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Interactions between HIV, dietary diversity and socio-economic position in an urban African setting

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ABSTRACT

Design and objectives: A cross-sectional field study was undertaken to assess the impact of HIV on dietary diversity in an urban context.

Setting and subjects: The study interviewed the food preparers of 47 households in Misisi Compound, a poor area of Lusaka, Zambia. Participants were stratified by the sex and HIV status of the nominal household head.

Outcome measures: Outcome measures were difference in mean Household Dietary Diversity Score (HDDS, 12 food groups), and achievement of HDDS target for assessing food security.

Results: The HIV status of the household head was associated with socio-economic position in female-headed households, with HIV-positive individuals significantly more likely to head a household of higher socio-economic position (P=0.037). HIV status was not associated with dietary diversity or any other measure in the study.

Conclusions: This study found no association between HIV infection in the household head and access to a diverse diet. This may be because while wealthier households are disproportionately affected by HIV in this population, they are also better placed to cope with the pressures of the disease and maintain food security. Coping strategies employed to maintain food security in urban populations should be further investigated.

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INTRODUCTION

Food security and HIV

Food security is a highly complex and fluid concept, involving the availability of foods, economic and social access to foods, and the stability of availability and access over time and through 'shocks' such as illness or drought. Stable access to nutritious food is particularly important in HIV as nutrients are needed by the body to fight the disease[1], and the effectiveness of and adherence to antiretroviral drugs used to combat the virus is affected by sub-optimal nutrition[2]. It has been recognised in previous research that the HIV epidemic tends to impact negatively on household and individual food security in Sub-Saharan Africa, and in turn food insecurity increases both biological and social susceptibility of individuals to HIV, lowering immunity and in some cases increasing high-risk behaviour in order to obtain food. While most research into these interactions has taken place in rural communities, little is known about the impacts in an urban setting.

Dietary diversity

Dietary diversity, the variety of foods or food groups consumed by a household (or individual), has been suggested as a useful proxy indicator of food security (access), and increased household dietary diversity is shown to be associated with more complex measures of food security such as per capita consumption and per capita caloric acquisition[4]. Dietary diversity has been shown to increase with socio-economic status, in both rural and urban areas, with consistently much higher diversity seen in urban areas and in wealthier households within urban areas[5].

Key words: *HIV, Food security Dietary diversity, Urban*

Food security and HIV in Zambia

This study was undertaken to assess the impact of HIV on dietary diversity in a poor area of Lusaka, Zambia's capital city. Dietary calorie availability per capita per day in Zambia is low compared to recommendations (1900kcal/day), although food availability is generally good in Lusaka. The 2002 Demographic and Health Survey (DHS) for Zambia found 19% of Zambians to be food insecure (measured by asking how often households have enough food to eat), but only 6.5% of Lusaka residents[7].

HIV prevalence in Zambia is thought to be around 14% (around 1.9 million people). In the last Zambian survey, HIV was found to be twice as prevalent in urban areas, at 20% compared to 10% in rural areas[8]. Zambia introduced 'opt-out' HIV testing in 2005, with the aim of testing all visitors to health centres in the country. Anti-retroviral drugs have been provided free since 2005, and currently an estimated 46% of those in need of the drugs receive them[9].

METHODS

The study comprised a cross-sectional field study to quantify and compare dietary diversity in households stratified by the sex and HIV status of the household head.

Participants and sampling

Participants were drawn from a population living in Misisi settlement, Lusaka, in July 2008. Misisi is a poor squatter area close to the city centre with a population of around 23,000, high housing density and no space for food cultivation. Participants were identified through an existing cohort enrolled in an ongoing study of micronutrient nutrition and gastrointestinal health with the *Tropical Gastroenterology and Nutrition Group* (TROPGAN), at the University Teaching Hospital, Lusaka. Participants were food-preparers of the households (mainly women) where the household head was enrolled in the TROPGAN study. Sampling was purposive, with households identified from the TROPGAN group chosen by the sex and HIV status of the household head. Representatives of 53 households were interviewed, and every household invited to participate attended their interview. Six households were found not to have the relevant HIV records and excluded, leaving 47 households in the study. Sample sizes were calculated to assess the difference between mean dietary diversity scores at 90% power and 5% significance.

Definitions

Household: 'Those whose main meals are prepared by the same person, living under one roof at the time of the study'.

Head of household: It was assumed for the purposes of this study that if a husband was present in the family, then he was the head of the household. If not, the prime-age or elder male was considered the head. If neither of these criteria was met, the prime-age or elder female was considered the head. Child-headed households were not included in this study.

Measures

This study assessed household access to foods, and the stability of that access through the shock of HIV, using Household Dietary Diversity Scores (HDDS) as a proxy measure of food security (access). The HDDS questionnaire elicits which of a range of foods or food groups have been eaten by anyone in the household over a reference period (24 hours); a simple sum of the number of food groups consumed gives the score, which is then compared to the average score of the top-scoring tercile, which indicates achievable dietary diversity in the population and is taken as a food security target[11]. HDDS thus looks at food consumption at household level, and can assess household access to foods and major availability issues in the study area. The HDDS questionnaire was adapted to local conditions from the validated FANTA HDDS questionnaire[11] using the standard 12 food groups (Table 1). Foods to be listed under each of the food groups were taken from the FAO's food balance sheets for Zambia, and this list was checked and added to by programme staff with local knowledge of foods available in Zambia and Lusaka.

This study was undertaken within an existing cohort all of whom had been tested for HIV within the last year, and HIV status of the household head was therefore based on confirmed positive blood tests. Individuals found to be HIV-positive had previously

been referred to a local clinic, where those with CD4+ cell-counts of <200 cells/mm^3 could access anti-retroviral drugs, which are available at no cost.

Socio-economic position (SEP) has been found to be independently associated with Household Dietary Diversity Scores[12], so SEP data were collected for control at the analysis stage. Assessments of household SEP and demographics in this study used various measures, including the sex, occupation and educational attainment of the household head (to assess social standing); two scores, derived from lists of household assets (out of six assets) and household characteristics (describing household access to water and sanitation, the type of flooring and the method of cooking used in the household, out of a maximum of 29) (to assess socio-economic standing); and household crowding and dependency ratio. Categories for each measure or score were taken from the Zambia Demographic and Health Surveys.

Other data collected relating to food security included how a household obtained food and any food aid received; whether the previous 24 hours represented a 'typical' day for the household in terms of food; whether anybody in the household ate a meal away from home in the previous 24 hours; and how many meals were prepared for the household in the reference period.

Table 1: Food groups used in the HDDS questionnaire

Food groups *(n=12)*
Cereals and grains
Roots and tubers
Legumes, nuts and pulses
Milk and dairy products
Eggs
Meat, poultry and insects
Fish and seafood
Fruits
Vegetables
Oils and fats
Sugar, honey, sweets and snacks
Other / miscellaneous

Data collection and analysis

Dietary diversity questionnaires were administered by TROPGAN study nurses, simultaneously translating from English to Nyanja as necessary. Nurses were trained on the study aims, the informed consent procedure, and the HDDS questionnaire. Information on the proposed study was read to each prospective participant in Nyanja, and opportunity for questions given, before informed consent was sought and witnessed.

Ethical approval was granted by both the London School of Hygiene and Tropical Medicine ethical board in London, and the University Teaching Hospital ethical board in Lusaka.

Data recording, cleaning and transformation, and qualitative analysis, were performed on Excel. Statistical analysis was performed using the STATA10 statistical package, with Fisher's exact test used to assess association between categorical variables.

RESULTS

Household characteristics

34% of the sample listed the occupation of the household head as 'casual labour', and 45% as 'own unregistered business'. This was significantly split by sex, with males more likely to be labourers (54%), and women more likely to run their own small business (70%) (P = 0.002). 10% of the sample received remittances, and only 2% (one household) received food aid of any kind; 98% of households purchased food to eat, and no household grew or foraged food. 20% of sampled households prepared only one meal the previous day, while 40% prepared 2 meals and 40% prepared 3.

The HIV status of the household head was associated with socio-economic position defined by both socio-economic score and asset score (table 2), with HIV-positive individuals more likely to head a household of higher socio-economic position. On further investigation of the data, the association between socio-economic score and HIV status was explained by the female-headed households (HIV-negative: 100% scoring <20; HIV-positive: 46% scoring <20; P = 0.037). HIV status was not associated with any other measure in the study.

Diet scores and food security

98% of respondents claimed that responses given represented a typical day's food in the household. Households consumed between 2 and 11 food groups; the average HDDS was 8 ± 2. HDDS was not significantly associated with any measure of socio-economics or demographics, or with the HIV status or sex of the household head even after stratification by socio-economic position. There was a non-significant trend towards higher HDDS in the HIV-positive households, with all 7 of the highest scores (HDDS=11) found in HIV-positive households.

The HDDS target was 10 (average HDDS for the highest-scoring tercile). 34 households (72%) failed to reach the target. This did not differ significantly by the HIV status of the household head, but was associated with a lower asset score, with those not meeting the target having a lower asset score (Not meeting target: 88% scoring <3 assets; Meeting target: 41% scoring <3 assets; P = 0.05). The cut-off for absolute food insecurity at emergency levels, suggested in the literature, is <4 food groups regularly consumed, giving an overall prevalence of severe food insecurity in the study population of 6%, in agreement with previous findings of 6.5% in Lusaka .

Table 2: Household characteristics and diet scores

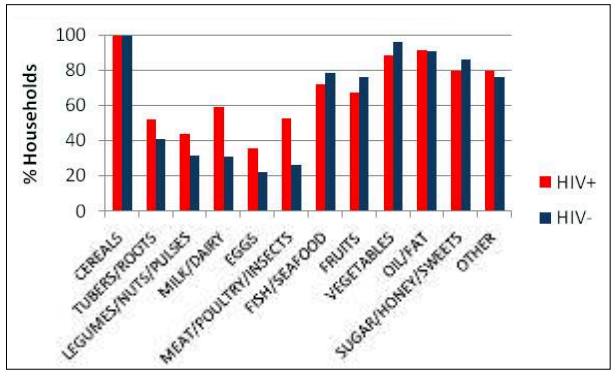
		All	HIV-	HIV+	P-value*
n (%)		47	22 (47)	25 (53)	-
Sex of household head	n (%)				
	m	24 (51)	12 (55)	12 (48)	-
	f	23 (49)	10 (45)	13 (52)	-
Socio-economic score / 29	mean (SD)		17.86 (2.1)	20.04 (2.79)	0.044
Asset score / 6	mean (SD)		1.36 (1.5)	2.64 (1.58)	0.021
HDD score / 12	mean (SD)	7.94 (2.33)	7.55 (2.04)	8.28 (2.54)	0.087

* Fisher's exact test for significant difference between HIV positive- and HIV negative- headed households

Dietary patterns

Patterns of consumption were similar between households; most protein-rich food groups (dairy, eggs and meat) were consumed by a larger proportion of HIV-positive households, while other micronutrient-rich food groups (fish, fruits, vegetables) did not differ significantly between households (figure 1). Every food group was consumed by several households, indicating availability in the area.

Figure 1: Proportion of households consuming each food group



DISCUSSION

Overall, this study paints a fairly positive picture of the impacts of HIV on household food consumption in a poor, urban area of Zambia, with little difference found between households and a high average dietary diversity. However, within the data were some households with very low dietary diversity, regardless of HIV status. The vulnerability and resilience of a household to food insecurity depends largely on the livelihood system relied on for income or food production, and the coping strategies employed to maintain food security in the face of a shock such as HIV[14]. Coping strategies were not assessed in this study, although both men and women seem to have the capacity to produce income for the household in this population either through work or receipt of remittances (and the term 'head of

household' may therefore be more flexible in terms of earning potential than was assumed in this study). This is important in urban areas which tend to be far more cash-intensive, with food purchased rather than grown.

Cut-offs classifying food security from HDDS are not well defined, nor are they standardised between studies. The measure of relative food security recommended[11] and used here showed almost three quarters of households attaining less than optimal dietary diversity, whatever the HIV status of the household head (but this may be an artefact of the measure itself, as in taking the average score of the top third of respondents as a target, roughly two thirds are likely to miss the target). Overall, diets in the study were monotonous and based on filling carbohydrates in all households , with only one or two foods in each food group consumed, even if overall dietary diversity as measured by a count of food groups consumed was high. Increased diversity within as well as between food groups should be pursued in order to improve diet quality.

Perhaps counter intuitively, it was households of higher socio-economic position (by both measures) that were more likely to be affected by HIV in this study (although it should be noted that this was not a random sample of households). While it has been found in numerous studies that HIV negatively affects the productivity and socio-economic status of households[15,16], this finding makes sense in the context of the uniqueness of the HIV epidemic in southern Africa, which has been seen to affect wealthier men over the poorer, who may have less access to different partners[17]. While all participants in this study were poor by most definitions, this relative difference in socio-economic position is important in understanding the lack of association of HIV with dietary diversity; while wealthier households are disproportionately affected by HIV they are also better placed to cope with the pressures of the disease and maintain food security. HIV prevalence is often negatively associated with measures such as child underweight and mortality, potentially explained by the generally better nutrition situation but higher HIV prevalence in towns compared to rural contexts. However, underweight has been shown to increase more dramatically in urban areas in reaction to other shocks such as drought[18], suggesting a fine line between coping and increased vulnerability due to HIV.

While much evidence is available on the livelihood links between HIV and lower food security in rural areas[19], the dearth of information on the impact of HIV in urban areas makes evidence-based policy and programming difficult. There are a minority of households in and around Lusaka and other African cities which are experiencing extreme food insecurity, and this figure is likely to rise with ever increasing urban migration, higher rates of HIV, weaker links to food-producing rural counterparts, and rising food prices. Evidence from other countries indicates that social grants for poorer households[20] and the practice of urban agriculture[21] , among other mechanisms, effectively buffer the socio-economic impacts of HIV, and may therefore improve both food security and general livelihoods. Policy makers should be aware that those households most vulnerable to both HIV and food insecurity may now be not in rural areas but in urban and peri-urban neighbourhoods, and further attention and resources should be directed to these.

Study limitations

The impacts of HIV on household food security are many and varied, and this study chose to look at just one element (the current infection of the household head with HIV). This does not allow for full analysis of the impact of HIV on a household through morbidity, mortality and the altered demographic load that are the major burdens of the HIV epidemic. Particularly, the household may have experienced an AIDS death or have adopted AIDS orphans, but not have a currently affected head, so would be classified as non-HIV-affected in this study. This study did not look specifically at coping strategies, but these are important in a full understanding food security and are under-researched in an urban context.

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