on decision making that the centre remains with and the amount it is willing to relinquish to decentralised bodies [76, 117]. This has implications for both how services are organised and more importantly, how resources (including health personnel) are managed to ensure that the objectives of the health system are effectively realised [3, 36]. The persistent tendency of the decentralised local governments' to seemingly depend on the centre for such aspects as managing recruitment and distribution of human resources for health may be associated with the unavailability of independent and effective structures of governance. In addition, inadequate management capabilities at the local government levels

may offer a partial explanation of this dependency [36]. Mills has indicated that during the initiation of decentralisation reforms in Tanzania and Papua New Guinea the opposition from central level bureaucrats led to the creation of weak local institutions of governance. The bureaucrats were reluctant to unleash an adequate power and authority to the local governments in order to strengthen the role of the centre in controlling the affairs of decentralised local governments [73]. Bossert *et al* has also pointed out that the tendency by many central organs of many countries to relinquish a ‘narrow decision space’ to decentralised units may be counterproductive to the objectives of health sector decentralisation which needs to be implemented by nurturing and sustaining a broad-based community participation. The architects of the reforms have consistently emphasised the need for a strong and effective stakeholder partnership in the implementation of the reform objectives which can only happen when the central authorities hand over a ‘wider-decision space’ to the decentralised local government authorities [76].

Against the evidence and issues highlighted in the literature above, the findings in Paper II suggest that , decentralised arrangement provides an opportunity for local plans to reflect directly to populations’ health care needs in general and local governments health personnel requirements, in particular. In addition, decentralised recruitment has been perceived to be effective in recruiting lower cadre health workers from within the remote districts or from nearby districts. There were however experienced difficulties in recruiting highly skilled health workers to work in remotely located districts to the extent that the central government has decided to partly intervene to correct the problem [39]. The partly reinstated central recruitment of health workers was generally perceived to be effective in recruiting highly skilled health workers but not perceived so in retaining them. This perception of ‘goodness’ of the central recruitment procedures could be interpreted as health managers’ confession of despair after their failure to attract and retain health workers in their respective districts whereas the real problem is that these districts are not attractive enough to prospective job seekers.

The failure by unattractive decentralised districts to attract qualified health workers was also perceived to have the potential to intensify the existing pre-decentralisation imbalances in the distribution of health workers in Tanzania. Related to improving equitable distribution of health workers across geographical areas and by recognising the need for a policy intervention at the national level to deal with the imbalances in staff distribution, Wang *et al* have emphasised that initiatives from the centre may run parallel with decentralised management of health workers at local levels [37]. It is believed that in circumstances when decentralisation seems to have the potential to exacerbate inequalities in distribution of resources (including human resources) “a centralised allocation system can move resources from areas of relative surplus to relative shortage, and being concerned with the overall performance of the health system, the centre has the incentive to do so, while incentives for managers of decentralised units are to concentrate on the needs of their own patch—at times, at the expense of others”[37]. The partial re-centralisation in recruitment of health workers currently implemented in Tanzania is in line with this proposal.

With regard to the expectation that decentralised recruitment will improve effectiveness in recruitment of health workers through reduced overload in channels of administration and communication; and through lessening bureaucracy in the process, the findings indicate a perceived complex and unnecessary long bureaucratic process related to recruitment of workers which has at times led to delays in getting the required health workers or increased costs of managing the process [39]. The identified problems related to recruitment and distribution of health workers in paper II are partly associated with the fact that the policy was partially implemented due to inadequate preparations. This is in line with the fact that the reforms in many low income countries did not originate from within the health sector and was largely influenced by donor conditionalities [37, 117]. Pressures from donors and reluctance from central level bureaucrats might have led to creation of weak institutions of governance at local level which could easily be manipulated by politicians to marshal their personal interests.

Paper III has attempted to analyse how strongly financial interventions affect nurses' willingness to work in remote health facilities compared to alternative interventions and how nurses with different characteristics respond to these interventions in shaping their preferences of medical practice. The paper indicates that nurses' practice location preferences are responsive to both financial and non-financial interventions. The findings further show that the salary for Tanzanian nurses needs to be raised by about 260% in order to attract about 80% of all nurses in remote areas. This finding indicate that substantial top ups are needed for Tanzanian nurses in order to accept working in remote areas. Compared to Ethiopia, a study has shown that a 57% and 83% salary premium will be needed to attract respectively 80% of graduating nurses and 80% of doctors to rural areas of Ethiopia [11]. These results may mean either, that the Ethiopian remote alternative is a better one than the Tanzanian, or that Ethiopian nurses are more willing to live and work in remote areas than the Tanzanian nurses.

The findings in Paper III further show that provision of free housing is effective in attracting nurses to work in remote areas; it raises the share of nurses who prefers a rural job from 19% to 34%. However, the effect of offering better educational opportunities is much larger; the share then increases from 19% to 47%. In comparison to Ethiopia, the provision of educational incentives was shown to increase the likelihood that a doctor would accept a remote jobs from 7.5% to 10.9% [118].

These results (in paper III) are in line with Dussault and Franceschini who have argued that in places where recruitment of health workers is difficult such as remote places of many developing countries, targeted educational subsidies might be one of the tools for attracting health workers [14]. Educational support for specialised medical care might serves two purposes. Firstly, it might increase the retention of health workers if the emigration of those receiving scholarships is on average lower than the migration rates of those who do not receive the scholarships. Secondly, if

truly students with remote background are more willing to work in remote areas as suggested by the findings of paper III, then conditional scholarship might likely increase the output of health workers trained in specialised skills to work in remote areas if there is a sufficient pool of qualified candidates from remote areas.

Another important finding of this sub-study is that rural origin is not necessarily sufficient to reduce the reservation wage for accepting remote work places. It was shown in paper III that nurses need to be recruited from more remote places than the ones where policy makers might want them to work in order for such selection strategies to have any effect. This distinction has not been made in previous literature. This finding suggest that more interventions than those proposed in paper III are needed in order to attract as many people as possible (not just those from very remote areas) to work in remote health facilities.

Apart from the above observation, our general result that rural origin may increase the likelihood of choosing a remote location is in line with a number of studies in high, middle and low-income countries [11, 17, 26, 30, 40, 52, 119]. The implication of these findings is that policy makers should opt to select more students with a strong remote origin to join medical training institutions. However efforts should be in place to ensure that there is a sufficient pool of qualified candidates from remote areas who can join medical training institutions.

It has been further shown in Paper III that those who have higher intrinsic motivation, i.e., those who are motivated to work where she/he can help the poor and the needy and strongly believe that poor and the needy people are found in remote areas, have on average 30% lower reservation wage than others, indicating a substantially higher willingness to work in remote areas. This is in line with studies by Deci and Wilson as quoted by Semeels *et al*, who point at the crucial importance of intrinsic motivation and professional commitment for public service delivery [11, 120, 121]. Similar observations have recently been revealed by Dixit in ‘an interpretive review on incentives and organisations’ [122]. Moreover, our results conform well with findings from Ethiopia by Semeels *et al* where nursing students who classified “opportunity to help the poor” as the most important job characteristic was found to have a 14% lower reservation wage than others. In addition, Semeels *et al* have shown that women in particular, and to some extent those from NGO schools, have a higher intrinsic motivation than others [11]. However, the analysis done in this sub-study (Paper III) did not reveal such patterns in the data.

8.0: Conclusions

The data presented by the three sub-studies forming this thesis permit the following conclusions: Firstly, inequalities in the distribution of health workers in Tanzania are enormous. The rural and remote districts are acutely disadvantaged both in terms of having fewer health workers per capita (total) in general and fewer qualified health workers, in particular. Inequalities are perceptible both when the conventional per capita norm is used and when alternative indicator (under five mortality) are used. However, inequalities are more pronounced when under five mortality is used than when population levels is used as an indicator of health care needs, indicating that the nature of inequality in the distribution of the health workforce may strongly depend on the underlying measure of health care needs. Thus, in cases of a non-uniform distribution of health care needs across geographical areas other measures of health care needs than population levels may have to be developed in order to ensure a more sensible measurement of distributional inequalities of the health workforce.

Secondly, organisation of the health system has implications for recruitment and distribution of health workers to work in remotely located health facilities. Apparently, both decentralised and centralised recruitment procedures have their strengths and weaknesses. Study findings presented in this thesis (Paper II) suggest that, a combination of centralised and decentralised recruitment systems might provide a promising hybrid form of health sector organisation in managing human resources by bringing the benefits of two worlds together. In order to ensure that the potential benefits of the two approaches are effectively integrated, careful balancing defining the local-central relationships in the management of human resources needs to be worked out and sustained.

Finally, incentives for taking up rural jobs stand to be an important aspect of the health systems of many countries if they are to effectively increase the share of health workers in remote areas and ultimately alleviate the distributional inequalities. Specific educational interventions are more effective in attracting nurses to remote areas than provision of free housing. Very high salary top ups are needed to match the effect of educational interventions and provision of free housing. Recruitment of students with remote origin seems to be quite effective in reducing the need for incentives, but only if people are recruited from places that are more remote than the place where policy makers would want them to work. In order to offer sound policy recommendations, the next steps should be to estimate the costs and compare the cost effectiveness of both nonfinancial and financial incentives.

9.0: Recommendations

9.1: Recommendations for policy and human resources planning in the health sector

- In planning for recruitment and equitable distribution of health workers, policy makers need to consider including other indicators of health care needs (on top of population) because disease burdens are not homogeneous across populations and geographical units. Poverty levels and different demographic profiles might translate into variations of health care needs between groups.
- There is a need to work out a strategy which will strengthen synergies between decentralised and centralised recruitment systems for improved recruitment of health workers in remote areas and ultimately reduce imbalanced distribution.
- In the context of ongoing decentralisation reforms, which have been shown to have implications for recruitment and distribution of health workers, there is a need to reduce the cost of the recruitment process by giving greater autonomy to the decentralised districts, by endowing poorer districts with added financial resources and strengthen institutional capacity of all local governments.
- In the context of ongoing decentralisation reforms, there is a need for increasing financial autonomy to the districts in order to flexibly devise innovative interventions such as using locally mobilized resources to recruit short-term contract workers.
- Given availability of resources, wage premiums (salary increase) can be a policy option to partially increase the share of health workers in remote areas. It seems more realistic though to plan for the use of nonfinancial incentives, such as improved access to further education.
- In order to exploit the benefits of 'rural origin' as a factor in increasing workers to work in remote areas, there is a need to decentralise training and or initiate a targeted recruitment of students from rural areas.

9.2: Recommendations for future research

- There is a need to identify more indicators of need and 'weigh' them appropriately in order to be used together with population levels to provide a more comprehensive and more sensible indicators of measuring distributional imbalances of health workers in low income settings.
- More research is needed in order to understand how better off decentralised districts (better off in terms of having more health workers per capita) have fared in attracting and retaining health workers to work in their districts
- There is a need to collect cost data for conducting cost effectiveness analyses of the interventions (for example financial vs nonfinancial interventions) aimed at increasing the share of health workers needed to work in remotely located health facilities. With bundled interventions (combination of interventions), there is also a need to conduct field experiments with data collected from respondents' real choices.

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