

Allocating funds for HIV/AIDS: a descriptive study of KwaDukuza, South Africa

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Objective	Through a descriptive study, we determined the factors that influence the decision-making process for allocating funds to HIV/AIDS prevention and treatment programmes, and the extent to which formal decision tools are used in the municipality of KwaDukuza, South Africa.
Methods	We conducted 35 key informant interviews in KwaDukuza. The interview questions addressed specific resource allocation issues while allowing respondents to speak openly about the complexities of the HIV/AIDS resource allocation process.
Results	Donors have a large influence on the decision-making process for HIV/AIDS resource allocation. However, advocacy groups, governmental bodies and local communities also play an important role. Political power, culture and ethics are among a set of intangible factors that have a strong influence on HIV/AIDS resource allocation. Formal methods, including needs assessment, best practice approaches, epidemiologic modelling and cost-effectiveness analysis are sometimes used to support the HIV/AIDS resource allocation process. Historical spending patterns are an important consideration in future HIV/AIDS allocation strategies.
Conclusions	Several factors and groups influence resource allocation in KwaDukuza. Although formal economic and epidemiologic information is sometimes used, in most cases other factors are more important for resource allocation decision-making. These other factors should be considered in any attempts to improve the resource allocation processes.
Keywords	Resource allocation, decision-making, priority setting, HIV/AIDS, South Africa

KEY MESSAGES

- In addition to formal resource allocation techniques, many political, social and ethical factors as well as players such as donors, media and community groups have a strong influence on the decision-making process for allocating funds to HIV/AIDS programmes.
- An understanding of the manner in which various techniques, players and other intangible factors play a role in the decision-making process for funding HIV/AIDS programmes can lead to improved allocation decisions. The framework developed in this study can be used to map and analyse the factors that influence HIV/AIDS programme funding in different settings.

Introduction

Resource allocation for HIV/AIDS

In recent years there has been a major influx of funds towards HIV/AIDS programmes in low- and middle-income countries. Global funding has increased from less than US\$300 million in 1996 to US\$13.7 billion in 2008 (UNAIDS 2009). Nonetheless, UNAIDS estimates that, in 2010, US\$25.1 billion is required for an effective response to HIV/AIDS in low- and middle-income countries (UNAIDS 2009).

Resource allocation, sometimes referred to as priority setting, is defined as the distribution of resources among programmes, populations or regions that are competing for the same funds (Martin and Singer 2003). Numerous approaches to allocating HIV/AIDS prevention and treatment resources have been developed, including cost-effectiveness league tables (Holtgrave 1998; Pinkerton *et al.* 2001) as well as operations research methods such as system dynamics models (Flessa 2003), computer simulation (Zaric *et al.* 1998; Nagelkerke *et al.* 2002; Flessa 2003; Rauner *et al.* 2003) and optimization (Kaplan 1998; Kaplan and Pollack 1998; Zaric and Brandeau 2001; Lasry *et al.* 2007). These methods include some measure of economic efficiency and are classified as 'rational economic approaches' to resource allocation (Lindblom 1959; Anderson 1979; Pinkerton *et al.* 2002). Rational economic approaches are valuable because they make the objective, constraints and trade-offs explicit and they can help to identify those allocations that yield the greatest benefit for the least expenditure.

Other priority-setting frameworks are based on acceptability, ethics and equity, including 'benchmarks of fairness' (Caplan *et al.* 1999) and 'accountability for reasonableness' (Daniels and Sabin 1997), which are criteria used to assess whether a given allocation is deemed equitable and reasonable. Programme budgeting and marginal analysis can be used to shift resources and minimize disruptions to existing allocation patterns (Mitton and Donaldson 2003). Previous studies have examined specific resource allocation processes, including priority setting for cancer and cardiac care in Ontario (Singer *et al.* 2000), priority setting for funding new cancer drugs in Ontario (Martin *et al.* 2001), the prioritization process associated with admissions to the intensive care unit of a hospital (Mielke *et al.* 2003) and the resource allocation techniques in three Canadian regional health authorities (Mitton and Donaldson 2002). Bate *et al.* (2007) studied how decision-makers of the English National Health Service manage health-care prioritizations and conclude that health economists must appreciate the importance of contextual factors and the complex realities of priority setting. Bollinger and Stover (2000) interviewed the National AIDS Control Program managers of 14 countries to ascertain how decisions are made and what tools they could use. A recent study of resource allocation practices within the National AIDS Control Program of Pakistan reveals that incremental budgeting and gut feeling are important determinants of allocation, while formal decision-making tools are not used due to lack of technical knowledge (Husain *et al.* 2007).

To our knowledge, there is no empirical study of the resource allocation process for HIV/AIDS prevention and treatment funds in sub-Saharan Africa at the local government level. This descriptive study explores the decision-making

process for allocating HIV resources by addressing the following three questions in the context of a municipality in South Africa: what is the decision-making process for HIV/AIDS resource allocation? what factors influence the resource allocation process? and how are decision-making support tools or frameworks used in HIV/AIDS resource allocation? This study was motivated by the need for a better understanding of how priority-setting tools for health-care resource allocation could be made more useable and useful to decision-makers.

Methods

Setting

South Africa is a middle-income, industrialized country with an estimated population of 49 million (Statistics South Africa 2009). It is divided into nine provinces; the provinces are divided into districts, and these are further divided into municipalities. Approximately 5.2 million people in South Africa are living with HIV and, as of 2009, the adult prevalence rate is 17% (Statistics South Africa 2009). The province of KwaZulu-Natal comprises 10 districts, including the District of iLembe. According to the 2007 survey of women attending antenatal clinics, HIV prevalence in iLembe is estimated at 41.5% (National Department of Health, South Africa 2008). Our study is focused on KwaDukuza, one of four municipalities in the District of iLembe, with a population of 172 000 (KwaDukuza Municipality 2007).

The government of South Africa's consolidated expenditure is estimated at US\$110 billion for 2009–10 (Department of National Treasury, South Africa 2008). According to the 2009 budget, 4% of government expenditure is allocated to the department of defence, 9% to public order and safety, 17% to education, 14% to social protection, 9% to housing and 10% to health (Department of National Treasury, South Africa 2008).

According to the National Health Act adopted in 2004, the National Department of Health is responsible for identifying health goals and priorities, formulating health policy, and developing health and human resources plans (Republic of South Africa 2004). The national government finances HIV/AIDS programmes through grants to the provinces. Provincial health departments are responsible for planning human resources for the rendering of health services, controlling the quality of health services and establishing mechanisms for the funding of health services within the province. Most of the actual disbursements happen at the provincial level. Districts and municipalities act as the health-care delivery arm for the province and claim their expenses from the province (Republic of South Africa 2004).

The total allocation to HIV and AIDS is US\$1.5 billion including allocations to the departments of health, education and social development (IDASA 2009). By the end of 2008, 630 775 people living with AIDS in South Africa had been started on antiretroviral therapy, while it is estimated that ~1.7 million people are in need of antiretroviral therapy (IDASA 2009).

Data collection

We used key informant interviews to explore perceptions of the HIV/AIDS resource allocation process in KwaDukuza: how the decisions are made; what factors influence the process; and whether formal resource allocation methods are employed. We conducted the interviews over a 6-week period during March and April 2005. Interview respondents were selected from organizations providing publicly funded programmes and from non-governmental organizations (NGOs) (Table 1). We obtained a preliminary list of potential interview respondents by an initial contact. At the completion of each interview we asked the respondents to suggest additional interview respondents. We stopped seeking interview respondents when no new names were given. Of 36 potential interviewees contacted, 35 (97%) agreed to participate. There are a small number of privately owned and managed health-care institutions in the area. However, they are only accessible to a small portion of the population and were not included in the study.

All interviews were conducted in person by a single interviewer [AL] and recorded following approval from the interview respondents. Two of the interviews were conducted with three respondents simultaneously, one with two respondents and the remaining 28 interviews were conducted ‘one on one’. The interview schedule consisted of semi-structured and open-ended questions (Box 1) developed to allow respondents to fully communicate the complexity of their resource allocation problems and constraints. The ordering of questions varied and follow-up confirmatory questions were added as necessary to guide the interview in an informal but meaningful manner (Bate *et al.* 2007).

The interviews lasted approximately 1 hour and took place at the respondent’s place of work. We audio-recorded 26 hours of interviews which were transcribed verbatim into over 500 pages of text.

Allocations to HIV/AIDS programmes are not centralized and several types of organization take part in the process: 46% of our interview respondents were from the government; 34% were from NGOs [including local community-based organizations, national or international NGOs and faith-based organizations (FBOs)]; 14% were academic researchers; and 6% were

from advocacy groups. The respondents represented different geographical levels: 59% represented the municipal level, 9% the district, 6% the province, 9% the national level and 17% of the interview respondents could not be classified in terms of their geographical representation (e.g. academics, international NGOs).

Data analysis

Interview transcriptions were used as the basis for our qualitative data analysis. A constant comparative approach was used to identify themes and sub-themes recurring in the text (Hewitt-Taylor 2001). All transcriptions were uploaded to QDA Miner, a software package for coding textual data, annotating and reviewing coded data and documents (Provalis Research 2004). Transcripts were read three times by one of the authors [AL]: once to create a hierarchy of codes representing the emerging themes and sub-themes and twice to assign portions of the text to the codes to which they correspond (Crabtree and Miller 1992). The final coding structure contained a total of 58 codes organized in four categories: situation analysis, HIV/AIDS programmes, resource allocation and influencing factors. A total of 920 segments were coded. On average, each code appeared in eight different transcriptions and occurred 16 times. The coding structure was validated through joint data sessions between the authors in order to review and revise the themes and ensure that the text supported the analysis (Bate *et al.* 2007). Preliminary

Table 1 Interview respondent profile

	% of interview respondents
Organization type	
Government	46
NGOs	34
Academia	14
Advocacy group	6
Organization level	
Municipal	59
District	9
Provincial	6
National	9
Other ^a	17

^aIncludes respondents who could not be classified in terms of their geographical representation (e.g. academics, workers at international NGOs).

Box 1 Interview questions

- (1) What are the main HIV/AIDS programmes that are currently implemented in KwaDukuza and who is running these programmes?
- (2) Can you describe the sources of funding behind the implementation of these programmes and how the funding is channelled to the programmes?
- (3) Within the context of KwaDukuza, who decides which HIV/AIDS programmes should receive funding, and how much funding each programme should receive?
- (4) How are HIV/AIDS funds allocated among the different intervention programmes that are funded?
- (5) How does a specific HIV/AIDS intervention programme come to be considered for funding?
- (6) How is the decision to fund a programme related to the anticipated results of that programme?
- (7) What types of data are analysed when deciding how to allocate the budget?
- (8) How do external factors influence the funding of the different HIV/AIDS programmes?
- (9) There are tools, software or spreadsheet forms, available to support the decision-making process for allocating funds to HIV/AIDS programmes. Are they used and why or why not?
- (10) Is there anything we haven’t discussed which you feel would be relevant to help me better understand HIV/AIDS programme funding in KwaDukuza?

results were presented in several scientific forums including the XVI International AIDS conference and the INFORMS 2005 annual meeting where validity was confirmed (Lasry *et al.* 2006).

This study was approved by the HIV/AIDS Research Ethics Board of the University of Toronto and the Research Ethics Board of the University of Western Ontario. Each interview respondent was ensured complete confidentiality.

Results

HIV and AIDS programmes in KwaDukuza

HIV/AIDS programmes are delivered through nine public primary health-care clinics and one public hospital, as well as FBOs, community-based organizations and large NGOs. Generally, programmes involving clinical or medical elements such as voluntary counselling and testing (VCT), antiretroviral therapy (ART), prevention of mother-to-child transmission (MTCT) and wellness are provided by the government through the public health-care system. However, some community-based organizations offer VCT and limited forms of wellness programmes, and one FBO funded by an international religious organization is providing ART, home-based care (HBC) and programmes for orphans and vulnerable children. Care and support components, such as HBC, programmes for orphans and vulnerable children, support groups and income generation programmes, are delivered mainly by NGOs, although the main public hospital also conducts support groups. Efforts to promote HIV/AIDS awareness and education are undertaken by most organizations. Condom distribution is managed by a national government programme that makes condoms widely available throughout KwaDukuza at no charge to the public.

Influencing factors for resource allocation

The codes and categories were analysed and regrouped into three larger sets: formal resource allocation techniques, or methods, used either by governmental or non-governmental decision-makers; players consisting of persons or groups that influence allocation decisions; and intangibles or factors that are not easily measurable but have a substantial influence on HIV/AIDS resource allocation.

Techniques

Governmental organizations and large national or international NGOs tend to use one set of more formal techniques while local FBOs and community-based organizations tend to use a different set of informal techniques, although not all techniques are used in all decision-making situations or by all types of organization (Table 2).

For governmental organizations and large NGOs, the HIV/AIDS resource allocation process typically begins with the selection of programmes that should be implemented in a community or a population. They often begin by examining population input data, which consist mainly of population projections and HIV/AIDS prevalence and incidence rates by gender and/or age group.

Table 2 'Techniques' influencing the resource allocation process

Types of technique	No. of code occurrences, <i>n</i> (%)	% of occurrences from government and large NGOs
Input data	35 (16)	86
Effectiveness or cost-effectiveness	32 (15)	78
Target setting	26 (12)	88
Priority setting	19 (9)	95
Costing	16 (7)	94
Equity	11 (5)	82
Last year	8 (4)	75
Rational economic model	6 (3)	100
Apparent need	34 (16)	26
Best practice	6 (3)	50
Proposal submission	21 (10)	33
Total code occurrences	214 (100)	67

Equity-based criteria can be applied to allocate HIV/AIDS resources between regions according to disease prevalence rates or between clinics according to their workload. Also, national and provincial governments may perform a priority-setting exercise where the selected programmes are ranked. For example, there has been more emphasis on education programmes than on programmes aimed at commercial sex workers. This information may drive the choice of programmes that are relevant to the affected population.

Once the programmes are selected, governmental bodies and large NGOs then determine the level of resource allocation to each programme. One commonly used technique is target setting, where specific penetration rates for interventions are set as goals. When priorities are set by the national government, they are cascaded through the spheres of government and more specific target levels are set depending on local population size and disease prevalence (iLembe Health District 2008). For example, the district health office establishes quantifiable objectives about the number of facilities offering VCT services, the number of people on ART, the adherence rate of those on treatment, and other factors. Then a costing exercise, aimed at estimating the cost of implementing the programmes, may be performed. For example,

"...we look at what personnel are needed for those interventions. We've done a lot of costing studies so that we know the average cost of these different types of services in the primary care environment. And we've worked out what it will cost to provide that health care package." (ID36, Female, Academia)

They may also seek information on the effectiveness and cost-effectiveness associated with the different HIV/AIDS programmes considered. For example, a government employee said:

"Then our main criteria was cost-effectiveness... So, on the mother-to-child prevention programme, for example, we calculated that it would be, let's just say it was something like 5000 rand per child infection. We used the international assessment of what effectiveness would be... In a South African context, 5000 rand or

thereabouts to prevent an AIDS infection is affordable. And in this kind of country we wouldn't want to see a child dying of AIDS because of 5000 rand." (ID28, Male, Government)

In some instances, a rational economic model is used to compare programme outcomes, although the results are not necessarily used to support resource allocation decisions. For example,

"...we tried to be fairly scientific about our approach and non-political so-to-speak. Although that was quite difficult because of the contested nature of the terrain, where virtually any kind of intervention was perceived to be political. But we tried to look at things in a fairly standard, I suppose, health-economic approach. . . . But one of the biggest problems has been the difficulty in moving from that kind of health-economic approach to the actual implementation. One of those is, for example, which I mentioned earlier, is the sex-workers programme issue, which in a model like [software package], a sex-worker programme with high frequency transmitter intervention approach is a powerful intervention, it affects the numbers in the model, but for a whole range of other reasons, getting such a programme to run or even to be seriously considered has been not easy." (ID28, Male, Government)¹

For subsequent planning efforts programme selection and resource allocation are largely influenced by last year's programme selection, last year's budget and last year's source of funding, and any changes are incremental. For example, one respondent stated:

"Mainly we use the previous year's figures, and we just add on a certain set increase. We compare the previous year and the activities of the grants. . . . Towards the end of every financial year, we submit an estimate to say: 'this year I've spent so much', so you consider inflation and say 'next year I'll be needing so much'..." (ID22, Female, Government)

Community-based organizations and local FBOs tend to use less formal techniques. First, they assess the apparent needs of a community. This is usually based on their direct experience with that community. One respondent described how she converted her daycare centre into an orphanage when a number of the children were orphaned by AIDS. Another respondent explained how volunteers in a HBC programme noticed that children were being left behind after patients in the HBC programme died, so the organization initiated a programme for orphans and vulnerable children. Community-based organizations and FBOs might also look into what other communities have done to address these needs and copy these best practices. For example, an income generation programme involving beading and sewing in KwaDukuza was designed based on the publicized success of such a programme in the town of Hillcrest.

Most of the community-based organizations and FBOs studied would establish the resource requirements for implementing the selected programmes and then submit proposals, whether solicited or not, to potential donors until one or more sources of funds are identified. Programmes run by local community-based organizations are typically funded by

several sources. For example, a HBC programme run by a community-based organization was successful in receiving some grant funding from the provincial department of health and a lump sum donation from a foreign AIDS foundation, while the neighbouring church supplies them with vitamins and antibiotics on an ongoing basis.

We observed that people tend to use different resource allocation techniques and no gold standard is applied. Also, the applicability and value of each technique is related to several factors including the type of organization, its reliance on external funding and the availability of data. Therefore, we are unable to suggest a way of weighting the importance of the various techniques described. We have proposed elsewhere a method that incorporates formal quantitative resource allocation modelling as well as the more qualitative influential factors into the decision-making process (Lasry *et al.* 2008).

Players

Table 3 lists the types of players that exert an influence on resource allocation decisions and highlights the number of code occurrences associated with each type of player that appeared in the transcribed interviews.

Donors tend to have their own preferences about which programmes they want to fund and they may earmark their funds to those programmes. One respondent representing an international NGO that acts as a donor qualified the organization as "quite aggressive" and "pretty pushy", saying that they would not let others' suggestions "divert us too much from what we're trying to achieve". Another respondent from the local government described how donors approached them to fund an orphanage. After some discussions with the donor, the local government "bought into the idea of the orphanage". A respondent from an organization receiving funding said:

"Sponsor's [sic] have got their own terms. . . for example, you can't use any generic drugs; like [the donor] which sponsors us, they basically allow only for the use of brand name drugs." (ID21, Male, NGO)²

A respondent from a public health institution said:

"[The donor] has got it into their heads that they must give us [lab equipment]. Fine, if that's what they want to do with their bucks, I don't see it as a sensible way to spend money. . . . I would

Table 3 'Players' that influence the resource allocation process

Type of player	No. of code occurrences (%)
Donors	34 (30)
Advocacy groups	22 (19)
Courts	19 (17)
Government	15 (13)
Local communities	15 (13)
NGOs	7 (6)
Media	3 (3)
Total code occurrences	115 (100)

put the money in an adherence programme. I would put it in a monitoring and evaluation system. I would beef up my psychosocial team... if they want to give us [lab equipment], ok, I don't see you must ever look a gift horse in the mouth." (ID3, Female, Government)²

Advocacy groups in South Africa have been instrumental to the provision of nevirapine for prevention of MTCT and the roll-out of antiretrovirals. In KwaDukuza, members of the Treatment Action Campaign lobbied for an HIV support group at the Stanger Hospital, which now holds weekly meetings. Local NGOs in KwaDukuza have created a networking forum that acts as an advocacy group. Some are pressuring the department of education to prevent orphans from being excluded from school for not paying fees.

When the influence of advocacy groups on government subsided, the courts of South Africa ordered the government to provide ART to AIDS patients on the grounds that not doing so was a violation of human rights. According to one interviewee:

"The constitution is a particularly important vehicle... people will rely on constitutional arguments. So that strengthens the hand of civil society. So that's really important and that doesn't happen in a lot of other countries because they don't have the same kind of rights entrenched in the constitution." (ID17, Female, Academia)

The government itself exerts a top-down influence on lower levels of government. Several interview respondents from the municipal government mentioned that the national or provincial government imposes HIV/AIDS programmes. For example, an official from the provincial government advised a public health-care facility that they would soon begin to dispense ART. A respondent from that facility then claimed:

"There's obviously going to be a big strain on the clinic with regards to workload... But when the programmes are sent down from Province there's not much we could say." (ID31, Female, Government)

Another respondent from a health-care facility described the government's ART rollout plan thus:

"In practice the Province decides or the National government decides; now in this instance, the courts decided. The Treatment Action Campaign took the government to court. And the government said to us 'you will do an antiretrovirals programme'. So, the government didn't have any option and so they got their national team together and they produced the plan. And in that plan it says all the things that you must do. And that's basically what we follow... It will also even talk about strategies and all those kinds of things. So, we follow it... Those big philosophical decisions about how to prioritise don't bother you much at this level..." (ID3, Female, Government)

Local communities influence NGOs to provide for needs not met by the public health-care system. They can also voice their concerns to their ward or municipal councillors. A municipal

employee described her interactions with the community in saying:

"People are dying in numbers; there is a lot of them that we are coming across. And the grannies are moaning that they don't have strength. Those things put pressure on us... I also visit churches to address communities on HIV because – that's where we've heard a good number of people. So many people phone me and said I'm HIV positive, I don't want to tell my family, but after hearing what you are saying, I've decided now to tell to my family but I need more advice on how to go about it." (ID2, Female, Government)

Some HIV/AIDS programmes are initiated by local NGOs, as in the case of community-based organizations running HBC programmes. In KwaDukuza, several community-based organizations and FBOs formed a networking forum to share their experiences and successes. Members of the forum have been elected as representatives to the KwaDukuza municipal HIV/AIDS council. A respondent from the municipality stated:

"NGOs who are dealing with HIV and AIDS put some pressure or impact on the decisions we are taking... they come to the Council to make presentations to the Council. Some of them will come to the Council because they want resources; they want a small piece of land; or they want to make use of a space; or a municipal hall; and all those things." (ID19, Male, Government)

The media, though not an organized body, are a vehicle for publicizing community concerns and needs. Press coverage and international headlines have acted as a catalyst resulting in the mobilization of other players such as advocacy groups and communities who in turn exert an important influence on the allocation of HIV/AIDS resources. For example, one respondent described an incident where a public hospital officer was dismissed for insubordination for helping an NGO provide ARTs to rape survivors; this occurred before the national ART rollout plan was announced. Press coverage of this incident generated significant controversy resulting in a withdrawal of the charges of misconduct and insubordination.

Intangibles

Many intangible factors have a significant influence on the resource allocation process in KwaDukuza (Table 4). These factors are rarely described explicitly as part of the rationale underlying the decision-making process for resource allocation.

Table 4 Intangible factors that influence the resource allocation process

Intangible factor	No. of code occurrences (%)
Political power	29 (25)
Capacity	26 (22)
Relationships	19 (16)
Culture and religion	16 (14)
Leadership	16 (14)
Ethics	10 (9)
Total code occurrences	116 (100)

Political power bears a strong influence on resource allocation. For example, two of the main political parties in South Africa are the African National Congress (ANC) and the Inkatha Freedom Party (IFP). KwaDukuza historically votes ANC while the District of iLembe votes IFP. One respondent expressed his frustration with this situation:

"We are answerable to iLembe. iLembe is IFP and iLembe wants all the credit... But if we want money, we have to go to iLembe for money... we're ANC, this KwaDukuza municipality—do you really believe that they're going to give us money?" (ID16, Male, NGO)

Another respondent voiced a similar opinion:

"As an NGO, because you're dealing with KwaDukuza on the one hand and you got iLembe on the other side—not talking to each other; both have different funding capabilities and so it's sort-of-political wranglings, and I think the NGOs and the FBOs they just disappear in those political manoeuvrings." (ID18, Female, NGO)

Another example is related to the accreditation process for rolling out antiretroviral medicines. Several interview respondents felt the accreditation process at some health-care facilities was precipitated in order to meet the targets set by the provincial government.

Capacity issues were cited several times as an impediment to the implementation of programmes, including references to the lack of health-care workers, managerial skills, medical equipment, infrastructure and facilities. As one respondent expressed:

"...the health system is bleeding nurses and health care workers in a big way; to the private sector; to overseas; to a lot of them dying of AIDS; and a lot of them just being very disenchanted with the health care system and leaving it completely. And the reason for that is poor conditions of service in the health care system... primarily due to under-funding..." (ID12, Male, Advocacy)

Relationships at both the personal and organizational level may promote or impede resource allocation. For example, a respondent from a community-based organization said about an employee of a local government health office:

"She's been very obstructive to our project. One minute, she's best friends with you and then the next minute you're not. You never quite know where you are as an NGO with the Department of Health. And I think that's been very difficult..." (ID1, Female, NGO)

Another respondent from a community-based organization described how they developed a symbiotic relationship with a hospital in which the hospital refers patients to the community-based organization for HBC and the organization refers their patients to the hospital for wellness and treatment programmes.

Religious and *cultural* factors were highlighted many times. For example, in KwaDukuza, HIV/AIDS programmes aimed at sex

workers are nonexistent because the culture shuns commercial sex. One respondent indicated that South Africans tend to show dedication and deference to their leaders:

"We are normally loyal with what is said by people that is in the higher ranks of us. As African people, if a king is saying something, I've got to obey—I've got to be so much faithful to the king... it creates some barriers... it's quite difficult to come out clearly saying that my leader is wrong now." (ID20, Male, Advocacy)

Some FBOs condemn the use of condoms and in some cases sexual activity. One respondent said:

"I believe that there should be big billboards up that are talking about how sex transmits death. You know, really get down to the bottom of it and really make people aware that sexual activity is likely to bring about HIV/AIDS." (ID16, Male, NGO)

These types of opinion conflict with the messages used by the local government and other NGOs in their awareness and education campaigns. As a result, the *relationship* between the local government health office and some FBOs is antagonistic, thereby disturbing the allocation of resources.

The foundation of some FBOs is to rely on prayer and faith in God as a means for decision-making. In reference to identifying sources of funding, one respondent said:

"Well for us, obviously being a faith-based organization, there's a lot of trust that God's going to provide the funding coming through." (ID18, Female, NGO)

Another respondent said:

"There is God and he's got the bigger plan in his head and he knows what he wants and how he's going to get it. And all we can do is just try as best we can. That's all we can do and the rest of it is in His hands." (ID16, Male, NGO)

Many respondents mentioned the government's lack of *leadership* in confronting HIV/AIDS. They attributed the slow adoption of programmes like the prevention of MTCT and the ART rollout to the leadership's dissident stance on HIV/AIDS.

A KwaDukuza HIV/AIDS Council, chaired by the mayor, has been established. The council is a multi-stakeholder forum aimed at raising HIV/AIDS-related issues and coordinating efforts. The council meets monthly but attendance is poor; meetings are frequently cancelled and rescheduled due to the absence of key stakeholders. This is widely interpreted as a lack of leadership and commitment to tackling the HIV/AIDS issues in KwaDukuza. Minutes of the KwaDukuza HIV/AIDS Council meetings suggest that the council is occupied with administrative issues such as correcting spelling mistakes of the previous meeting's minutes and reiterating the code of conduct for the council. Representatives from NGOs, community-based organizations and FBOs indicated their frustration with the council and its bureaucratic structure; they have complained that the council is not receptive to their proactive recommendations.

Finally, many respondents felt that *ethical considerations* made it inappropriate to use affordability or cost-effectiveness to drive the resource allocation process. An official from the Department of Health expressed the moral obligation as follows:

"[Prioritizing] It's very difficult... In a sense, you need to play God. You need to say that certain programmes have more priority than others. I would divide my money up a lot more to prevention than what we've been doing... But the curative part that's the thing that's keeping us going. It's the fact that for the first time we can see people laughing and smiling and going on with their lives, and they know that they're not sentenced to death. It's very, very hard to prioritise... I think that ultimately what we're just going to make is almost like a philosophical decision... It's made easier in a way for us by the fact that not everybody will be eligible for the treatment." (ID3, Female, Government)

Another respondent stated, in reference to HIV/AIDS resource allocation:

"...it's all been taken over by technocists [sic]; and operations researchers and maximizers and this and that. I don't want to live in a society where we decide that the value of your life isn't worth it... This is not right." (ID30, Female, Academia)

Discussion

We sought to answer three research questions in this study. The first was 'What is the decision-making process for HIV/AIDS resource allocation?' Our analysis revealed several important insights. For governmental organizations and international or national NGOs, the resource allocation process begins with the selection of HIV/AIDS programmes and is based on available data. Once the programmes are selected, they use further techniques to determine the funding level for each programme. For local community-based organizations or NGOs, the selection of HIV/AIDS programmes is driven by their experiences in the field; they then submit proposals to identify funding sources. Governmental organizations and large NGOs tend to use more formal techniques, while local community-based organizations and FBOs tend to be less formal and more opportunistic. Also, initial planning efforts tended to be more thorough than subsequent planning efforts, which were often based on historical spending trends. In local community-based organizations and FBOs, allocation decisions tend to be made internally by the organization's director aided, where applicable, by finance and programme managers. At the local government level in KwaDukuza, hospital and clinic managers are the main decision-makers; they are influenced in part by donors and by meeting their portion of the district's target levels. Albeit ad hoc, there is an attempt to coordinate HIV/AIDS services between health-care facilities and community-based organizations.

The second question was 'What factors influence the resource allocation process?' We found that external individuals and organizations, as well as a number of intangible factors, have a strong influence on decision-making. In many instances their influence was stronger than that of the formal planning

exercises undertaken by decision-makers and placed constraints on the types of decision that could be made.

The third question was 'How are decision-making support tools or frameworks used in HIV/AIDS resource allocation?' No respondents representing small organizations or local level decision-making mentioned the use of such formal techniques. The one respondent who did indicate the use of rational economic models was from a national level organization. This respondent used epidemiological and cost-effectiveness models but did not use other methods including operations research techniques or other frameworks.

We conducted a search in PubMed using the search terms 'resource allocation', 'model' and 'HIV'. We found 29 references containing all three terms detailing mathematical models intended to be useful for decision-making. However, only one of the references consider the factors identified in this study and these are clearly important to decision-making (Lasry *et al.* 2008). The factors and processes uncovered in this research may lead to improved methods of resource allocation. Resource allocation methods that include a thorough understanding of the current allocation process, the stakeholders involved and their influence on the allocation are likely to yield recommendations that are useful and attuned to the context within which resource allocation decisions are made. The current allocation of resources in KwaDukuza and the results of an improved allocation are discussed elsewhere (Lasry *et al.* 2008). In general, a cost-effectiveness-based approach applied in KwaDukuza would encourage increasing the allocation to condom distribution and treatment of sexually transmitted infections (Lasry *et al.* 2008).

As with all case study research, our results are limited to the setting in which they were conducted. However, we believe that they are likely applicable to other municipalities in South Africa given the similarity in backgrounds. Our results are similar to those of Bollinger and Stover (2000), who interviewed the National AIDS Control Programme managers of 14 countries, including South Africa. Both studies demonstrate that donors exert a strong influence on the decision-making process for HIV/AIDS resources, that past allocations are an indicator of current allocations and that legal, political and ethical considerations are determinants of HIV/AIDS resource allocation patterns (Bollinger and Stover 2000).

Further, our results are consistent with other descriptive studies of health-care priority setting. In an evaluation of priority setting for reproductive health in Ghana, researchers concluded that political attention trumped available scientific and economic evidence in terms of the priority given to breast cancer over cervical cancer (Reichenbach 2002). Reichenbach determined that leadership, advocacy, media attention, culture and political issues affect priority setting (Reichenbach 2002). An analysis of health-care priority setting in Canada, Norway and Uganda determined that, in all three countries, previous allocations, advocacy, external pressures and, in the case of Uganda, international development organizations, are among salient considerations in the priority-setting process (Kapiriri *et al.* 2007). Though costs and efficiency are used to create guidelines, these are often overridden by public pressures and lobbying (Kapiriri *et al.* 2007). In addition, priority-setting decisions are disseminated to the public, but the reasons behind the decisions are not provided (Kapiriri *et al.* 2007).

Our study has limitations. Our method of sampling interview respondents may have resulted in a non-representative sample. However, due to the nature of the information sought, we could not draft an exhaustive list of potential interview respondents from which to draw a random sample. We did not have access to decision-makers at privately owned and managed health-care institutions. Therefore, they were excluded from our study. However, there are few privately managed medical clinics in KwaDukuza and the vast majority of the population in KwaDukuza does not have private medical insurance.

Our study contributes to the identification of important factors that are an integral part of the decision-making process for resource allocation. By highlighting these factors, we expose the gap between the state of the art in resource allocation modelling and the realities that decision-makers are faced with in their actual decision-making processes. Without a thorough understanding of existing decision-making processes, it is unlikely that formal resource allocation models can be made easily portable to any real decision-making situation.

In this study, we explored the decision-making process for allocating HIV resources in KwaDukuza. We observed that in addition to formal resource allocation techniques, many political, social and ethical factors as well as players such as donors, media and community groups have a strong influence on the allocation of HIV funds. If models are to be used, they should account for the influence of external factors; we recommend resource allocation methods that take into consideration both principles of efficient resource allocation and the role of non-quantifiable influences on the decision-making process. We refer the reader to the description of a rational economic model for resource allocation embedded in a decision-support framework that includes an analysis of the external factors that influence the process (Lasry *et al.* 2008). We believe that an understanding of the influencing factors highlighted in this study can lead to improved allocation decisions.

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Endnotes

- ¹ The name of the software package has been kept confidential to protect the identity of the respondent.
- ² The name of the donor and type of equipment are concealed to maintain confidentiality of the donor and the respondent.

References

Anderson JE. 1979. *Public Policy-Making*. New York: Holt, Rinehart and Winston.

Bate A, Donaldson C, Murtagh MJ. 2007. Managing to manage healthcare resources in the English NHS? What can health

economics teach? What can health economics learn? *Health Policy* **84**: 249–61.

Bollinger L, Stover JM. 2000. *How do AIDS Control Program Managers Make Resource Allocation Decisions?* Glastonbury, CT: The Futures Group International.

Caplan RL, Light DW, Daniels N. 1999. Benchmarks of fairness: a moral framework for assessing equity. *International Journal of Health Services* **29**: 853–69.

Crabtree B, Miller W. 1992. *Doing Qualitative Research*. Newbury Park, CA: Sage.

Daniels N, Sabin J. 1997. Limits to health care: fair procedures, democratic deliberation and the legitimacy problem for insurers. *Philosophy & Public Affairs* **26**: 303–50.

Department of National Treasury, South Africa. 2008. *2009 Budget Highlights*. Pretoria: Department of National Treasury, Government of South Africa.

Flessa S. 2003. Decision support for AIDS control programmes in eastern Africa. *OR Spectrum* **25**: 265–91.

Hewitt-Taylor J. 2001. Use of constant comparative analysis in qualitative research. *Nursing Standard* **15**: 39–42.

Holtgrave DR. 1998. The cost-effectiveness of the components of a comprehensive HIV prevention program – a roadmap of the literature. In: Holtgrave DR (ed.). *Handbook of Economic Evaluation of HIV Prevention Programs*. New York: Plenum Press.

Husain S, Kadir M, Fatmi Z. 2007. Resource allocation within the National AIDS Control Program of Pakistan: a qualitative assessment of decision maker's opinions. *BMC Health Services Research* **7**: 11.

IDASA. 2009. *HIV and AIDS analysis of the South African national budget (2009/10)*. Cape Town: IDASA - Institute for Democracy in South Africa.

Ilembe Health District. 2008. *District Health Plan 2008/2009*. KwaDukuza, South Africa.

Kapiriri L, Norheim OF, Martin DK. 2007. Priority setting at the micro-, meso- and macro-levels in Canada, Norway and Uganda. *Health Policy* **82**: 78–94.

Kaplan EH. 1998. Economic evaluation and HIV prevention community planning: a policy analyst's perspective. In: Holtgrave DR (ed.). *Handbook of Economic Evaluation of HIV Prevention Programs*. New York: Plenum Press.

Kaplan EH, Pollack HA. 1998. Allocating HIV prevention resources. *Socio-Economic Planning Sciences* **32**: 257–63.

KwaDukuza Municipality. 2007. *Integrated Development Plan 2007/08*. KwaDukuza, South Africa.

Lasry A, Carter MW, Zaric GS. 2008. S4HARA: system for HIV/AIDS resource allocation. *Cost-effectiveness and Resource Allocation* **6**: 7.

Lasry A, Zaric GS, Carter MW. 2006. What factors influence the funding of HIV/AIDS programs in kwaDukuza? *XVI International AIDS Conference, Toronto*. Abstract Number MOPE0713.

Lasry A, Zaric GS, Carter MW. 2007. Multi-level resource allocation for HIV prevention: a model for developing countries. *European Journal of Operational Research* **16**: 786–99.

Lindblom C. 1959. The science of "muddling through". *Public Administration Review* **XIX**: 79–88.

Martin DK, Pater JL, Singer PA. 2001. Priority-setting decisions for new cancer drugs: a qualitative case study. *The Lancet* **358**: 1676–81.

Martin DK, Singer PA. 2003. A strategy to improve priority setting in health care institutions. *Health Care Analysis* **11**: 59–68.

Mielke J, Martin DK, Singer PA. 2003. Priority setting in a hospital critical care unit: qualitative case study. *Critical Care Medicine* **31**: 1–5.

- Mitton C, Donaldson C. 2002. Setting priorities in Canadian regional health authorities: a survey of key decision makers. *Health Policy* **60**: 39–58.
- Mitton C, Donaldson C. 2003. Tools of the trade: a comparative analysis of approaches to priority setting in healthcare. *Health Services Management Research* **16**: 96–105.
- Nagelkerke NJD, Jha P, de Vlas SJ *et al.* 2002. Modelling HIV/AIDS epidemics in Botswana and India: impact of interventions to prevent transmission. *Bulletin of the World Health Organization* **80**: 89–96.
- National Department of Health, South Africa. 2008. *The National HIV and Syphilis Prevalence Survey 2007*. Report. Pretoria: Department of Health, Government of South Africa.
- Pinkerton SD, Johnson-Masotti AP, Derse A, Layde PM. 2002. Ethical issues in cost-effectiveness analysis. *Evaluation and Program Planning* **25**: 71–83.
- Pinkerton SD, Johnson-Masotti AP, Holtgrave DR, Farnham PG. 2001. Using cost-effectiveness league tables to compare interventions to prevent sexual transmission of HIV. *AIDS* **15**: 917–28.
- Provalis Research. 2004. *QDA Miner version 1.2. 1.2*. Montreal: Provalis Research.
- Rauner MS, Brailsford SC, Flessa S. 2003. Using discrete event simulation to select affordable intervention programs for vertical HIV transmission in developing countries. In: Anderson J, Katzper M (eds). *Proceedings of the 2003 International Conference on Health Sciences Simulation*. USA.
- Reichenbach L. 2002. The politics of priority setting for reproductive health: breast and cervical cancer in Ghana. *Reproductive Health Matters* **10**: 47–58.
- Republic of South Africa. 2004. National Health Act, Act No. 61 of 2003. *Government Gazette*. Cape Town.
- Singer PA, Martin DK, Giacomini M, Purdy L. 2000. Priority setting for new technologies in medicine: qualitative case study. *British Medical Journal* **321**: 1316–8.
- Statistics South Africa. 2009. *Mid-year population estimates*. Pretoria.
- UNAIDS. 2009. *What Countries Need: Investments Needed for 2010 Target*. Geneva: UNAIDS.
- Zaric GS, Brandeau ML. 2001. Optimal investment in a portfolio of HIV prevention programs. *Medical Decision Making* **21**: 391–408.
- Zaric GS, Brandeau ML, Bayoumi AM, Owens DK. 1998. The effect of protease inhibitors on the spread of HIV and the development of drug resistance: a simulation study. *Simulation* **71**: 262–75.