

# HIV/AIDS, artisanal fishing and food security in the Okavango Delta, Botswana

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## Abstract

Generally, rural households pursue all year round natural and non-natural resource-based livelihood systems to diversify these options in order to cope with risks emanating from a range of shocks and stressors. Artisanal fishing in the Delta is not only a major livelihood option but also a source of food security. This paper is based on analysis of primary data collected from a survey of 248 subsistence fishers' households through simple random sampling in 22 villages in the Delta. The overall objectives of the survey were to assess the general prevalence of HIV/AIDS in the Ngamiland district of Botswana, to investigate potential effects of AIDS-related stressors, particularly chronic illness on artisanal fishing activities, and to assess implications towards food security. Results from this study indicate that HIV prevalence rates for pregnant women attending antenatal clinics in the Delta are approximately 30% and are related to factors such as marriage, education, and employment. Despite this relatively high prevalence percentage, most of the affected households do not have adequate access to HIV/AIDS support facilities. Support services are provided on the basis of population size and/or status of the settlement (i.e. urban, urban village, rural or remote). Therefore, since about 50% of the Delta's population lives in settlements of less than 500 people, they receive health services indirectly through major population centres whose capacity to deliver timely HIV/AIDS services is limited. This disproportionate access to HIV/AIDS services disadvantages the majority of fishing communities in the Delta, and may affect their ability to fish. Moreover, about 53% of sampled households had cared for a continuously ill person/s (CIP's) in the last 5 years, out of which approximately 29% felt that this seriously impacted fishing activities. These serious impacts included sale of family assets, depletion of savings, and switching or abandoning fishing activities. Subsequently, household food security is seriously affected because fish provides a significant proportion of food to CIP households where approximately 55% of households get their food from fish products. During food shortages, CIP households resorted to a hierarchy of strategies which included cutting down on meals or reducing meal portions, looking for paid work, gathering wild fruit, asking for food from relatives, selling livestock, and getting social assistance. In conclusion, artisanal fishing is a natural safety net which constitutes an important buffer for households affected by HIV/AIDS-related stressors in the Okavango Delta. Access to fish helps these households mitigate potentially adverse impacts such as deterioration into chronic poverty.

*Keywords:* Artisanal fishing; Okavango Delta Botswana; HIV/AIDS; Food security

## 1. Introduction

The negative impacts of HIV/AIDS across all sectors of the Botswana economy has been well documented (Central Statistics Office (CSO), 2002, 2004). However, positive strides have also been made since the first AIDS case in

Botswana was diagnosed more than 20 years ago. These include the advent of antiretroviral drugs (ARV) treatment which has prolonged life, the prevention of transmission from mother to child (PMTCT) reduced cases of infant HIV infections, more people seeking voluntary testing and counselling which makes it possible for people to protect themselves against infection (Ministry of Health (MoH), 2005). Although recent data suggest some indications of sexual behavioural change at the individual level,

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varying levels of access to HIV/AIDS services within and across rural and urban districts in the country means that prevalence rates within and across social and occupation groups, and the impacts of the disease across economic sectors, are also likely to differ significantly. Inevitably, HIV/AIDS is likely to have profound impacts across livelihood systems (natural and non-natural based) in Botswana. Logically, the impact of the epidemic on human productivity, including the capacity to cope and mitigate the effects, both within and across economic sectors, is also likely to vary substantially.

Sources of livelihood in the Delta are diverse: natural resource-based (e.g. fishing, arable farming, collection of veldt products, basket making, and community-based natural resources management – CBNRM), and non-natural based (formal employment) sources. Similar to other economic sectors, HIV/AIDS is likely to have profound impacts on subsistence fishing. Possibly, it is likely that a large proportion of fishing households have experienced irreversible losses of income, assets, and the capacity to invest in the future. In fact, some researchers have noted that fishing communities in Africa are ‘hot-spots’ for the HIV/AIDS virus (Baro, 2004; Forum, 2005; Gordon, 2005; MAAIF, 2005). Additionally, hygiene and sanitation conditions in fishing camps are usually poor and thus contribute to people’s vulnerability to infection (World Fish Centre, 2006). In particular, fishing communities have limited access to sexual health services including HIV/AIDS prevention, care, and support. Although subsistence fishing is the main source of livelihood for most communities in developing countries, these communities are rarely taken into account in national HIV/AIDS control programs and their socio-economic and environmental significance have been ignored (SFLP, 2004).

Generally, women in most fishing communities play an important role in fishing such as processing and marketing (World Fish Centre, 2006). However, different sexual relations have developed from these activities which have facilitated the prevalence of sexually transmitted diseases (SFLP, 2004, p. 9). In Botswana’s rural areas, women are more likely to be unemployed than men (CSO, 2004). Therefore, some women in fishing villages are more likely to resort to risky behaviour such as having multiple partners, engaging in transaction or inter-generational sex, sale and consumption of alcohol especially in landing sites. This is compounded by gender and age inequalities which make women more vulnerable to sexually exploitative relations which place them at risk of contracting the HIV virus.

According to Erskine (2004), few studies have considered HIV/AIDS as a threat to natural resource use. Notwithstanding, several case studies in Kenya, Namibia, South Africa, Uganda (Ruhweza and Thaugphet, 2001) and Malawi (COMPASS, 2003) have assessed the linkages between HIV/AIDS and natural resource management, including mitigation effects (Oglethorpe and Gelman, 2004 <http://www.frameweb.org/>). For instance,

Bishop-Sambrook (2004) conducted a systematic analysis of the link between gender, HIV/AIDS, agriculture and other natural resources sectors.

A systematic analysis of the impact(s) of AIDS on fisheries-based livelihoods has hitherto received little attention (Allison and Seeley, 2004, 2006; Gordon, 2005). Several case studies have shown that some African fishing communities (e.g. in the DRC, Kenya, Uganda, Zambia and Tanzania) have higher HIV prevalence rates than ‘known risk groups’ (e.g. truck drivers and commercial sex workers) (Tanzarn and Bishop-Sambrook, 2003; SFLP, 2004; Allison and Seeley, 2006; Keizire, 2006; Keulder, 2006; M’Boussou, 2006). Therefore, although ecosystem variability determines fish availability in floodplain fisheries (Welcomme, 1985), HIV/AIDS is fast becoming a major factor in regulating fish availability to most fishing communities (ID21, 2006).

According to MAAIF (2005), fish availability can be dramatically reduced when people become too weak to fish (or eventually die) with a consequent loss of indigenous knowledge and fishing skills (due to the HIV/AIDS pandemic). Therefore, HIV/AIDS can have a multiplier effect whereby productive pursuits such as fishing are severely curtailed with a resultant loss of rural employment and provision of food (Campbell and Townsley, 1996). The paper addresses this knowledge gap by investigating the effects of chronic illness (an HIV/AIDS-related stressor), on subsistence fishing in the Delta. This is the first study of this nature in the Delta’s fishery, and it is hoped that it will lay the foundation for a comprehensive management regime.

Existing HIV/AIDS programs in Botswana concentrate more on non-natural resource-based formal employment sectors. Conversely, HIV/AIDS is not featured as a major threat to fisheries-based livelihoods. Surprisingly, the threat of HIV/AIDS to the sustainability of natural resource-based livelihoods generally and subsistence fishing specifically was ignored in the ODMP project. Admittedly, information about the prevalence and spread of HIV at village level is scarce if not non-existent. Therefore, without a systematic investigation, it is difficult to establish the location of HIV/AIDS “hot spots” in the Delta. Notwithstanding, HIV/AIDS prevalence rates among fishing communities in developing countries are generally five to ten times higher than the general population (<http://www.sflp.org/ftpl/others/>). Hence, it can be assumed that the Delta’s fishing communities are likely to share similar characteristics based on prevalence and transmission rates. According to McGoodwin (2001), production relations and organization of fishing activities of small scale fishers in developing countries are similar even though members have very distinct cultures.

Moreover, lack of information on HIV prevalence at the village level results in the compartmentalisation and marginalization of small-scale fishing communities in public policy. This is also coupled with a lack of knowledge regarding the significant role played by small scale fisheries

in reducing poverty (SFLP, <http://www.sflp.org/eng/003/fightaids.htm/>). Recent research in the Delta has highlighted the prevalence and adverse impacts of HIV/AIDS on natural resource-based livelihood systems (Kgathi et al., 2004, forthcoming; Ngwenya et al., forthcoming). Respondents in six selected case study villages said AIDS was either a shock comparable to others (e.g. crop damage by wildlife), or the most devastating ever experienced (Kgathi et al., 2004).

### 1.1. Conceptual issues

#### 1.1.1. Artisanal fishing livelihood and food security

Artisanal or subsistence fishing livelihood systems in this paper means fishing activities for “domestic consumption”, with any earnings made out of the fisher’s catch considered a bonus. A livelihood comprises of assets (forms of capital) and various ways (strategies) in which a household makes a living (Scoones, 1998; Ellis, 2000). A fishing livelihood requires access to various forms of capital. These include natural capital (aquatic ecosystems and the living species they support, forests, and wildlife). Physical capital for fisher households includes fishing gear, access to landing sites, and processing and marketing facilities. Physical capital is also human created, and it comprises assets like machines, buildings, roads, and other forms of infrastructure. Financial capital refers to the money households have access to, in order to adapt to various livelihood strategies. Financial capital is needed for sustaining operations and maintaining or enhancing various items of physical and natural capital. Human and socio-cultural capital includes skills and stocks of indigenous knowledge, and information possessed by households for use in fishing harvesting. In the Okavango Delta, limited research has explored the general impacts of HIV/AIDS on various forms of capital (natural, social, human, and physical) (Ngwenya et al., forthcoming). Conversely, specific impacts of HIV/AIDS on fishing capital in the Okavango Delta have yet to be ascertained.

The Delta is endowed with natural resources (fish, wildlife, and veldt products such as grass and reeds), which are however subject to natural and human-induced shocks. There are unpredictable, irregular, and large disturbances negatively affecting livelihoods (e.g. drought, channel desiccation and HIV/AIDS) and stresses which are smaller, predictable, regular, and sometimes continuous (such as channel blockages, veldt fires, chronic illness, and death) (Pearce et al., 1992). HIV/AIDS is a human-induced shock which impacts fisher households’ access to and control over different forms of capital listed above. Variability in household’s portfolio of assets is likely to influence its perception of, and capability to manage, risk/s emanating from these shocks and stressors. Risk is defined as “the variation or stability of income” resulting from a shock, or more generally as “the possibility of disaster or ruin” (Dercon, 2001). Some AIDS-affected fisher households

will be more vulnerable to risk (variation or stability of income) than others, and will adapt coping strategies which could either increase or decrease vulnerability to future shocks.

According to D’Haese and Kirsten (2003, 100), vulnerability is the ability of a household to cope with, and recover from, shocks and stresses. Vulnerable households tend to be “defenceless” because they are economically and socially dependent. The ability to cope with, and recover from, shocks and stresses depends on household resilience (the capacity to withstand loss or damage, or to recover from the impact of a disaster Rolfe, 2006). The higher the resilience of a household, the less likely it is to suffer irreparable damage. Conversely, the higher the vulnerability, the more exposure there is to loss or damage and the greater the incapacity to prevent, mitigate or cope with such an event.

It is important to note that vulnerability to and ability to manage risk varies. Women, children, and elderly headed households, and those with high dependency ratios, are likely to be more vulnerable than others (the age and gender dimensions). However, vulnerability is also influenced by location (in relation to flooding regimes), by ownership of assets and the quality of access to common property resources (e.g. fishing grounds and landing sites), and social contacts (social support networks) which can be drawn upon in times of need.

Although, ample research illustrates that HIV/AIDS disproportionately impacts on women worldwide, HIV prevalence rates among women working in fishing communities have not been adequately studied. Notwithstanding, HIV prevalence rates are likely to be higher due to the subordinate economic and social position of women in the society. In addition to being a social group most at risk, women are usually responsible for caring for the sick, dying or dead in the society. Caring for continuously ill members of the household is likely to have adverse effects on fishing as a livelihood activity and on food security (physical and economic access of sufficient food quality and quantity; Haddad and Gillespie, 2001; Gillespie and Kadiyala, 2005).

Fish offers micronutrients, vitamins, minerals, and proteins known to increase the efficacy of HIV/AIDS treatments (World Fish Centre, 2006). Food insecurity is the inability to acquire or consume an adequate quality or sufficient quantity of food in socially acceptable ways or the uncertainty that one will be able to do so (Wolfe and Frongillo, 2000).

#### 1.1.2. HIV/AIDS

In this paper, a CIP is defined as any person declared by a medical doctor as terminally ill and has an incurable disease such as HIV/AIDS. Such a person may or may not be bed-ridden, and is cared for at home either by family member/s, relatives (close or distant), members of the community, friends, neighbours or church groups during periods of intense need or social distress (social crisis).



Barnett and Blaikie (1992) categorise households as either “AIDS-affected” or “AIDS-afflicted”. The latter are households with members who are ill or have died from HIV/AIDS, while the former are households who are not infected, but have used their resources to support households afflicted by HIV/AIDS. Furthermore, they refer to households who are neither affected nor afflicted by HIV/AIDS as “unaffected households.” Although this categorization has been useful in Botswana, almost all households have been affected by the epidemic. Hence, the distinction between “affected households”, “afflicted” and “unaffected households” is very fluid.

The reality is that virtually every community and individual in Botswana has been affected by the HIV/AIDS epidemic. A more useful categorization of households would indicate the level of affectedness (e.g. the “most affected households” or the “least affected households”). A highly affected household can experience single or multiple death(s) of family members and/or bed-ridden chronically ill person(s) that require care-giving either simultaneously (where several family members are ill at the same time) or sequentially (where family members are ill one after the other) over brief or extended time periods (Ngwenya and Butale, 2005; Ngwenya and Kgathi, 2006; Ngwenya et al., forthcoming). AIDS-related chronic illness is a stressor that can result either in death, temporary or permanent disability/incapacitation. Care-givers of continually ill patients either deplete savings, abandon their economic activities, scale down production inputs, bring in labour from outside the household or switch from high to low input or low income return activities (Butale, 2004; Ngwenya and Butale, 2005).

Ascertaining whether or not a household has HIV/AIDS infected person(s) or has lost someone due to the disease is difficult given the sensitivity of the information and social stigmatization. Generally, people are unwilling to openly discuss HIV and AIDS (Stokes, 2003). In Zambia, when respondents were asked about HIV infected people, only 3% indicated the prevalence rate, in sharp contrast to the nationally reported rate of over 20% (SADC-FANR, 2003). Therefore, this survey used the presence of continuously ill person/s (CIP/s) over the past 5 years as proxy indicators of HIV and AIDS. Nationwide 6.7% of households reported having a seriously ill person and 5.6% reported death in the household (CSO, 2004).

Several studies in Ngamiland suggest that the majority of continuously ill persons had AIDS-related conditions where over 40% of care-givers were aware of their HIV status and some of whom were not on anti-retroviral drugs (Butale, 2004; Ngwenya and Butale, 2005; Ngwenya and Kgathi, 2006). Furthermore, it is estimated that up to 49% of all households in Botswana are likely to have at least one member infected by the HIV virus. It is also envisaged that about 26% of households can expect to lose an income earner and that about 6.9% of households will disappear due to infection of all household members within the next 10 years (GoB and UNDP, 2000).

## 1.2. Objectives

This is the first exploratory study that focuses specifically on artisanal fishing in the Okavango Delta (OD), which is located in north-western Botswana. The study will highlight the prevalence of HIV/AIDS at mezzo (district) level and effects of HIV/AIDS-related stressors at micro-level (household) in the fishing community. The objectives of the study are

- To assess the general prevalence of HIV/AIDS in Ngamiland.
- To investigate general access to AIDS support services by fishing villages in the Okavango Delta.
- To investigate the prevalence and implications of HIV/AIDS-related chronic illness on artisanal fishing and food security in the Delta.
- To identify policy implications of the findings and make recommendations.

## 2. Study area

The Okavango Delta is found in Ngamiland district in north-western Botswana, bordering with Namibia. According to the 2001 population census, Ngamiland has 124,712 people with an annual growth rate of 2.8% (CSO, 2002). The district is characterized by a diversity of cultures in a multi-ethnic. Most of the district’s population still depends directly on subsistence utilisation of the Delta’s natural resources. Arable agriculture is practised mainly at a subsistence level, because the soils and climate are generally not well suited for large-scale crop production. However, small-scale flood recession farming is practised locally on the fringes of the Delta. Moreover, there is a buffer zone around the Delta which has been declared a stock free zone. Therefore, significant livestock production is found on the dry land areas within the Delta where grazing is generally good.

This study focuses mainly on western Ngamiland communities where most fishing villages are located (Fig. 1a), where the majority of the villages are in the panhandle (Figs. 1b and 2). The HaMbukushu, who practise dry-land farming, is the dominant ethnic group. At the western and south-eastern fringes of the Delta, the WaYei practise *molapo* (flood recession) cultivation. Dry-land farming is also practised in the edges of the Delta.

### 2.1. Methodology

#### 2.1.1. Data collection methods

Socio-economic data on HIV/AIDS, subsistence fishing, and food security were collected from 21st June to 3rd July 2004 from a representative sample of households in 22 fishing villages around the Delta. Participatory groundwork was done with stakeholders (relevant government fisheries and district and village authorities) to elicit their understanding of key questions and gaps in knowledge about

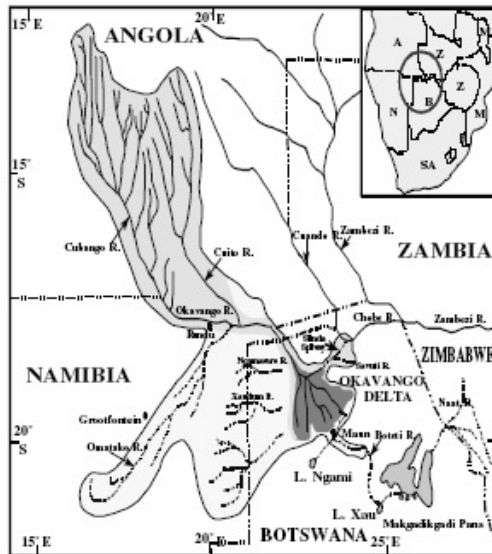


Fig. 1a. The Okavango River basin.

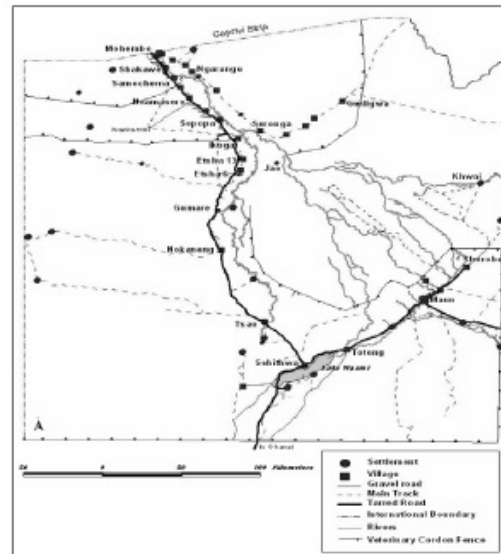


Fig. 2. OD Fishing villages.

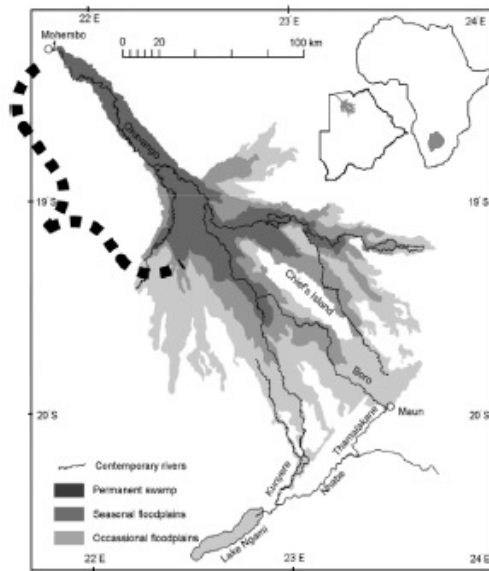


Fig. 1b. The Okavango Panhandle.

the fishing economy and food security. Based on the results a survey questionnaire was developed to elicit information on the objectives of this study. The questionnaire was pre-tested, before being edited and updated.

Ten percentage of subsistence fishers' households in the 22 fishing villages were sampled through simple random

sampling. The 2001 national census enumeration list of households in each village was used (CSO, 2001). A total of 248 subsistence fishing households were interviewed. HIV/AIDS data were obtained from the Second Botswana AIDS Impact Survey (BAIS II) data set from the Central Statistics Office (CSO, 2004), National AIDS Coordinating Agency NACA, 2006 Quarterly Reports, and the 2005 Botswana Sentinel Surveillance (Ministry of Health (MoH), 2005). Data were also collected through a literature review of secondary sources (published and non-published).

2.1.2. Data analysis

Descriptive frequencies and cross tabulations were derived from the household survey questionnaire results using SPSS (version 13.0) and also from BAIS II data (CSO, 2004). Data from open ended questions, participant observation, and informal interviews were thematically analyzed (Weiss, 1994; Wuthnow et al., 1994; Bernard, 1995).

3. Results

3.1. HIV prevalence in Ngamiland and access to health services

The BAIS II results reveal that the national prevalence rate for HIV positive people is 17% at country level, and 16% and 13% for Ngamiland South and Ngamiland North, respectively (CSO, 2004). However, disaggregated data for the 25–49 age group indicate prevalence rates of 36% and 29%, respectively for the two areas. Prevalence rates for

the 15–49 year olds are 26% and 22%, respectively for Ngamiland South and Ngamiland North (CSO, 2004).

During follow-up interviews with health care professionals in Seronga and Etsha 6, HIV prevalence rates for pregnant women attending antenatal clinics were 30% and 29%, respectively. These sero-prevalence figures are close to the NACA quarterly report which shows that in 2005 the HIV prevalence rate for pregnant women attending antenatal clinics countrywide was 33.4% (NACA, 2006). The highest prevalence was among women aged 30–34 (49.2%) followed by 25–29 (44.5%) (Table 1). Similar observations were made in the same age group in the BAIS II survey where the prevalence was 40%.

Table 2 shows a decline in HIV positive rates in Ngamiland district from 2001 to 2005. Most reduction has occurred in younger age groups (14–24 years). It has been observed that relatively few teenage boys and young men are infected compared to their female counterparts. Therefore, this suggests that females are more likely to be infected through inter-generational sex. Condom use with the most recent partner has been shown to be significantly related to age (Ministry of Health (MoH), 2005).

Infection rates are differentiated by social status such as marriage, educational attainment, and employment. In Ngamiland west and east, the infection rate for women living with a male partner and single women is very high, and relatively low among married women. Prevalence by educational attainment shows that infection is highest among those with primary education, followed by those with sec-

ondary education. Prevalence by employment status suggests that there is no difference between those with regular employment and the self-employed in the district (Table 3).

In Botswana, HIV/AIDS programs and support infrastructure are delivered by government and non-governmental institutions. Health facilities are part of every district's physical capital. In general, the development of health facilities in Botswana is guided by the National Settlement Policy of 1998 (GoB, 1998). According to the policy, service provision follows a hierarchy of settlements according to population size and/or status of the settlement (urban, urban village, rural or remote). Large settlements and district headquarters receive high order services such as general and primary hospitals, while small or unrecognized settlements receive low order services such as health posts and mobile stops. Provision of HIV and AIDS support facilities logically follows the same model as that of provision of general health care facilities, thus high order services (referral and specialist) for large settlements and district headquarters and low order services (primary prevention) for smaller settlements.

The National Settlement Policy defines a village as a traditional settlement that is established on tribal land, and has a minimum population of 500 people. Settlements which do not meet this criterion are often referred to as "remote area settlements." There are several practical problems which are associated with the delivery of social services (health, water, social welfare services and education) using settlement hierarchy criteria. In Ngamiland, about 50% of population lives in settlements of less than 500 people which have not been classified as remote area dwellers (Ngamiland DDP, 2003/2009). These are known as un gazetted settlements. Therefore, they cannot receive health services directly except through primary centres such as Maun or Gumare. In terms of access to health resources, some officially gazetted villages are physically large and their health catchment areas consist of scattered satellite settlements in the form of *meraka* (cattle post) or *masimo* (ploughing fields) (Kgathi et al., 2004).

The Botswana government AIDS service delivery infrastructure includes voluntary testing (VT), isoniazid preventive therapy (IPT), treatment of opportunistic infections (OI), prevention of mother-to-child transmission (PMTCT) of HIV, anti-retroviral therapy (ARV), and routine testing (RT). Roll out sites for ARV treatments, for instance, are in Shakawe, Gumare, and Maun. District level data suggest that, in Ngamiland, 29.7% of residents have access

Table 1  
HIV prevalence countrywide among women by age

Data source	15–19	20–24	25–29	30–34	35–39	40–49
BAIS II	9.8	26.2	41	43.7	37.8	28
VCT	11.6	18.5	37.1	43.3	35.5	27.8

Source: Department of AIDS Prevent and Care (2005) and Ministry of Health (MoH) (2005).

Table 2  
Prevalence trends

North West district	2001	2002	2003	2005
Ngamiland East (Ngami sub-district)	35.8	40.7	38.4	27.3
Ngamiland West (Okavango sub-district)	39.2	34.2	32.7	29.2
Chobe	38.9	38.4	47	–

Source: Department of AIDS Prevent and Care (2005) and Ministry of Health (MoH) (2005).

Table 3  
Prevalence in Ngamiland by social status

North West district	Marital status %			Education %				Employment %		
	Single	Married	Living together	Non	Primary	Secondary	University	Temp-employ	Regular-employ	Self-employ
Ngamiland East	32.8	13.6	33.3	14.3	41.7	17.3	25	16.7	33.3	33.3
Ngamiland West (Okavango)	32.5	16.7	40	28.2	39.6	28.9	–	25	35.3	–

Source: Department of AIDS Prevent and Care (2005).



to a hospital, 89.2% to a clinic, 27.0% to a health post, and 18.9% to a mobile clinic (CSO, 2004). Ngamiland east, where the district capital Maun is located, has more high order health facilities than Ngamiland west (Okavango). Table 4 suggests that higher and middle level service providers such as doctors are more readily available to residents in the east than to those in the west. Conversely, middle professional and low order para-professional service providers such as nurses, social workers, and family welfare educators (FWE's), respectively, are more readily available to residents in the Ngamiland west. However, in the context of the settlement policy, the capacity of primary health centres to deliver timely HIV/AIDS services to scattered associated localities is thus limited.

The disparities in reported availability of health facilities and services between Ngamiland east and west appear to imply a relationship between availability and access. Although availability does not necessarily imply access, it does however offer an opportunity for access. Real access for communities may further be enhanced by the existence of community care-giving groups. A significant proportion of Delta communities (especially Ngamiland west) face numerous challenges in accessing HIV/AIDS services through public health facilities (Magole et al., 2006). Availability of specific NGO's such as the Botswana Family Welfare Association, Maun Counselling Centre and other voluntary or routine testing and counselling centres give residents in Ngamiland east an added advantage over those in the west.

There is a paucity of disaggregated district level data to establish the impact of these services in reducing infection rates as well as in mitigating the impacts of the disease on infected individuals and households. Clearly, compared to rural and remote parts of the district, Maun residents are more likely to enjoy better access to general health and HIV/AIDS service facilities. Access to ARV's has resulted in a decline of AIDS-related mortality rates and of bed-ridden home-based care patients. Furthermore, access to highly active anti-retroviral therapy (HAART) (through antenatal clinics) has resulted in the decline of HIV positive babies and orphaned children. There is also evidence that younger and more educated urban dwellers are more likely to use condoms than older, less educated rural dwellers (Ministry of Health (MoH), 2005). Differential access to HIV/AIDS services disproportionately disadvantages the majority of fishing communities in the Delta.

Table 4  
Access to professional service providers

District	Nurse (%)	Doctor (%)	Social worker (%)	Family welfare educator (%)
Ngamiland East (Ngami sub-district)	100.0	68.8	75.0	81.3
Ngamiland West (Okavango sub-district)	90.5	23.8	90.5	90.5

CSO (2004), BAIS II community schedule.

### 3.2. Morbidity and fishing

Of the 248 fisher households surveyed, 53% indicated that they had cared for continuously ill person/s in the last 5 years. The prevalence of CIP varies across villages indicating that some households were more affected than others. In some cases, all sampled households had a CIP such as Etsha 6 and Sepopa (70%), Samochema (66.7%) as summarized in Table 5. Of the households which indicated that they had a continuously ill person, at least 29% said the illness had a serious impact on fishing activities, 9.4% moderately, 10.7% minimally while 51% said that the illness had no effect at all (Fig. 3). Follow-up informal interviews suggest that serious impacts included sale of family assets, depletion of savings, switching or abandoning fishing activities. Some villages experienced more severe impacts on fishing activities than others. A large proportion of respondents in major villages like Ngarange, Shakawe and Seronga indicated that caring for a CIP had serious impacts on fishing activities, compared to smaller villages like Kauxwi and Etsha 7.

However, some households in other villages like Rwee/Jwata, Mohebo West and Sepopa indicated that having a CIP had either a minimal effect or did not affect fishing activities at all. Part of the explanation given for the variation in effect was that some of the CIP's did not do any fishing prior to falling ill, while others fished only for children, some could not fish because of care giving responsibilities, and others could not fish because they became incapacitated (Table 5).

### 3.3. CIP households' portfolio of assets

A large proportion (about 51%) of CIP households had traditional houses in poor repair, while only a small percentage (approximately 2.4%) had houses made from concrete blocks in good repair. In addition, CIP households were more likely to own small stock than cows. Although 89% had arable fields based on communal land entitlement, only 46% had a yoke and plough to cultivate their fields while 29% had a donkey cart. This means that either the land lay fallow or, for those who could afford it, labour was hired for cultivation.

Regarding cash income, about 35% had a gross monthly income of less than P500.00 (local currency) or about US\$2/day or less, while only a small proportion (5%) had over P1000.00 (Table 6). Moreover, the majority (about 56%) had a fishing basket, a few (30%) had (*me*)koro (dug-out canoe) while a small percentage (10%) had a plank fishing boat. Therefore, basket fishing is the major fishing activity (Table 6). Although the majority (77%) had access to potable water through communal standpipes, 20% were at risk of contracting waterborne diseases because of drinking untreated water. About 88% of fisher households used the bush to relieve themselves which makes them more vulnerable to illness and also contributes generally to poor health.

Table 5  
Effects of chronic illness

Village	N	CIP %	Effect on fishing activities				Explanation			
			Seriously	Moderately	Minimally	Not at all	Did not do fishing	Fished for children	Caregiving	Incapacitated fishing
Etsha 6	8	100	38	13	25	25				
Etsha 7	9	66.7	40			60	22.2			
Etsha 8	9	66.7	16.7	16.7		66.7				
Etsha 9	7	28.6								
Ikoga	10	50		10	10	80				
Sepopa	10	70	14.3		42.9	42.9	22.2	33.3		
Kajaja	10	40	10	10	10	70	11.1			
Nxamasere	14	64.3	23.1			76.9	11.1		11.1	
Xhaoga	7	57.1		14.3	28.6	57.1	11.1			
Samochima	15	66.7	13.3	6.7	20.0	60	22.2			12.5
Shakawe	21	38.1	85.7			14.3			11.1	37.5
Rwee/Jwata	12	50		16.7		83.3				
Mohembo West	19	47.4		9.1	9.1	81.8				
Seronga	17	52.9	77.7	22.2					11.1	12.5
Ngarange	12	66.7	88.9	11.1					11.1	
Mogotho	7	57	50		50					12.5
Sekondomboro	8	37.5	66.7		33.3				11.1	
Xakao	16	37.5	14.3	28.6	14.3	42.9			11.1	
Kauxwi	16	50	44.4	11.1	11.1	33.3			33	12.5
Mohembo East	14	57.1	27.3	9.1	9.1	54.5				

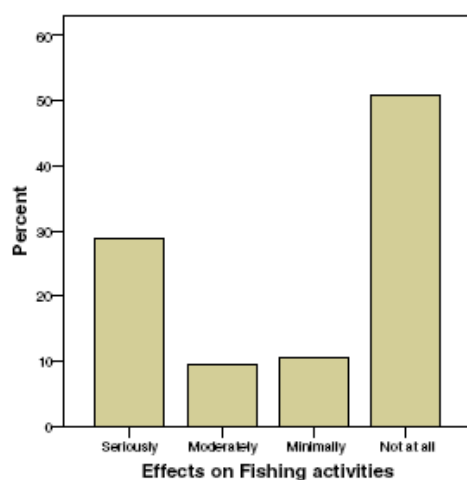


Fig. 3. Effect of chronically ill people on fishing activities.

### 3.4. Fish and food security in CIP households

Fish provides a significant proportion of food to CIP households. Results indicate that approximately 55% of CIP households get their food from fish products. Some CIP households (49%) peddle fish in the village while 10% own a stall, other households' barter fish for grain (67%) (Table 6). The money derived from fish sale activities is used to purchase food (63%) and the rest to buy toiletries and clothing. Also, during food shortages, CIP households resort to a hierarchy of strategies which include cutting down on meals or reducing meal portions, looking for paid work, gathering wild fruit, asking for food from relatives, selling livestock, and getting social assistance (Table 7).

## 4. Discussion and summary

At the macro-level, there is sufficient institutional health infrastructure in Ngamiland. However, health service deliv-

Table 6  
CIP households assets

Type of housing	N	%	Water, sanitation, fuel and transport	N	%	Fishing assets	N	%
Traditional in good repair	53	42	From river channel	26	20	Mo(me)koro	39	30
Traditional in poor repair	64	51	Standpipe	99	77	Plank fishing boat	12	10
Block brick in good repair	3	2.4	Tap-in-plot	3	23	Fishing basket	74	56
Mixed type in good repair	6	5	Pit latrine	13	10	Fishing gear	14	10
Cattle ownership	45	35	Bush	113	88	Peddling in village	37	49
Small stock	52	40	Seemo	2	2	Own fishing stall	9	10
Arable fields	116	89	Cooking/wood	126	100	Gross monthly income < P500	64	35
Yoke and plough	60	46	Donkey cart	40	29	Gross monthly income < P1000.00	107	59
			25 or 50l drums	82	63	Gross monthly income > P1000.00	10	5



Table 7  
Food shortage coping strategies  $N = 130$

Food shortage	<i>N</i>	%
<i>First strategy</i>		
Increase fish catch	31	24
Cut meals	22	17
Look for paid work	18	14
Sale of crafts	14	12

ery on the basis of settlement hierarchy highlights the existence of differential access within the district and across villages. Care services, NGOs and CBOs could play an important service gap-filling role. Fishing is a highly labour intensive occupation (Torrel et al., 2006) and therefore depends heavily on a healthy labour force. Poor health and poor sanitation makes people in fishing communities in the Delta more vulnerable to illness. The multiplier effect of the loss of productive labour and declining productivity (due to HIV and AIDS) may ultimately affect fish supply, fish products and hence affect household's food security (Allison and Seeley, 2004; Gordon, 2005). Moreover, the epidemic has a negative impact on households' financial capital because of cascading multiple stressors.

Prevalence rates within the productive labour force (15–49) are relatively high which is bound to have a detrimental effect on fishing activities. According to Mosepele (2001), the highest proportion of fishers in the Delta is aged between 11 and 40 years. Therefore, this demographic stratification suggests that fishers are more likely to be exposed to HIV and AIDS than other age groups in the population. A similar observation was made for Ugandan fishers (Tanzam and Bishop-Sambrook, 2003; Baro, 2004). Moreover, Allison and Seeley (2004) also observed that fishers in South Asia, Latin America, and Eastern Europe have higher HIV sero-prevalence rates than the rest of the population. Most importantly, basket fishers in Ngamiland, who are predominantly women, are perhaps the most vulnerable fishing group to HIV infection. The majority of these have a poor capital resource base, are single (never married or cohabiting), have poor education, and are unemployed.

Baro (2004) asserts that the role of fish as a source of livelihood has expanded greatly worldwide in the last decade. This agrees well with recent research that has shown subsistence fishing to be a major source of livelihood for most households in the Delta (Mosepele et al., 2006; Mosepele, 2003). However, the role of fish as a major source of food security to the Delta's subsistence fishers is at stake because, according to Allison and Seeley (2004), HIV/AIDS has a severe impact on fishers. It is disconcerting that a high proportion of subsistence fishing households have CIP's. This concurs with Kgathi et al. (2004) who found that about 46% of households in the Okavango Delta had a CIP, and that these households were also generally poor with limited productive and financial assets. Moreover, most of the households have a gross monthly income of about US\$2/day or less. These households fall within the World Bank's definition of absolute

poverty. According to the UNDP Human Development Report (2006), about 23% of Botswana live below the income poverty line. The study results suggest district variability in absolute poverty levels (46% of households) which is likely to be higher than the national average (23%). The figure is also close to the Ngamiland human poverty index (HPI) which is 40.6% (UNDP, 2000). The situation is further worsened by poor physical infrastructure, especially roads and processing and marketing facilities in the district.

Although the Okavango Delta is richly endowed with natural capital, the physical capital of fisher households is low. This study has also shown that subsistence fishing households with CIP's are generally poor with limited productive and financial assets which reinforce that of Mosepele et al. (2006), who found that the Delta's subsistence fishers are generally impoverished. Moreover, a high proportion of these households have children aged between 0 and 60 months, as well as two children aged between 5 and 10 years, and, on average, constitute a household size of 7 individuals (Mosepele et al., 2006). Therefore, this suggests that a relatively unproductive subsistence fishery will have far reaching consequences on not only child nutrition but also general food security in the community.

Given diverse sources of livelihood in the Delta and that fishing constitutes one among others (such as arable farming and sale of crafts), the living standards of subsistence fishers are likely to vary substantially across seasons. What is important to consider is that some households may permanently or transiently fall under the poverty line due to seasonal variability. Most incomes of fishing households are derived from agricultural activities between January and July (Mosepele et al., 2006), therefore food shortage during the dry season (August–December) could potentially trigger permanent or transient poverty. According to Muller (1997), most poverty is transient and is due to high seasonal variability. Availability of fish is therefore likely to prevent moderately poor households from succumbing to transient poverty or falling below the poverty line. This capacity very much depends on the portfolio of assets which will ultimately determine the household's resilience or the difference between those "most" or "least" affected by the AIDS pandemic. Access to fish for domestic consumption is therefore also an important natural safety net in the OD (Mosepele et al., 2006). This is particularly significant because unlike other districts in the south eastern part of the country, Ngamiland has weak community safety nets in the form of community-based informal institutions such as savings and credit associations, burial societies, and philanthropic and community support groups (Kgathi et al., 2004). Community safety nets in the context of households would cushion households from AIDS-related stressors through transfers or exchange of cash, food, clothing, and informal loans (Ngwenya, 2003, 2004, 2006; Foster, 2005).

Women and girls are primary care-givers of the continuously ill. Care giving over extended periods would severely limit their productive labour with increasing cases

of CIPs in the Delta. According to Mosepele (2003), basket fishing is a major source of childhood nutrition. Therefore, keeping women and girls occupied as caregivers would severely curtail their productive labour in the fishery. Subsequently, this would result in what has been observed by Torrel et al. (2006) and Curry et al. (2006) that HIV/AIDS contributes to a reduction in the amount of available food. This will then reduce both individual nutritional status and household food security.

#### 4.1. Policy implications

The livelihoods of fishing communities are severely affected by HIV and AIDS (World Fish Centre, 2006). In Botswana, existing fisheries policies are silent on the epidemic and no reference is made to possible HIV/AIDS-related activities. Moreover, the institutional environment does not identify fishing communities as one of the social groups that is vulnerable to HIV, and therefore intervention to date does not target this sector. The SADC protocol on fisheries (SADC, 2001) binds member states to facilitate the provision of infrastructure (social, physical, and support services) for the development of artisanal, subsistence, and small-scale commercial fisheries. However, this protocol will fall short if it does not integrate HIV/AIDS-related issues holistically to ensure that rural communities are empowered and enlightened about this scourge. Failure to address this issue by governments will result in failure of fisheries policy.

According to Baro (2004), Uganda has already taken proactive steps to combat the impacts of HIV/AIDS in fishing communities. Some of these include establishing a coordination unit in the ministry responsible for fisheries and appointing HIV/AIDS focal point officers in all units/agencies in the Ministry. Fisheries planners/managers in Botswana should learn from these initiatives and enact comprehensive HIV/AIDS programmes tailored specifically for the fishing community. This study has shown that, there are relatively high levels of CIPs in Delta fishing communities. This phenomenon is likely to have a detrimental effect on fish production and food security. The fisheries department must instigate social protection (SP) measures (Farrington et al., 2004) in order to promote subsistence fishing livelihood. This will, in turn, socially protect individuals and households by reducing risk and vulnerability to HIV infection. SP measures should focus more on preventing the poor from sinking further into poverty by promoting their capacity to 'bounce back' quickly.

#### 5. Conclusion

District level data of HIV/AIDS prevalence rates do not reflect the severity of the epidemic in and across the artisanal fishing community. Prevalence rates of HIV/AIDS among women in fishing communities are likely to be higher due to their subordinate economic and social position. Morbidity and mortality due to HIV/AIDS place fishing

communities among those meriting close policy and support programs. Additionally, HIV infection is likely to have a multiplier effect on rural incomes because of (potentially) high mobility and high volume interactions between fishing and non-fishing communities through trade and market links. Subsequently, declining productivity will affect family income, assets base and the capacity to invest in the future. Moreover, with increased mortality (due to HIV/AIDS), indigenous knowledge and management skills are lost. Notwithstanding, this study has shown that while there is limited information on HIV/AIDS prevalence rates in the Delta's subsistence fishery, there are relatively high levels of CIP's which invariably have a detrimental impact on fish production. Undoubtedly, decreased fish production will cause increased malnourishment within the subsistence fishing community, and severely impair food security.

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