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Are Non-Critical Medical Devices Potential Sources of
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COVER IMAGE

A female doctor with the International Medical Corps examines a woman patient at a mobile health clinic in Pakistan

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Benedict Harris
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From the Editor-in-Chief

During 2014-2015 the World Health Organization (WHO) will unveil a global strategy to address the issues of Universal Health Coverage (UHC) and People-Centered Integrated Health Services (PCIHS) (WHO 2014). This strategy will describe the models of care and contextual issues that need to be taken into account as health systems in developing countries seek to provide equitable and accessible care. The papers in this issue raise some very interesting points and challenges relevant to both UHC and PCIHS and other global health agendas.

The paper by Nigatu Haregu et al. explore the potential benefits that various policies, incentives, programs and initiatives can provide in managing both communicable (HIV/AIDs) and Non-Communicable Diseases (NCD). The NCD issue is a global agenda taken up by all governments from low, middle and high-income countries. At a time when high-income countries are seeking relief from the financial burden of NCDs as the major cost driver, low and middle income countries are also showing consistent growth in their healthcare costs associated with NCDs. While there is a growing global focus on NCDs and PCIHS, we can't take our eyes off the existing and emerging issues associated with infectious disease like Ebola, TB, HIV/AIDs and more.

The paper by Chigozie Jesse Uneken on non-critical medical devices as potential sources of infections in healthcare facilities points to some essential policy and practice gaps. If we are concerned with UHC, achieving progress on global health and attending to quality and desired health outcomes, we will also need to pay

attention to the factors that contribute to micro and macro systems failures. As the authors discuss, the lack of clear policies and practices throughout the cycle of care leads to "missing links" that can result in growing disease burden.

Finally, striking the balance in Human Recourse for Health (HRH) planning is an age-old discussion, with more documents, publications and tools than any of us can count. In spite of all of this, we continue to encounter interesting and yet, problematic issues.

The paper by Muhammad Ahmed Abdullah and colleagues on the workforce crisis in Pakistan highlights some of these issues. While the progress that Pakistan has made in growing its HRH is commendable, it is striking to see the inverse balance of HRH. WHO recommends that for every physician, four nurses should also be trained. In Pakistan, the reality is different, for every two physician there is one nurse. It is hard to imagine how UHC, PCIHS, NCD, PHC and many more global health agendas can be attained without clear national policies and investment in planning and building the required HRH capacity.

WHO is currently working on an HRH Strategy that will be submitted to the World Health Assembly (WHA) in 2016. In all likelihood, the strategy will consider and address some of these anomalies.

Dr. Judith Shamian RN, PhD,
President,
International Council of Nurses
shamianjudith@gmail.com
Twitter: @judithshamian

World Health Organization (WHO). 2014. *WHO Global Strategy on People-Centred and Integrated Health Services*. Retrieved November 18, 2014. <<http://www.who.int/servicedeliverysafety/areas/people-centred-care/en>>.



The Health Workforce Crisis in Pakistan: A Critical Review and the Way Forward



Muhammad Ahmed Abdullah, Shifa College of Medicine, Islamabad

Fatima Mukhtar, Health Services Academy, Islamabad

Salim Wazir, Ayub Medical College, Abbottabad

Irum Gilani, Health Services Academy, Islamabad

Zulfikar Gorar, Health Services Academy, Islamabad

Babar Tasneem Shaikh, Health Services Academy, Islamabad



Correspondence may be directed to:

Dr. Ahmed Abdullah,

Department of Community Health Sciences

Shifa College of Medicine, Pitrus Bokhari Road; H-8, Islamabad,

Tel.: +92-333-5494758; e-mail: drahmedabdullah83@gmail.com.



Abstract

Today, the developing world suffers due to the health “workforce crisis.” The World Health Report 2006 uses this term to study the current scenario in the developing countries. Human resource planning is a critical activity within the broader sectoral planning, especially when it comes to the health sector. Pakistan faces an acute shortage of different cadres of healthcare workers, which is bound to escalate further because of the high population growth rate, inequitable distribution and out-migration of the healthcare workforce. In the wake of ongoing reforms in the health sector of Pakistan, it is suggested that for the strengthening of health systems, there ought to be a serious thought process involved for developing a human resource plan for the health sector that responds to the needs of the population and the disease burden. A national strategy is imperative to retain, train and incentivize the health workforce.

Introduction

A robust workforce is a *sine qua non* for any organization to operate in a productive manner to achieve its goals. More than two-thirds of the expenditure of an organization is consumed by human resources, besides the huge amount of time and other resources spent in terms of management (Hernandez et al. 2006). Successful and productive organizations are synonymous with effectively and efficiently managed human resources. Human resources have always remained the most important asset of any system or organization. Out of man, money and material, man has always stood his ground as the strongest contender for making things happen. The objective of human resource planning is to ensure that the right number of personnel with the appropriate skills and competencies are available in the right place at the right time. Human resource planning is a critical activity within the broader sectoral planning activities. Health services rely heavily on personnel, whereby 60–75% of the health sector budget is spent on sustaining this particular resource (Green 2007).

Human resources for health (HRH) are identified as one of the core building blocks of a health system (WHO 2007). They include physicians, nurses, midwives, dentists, allied health professionals, community health workers, social health workers and other

healthcare providers, as well as health management and support personnel – those who may not deliver services directly but are essential to effective health system functioning, including health services managers, medical records and health information technicians, health economists, health supply chain managers, medical secretaries and others (WHO 2013).

The World Health Organization (WHO) estimates that there are around 59.2 million health providers working around the globe, and a shortage of almost 4.3 million physicians, midwives, nurses and support workers worldwide. The shortage is most severe in 57 of the poorest countries, especially in sub-Saharan Africa. The situation was declared on World Health Day 2006 as a “health workforce crisis” – the result of decades of underinvestment in health worker education, training, wages, working environment and management (WHO 2006). Shortages of skilled health workers are also reported in many specific care areas. For example, there is an estimated shortage of 1.18 million mental health professionals, including 55,000 psychiatrists, 628,000 nurses in mental health settings and 493,000 psychosocial care providers needed to treat mental disorders in 144 low- and middle-income countries (Scheffler et al. 2011).

The developing world suffers greatly at the hands of the health workforce crisis. The global distribution of the health workforce is

inequitable in very obvious terms, with a global health workforce per 1,000 population ratio of 9.3; the regional values vary from 24.8 in the Americas to 4.3 and 2.3 in Southeast Asia and Africa, respectively (WHO 2013). The current ratio (0.473) of physicians to 1,000 people is inadequate to maintain the nation's health in Pakistan. By 2020, physician workforce shortages for Pakistan might range between 57,900 and 451,102 physicians, depending on the future needs (Talati and Pappas 2006). The shortfall of health workers hits developing countries like Pakistan the most, and is envisaged to hinder Pakistan's achievement of the Millennium Development Goals (MDGs) by the year 2015. The WHO has defined a threshold level of health workforce required to deliver essential health interventions to achieve the MDGs by 2015, and Pakistan is one of the 57 countries found to be below that threshold level (WHO 2011).

This paper purports to look into the health workforce crisis in Pakistan. Review of literature was carried out to attain a better understanding of this problem with a general focus on developing countries and a special focus on Pakistan. Core recommendations were developed keeping in mind the case study of Pakistan in the light of the World Health Report 2006: Working Together for Health.

Methods

The main source of information used for this paper was gleaned from the Pakistan Medical and Dental Council's website, Economic Survey of Pakistan 2011–2012 and Population Association of Pakistan. A literature search was conducted through MEDLINE®, using the keywords “human resources for health, health workforce crisis, Pakistan and developing countries.” Moreover, using Google Scholar™, a few key publications were consulted. The bibliographies retrieved through PubMed and the reports were then searched for further references. Some articles, though non-specific to

Pakistan, were consulted to understand the context of the HRH in other parts of the region and in developing countries. The World Health Report 2006: Working Together for Health was utilized for studying key factors relating to HRH in Pakistan. The chapters of the document have been studied and discussed in detail one-by-one with the perspective of HRH in Pakistan as a case study.

Health Workforce Profile – Pakistan

At the Beginning

Pakistan has come a long way since her birth in 1947; in 1950, there were only 2,298 physicians, 418 nurses and no dentists. By 2005, approximately 74,000 physicians were practicing in Pakistan. Annually, local medical schools and international medical graduate certification courses provide 5,400 physicians (soon to reach 6,800). Each year 1,150 physicians emigrate and an estimated 570 physicians stop practicing for various reasons. There are 292 hospitals, 722 dispensaries and 91 maternal neonatal and child health program centres throughout the country (Population Association of Pakistan 2014). According to the Pakistan Medical and Dental Council, 142,017 physicians and 14,479 dentists have been registered as of June 2014 (Pakistan Medical and Dental Council 2014a). Over the years, Pakistan has struggled to counter this scarcity of resources, and with under-productivity, maldistribution, migration and social threats to health workers, human resources continues to be a pertinent issue for the public health scenario in Pakistan (Bhatt et al. 2010).

Important Historical Milestones in HRH Capacity Building

Pakistan has given much attention to increasing the number of doctors and medical schools over the past 65 years (Talati and Pappas 2006; Nishtar 2010). There were only

two medical colleges (King Edwards Medical College in Lahore and Dow Medical College in Karachi) at Pakistan’s inception. It was in 1962 that a formal postgraduate training institute was established by the name of the College of Physicians and Surgeons (Rathore 2013). The first medical college established after independence in Pakistan was Fatima Jinnah Medical College (Lahore 1948), the second was Nishtar Medical College (Multan 1951) and the third was Khyber Medical College (Peshawar 1954). During the 1970s, Punjab Medical College (Faisalabad 1973), Rawalpindi Medical College (Rawalpindi 1974) and Allama Iqbal Medical College (Lahore 1975) were established. Since then, many public-sector medical colleges have been established, reaching 38 by 2012 (Pakistan Medical and Dental Council 2014b). In the late 1990s, private medical colleges started functioning, and by 2012 approximately 50 of such institutes have been established.

The Current Scenario of the Health Workforce in Pakistan

Pakistan has 160,289 doctors, 12,544 dentists, 82,119 nurses, 29,000 midwives, 13,678 lady health visitors (LHVs), and 32,511 pharmacists, as reported by the Economic

Survey of Pakistan 2013–2014 (Ministry of Finance 2014). However, according to international standards, there should be two physicians per 1,000 population, one dentist per 1,000 population, four nurses to one doctor and one pharmacist to six doctors (WHO 2011), as shown in Table 1. Although Pakistan has shown an improvement in the number of health workers produced in the past years, it still lags behind international standards. The sex distribution of doctors shows that the majority are male, whereas in the case of nurses, a female dominance is seen in the provinces of Punjab and Sindh (PM&DC). With approximately 6,800 medical students graduating annually, the number of younger physicians is expected to rise in the coming years. Nevertheless, this age group has a greater chance of migrating to a developed country or from rural to urban areas. There is no central database that could provide statistical figures about the health workforce. Figures are available from professional regulatory bodies such as the Pakistan Medical and Dental Council, Pakistan Nursing Council etc. These figures cannot tell us who is where. More so, it is not possible to locate whether the personnel are in the country or outside – alive or dead.

Table 1. Human resource for health in Pakistan – standards and shortfall

Health Human Resource	Registered	International Standard	Required for a Population of 170 Million	Shortfall	Shortfall (%)
Doctors	160,289	2 per 1,000 population	340,000	179,711	52.85
Dentists	12,544	1 per 1,000 population	170,000	157,456	92.62
Nurses	82,119	4 per 1 doctor	1,360,000	1,304,835	95.94
Pharmacists	32,511	1 per 6 doctors	62,085	29,574	47.63
Lady health visitors	13,678	1 per 10,000 population	17,000	3,322	19.54
Registered midwives	29,000	1 per 5,000 population	34,000	5,000	14.70
Lady health workers	100,000	1 per 1,000 population	170,000	74,000	43.52

Sources: WHO Global Code of Practice on International Recruitment of Health Personnel Implementation Strategy Report 2011 – Pakistan; Pakistan Nursing Council, Islamabad; Economic Survey of Pakistan 2013-2014.

Table 1 depicts data profiles of health workers who are registered compared to the requirements as per international standards. Cadres who make up the majority of the health workforce are critically small in number, except LHVs. It is a proven fact that better health-related indicators are correlated with the number and density of such health workers in a country (El Jardali et al. 2007). The report (the source of data) falls short of mentioning how many of them are actually working. The figures show that Pakistan is doing fairly well as far as doctors are concerned, but in terms of other cadres, like dentists, the shortage is 92.62%, and nurses are short by 95.94%.

In a large survey assessment conducted in 2009, it was observed that the median number of doctors per 1,000 population working in the public sector is 0.27 and the median number of nurses is 0.24. This survey also depicted the inter-provincial variation in the availability of doctors and nurses in the health system (Hafeez et al. 2010), as shown in Table 2.

Responding to Urgent Health Needs

With regard to the MDGs, there are certain indicators in which progress has been made; in some, the situation is static, whereas others have shown a downward trend. This all has to be viewed amidst the economic and political challenges the country has faced in the past years. The natural and manmade disasters have also affected the HRH directly and indirectly, and hence the attainment of the MDGs (Ministry of Planning, Development and Reform 2013). However, Pakistan has

taken the following steps to achieve the MDGs with respect to the health workforce:

1. The National Program for Family Planning and Primary Healthcare has trained more than 100,000 LHVs, and their coverage has increased to 83% to meet one of the MDG targets by 2015. There is a proposal to train male community health workers to access difficult areas for the health-care provision.
2. The national maternal neonatal and child health program is in place, which aims to train 10,000 community midwives.
3. The Basic Development Needs Program, which involves the communities, has been adopted and needs to be implemented in other areas.
4. The National Disaster Management Authority, Islamabad, has conducted training programs under the Program for Enhancing Emergency Response. Three urban search and rescue teams are being developed in Lahore, Karachi and Islamabad, and these are coordinating with the education department to include disaster management in the curricula of various educational institutions.

Preparing the Health Workforce

There are 88 medical and dental colleges, 26 public health schools for the training of LHVs, 109 nursing schools, seven nursing colleges, 28 pharmacy institutes and 141 midwifery schools in the country. There are

Table 2. HR variations across the provinces

Provinces	Doctors/1,000 Population	Nurses/1,000 Population
Sindh	0.58	0.21
Punjab	0.13	0.19
Khyber Pakhtunkhwa	0.33	0.39
Balochistan	0.17	0.23
Islamabad – capital	0.28	0.23

22 universities in the country that offer medical and dental degrees (Pakistan Medical and Dental Council 2014b). The distribution of medical colleges in the country is highly skewed, with 12 of the 30 public medical colleges in the province of Punjab and only one in Baluchistan, whereas AJ&K has recently started one private and three public medical colleges. The College of Physicians and Surgeons, Pakistan, provides Fellow of College of Physicians and Surgeons training in 64 specialties and sub-specialties, Member of College of Physicians and Surgeons training in 18 specialties and Diploma of College of Physicians and Surgeons training in two specialties. The PNC governs the rules and regulations of promoting the nursing profession and has a nursing examination board in each province (Pakistan Nursing Council 2014).

A recent study showed that the performance of LHVs in regards to knowledge of MNCH was good, with 30% of them achieving a more than 70% grade. The medical officers, in comparison, performed poorly with regards to their knowledge of maternal neonatal and child, with only 6% scoring more than 70%. All three cadres of healthcare providers performed poorly in the resuscitation skill, and only 50% were able to demonstrate steps of immediate newborn care. Only 50% of LHVs could secure a good position on the competency scale in this critical component of skills (Arif et al. 2010). Medical education and training is rapidly evolving in Pakistan, bringing radical innovations. There is a shift from the traditional didactic approach to a more student-centred interactive approach. The curriculum is also being adapted to competency-based and integrated curriculum. Faculty development activities are being undertaken in medical institutes of the country through their medical education departments. However, these initiatives are faced with challenges of a dearth of trained facilitators, lack of incentives and lack of faculty interest.

Making the Most of Existing Health Workers

The three important issues that need to be addressed to ensure good performance of the health workforce are their appropriate recruitment, preventing their attrition and providing the right incentives to them. The performance of the health workforce is assessed in terms of their availability, productivity, responsiveness and competence. Therefore, the motivation can be achieved through financial benefits, continuous professional development, regular feedback and other incentives (Willis-Shattuck 2008).

One study conducted to assess the level of job satisfaction of the public health professionals reported that regular government employees were less satisfied with regards to salary, motivation/recognition and professional facilitation as compared to the contractual employees. Health workers from Punjab (both public and private) reflect the highest job satisfaction scores as compared to other provinces and the capital Islamabad. The performance of health workers in Pakistan seems to be directly affected by the poor working conditions, the unavailability of resources, poor supervision, fewer educational opportunities and less personal safety especially for the female workforce. In addition, corruption in worker recruitment, deployment and promotion further deteriorates the situation (Kumar et al. 2013). Such demotivating factors lead to a weak health system and service delivery, hence impinging on the health of the people.

Managing Exits from the Workforce

The major reasons health workers leave the health sector include overseas migration, change of occupation or work status and, of course, retirement. This creates a shortfall of workers that, if not appropriately and timely replaced, can lead to dire consequences for the health sector (WHO 2006). In Pakistan, the migration of the health workers to developed countries is one big reason for the

health workforce attrition. Migration of the health workforce is primarily in the search for a better life and livelihood. According to another government source, about 1,000–1,500 physicians leave the country annually, of which 10%–15% return, so the annual net migration is 900–1,275 physicians (Bureau of Emigration & Overseas Employment).

Estimates show that around 1,700 Pakistani physicians are lost from the practicing physician pool each year; 1,150 per annum immigrate to more developed countries. Around 12,813 are working in Western countries and another 25,000 in Arabic-speaking countries (Pakistan Medical and Dental Council 2014a). To retain these workers, employment opportunities need to be provided to them through filling the already sanctioned posts and creating new ones based on population health needs.

To decrease the negative effect of this migration, at least, the source country can train the health workforce according to the demands of their place of employment and encourage their return back home. Competitive salaries, fringe benefits, housing facility and career development opportunities help in the repatriation of the health workforce.

Formulating National Health Workforce Strategies

There are no *prêt-à-porter* health workforce strategies, and therefore every country needs to develop its own strategy through consensus and participation of all stakeholders, notwithstanding principles of universal health-care and social protection to all the individuals of a country. A good HR strategy will help build trust within the communities and sustain it through good governance, regulation, leadership and strategic intelligence (WHO 2006). National health policies in Pakistan have reflected human resource planning in the past but rarely have they translated into practice. Recently, there have been incentive packages for doctors to encourage

them to work in rural areas. Such packages usually benefit doctors and ignore other cadres. But enhancing remunerations only and ignoring all other issues related to human resource development, management and planning reflects poorly on the leadership of health departments. For the strengthening of health systems, there ought to be a serious thought process involved for HR planning, management, deployment and development, particularly for improving the health status of the vulnerable segments of the population (Mazhar and Shaikh 2012). Two provinces of Pakistan, namely, Punjab and Sindh, are in the process of making their own HRH strategies, which expectedly will lay out a concrete human resource development plan according to the needs of the public sector and the private market. A wider consultation in this regard, however, will yield more realistic and feasible plans.

Working Together Within and Across Countries

The lack of information available on the health workforce is a hindrance to addressing challenges related to them. Standards ought to be set regarding the workforce assessment. A universally agreed-upon definition of the health workforce is required and indicators need to be developed for their performance assessment. The indicators may pertain to sufficient numbers, equitable distribution, good competencies, appropriate socio-cultural and linguistic background, responsiveness to clients and productivity.

Pakistan has adopted the WHO Global Code of Practice on recruitment of HR, which will help the country in addressing its problems related to the international migration of its health workforce (WHO 2011).

Way Forward and Conclusion

HRH has been a neglected component of health planning in Pakistan. There is a need to develop a reliable information system to collect data on the health workforce for

strategic planning and decision-making. Such an approach may resolve the issues of inequitable distribution and deployment across the provinces. Moreover, this system can establish a database of training and refresher courses for various cadres, so as to provide an equal opportunity to everyone and to signal towards the need for further training vis-à-vis disease burden. Besides, a review of monetary benefits, improved working conditions and career development opportunities would have the scope of retaining health personnel in their jobs. Finally, a result-based management culture could bring about a change in the status quo, and would ensure greater accountability. Only a motivated health workforce can guarantee the improvement of the health of the population.

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Are Non-Critical Medical Devices Potential Sources of Infections in Healthcare Facilities?



Chigozie Jesse Uneke, Department of Medical Microbiology/Parasitology,
Faculty of Clinical Medicine, Ebonyi State University, Abakaliki, Nigeria



Correspondence may be directed to:

Dr. C.J. Uneke,
Department of Medical Microbiology/Parasitology,
Faculty of Clinical Medicine, Ebonyi State University,
PMB 053 Abakaliki, Nigeria
Tel.: 234-08038928597;
e-mail: unekecj@yahoo.com.



Abstract

This paper reviewed studies that investigated the contamination of non-critical medical devices (NCMDs) and their potential as routes for nosocomial infection transmission. Using MEDLINE Entrez PubMed, relevant publications were identified using “nosocomial infections” in combination with each of the following: stethoscopes, ultrasound transducers, tourniquets, pens, scissors, white coats, thermometers, blood pressure cuffs, dermatoscopes and otoscopes. Of 258 studies identified, 51 fulfilled the study inclusion criteria and had sufficient information on microbiological assessment of the NCMDs. All the studies reported microbial contamination of NCMDs, with *Staphylococcus* species as the predominant contaminant. The studies reported that health workers rarely disinfect NCMDs between uses with different patients. Most studies recorded NCMD contamination rates ranging from 25% to 100%. Percentage contamination of NCMDs by methicillin-resistant *Staphylococcus aureus* ranged from 2.3% to 32%. To reduce the possibility of a nosocomial infection transmission through contaminated NCMDs, disinfection of NCMDs before using them on each patient must be strictly adhered to.

Introduction

Nosocomial infection or hospital-acquired infection is a major public health safety concern for patients and healthcare professionals in both developed and developing countries worldwide (Bagheri Nejad et al. 2011; WHO 2002). Nosocomial infections are defined as infections that patients acquire during the course of receiving treatment for other conditions within a healthcare setting that were not manifest or incubating at the time of admission (CDC 2012).

In recent years, nosocomial infections have reached epidemic proportions and are one of the main concerns in the healthcare arena. Consequently, global awareness has been created about the impact of nosocomial infections, and efforts are being made in various parts of the world towards reducing nosocomial infections by using a multifaceted approach focusing on high-level leadership and commitment, safe practices, clean environments and well-designed processes and systems (WHO 2005). Among the safe practice strategies is the surveillance of device-associated nosocomial infection (DA-NI), which plays a substantial role in hospital infection control and quality assurance (Edwards et al. 2009).

Unfortunately, the primary attention to DA-NI prevention is usually paid to high-risk invasive diagnostic and therapeutic healthcare tools, while the importance of non-critical healthcare tools tends to be underestimated (Uneke and Ijeoma 2011). Non-critical medical devices (NCMDs) are those that come in contact with intact skin but not mucous membranes; they are intended to make topical contact and not penetrate intact skin (CDC 2008). These NCMDs may include but are not limited to stethoscopes, ultrasound transducers, hand gloves, tourniquets, physicians' and nurses' pens, scissors, white coats, thermometers and blood pressure cuffs. Although NCMDs are among the most commonly used

devices in healthcare settings, they appear to present a low risk of disease transmission when reused after reprocessed by proper disinfection. However, they are rarely disinfected between patient use by health workers, and there are numerous reports of their contamination by microbial agents (Schabrun et al. 2006; Treacle et al. 2009; Uneke et al. 2008; Uneke and Ijeoma 2010; Wolfe et al. 2009). In most healthcare facilities, sanitation of the NCMDs is neither addressed nor practiced, and the guidelines do not address issues with respect to disinfection of NCMDs between patient use (Obasi et al. 2009).

It is therefore imperative to examine the possibility of contaminated NCMDs serving as potential routes or vehicles of nosocomial infections and what implications this could have on patient safety in healthcare facilities. This is very important because the development of rational control methods for nosocomial infections may require the microbial evaluation of frequently used NCMDs due to their potential of serving as reservoirs of pathogens that can colonize patients and other persons in the hospital environment.

The objective of this paper is to systematically review scientific information and findings from studies that investigated the microbiological contamination of NCMDs. This is done with the view to highlight the importance of contaminated NCMDs as a potential route for nosocomial infection, the patient safety implications, public health policy and operational research prospects.

Methods

A MEDLINE Entrez–PubMed search was initially performed in October 2013 and performed again in May 2014 using the “Advanced” search option in PubMed, and studies reported in English that investigated the contamination of NCMDs were identified. The following are the search strategies used and the publications yielded:

stethoscopes AND nosocomial infection = 72 publications; tourniquet AND nosocomial infection = 27 publications; ultrasound transducer AND nosocomial infection = 11 publications; blood pressure cuffs AND nosocomial infection = 13 publications; thermometer AND nosocomial infection = 59 publications; white coats AND nosocomial infection = 28 publications; scissors AND nosocomial infection = 6 publications; dermatoscope AND nosocomial infection = 2 publications; otoscopes AND nosocomial infection = 2 publication; pens AND nosocomial infection = 38 publications. Using these search strategies, 258 studies were identified and considered for the review. The studies were further reviewed to exclude studies that did not fulfill the major inclusion criteria: (1) studies conducted in hospital environment; (2) studies involving health personnel who come into direct contact with patients; and (3) studies that conducted microbiological laboratory assessment of the NCMDs investigated. Consequently, 207 studies were excluded. The remaining 51 studies fulfilled the study inclusion criteria and were used.

The various reports were systematically reviewed with respect to the location, target users of the NCMDs, prevalence of microbial contamination of the NCMDs, prominent bacterial contaminant and the percentage of NCMDs contaminated by methicillin-resistant *Staphylococcus aureus* (MRSA). Bibliographies of all papers obtained were checked for additional relevant information, which was included in the review.

Results

The 38 selected studies provided scientific information that enabled meaningful and reasonable comparisons. The NCMDs investigated were obtained from health professionals directly in contact with patients. All of the studies reported that the health workers rarely disinfect the NCMDs between uses with different patients. High levels of bacterial contamination of NCMDs were recorded in most of the studies, with *Staphylococcus* species as the most prominent contaminant. A summary of the profile of the studies reviewed is provided in Table 1.

Table 1. Summary of the profile of the studies on assessment of bacterial contamination of non-critical medical devices in healthcare facilities

Type of NCMD	Number of studies included	Total number of NCMDs screened in all studies	Proportion (%) positive/contaminated NCMDs	Most prominent bacterial contaminant	Range of proportion (%) contaminated by MRSA
Stethoscopes	17	1,698	1,242 (73.1)	<i>Staphylococcus</i>	0–32
Tourniquets	7	550	196 (35.6)	<i>Staphylococcus</i>	0–25
Ultrasound transducers/probes	4	858	214 (24.9)	<i>Staphylococcus</i>	0
Blood pressure cuffs	4	405	284 (70.1)	<i>Staphylococcus</i>	2–8
Thermometers	2	238	113 (47.5)	<i>Staphylococcus</i>	0
White coats	8	777	316 (40.7)	<i>Staphylococcus</i>	3.5–18
Scissors	2	235	185 (78.7)	<i>Staphylococcus</i>	0
Dermatoscopes	1	112	73 (65.2)	<i>Staphylococcus</i>	0
Otoscopes	2	95	60 (63.2)	<i>Staphylococcus</i>	0–9.5
Pens	4	222	173 (77.9)	<i>Staphylococcus</i>	0–7.3

Majority of the studies (17 publications) provided information on the potential of stethoscopes to transmit nosocomial infections (Bukharie et al. 2004; Cohen et al. 1997; Datta et al. 2013; Gopinath et al. 2011; Lecat et al. 2009; Madar et al. 2005; Marinella et al. 1997; Merlin et al. 2009; Pandey et al. 2010; Russell et al. 2012; Sood et al. 2000; Tang et al. 2011; Uneke et al. 2008, 2010; Whittington et al. 2009; Youngster et al. 2008; Zuliani et al.

2002) (Table 2). Of these, seven studies were conducted in developed countries and 10 were done in developing countries. The number of stethoscopes screened in the various studies ranged from 40 to 300, and the prevalence of bacterial contamination ranged from 10.9% to 100% (Table 2). As high as 20%, 21% and 32% MRSA contamination was recorded in studies conducted in Slovakia, India and the USA, respectively (Table 2).

Table 2. Outcome of studies that investigated the microbial contamination of stethoscopes used by health professionals

Authors/ year of publication	Country	Target users	Number of stethoscopes screened	Number (%) contaminated with bacteria on diaphragm	Most prominent bacterial contaminant	Percentage contaminated by MRSA
Cohen et al. (1997)	Israel	Physicians	55	55 (100)	<i>Staphylococcus</i>	7.3
Marinella et al. (1997)	USA	Physicians, nurses, medical students	40	40 (100)	Coagulase-negative staphylococci	0
Sood et al. (2000)	India	Health workers	106	64 (60)	<i>Staphylococcus</i>	21
Zuliani Maluf et al. (2002)	Brazil	Medical staff and students	300	261 (87)	<i>Staphylococcus</i>	NA
Bukharie et al. (2004)	Saudi Arabia	Health workers	100	30 (30)	Gram-positive bacilli	0
Madar et al. (2005)	Slovakia	Physicians, medical students	110	101 (91.8)	<i>Staphylococcus</i>	20
Youngster et al. (2008)	Israel	Physicians, medical students	43	39 (86)	<i>Staphylococcus</i>	2.3
Uneke et al. (2008)	Nigeria	Medical students	201	161 (80.1)	<i>Staphylococcus</i>	NA
Whittington et al. (2009)[21]	UK	Health workers	46	5 (10.9)	<i>Staphylococcus</i>	0
Lecat et al. (2009)	USA	Health workers	99	99 (100)	<i>Staphylococcus</i>	NA
Merlin et al. (2009)	USA	Health workers	50	16 (32)	MRSA	32
Pandey et al. (2010)	India	Health workers	80	44 (55)	<i>Staphylococcus</i>	7.3
Uneke et al. (2010)	Nigeria	Health workers	107	84 (79)	<i>Staphylococcus</i>	NA
Tang et al. (2011)	Canada	Physicians, nurses	100	70 (70)	Coagulase-negative staphylococci	0
Gopinath et al. (2011)	India	Health workers	40	11 (27.5)	Enterococci	NA
Russell et al. (2012)	USA	Health workers	141	141 (100)	<i>Staphylococcus</i>	0
Datta et al. (2013)	India	Health workers	80	21 (26.3)	<i>Staphylococcus</i>	50

NA = not assessed/not reported.

All seven studies that described the microbial contamination of tourniquets were conducted in developed countries (Ahmed et al. 2009; Brennan et al. 2009; Elhassan et al. 2012; Leitch et al. 2006; Pinto et al. 2011; Rourke et al. 2001; Thompson et al. 2011). The number of tourniquets screened ranged from 20 to 200, and prevalence of bacterial contamination ranged from 5% to 100% (Table 3). A 25% MRSA contamination was recorded in one of the studies (Leitch et al. 2006).

The four studies that investigated ultrasound transducers/probes as potential tools for nosocomial infection transmission were all conducted in developed countries (Kac et al. 2007, 2010; Patterson et al. 1996; Schabrun et al. 2006). The number of (or times) ultrasound transducers/probes screened ranged from 44 to 440, and prevalence of bacterial contamination ranged from 3.4% to 92% (Table 4). No MRSA contamination was recorded.

Table 3. Outcome of studies that investigated the microbial contamination of tourniquets used by health professionals

Authors/year of publication	Country	Target users	Number of tourniquets screened	Number (%) contaminated with bacteria	Most prominent bacterial contaminant	Percentage contaminated by MRSA
Rourke et al. (2001)	UK	Health workers	200	10 (5)	<i>Staphylococcus</i>	0
Leitch et al. (2006)	UK	Health workers	131	32 (25)	MRSA	25
Ahmed et al. (2009)	UK	Health workers	20	20 (100)	Coagulase-negative staphylococci	10
Brennan et al. (2009)	Ireland	Health workers	15	15 (100)	<i>Staphylococcus</i>	NA
Thompson et al. (2011)	UK	Health workers	34	23 (67.6)	Coagulase-negative staphylococci	NA
Pinto et al. (2011)	Australia	Health workers	100	78 (78)	MROs	14
Elhassan and Dixon (2012)	UK	Junior doctors, nursing staff	50	18 (36)	<i>Staphylococcus</i>	12

NA = not assessed/not reported.

Table 4. Outcome of studies that investigated the microbial contamination of ultrasound transducers/probes used by health professionals

Authors/year of publication	Country	Target users	Number of (or times) transducers/probes screened	Number (%) contaminated with bacteria	Most prominent bacterial contaminant	Percentage contaminated by MRSA
Patterson et al. (1996)	USA	Health workers	191	175 (92)	<i>Staphylococcus</i>	NA
Schabrun et al. (2006)	Australia	Health workers	44	12 (27.2)	<i>Staphylococcus</i>	0
Kac et al. (2007)	France	Health workers	183	12 (6.6)	<i>Staphylococcus</i>	NA
Kac et al. (2010)	France	Health workers	440	15 (3.4)	<i>Staphylococcus</i>	NA

NA = not assessed/not reported.

Table 5 shows the outcome of studies that investigated the potential of nosocomial infection transmission by blood pressure cuffs (de Gialluly et al. 2006; Uneke and Ijeoma 2010; Walker et al. 2006) and thermometers (Smith et al. 1981; Uneke and Ijeoma 2011). The number of blood pressure cuffs screened ranged from 24 to 203, and prevalence of

bacterial contamination ranged from 45% to 100% (Table 4). Up to 8% MRSA contamination was recorded in one of the studies. In the study that was conducted in Nigeria (Uneke and Ijeoma 2011), 62% of the 58 thermometers screened had bacterial contamination (Table 5). MRSA contamination of the thermometers was not assessed.

Table 5. Outcome of studies that investigated the microbial contamination of blood pressure cuffs, thermometers and white coats used by health professionals

Authors/ year of publication	Country	Target users	Number of (or times) transducers/ probes screened	Number (%) contaminated with bacteria	Most promi- nent bacterial contaminant	Percentage contaminated by MRSA
Blood pressure cuffs						
de Gialluly et al. (2006)	France	Health workers	203	95 (45)	<i>Staphylococcus</i>	4.3
Walker et al. (2006)	UK	Health workers	24	24 (100)	<i>Staphylococcus</i>	8
Uneke and Ijeoma (2011)	Nigeria	Health workers	28	23 (82.1)	<i>Staphylococcus</i>	NA
Grewal et al. (2013)	Australia	Health workers	150	142 (94.7)	<i>Staphylococcus</i>	2
Thermometers						
Smith et al. (1981)	USA	Health workers	180	77 (43)	<i>Staphylococcus</i>	NA
Uneke and Ijeoma (2011)	Nigeria	Health workers	58	36 (62.1)	<i>Staphylococcus</i>	NA
White coats						
Wong et al. (1999)	UK	Physicians	100	25 (25)	<i>Staphylococcus</i>	NA
Treacle et al. (2009)	USA	Health workers	149	34 (23)	<i>Staphylococcus</i>	18
Priya et al. (2009)	India	Interns, graduate students, faculty members	51	39 (76.5)	Gram-positive cocci	NA
Pandey et al. (2010)	India	Physicians	130	37 (28.5)	<i>Staphylococcus</i>	7.3 (total isolates)
Uneke and Ijeoma (2010)	Nigeria	Physicians	103	94 (91.3)	<i>Staphylococcus</i>	NA
Banu et al. (2012)	India	Medical students	100	37 (28.9)	<i>Staphylococcus</i>	NA
Malini et al. (2012)	India	Medical students	30	30 (100)	<i>Staphylococcus</i>	NA
Singh et al. (2013)	Canada	Staff and students of veterinary teaching hospital	114	20 (17.5)	MRSA	3.5

NA = not assessed/not reported.

The potential of white coats to transmit nosocomial infection was investigated by seven of the identified studies (Banu et al. 2012; Pandey et al. 2010; Priya et al. 2009; Treacle et al. 2009; Uneke and Ijeoma 2010; Wong et al. 1991). The number of white coats screened ranged from 51 to 149, and prevalence of bacterial contamination ranged from 23% to 91.3% (Table 5). Up to 18% MRSA contamination was recorded in one of the studies.

The outcome of the studies that investigated the potential of nosocomial infection transmission by scissors, dermatoscopes and otoscopes is presented in Table 6 (Cohen et al. 1997; Embil et al. 2002; Hausermann et al. 2006; Korkmaz et al. 2013). Of the 42 otoscopes screened from physicians in Israel, 90.4% had bacterial contamination, of which 9.5% were MRSA (Cohen et al. 1997).

Table 6. Outcome of studies that investigated the microbial contamination of scissors, dermatoscopes, otoscopes and pens used by health professionals

Authors/ year of publication	Country	Target users	Number of devices screened	Number (%) contaminated with bacteria	Most promi- nent bacterial contaminant	Percentage contaminated by MRSA
Scissors						
Embil et al. (2002)	Canada	Health workers	232	182 (78.4)	<i>Staphylococcus</i>	NA
Nwankwo 2012	Nigeria	Health workers	3	3 (100)	<i>Coagulase-negative staphylococci</i>	NA
Dermatoscope						
Hausermann et al. (2006)	Switzerland	Health workers	112	73 (65.2)	<i>Staphylococcus</i>	NA
Otoscope						
Cohen et al. (1997)	Israel	Physicians	42	38 (90.4)	<i>Staphylococcus</i>	9.5
Korkmaz et al. (2013)	Turkey	Otolaryngologists	53	22 (41.5)	<i>Staphylococcus</i>	NA
Pens						
Bhat et al. (2009)	India	Physicians, nurses	75	26 (34.6)	<i>Staphylococcus epidermidis</i>	2.7
Sim et al. (2009)	UK	Physicians	64	64 (100)	<i>Staphylococcus</i>	NA
Wolfe et al. (2009)	USA	Respiratory therapists	20	17 (85)	<i>Coagulase-negative staphylococci</i>	0
Pandey et al. (2010)	India	Physicians	100	66 (66)	<i>Staphylococcus</i>	7.3 (total isolates)

NA = not assessed/not reported.

Four studies investigated the microbial contamination of physicians' pens (Bhat et al. 2009; Pandey et al. 2010; Sim et al. 2009; Wolfe et al. 2009) (Table 5). In one of the studies, there was a 100% contamination of the physicians' pens (Sim et al. 2009), while in another study, of the 34.6% of the pens contaminated, 2.7% had MRSA (Pandey et al. 2010).

Discussion

The high rate of microbial contamination of the so-called NCMDs demonstrated by the studies reviewed suggests that these devices might be a potential route for the transmission of nosocomial infections in health facilities. This is a serious public health issue especially in healthcare facilities in middle- and

low-income settings where effective infection control systems and standard infection control operational policies are either lacking or non-functional. The WHO Nosocomial Infection Fact Sheet (http://www.who.int/gpsc/country_work/gpsc_ccisc_fact_sheet_en.pdf) reported that most countries lack surveillance systems for healthcare-associated infections and those that do have systems often struggle with the complexity and lack of standardized criteria for diagnosing and preventing the infections. This is a common scenario in most health facilities in developing countries, and as standard infection control systems are not in place, it would not be surprising if little or no attention is given to DA-NIs.

The NCMDs reviewed in this paper are undoubtedly among the most frequently used healthcare devices by health workers when attending to patients. Because they are not usually used for invasive procedures, little attention is paid to their disinfection between patient care by health workers, as indicated by the studies reviewed. For instance, in some of the studies that investigated microbial contamination of stethoscopes, a considerable number of physicians admitted they never disinfected their stethoscopes for several months (Pandey et al. 2010; Uneke et al. 2010; Zuliani Maluf et al. 2002). There is sufficient evidence that showed that the lack of adherence to simple nosocomial infection control guidelines, including hand hygiene and disinfection of medical devices used between patient care, might enhance nosocomial infection transmission (WHO 2002). The high rate of non-compliance with hand hygiene, for instance, which is a well-established phenomenon among health workers in most healthcare facilities, may also be contributing to the DA-NI burden (Pittet 2001). This is because pathogen-contaminated hands of a health worker not only directly transmit these infectious agents to patients, but the pathogens on contaminated hands also could

colonize medical devices used on patients and

could further jeopardize patient safety. The ability of the pathogens to attach and establish themselves on the components or parts of NCMDs that come into contact with patients' skin was demonstrated in some of the studies reviewed, e.g., diaphragm of stethoscopes (Cohen et al. 1997; Zuliani Maluf et al. 2002) and fabrics of blood pressure cuffs (de Gialluly et al. 2006; Walker et al. 2006). During the diagnosis of infected skin, it is possible for pathogens to be transferred to another patient during diagnosis using the same NCMDs without prior sterilization or disinfection (Obasi et al. 2009). The skin surface contacted by the NCMDs, e.g., stethoscope diaphragm, may be broken or open due to a variety of causes, including surgical incision, weeping dermatitis, infected lesion, rash, abrasion, laceration, puncture wound, needle sticks, open and infected wounds and various tubes, drains, ostomies, topical irritation, micro-cuts and skin breakdown (Patent Storm 2004).

It is of public health concern that some of the studies reviewed in this paper indicated high percentages of MRSA contamination of the NCMDs, including stethoscopes (32%) (Merlin et al 2009), tourniquets (25%) (Leitch et al 2006), blood pressure cuffs (8%) (Walker et al. 2006), white coats (18%) (Treakle et al. 2009) and otoscopes (9.5%) (Cohen et al. 1997). There is therefore the potential of transmitting such MRSA from one patient to another from these contaminated NCMDs, especially in the intensive care unit (van den Berg et al. 2000; Whittington et al. 2009). These MRSA and other antibiotic-resistant organisms are capable of initiating severe infectious epidemics in a hospital environment, and the infected patients could require contact isolation and aggressive treatment to prevent the spread of the organisms (Gupta et al. 2004; van den Berg et al. 2000). Although DA-NIs do not usually receive public attention except when there are epidemics, it is clearly unethical to wait until this has occurred before taking appropriate measures to promote patient safety. According to the WHO

Nosocomial Infection Fact Sheet (http://www.who.int/gpsc/country_work/gpsc_ccisc_fact_sheet_en.pdf), healthcare-associated infections usually receive public attention only when there are epidemics; although often hidden from public attention, the very real endemic, ongoing problem is one that no institution or country can claim to have solved, despite many efforts.

Many basic nosocomial infection prevention and control measures, such as appropriate hand hygiene, correct application of basic precautions during invasive and non-invasive procedures and sanitizing of medical devices between uses with patients, are simple and low-cost, but require staff accountability and behavioural change (WHO 2002). Most of the studies reviewed in this paper demonstrated that simply cleaning the NCMDs with disinfectants before using them with each patient considerably reduces or eliminates microbial contaminants on the devices.

Lecat et al. (2009) showed that cleaning the diaphragm of stethoscopes with an ethanol-based cleanser and isopropyl alcohol pads significantly reduced the colony-forming unit counts by 92.8% and 92.5%, respectively. In the UK, Ahmed and colleagues noted from their study on cleaning tourniquets with detergent and disinfectant wipes that there was a 99.2% reduction in contamination of the tourniquets five minutes after cleaning (Ahmed et al. 2009). Therefore, the development of rational control methods for nosocomial infections requires the consideration of frequently used medical devices such as the NCMDs. This is because the NCMDs have the potential of serving as vectors or reservoirs of pathogens that can colonize patients and other persons in the hospital environment. The need for a change in the attitudes of health workers towards sanitation of NCMDs between uses with different patients cannot be overstated because of the patient safety implications. According to Burke (2003), identification of the risk factors of nosocomial

infections permits elucidation of those that are alterable from those that are not and facilitates the development of targeted interventions to reduce the risk of infection. The findings of this review therefore make a case for the classification of contaminated NCMDs as potential transmitters of nosocomial infection, and any infection control policy must take their continuous disinfection into account.

According to the WHO (2008), every patient has the right to be treated using the safest technology available in health facilities. This implies freedom from unnecessary or potential harm associated with healthcare, including that which may be caused by medical devices. WHO (2008) further noted that all healthcare professionals and institutions have obligations to provide safe and quality healthcare and to avoid unintentional harm to patients. Kohn et al. (2000), in a report on building a safer health system, advocated the need to establish processes or structures that, when applied, reduce the probability of adverse events resulting from exposure to the healthcare system across a range of diseases and procedures. This should be applied to the control of DA-NI, paying special attention to the NCMDs.

Conclusion

The studies reviewed demonstrated that NCMDs can harbour potential infectious pathogens, including antibiotic-resistant bacteria. It is pertinent to state, however, that most of the studies reviewed were unable to unequivocally demonstrate that the NCMDs actually transmitted the microbial contaminants. This is a major limitation with the studies reviewed. An exception was the study by Gupta et al. (2004), who used multiple logistic regression analysis to show that exposure to a health worker wearing artificial fingernails was associated with infection or colonization by a clone of extended-spectrum beta-lactamase-producing *Klebsiella pneumoniae* in a neonatal intensive care unit.

The inability of the majority of the studies reviewed to clearly demonstrate that the contaminated NCMDs were responsible for the transmission of nosocomial infections was largely due to the types of study designs used, of which the majority were cross-sectional studies. Future studies with a more complex design, such as randomized controlled designs, would be required to accomplish this. Nevertheless, all the studies did show that the NCMDs were contaminated with pathogenic bacteria and that poor NCMD cleaning/disinfection practices were significantly associated with this contamination. Based on the findings of this review, a patient safety initiative is urgently needed that can be implemented in a resource-poor setting and that must incorporate effective disinfection and handling of NCMDs as part of policy components. The following strategies have been advocated by the studies reviewed: (1) institution of policy reforms on nosocomial infection, which must include effective disinfection, handling and maintenance of NCMDs; (2) making it compulsory for NCMDs to be sanitized before using them on each patient; (3) provision of disinfectants and sanitizers at each point of patient care to encourage compliance; (4) involving both hospital management and the health worker associations in promoting compliance; (5) instituting staff education and accountability improvement mechanisms on nosocomial infection, including DA-NIs; (6) establishing an audit or feedback mechanism to monitor compliance; and (7) the use of disposable NCMDs where possible, e.g., disposable stethoscopes, tourniquets and thermometers, especially for clinical high-risk environments. Although this strategy is definitely out of reach of most resource-poor settings, under such clinical high-risk situations, healthcare workers and health facilities management should ensure strictest adherence to standard device disinfection practices. Finally, the management of healthcare facilities should ensure that competent, conscientious and

safety-conscious healthcare workers are in front-line services and receive support to provide the safe delivery of healthcare.

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National Responses to HIV/ AIDS and Non-Communicable Diseases in Developing Countries: Analysis of Strategic Parallels and Differences



Tilahun Nigatu Haregu, Department of Epidemiology and Preventive Medicine,
Monash University, Melbourne, Australia

Geoffrey Setswe, School of Health Sciences,
Monash University, Ruimsig, South Africa

Julian Elliott, Infectious Disease Unit, Alfred Hospital, Melbourne, Australia

Brian Oldenburg, Department of Epidemiology and Preventive Medicine,
Monash University, Melbourne, Australia



Abstract

HIV/AIDS and non-communicable diseases (NCDs) epidemics may have many important similarities in their aetiology, pathogenesis and management. Evidence about the similarities and differences between the national responses HIV/AIDS and NCDs is essential for an integrated response. The objective of this study was to examine the parallels and differences between national responses to HIV/AIDS and NCDs in selected developing countries.

This study applied a strategic level comparative case study approach as its study design. The main construct was national response to HIV/AIDS and NCDs. The 4 overarching themes were policy response, institutional mechanism, programmatic response and strategic information. Four countries were purposively selected as cases. Data were collected and triangulated from a multiple sources. The focus of analysis included identifying items for comparison, characteristics to be compared, degrees of similarity, and strategic importance of similarities. Analysis of data was qualitative content analysis with within-case, between-case, and across-case comparisons.

While the nature of the disease and the contents of national HIV/AIDS and NCD policies are different, the policy processes involved are largely similar. Functional characteristics of programmatic response to HIV/AIDS and NCDs are similar. But the internal constituents are different. Though both HIV and NCDs require both a multi-sectorial response and a national coordination mechanism, the model and the complexity of the coordination are different. Strategic information frameworks for HIV/AIDS and NCDs use similar models. However, the indicators, targets and priorities are different. In conclusion, the national responses between HIV/AIDS and NCDs are largely similar in approaches and functions but different in content.

Introduction

On top of the already existing burden of communicable diseases, maternal and child health problems and injuries/accidents, the epidemic of non-communicable diseases (NCDs) is a new additional public health threat to most developing countries.¹ Since the beginning of HIV epidemic, about 70 million people have been infected by the virus and 35 million people have died due to the virus. At the end of 2011, about 34 million people were living with HIV. An estimated 0.8% of adults aged 15-49 years are living with the virus. About 1.7 million

people died of AIDS-related illnesses worldwide in 2011. Sub-Saharan Africa accounts 69% of people living with HIV worldwide. About 1 in 20 adults in Sub-Saharan Africa (4.9%) are living with the virus.² NCDs kill more than 36 million people every year. About 80% of NCD related deaths (29 million) occur in low-and-middle income countries. More than 9 million NCD related deaths occur before 60 years of age. The majority (90%) of premature NCD deaths occur in low and middle income countries. Four common NCDs (cardiovascular diseases, cancers, chronic respiratory diseases,

and diabetes) account for 80% of all NCD related deaths. These four common NCDs share four major risk factors: tobacco use, physical inactivity, harmful use of alcohol and unhealthy diet.³ Development, industrialization, urbanization, investment, and aging are the major drivers of the NCD epidemic in those countries.⁴

In addition to their epidemiological overlap in developing countries, HIV/AIDS and NCDs share many additional commonalities that are related to their causation (aetiology), progression (pathogenesis), and response (prevention and control). Evidence about these inter-relationships is essential for the planning and implementation of coordinated and/or integrated programs.⁵ From the viewpoint of risk factors, HIV/AIDS is mostly related to most-at-risk and vulnerable populations and are at higher risk of being infected or affected by HIV [most-at-risk and vulnerable populations includes commercial sex workers (CSW), men having sex with men (MSM), intravenous drug users (IDUs) and bridge population (Migrant workers and long distance truck drivers)]. Examples include unprotected sex with a partner whose HIV status is unknown, multiple sexual partnerships involving unprotected sex, and injecting drug use with contaminated needles and syringes.⁶ Key populations for HIV vary based on context. The most common key populations include people living with HIV, their partners and families, people who sell or buy sex, men who have sex with men, people who use drugs, orphans and other vulnerable children, certain categories of migrants and displaced people and prisoners.⁷ The common NCDs (cardiovascular disease, cancers, diabetes and chronic respiratory disease) are associated with four common behavioural and lifestyle risk factors (unhealthy diet, insufficient physical activity, tobacco use, and harmful use of alcohol).⁸ The similarities and differences between the global

responses to HIV/AIDS and NCDs have already been explored.⁹ Largely influenced by the global level responses, national level responses to HIV/AIDS and NCDs apply a multi-sectorial approach and whole-of-government efforts in order to mitigate the multi-faceted risk factors and impacts of the problems.^{10,11} The implementation of such approaches needs well-coordinated policies/strategies and systems. As intervention against either HIV/AIDS or NCDs will affect the other, intervening jointly against HIV/AIDS and NCDs, rather than competing for limited funds, is an essential policy approach that requires innovative models and approaches.¹²

Although the similarities between HIV/AIDS and NCDs in risk factors, progression and management are known, the similarities and differences between national level responses to them are not well investigated.⁹ Though the specific behavioural entities involved are different, this signifies the importance of behavioural dimension in the risk factors of both HIV/AIDS and NCDs.¹³ Evidence from the analysis of the parallels and differences between the national response to HIV/AIDS and NCDs is useful in pinpointing potential areas of integration and differentiation. Therefore, this study was designed to examine the strategic level parallels and differences between national responses for HIV/AIDS and NCDs in selected developing countries and emerging economies.

Scope of the study

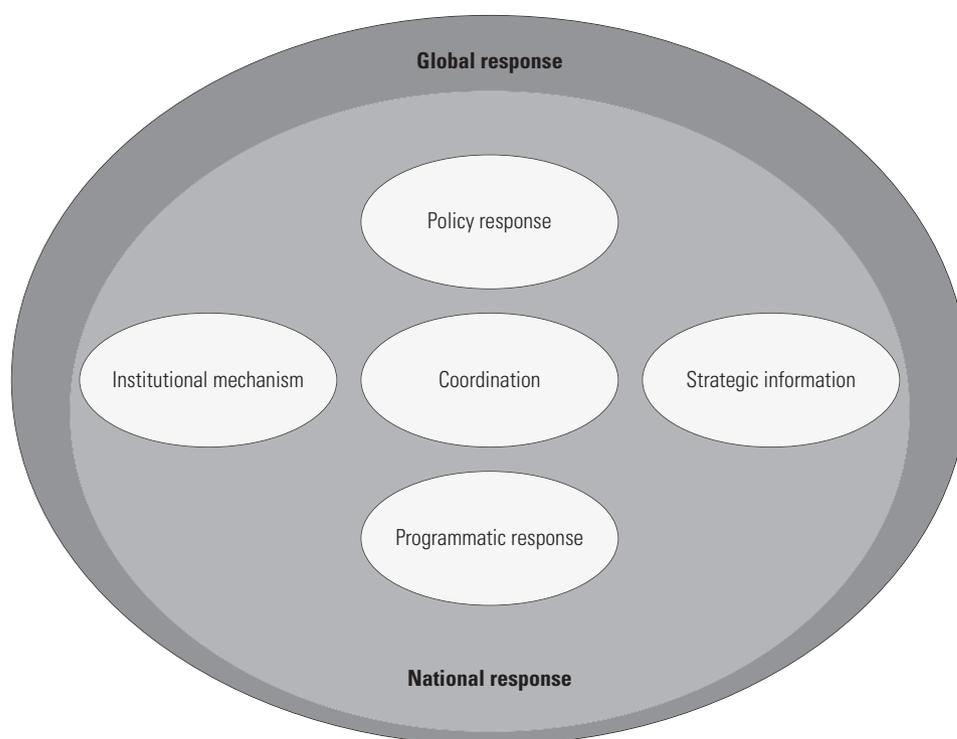
The major construct of this study was the national (strategic) level response to HIV/AIDS and NCDs. Adapted from the World Health organization's Health system framework; the overarching themes were policy response, programmatic response, institutional mechanism, and strategic information.¹⁴ These themes were assumed to be inter-locked constituents of the main

construct. Information related to the magnitude, determinants, trends, and distribution of the problems was used for the purpose of context setting.

Figure 1 shows the conceptual framework of this study. Coordination is the key element of multi-sectoral response to HIV/AIDS

and NCDs as all major response functions require strong national level coordination. As indicated in the framework, country level responses are shaped by both global responses including MDGs and local contexts like local epidemiology of the diseases.

Figure 1. Conceptual Framework of the study: broken lines show the fact that national responses are shaped by global responses; the circles show the major elements of national response.



Study design

This study was a comparative case study. A case study approach was used as the main focus was on how countries are responding to the epidemics. Besides, there was a need to uncover contextual factors.

Selection of cases and study setting

The selection of countries was purposive (maximum variation) based on in the combined cluster analysis of epidemiological trends of prevalence of HIV/AIDS and Diabetes from a study that identified four

clusters of countries.¹⁵ One country from each cluster was selected based on ease of access to data sources. The selected countries are South Africa (17.3% HIV and 6.5% diabetes prevalence), Malaysia (0.4% HIV and 11.7% diabetes prevalence), Sri Lanka (0.1% HIV and 7.8% diabetes prevalence), and Ethiopia (1.4% HIV and 3.4% diabetes prevalence).^{16,17} Malaysia and South Africa are upper middle income countries. Sri Lanka is a lower middle income country. Ethiopia is a least developed country.

Data collection

Multiple data sources were used in this study. These included policy documents, performance reports, databases, surveys reports and peer reviewed literature. The primary policy documents reviewed were the most recent Health, HIV/AIDS, and NCD policies/strategies which were available in the public domain. Most recent annual health sector and HIV/AIDS were among the reports reviewed. This study also draws on publicly available NCD related data collected in 2010 from the Ministries of Health of countries as part of the WHO sponsored global key-informant surveys.¹⁸ The data contains variables related to the capacity of countries to respond to HIV/AIDS and NCDs in five areas: public health infrastructure; the status of policies, strategies, action plans and programmes; health information systems, surveillance and surveys; the capacity of health care systems for early detection, treatment and care; and health promotion, partnerships and collaboration. Information from global and national level survey reports and other peer-reviewed literature relevant to health systems response to HIV/AIDS and NCDs with special reference to the case countries was also used.

Data collection tools

Using the four overarching themes, a data abstraction template was developed. Theme-based matrices were independently populated for each of the countries and the disease conditions. All the NCD data from Global Health observatory (2010) collected from the four case countries was extracted and included in this study.

The themes and sub-themes of the study are: i) *problem description*: magnitude of the problem, risk factors for the problem, historical overview of the response; ii) *policy response*: policy making bodies, policy frameworks, policy interventions; iii) *programmatic response*: prevention, treatment, care and support, cross-cutting areas (capacity

building, health system strengthening etc.); iv) *institutional mechanism*: institutional structures (actors – state and non-state, and partners), national coordination mechanism; v) *strategic information*: monitoring and evaluation systems, surveillance systems, monitoring and evaluation interventions.

The sub-themes were used as categories in the coding process.

Data analysis and management

The overall analysis was a qualitative content analysis approach. Comparative analysis of strategic parallels within a country (within case), comparison of strategic parallels of a disease between different cases (between-disease), and comparison of strategic parallels across all the cases and the two disease conditions (cross-case) were used. In this process, items to be compared were the core components of the response. The focus of analysis included identifying items for comparison, characteristics to be compared, degrees of similarity, and strategic importance of similarities. Findings were summarized using integrative synthesis.¹⁹

Problem description

Magnitude of HIV/AIDS and non-communicable diseases

HIV/AIDS is a generalized epidemic in South Africa and Ethiopia but a concentrated epidemic in Malaysia and Sri Lanka. NCDs cause more deaths than HIV/AIDS in all the case countries except South Africa. Table 1 illustrates, NCDs accounts about one-third of total annual deaths in South Africa and Ethiopia but about two-third of total annual deaths in Malaysia and Sri Lanka.^{20,21} However, it would be important to consider age at death in the comparison of HIV and NCD related deaths. HIV related deaths generally occur at a lower age than that of NCDs. Thus, HIV related deaths are associated with higher DALYs.

National Responses to HIV/AIDS and Non-Communicable Diseases in Developing Countries: Analysis of Strategic Parallels and Differences

Table 1. HIV/AIDS and non-communicable diseases profiles of the case countries, 2011

Country	HIV prev. %	AIDS prev. %	PLHIV	HIV deaths	NCD deaths	NCD deaths %
South Africa	17.3	15.9	5,600,000	270,000	190,600	29
Sri Lanka	<0.	<0.1	4,200	<500	117,900	65
Malaysia	0.4	0.4	81,000	5,900	89,500	67
Ethiopia	1.4	3.6	790,000	54,000	338,300	34

NCD – non-communicable diseases

Risk factors for the problem

Heterosexual intercourse is the main driver of HIV epidemics in all case countries. Intravenous Drug Users (IDU) and Men having Sex with Men (MSM) are more important in Sri Lanka and Malaysia. The burden of HIV/AIDS is higher among Females in South Africa and Ethiopia; but in Males in Malaysia and Sri Lanka.

NCDs risk factors and risk groups have mixed picture in the case countries: South Africa and Malaysia have high rates for tobacco smoking, physical inactivity, and obesity as compared to Sri Lanka and Ethiopia. Magnitude of raised blood pressure and raised blood glucose are more or less similar across the case countries (Table 2).²⁰

Table 2. Prevalence of common non-communicable diseases risk factors in the case countries (2011)

Country	Daily tobacco smoking (%)	Physical inactivity (%)	Raised blood pressure (%)	Raised blood glucose (%)	Obesity (%)
South Africa	14	51.1	42.0	10.6	31.3
Sri Lanka	10.6	26.0	39.2	8.8	5.1
Malaysia	21.5	60.5	34.7	10.5	14
Ethiopia	2.4	17.9	35.2	NA	1.1

NA – Data not available.

Historical overview of the response

The history of national response to HIV/AIDS started in the late 1980s or early 1990s (Table 3). National level policy/strategy/plan was formulated and national

coordinating mechanism (NCM) was established during those years. National HIV/AIDS responses in the case countries have gone through at least three strategic periods.²²

Table 3. Milestones in the history of national response to HIV/AIDS and non-communicable diseases

	South Africa	Sri Lanka	Malaysia	Ethiopia
TFirst HIV/AIDS case reported	1982	1986	1986	1984
First HIV/AIDS NCM	1992	1986	1985	1985
First HIV/AIDS national plan	1994	1996	1988	1985
First Integrated NCD plan	2013	2009	2010	2010

NCM – national coordinating mechanism; NCD – non-communicable diseases.

Integrated national response to NCDs started during the past five years. However, disease-specific NCD responses were in place for years, although they received very little attention. Though NCDs were included in the sector-wide strategies and were being addressed by the sector-wide structures for years, integrated national responses to NCDs are either at the first strategic period.²³

Policy response

Policy responses to HIV/AIDS and NCDs in this study include the incorporation of HIV/AIDS and NCDs in to sector-wide policies, the development of separate HIV/AIDS and NCD policies, and the rollout of policy/regulatory interventions that are important to curb the tide of the epidemics. All these require complex processes with a wide range of consultations and deliberations. Moreover, they are highly influenced by global policies.

Policy processes

Analysis of the policy-related processes involved in the national response to HIV/AIDS in the case countries has revealed four major processes. The first one is political leadership which involves the highest political bodies of a country (Cabinet/members/Ministers/President etc.). The second process is policy making process that involves drafting (and approving) policies and overseeing its implementation. The third process is policy advisory role that addresses policy and technical issues and plays advisory role on policies and technical issues. The final process is program governance which is usually provided by National (HIV/AIDS) secretariat/working group/taskforce (members).²⁴⁻²⁷ With regard to NCDs, all four case countries have a responsible body in the Ministry of Health responsible for NCDs. NCD specific policy processes and governance structures vary widely across countries. South Africa has started establishing a National Health Commission to be chaired by the presidency and involving all relevant government sectors

and others. In addition, it has established an advisory committee on the prevention and control of cancer in January 2013. South Africa also has inter-ministerial committee on prevention of substance abuse. The department of health currently has lead role in presenting a bill on control of the marketing of alcohol. Sri Lanka has National Health Council for promoting collaboration, and National NCD steering committee for monitoring policy implementation. Malaysia proposed Cabinet Committee for Health Promoting Environment chaired by Deputy Prime Minister and involves the major ministries. In Ethiopia, a National Technical working group drafted the strategic framework for the prevention and control of NCDs. A national level NCD consortium is also established.²⁸⁻³²

Policy frameworks

Both HIV/AIDS and NCDs are included in the health sector policies in all the case countries. The 10 point NHS of south Africa, the 4th HSDP of Ethiopia, the 10 year Health Master plan of Sri Lanka, and the 10th Country Health Plan of Malaysia all have included both NCDs and HIV.³³⁻³⁶ Besides, all the case countries have stand-alone policy/strategy frameworks for both HIV/AIDS and NCDs: at least the 3rd for HIV and the first for NCDs. Based on the data from Global Health Observatory (GHO), though the mix varies, all the countries have NCD related policies/strategies. Case countries also have HIV policies specific to some *population* groups, and specific *technical* areas. South Africa and Sri Lanka have operational policy documents on the four major NCDs and the four common NCD risk factors. At the time of this study, we haven't found specific operational policy document on diabetes and alcohol from Malaysia. At the time of this study, Ethiopia hasn't yet launched an operational policy/strategy/action plan on the four major NCDs and four common NCD risk factors.

There are concerns in the alignment of HIV/AIDS and NCD specific policies/strategies with the sector-wide policies/strategies. The alignment of NCD specific policies with disease/risk factor specific policies is also another area of concern in the integrated response to NCDs. Different types of Tobacco Acts are available in the case countries. At the time of this study, all the case countries except Ethiopia have ratified the

WHO Framework Convention on Tobacco control (FCTC). Food Acts and Nutrition policies/strategies also exist in the case countries. Stand-alone policy frameworks for promotion of physical activity in the case countries were not identified in this study. South Africa has recently developed a policy addressing cervical cancer. The most recent policy frameworks for HIV/AIDS and NCDs are listed in Table 4.

Table 4. List of most recent HIV/AIDS and non-communicable diseases policy frameworks

Country	HIV/AIDS	NCD
South Africa	National strategic plan on HIV, STIs and TB: 2012-2016. ²⁴	South African NCD action plan 2013-2016. ³²
Sri Lanka	National HIV/AIDS strategic plan: 2013-2017. ²⁷	The National Policy & Strategic framework for Prevention & Control of chronic NCDs, 2009. ²⁸
Malaysia	National Strategy Plan on HIV and AIDS: 2011-2015. ²⁶	National Strategic plan for NCDs: 2010-2014. ²⁹
Ethiopia	Strategic plan for intensifying Multi-sectoral HIV and AIDS response in Ethiopia: 2010/11-2014/15. ²⁵	Prevention and Control of Chronic NCDs: Strategic Framework: Nov 2010. ³⁰

NCD – non-communicable diseases.

Policy/regulatory interventions

HIV/AIDS policy/regulatory interventions focus on right, equity and justice related to HIV programming and People living with HIV. On the other hand, policy/regulatory interventions of NCDs focus on the use of policies to reduce exposure to the risk factors (regulatory measures) such as tobacco smoking, alcohol use and consumption of high calorie foods. Gender-based violence and discrimination got more attention in HIV/AIDS response as they are more related to HIV. Mandatory NCD screening for employees is being implemented in Malaysia. Malaysia has developed a guideline to control marketing of food and alcoholic beverages to children. Our review of documents shows that reporting cancer has been made compulsory by regulation in South Africa. Regulations to reduce salt content in specified foods are gazetted in South Africa. Regulations on trans-fatty acids have already been in practice since 2011 in South Africa. Our literature search hasn't found such regulations in Sri Lanka and Ethiopia.

Programmatic response

Evidence from the case countries indicated that integrated NCD programs are not well instituted. Most of the existing NCD interventions are either sector-wide or disease/risk factor specific interventions. In the sector-wide interventions adequate priorities are not accorded to NCDs. As funding and donor interest in NCDs is generally low, disease/risk factor specific interventions are small and fragmented. In contrast, HIV/AIDS responses have attracted more resources and several sector-wide and HIV/AIDS specific programs have been implemented. However, most of the funding for HIV/AIDS was from external sources. Using these resources, several intervention protocols and guidelines have been developed and rolled out for the implementation of HIV/AIDS programs.³⁷⁻⁴⁰

Prevention of HIV/AIDS and non-communicable diseases

Both HIV/AIDS and NCD prevention strategies in the selected countries has been on behavioral/life style, structural, biomedical/

biological, and policy/regulatory *dimensions*. Apart from Ethiopia, the other case countries have implemented fiscal interventions to influence behavior change and have earmarked taxes from fiscal interventions to influence behavior change used to fund health promotion programmes or a health promotion foundation. Individual, community-based, and institution-based *approaches* are used in the prevention approaches of both HIV/AIDS and NCDs. Most of the *stakeholders* (actors) in both HIV/AIDS and NCDs are those outside the healthcare system and includes several government sectors, NGOs, CBOs, FBOs etc. For instance, both HIV/AIDS and NCDs are integral to the school health program in South Africa. Influencing individual decision (to practice safe sexual behavior in case of HIV and to eat healthy foods, to stop smoking, to reduce alcohol or to improve physical activity; or to get screened/tested) is the *ultimate goal* of most of the prevention programs.

Malaysia has expanded communication for behavioral impact program for dengue to also include NCDs. It has also appointed a Malaysia Health Ambassadors to encourage Malaysians adopt healthy lifestyles. The country has also introduced an NCD risk factor intervention program – NCD prevention a Malaysia Program – in communities, workplace and schools. Media players are also actively engaged in NCD prevention interventions. Ministry of Health agreed to implement a new healthy eating guideline in schools.

However, there are also essential differences in the prevention of HIV/AIDS and NCDs. Most of these differences emanate from the disease characteristics and epidemiology of HIV/AIDS and NCDs. Firstly, the main target populations for HIV/AIDS prevention are youth (15-24 years) and key populations (most at risk populations).⁴¹ But the main target population considered in most NCD prevention are adults (>30 years of age). Secondly, the purpose of HIV/AIDS prevention programs is to reduce transmission and

vulnerability while that of NCDs is to reduce the risk of developing NCDs. Thirdly, the content (package) of the prevention programs is different. The contents of HIV/AIDS prevention programs are geared towards reducing the risk of transmission of the virus through sexual, parenteral and/or vertical routes while that of NCDs are geared towards reducing the common NCD risk factors and adopting healthy lifestyles. Lastly, the socio-cultural contexts surrounding HIV/AIDS prevention and NCD prevention are different. HIV/AIDS risk factors, mainly high risk sexual behaviors, are generally considered to be more sensitive than that of NCD risk factors.

South Africa, which managed to screen 13 million people for HIV, has acknowledged that HIV testing offers an excellent opportunity for NCD screening and thus has instructed that health testing must become comprehensive so that NCDs are tested at the same time as HIV and TB. This country has also made a decision to provide Human Papilloma Virus (HPV) vaccine to pre-pubescent girls. In Ethiopia, a screening project for Gestational Diabetes was implemented together with the PMTCT program in healthcare facilities. As women on HIV/AIDS treatment may have higher risk of gestational diabetes, this project was considered to be exemplary. Healthy Lifestyle Centers (HLCs) in Sri Lanka are other examples of integrated prevention approaches.

Treatment of HIV/AIDS and non-communicable diseases

As the history of implementation of national treatment programs of HIV/AIDS and NCDs are very different, the main priorities of HIV/AIDS and NCD treatment strategies are also different. The main priorities of HIV/AIDS treatment programs are ensuring universal coverage to treatment for all eligible PLHIV and improving the quality of treatment programs. In contrast, the priorities of NCD treatment strategies are to increase availability of drugs and improve accessibility of treatment services. However, as both HIV/

AIDS and NCDs are chronic diseases, the delivery of HIV/AIDS and NCD treatment services have the following characteristics in common. Both require strong health systems and skilled multi-disciplinary health teams. Both need long-term monitoring and follow up. Both HIV/AIDS and NCD treatment also require adjacent prevention interventions, positive health, dignity and prevention (PHDP) for HIV/AIDS and improved health behavior/life style/ for NCDs. Based on data from Global Health Observatory guidelines for the management of diabetes and hypertension were available and implemented in all the case countries except Ethiopia. Most of the NCD tests were not available at primary health care level in Ethiopia. In the other three countries, at least half of the basic NCD tests were available at primary healthcare level. Regarding the general availability of NCD related medicines in the public health sector, Ethiopia has less than one fourth of the drugs considered for assessed while the other three countries have more than fourth-fifth of the drugs included in the list for the assessment. Assessment of the general availability of NCD related procedures (renal photocoagulation, renal replacement therapy, radiotherapy and chemotherapy); Ethiopia didn't have any of these. Malaysia has all the four, South Africa had all except renal replacement therapy, and Sri Lanka had all except renal photocoagulation. A symptom-based NCD diagnostic tool (known as primary care 101) is being developed in South Africa where NCDs are included in primary care package.

National Cancer Institute is a premier tertiary level hospital for diagnoses and treats cancer cases in Sri Lanka. Access to cancer treatment is limited. In rural areas, traditional healers have greater roles. In South Africa, only tertiary (specialised) hospitals and some private medical centres have cancer treatment facilities. In Ethiopia, where cancer is considered as a death sentence, there is only one

cancer treatment centre for the whole population. In Sri Lanka and Malaysia, there are a few more cancer treatment centres.

Care and support for HIV/AIDS and non-communicable diseases

We have looked in to four major areas of care and support strategies for HIV/AIDS and NCDs: Continuity of care, control of disease progression, prevention of complications and integration of care services. Continuum of care for both HIV/AIDS and NCDs involves the patient, peers, family members, community systems and healthcare systems. Patient participation is important in both cases. In order to control disease progression, care and support programs of both HIV/AIDS and NCDs work for retaining patients in care with adequate treatment adherence. Both HIV/AIDS and NCDs are associated with a range of complications including co-infections and comorbidities. Accordingly, prevention of these complications is among the major priorities of care and support programs for HIV/AIDS and NCDs. Effective and efficient provision of care and support services also require integration of services along the continuum and across the components.

HIV/AIDS Care and support programs often include care for orphan and vulnerable children and economic strengthening activities that are intended to reduce vulnerability. They also consider stigma and discrimination as a major area of focus. NCD care and support programs often include healthy ageing as its focus area. Self-care is considered to be more important in NCD care and support strategies. In both HIV/AIDS and NCD care, improving the quality of life patients through better adherence to recommended treatment and retention in care is considered to be a key strategy. Promoting positive living and decreasing risk of infectivity are relevant elements of HIV/AIDS care and support programs. Apart from generic

strategies for NCD related care, countries also have disease specific care guidelines for specific NCDs (e.g. diabetes care guideline in South Africa).

Cross-cutting technical areas

The main crosscutting programmatic responses stated in both NCD and HIV policy documents are capacity building, Health System Strengthening (HSS), mainstreaming, partnerships and empowerment. HSS and reform is one of the three NCD strategies in South Africa. An important initiative of this is the development of integrated chronic disease (both communicable and Noncommunicable) management model in three districts. We considered that the capacity building and HSS interventions should focus on both disease-specific (HIV/AIDS and NCD) structures (for technical and analytical capacity) and sectorwide structures (for program planning, implementation, monitoring and evaluation capacity).

The capacity building and HSS interventions, however, seem to provide more weight to on HIV/AIDS and NCD specific structures and functions rather than sector-wide structures and functions. As mainstreaming of interventions is mainly to government sectors, most of the government sectors may end up in having both HIV/AIDS and NCD related activities. Both HIV/AIDS and NCD responses involve broader partnership frameworks though the types of individual partners vary. Empowerment of community is another important area of focus of national responses to HIV/AIDS and NCDs in the case countries.

Institutional mechanisms

Institutional structures for HIV and non-communicable diseases response Institutional structures involved in the national response to HIV/AIDS and NCDs are of two categories: actors (state and

non-state), and partners. For HIV, these can be further classified in to sector-wide structures, and HIV-specific structures. For NCDs the list includes sector-wide structures, NCD-specific structures (integrated), disease-specific structures (individual NCD) and risk factor specific structures (individual risk factors). Currently, the state actors for HIV/AIDS are the majority of government ministries/departments/bureaus/agencies. Despite the principle that NCD response is a whole of government and whole of society effort, most of state actors for NCDs are agencies whose roles are directly related to the common NCD risk factors: unhealthy diet, physical inactivity, tobacco use, and alcohol use. With regard to the non-state actors, the national responses to HIV/AIDS involve several UN agencies, Non-governmental organizations and civil society organizations. Most of these structures are currently engaged in either technical/financial support and/or implementation of HIV/AIDS programs. On the other hand, non-state actors involved in the national response to NCDs are mostly disease and risk factor specific civil society organization and networks/coalitions/consortiums who are involved in advocacy, training, service delivery and research.

In the national responses to HIV/AIDS in the selected countries, there is a strong partnership with international donors and technical partners. Some of these (e.g. global fund) requires a separate coordination mechanism. In HIV response, partnership is in action but duplication/overlap is a problem. In NCD response, partnership is in a form of working relations and is a future strategy. Resources for HIV response are mostly from external sources. Resources for future NCD response are currently lacking and are expected from external sources too.

The Ethiopian National NCD consortium is a platform established by civil society

organizations working on NCDs. It provides an excellent opportunity to promote a coordinated national response to NCDs. The consortium is working closely with both governmental and non-governmental organizations.

National coordination mechanisms

As the response to both HIV/AIDS and NCDs is multi-sectoral and multi-stakeholder in nature, a national coordination mechanism is needed. The location of the National coordination mechanisms (NCM) and its relation with sector-wide structures vary across countries. The current NCM for NCDs in all the case countries are under Ministry (Department) of health although new NCMs have been proposed. In Malaysia and Sri Lanka and NCM for HIV/AIDS are also under Ministry of Health. In South Africa and Ethiopia, the NCM for HIV/AIDS response is accountable to a higher government body than the Ministry (Department) of Health. The role of the NCMs is more of Planning, coordination and implementation, and M&E rather than a technical advisory one. A partnership forum for HIV in South Africa and Ethiopia has other partners as members of the advisory body. Establishment of NCD coordination networks seems the future direction of NCD actors.

The NCMs for national response to HIV/AIDS in the case countries are South African National AIDS Council (SANAC) in South Africa, National STD and AIDS Control Program (NSACP) in Sri Lanka, AIDS/STI sector of the Disease Control Division in Malaysia, and HIV/AIDS prevention and control offices (HAPCO) in Ethiopia. Similarly, NCD cluster (Department of Health), NCD Prevention and Control Unit (Ministry of Health), NCD section (Disease Control Division/Ministry of Health) and NCD focal unit (Ministry of Health) are the NCD mechanisms in South Africa, Sri Lanka, Malaysia and Ethiopia respectively.

Strategic information

Monitoring and Evaluation along with innovative research are the key HIV and NCD strategic areas in all the case countries. The three types of monitoring activities evident in this study are patient/clinical/monitoring, disease/risk factor/ monitoring and program monitoring. As all these forms of monitoring are driven by the national programs, their stages of implementation are different for HIV/AIDS and NCDs in the case countries. But the NCD monitoring can learn from HIV monitoring. A study conducted in Ethiopia revealed that patient monitoring systems developed for HIV/AIDS programs could be adapted for NCDs.⁴²

Monitoring and evaluation systems

The Health information system (HIS) in each of the case countries supports strategic, management and operational decisions in the entire health sector. The HIS is a result of combined efforts of many stakeholders including the Ministry of Health and National statistical offices. M&E units in the NCM of HIV/AIDS response coordinate the M&E of National Strategic Plans (NSP) using the concept of one national M&E framework. The HIV/AIDS M&E system is inter-linked with national HIS. Despite the presence of NCD strategic plans in all the case countries, the development of M&E frameworks for NCDs is at early stage. South Africa has set ten targets to be achieved by 2020. Sri Lanka's strategic plan states indicators and their means of verification.

The flow of M&E data in the case countries is as follows. In Sri Lanka's HIV response, all reporting units report directly to the Strategic Information Management (SIM) unit of National STD/AIDS control program. In Malaysia, the Malaysian AIDS Council (MAC) coordinates the report from Civil Societies and NGOs and reports to the National AIDS Program Secretariat at Ministry of Health. All government sectors directly report to the

secretariat. In Ethiopia, government sectors report to Federal HIV/AIDS Prevention and control office while other implementors report to relevant structures at their level of implementation. In South Africa, Health facilities report to District AIDS councils, which report to provincial AIDS councils, which further report to SANAC. Government and civil society sectors will be reporting within their established structures at the different levels

Both national HIV/AIDS and NCD M&E systems need to draw data from national health information system. The performance of HIV/AIDS and NCD M&E systems is therefore directly related to national HIS. Similarly, interventions designed to strengthen HIV/AIDS and NCD M&E systems will directly contribute to the national HIS. Both HIV/AIDS and NCD M&E systems need to invest on national HIS. The requirements of HIV/AIDS and NCD M&E systems should fit with the capacity of the national HIS. HIV/AIDS indicators are well included in the National HIS of the countries. However, the current National HIS in the case countries are not responsive to NCD related indicators. Hypertension rate and Mental Health case load are captured in South African District Health Barometer. Hospital statistics in Sri Lanka has indicators on NCDs.

Surveillance, surveys and registry

ANC-based HIV sentinel surveillance, Behavioral Survey Surveillance (BSS) and Demographic Health Surveys (DHS) are the common forms of HIV/AIDS surveillance and surveys in the case countries. AIDS case reporting is also among the mechanisms used to monitor the status of the HIV/AIDS Epidemic. Surveillance systems for NCDs are at different stages in the case countries. Malaysia, Sri Lanka and South Africa have reported the existence of cancer registry and NCD risk factor surveillance. Both cancer registry and surveillance of NCD risk factors were not available in Ethiopia. South Africa

has prepared a plan for comprehensive NCD surveillance. In the interim, South African Health and Nutrition Examination Survey is expected to provide relevant information. Ethiopia has conducted NCD situational assessment and is looking forward to conduct a baseline assessment of NCDs. There are generally three forms of NCD surveillance considered: risk factor surveillance (bio-behavioral), disease surveillance and case registry/reporting. The eligible population groups vary but the two M&E systems can learn from each others – especially methods and techniques. Some general population surveys like DHS, in some countries, address both HIV/AIDS and NCDs. In South Africa, a chronic disease register has been produced for implementation in public health facilities to ensure that NCDs are detected early and managed appropriately.

In Malaysia, the National Health and Morbidity survey for NCD risk factors will be conducted every four years. Several NCD indicators are also included in the performance indicator sets of Ministry of Health. The National Diabetes registry is established to obtain epidemiological and clinical data of diabetes patients receiving treatment in healthcare facilities throughout Malaysia. It involves electronic collection of data and is made available online.

Discussion

HIV/AIDS and NCD epidemics have many commonalities. Both HIV/AIDS and common NCDs have slow pace of progression. HIV/AIDS has a long asymptomatic stage. The asymptomatic stage lies between primary HIV infection and the development of AIDS.⁴³ The risk of many NCDs is set during development of a person. Nutritional imbalance and exposure to environmental chemicals during development can increase NCD risk later in life.⁴⁴ Most NCDs are associated with long-term and persistent exposure to the risk factors. Many NCDs also have

pre-dis-ease stages that may last for a number of years.⁴⁵ Moreover, combinations of major NCDs and infections can interact adversely. Co-morbidities in HIV/AIDS and NCDs are also of great clinical and public health importance.⁴⁶

In the early period, infectious disease, like HIV/AIDS, and NCDs were perceived to be largely different. But with the advent to treatment, HIV/AIDS has now turned out to be a chronic disorder, like many of the common NCDs. As both are chronic diseases, the response interventions to HIV/AIDS and NCDs share many similarities. Prevention strategies of both HIV/AIDS and NCDs are targeted at modifying known risk behaviours. Treatment and care interventions focus on controlling disease progression and improving quality of life through better adherence to treatment, frequent monitoring of biomarkers, and provision of social support.⁴⁷ National responses to HIV/AIDS and NCDs are at different stages of maturity. As a result of this, the level of attention and priority given to HIV/AIDS and NCDs during the past three decades in developing countries are very different. These differences have shaped all the components of national response in different ways. In this regard, National responses to HIV/AIDS are at a higher level of maturity and thus the focus of HIV/AIDS policies are quality and sustainability. As a result of early stages of development, the current focuses of NCD policies are advocacy and instituting appropriate institutional systems. Though differences in stages of maturity of programs are recognized, NCD programs can learn

a lot from the experiences of HIV programs. The programmatic responses to HIV/AIDS and NCDs are comprised of prevention, treatment, care and support and cross-cutting interventions. The main target population groups and the contents of interventions show higher level of differences than the approaches and models used in the delivery of interventions in the cases countries. Of great importance is the overlap between cross-cutting interventions of both HIV/AIDS and NCDs that mainly aim for strengthening sector-wide structures. In this regard, cross-cutting interventions are potential areas of integration.

Regarding institutional mechanisms, both HIV/AIDS and NCDs involve multi-sectoral and whole of government and whole of society efforts. Both require a country response coordinating mechanism at national level. The nature and complexity of the coordination mechanisms, however, are different. National HIV/AIDS response coordination mechanisms have the characteristics of agency while those of NCDs have the characteristics of network. This difference has an important implication in the integration of HIV and NCD responses with the overall health system interventions.

The models and methods of strategic information of national responses to HIV/AIDS and NCDs share many similarities though the contents and priorities of the strategic information section of the responses have many essential differences. A summary of the parallels and differences between national responses is shown in Table 5.

Table 5. Summary of the parallels and differences between national responses to HIV/AIDS and non-communicable diseases

	HIV/AIDS	Both HIV/AIDS and NCDs	NCDs
Policy response	3rd or 4th strategic period. Policy priorities are quality and sustainability. Sector, population, program specific policies.	Have responsible policy making bodies and national policy framework. Both are included in sector-wide policy frameworks.	At early stage. Advocacy and instituting systems are priorities. Disease, risk factor specific policies.
Prevention	Youth and MARPs focused; aim to reduce transmission; purpose is changing sexual behavior; more sensitive context; human rights, equity and justice as interventions.	Prevention approaches; intervention dimensions; affecting individual decision is the ultimate goal. Mostly outside the health sector.	Adult focused; aims to reduce risk; purpose is to change lifestyle; less sensitive context; regulatory measures as interventions.
Treatment	Coverage higher. Ensuring universal coverage and improving quality are the strategic priorities indicated in the policy frameworks.	Need strong health systems; multidisciplinary health teams; adjacent prevention; long duration of monitoring and follow up. Adherence is key.	Coverage low. Increasing availability and accessibility of treatment services is the main priority.
Care and support	Orphan and vulnerable children are concerns; co-infections more common; stigma and discrimination is a concern.	Ensuring continuum of care, control of disease, prevention of complications and provision of integrated services.	Comorbidities are more common; mostly associated with ageing/aged care;
Cross-cutting	Strengthening HIV/AIDS specific (technical and analytical capacity) and sector-wide structures (for management and implementation).	Strengthening of sector-wide structures; mainstreaming in to sectors; community empowerment; partnership and cooperation	Strengthening NCD specific structures (technical and analytical capacity)
Institutional arrangement	Most of government sectors involved; many NGOs and CSOs involved in implementation; well established NCM; better funded.	Involves both state and non-state actors as well as partners; a multi-sectoral coordinating structure is existing.	Limited government sectors involved; CSOs involved in advocacy; NCM at early phase; low funding.
Monitoring and evaluation	Target population are ANC mothers, youth, and MARPs; stronger evidence base; priorities are ensuring quality and utilization of evidence	Draws data from national Health information system; risk factors and disease surveillance as well as case registry	Target population are adults; weak evidence base; priorities are ensuring NCD responsive information systems

NCD – non-communicable diseases.

Information outlets for HIV/AIDS in the case countries include AIDS resource centers, websites of National Coordinating Mechanisms, and telephone-based help/talk lines, and State and private media. Information outlets for NCDs are mainly websites of civil society organizations engaged in NCD advocacy activities. Most of the available information about NCDs is related to the magnitude of the problems and their risk factors. Information about the responses to NCDs are very limited.

Emphasis is given to NCD specific and HIV/AIDS specific M&E system and the sector-wide M&E system in all the case countries. The main priorities of HIV/AIDS M&E systems in the case countries is to strengthen existing M&E systems in health facilities and

to incorporate new systems for community-based monitoring and reporting. By doing this, the quality of HIV/AIDS information is expected to be improved. Among the M&E priorities is instituting a culture of evidence-informed decision making i.e. the use of evidence for policy and programs.

In comparison, the main M&E priorities related to NCDs is making the national HIS responsive to NCDs. These include incorporating NCDs in to national HIS, promoting the generation and utilization of NCD related evidence and instituting new methods of NCD monitoring and evaluation (e.g. surveillances, registry systems) as an integral part of national HIS.

The findings of this study have important implications for policy and practice. The main

implication is the coordination of national responses to HIV/AIDS and NCDs in order to reduce duplication and overlap and maximize synergy and efficiency. This study has identified essential areas of focus for integrated response. One of these is the crosscutting interventions that focus on strengthening health systems.

There are some limitations associated with this study. Firstly, this study is limited to the context of four purposively selected case countries. The countries have heterogeneous epidemiological and socio-economic contexts. Thus, the study findings are only analytically generalizable. Secondly, the analysis focuses on national level (macro-level) responses and may not reflect meso and micro-level situations in the case countries. Moreover, exploration of the differences between case countries was beyond the scope of this study. Thirdly, the study is limited to the five broader thematic areas and information extraction is limited to these thematic areas only. Besides, limitations related to data availability and quality as well as the value-nature of the analysis methods should be taken in to consideration in the interpretation of the findings.

Conclusions and Recommendations

While the content characteristics of HIV and NCD policies are different, the process characteristics involved are largely similar. The operational characteristics of programmatic response to HIV and NCDs are similar. But the internal constituents of the programmatic response are different. Though both HIV and NCDs require both a multi-sectoral response and a coordination mechanism, the models and complexity of coordination are different. Strategic information frameworks for HIV/AIDS and NCDs employ similar methods. However, the indicators, targets and priorities are different. In general, the parallels between the national responses between HIV/AIDS and NCDs are largely in process characteristics and the differences are in content characteristics. The differences in the

nature of the diseases and the level of maturity of the responses explain the major differences. It will be wise to consider the parallels identified in this study as initial areas of focus for integrated response to HIV/AIDS and NCDs in low- and middle-income countries. We also recommend further and more detailed exploration of similarities and differences between the responses to HIV/AIDS and NCDs in specific countries.

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