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Research Materials

An Assessment of the KDICP and MDICP Data Quality: Interviewer Effects, Question Reliability and Sample Attrition

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Abstract

This paper evaluates the quality of the data collected as part of the Kenya and Malawi Diffusion and Ideational Change Projects, two longitudinal household surveys that examine the role of social networks in attitude formation and behavior regarding family planning, and HIV/AIDS in rural Kenya and Malawi. We investigate three sources of non-sampling error: interviewer effects, response unreliability and sample attrition, and discuss their possible interactions. We pay particular attention to their implications for AIDS-related behavioral research.

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1. Introduction

Three key sources of non-sampling error in longitudinal research are interviewer effects, response unreliability and sample attrition. Interviewer effects refer to the degree to which interviewers in a survey differentially affect responses, or subsequently miscode them (Fowler and Mangione 1990). Reliability refers to the reproducibility or stability of data gathered by the survey instrument (Litwin 2003). And sample attrition refers to the percentage of respondents interviewed in the first wave of a panel survey but not in a subsequent wave (Alderman et al. 2001).

In this paper we assess these sources of error in the Kenya and Malawi Diffusion and Ideational Change Projects (KDICP and MDICP, respectively), building on work that has addressed single sources of error in these data (Behrman and Watkins 1998; Weinreb et al. 1998; Reynar 2000; Weinreb 2000b; White and Watkins 2000; Alderman et al. 2001; Miller et al. 2001; Bignami, this volume; Schatz, this volume). We hope that our assessment contributes to the relatively sparse literature on data collection methodology in sub-Saharan Africa. In the early days of survey research in developing countries, studies related to data collection issues were numerous (e.g., Westoff, Potter and Sagi 1961; Stycos and Back 1964; Freedman and Takeshita 1969; Stoeckel and Choudhury 1969; Ryder and Westoff 1971; Brackbill 1974; Muckerjee 1975). This eventually culminated in a number of systematic data-quality studies sponsored by the World Fertility Surveys (WFS) (e.g., O'Muircheartaigh 1982; 1984a; 1984b). The latter reached encouraging conclusions about the data quality for surveys in developing countries (see Bignami, this volume). Perhaps as a result of that, the WFS and its successor, the Demographic and Health Surveys (DHS), marked the beginning of an era of standardized sample surveys in developing countries with a reduced interest in data collection methodology. Notable exceptions include Axinn (1991), Blanc and Croft (1992), Becker et al. (1995), Curtis (1995), Stanton et al. (1997), and Javeline (1999).

These limitations of the existing methodological literature may be particularly problematic for social research related to AIDS, since the latter tend to use a gamut of sensitive questions. In the classical response-effects literature, sensitive questions are said to trigger "noisy" responses. These refer to either biased responses or responses with considerable random error around them. Bias can affect the means in univariate statistics, intercepts in multivariate models, and ultimately the observed relationships among parameters if it is correlated with other factors in the model. Random error weakens the observed relationships among parameters (Blalock 1961; Zeller and Carmines 1980). Exploring levels and consequences of interviewer effects, question reliability and attrition is one way to address the extent to which these considerations affect social research outcomes, and in particular research on the social-behavioral aspects of AIDS.

Addressing interviewer effects, question reliability and sample attrition in the same analysis also allows us to make some speculations about the potential interactions between them. For example, we suspect that *actual* discomfort with a question makes it more susceptible to role-independent interviewer effects and to lower reliability over time (Sudman and Bradburn 1974; Fowler and Mangione 1990). Yet we also suspect that *anticipated* discomfort with certain types of questions may partly underlie high attrition rates. This is especially the case where the stated reason for attrition is that respondents are visiting a neighboring village, or they claim to be too busy to respond to questions. These are more acceptable ways to avoid participation in a research project than outright refusal, especially where a local leader has given his blessing to the project.

The KDICP and MDICP are particularly equipped to address these issues for a number of reasons. First, both surveys deal with a wide range of questions related to family planning, gender relations, social networks, socio-economic background characteristics, as well as AIDS and sexual behavior, allowing for a comparison of questions with varying degrees of sensitivity. Second, the data collection strategies and research instruments are comparable for all sites in both the KDICP and MDICP. We can therefore explore variation in response patterns across a range of cultural contexts. Finally, changes in data collection methodologies across survey rounds (especially the introduction of "gifting" and the translation of questionnaires into the dominant local language) give us some leverage to explore the effects of specific methodological choices on non-sampling error.

We begin with a brief description of the projects (for a detailed description of their study design, see the Introduction to this volume). The body of the paper is divided in three sections that focus on role-restricted and role-independent interviewer effects, test-retest reliability, and sample attrition. In the conclusion, we discuss the results and highlight the potential interaction between these sources of error.

2. The data

The KDICP and MDICP are longitudinal research projects comprising survey type interviews and qualitative methods of data collection. They examine the role of social networks in influencing attitudes and behavior regarding family size, family planning, and HIV/AIDS in four sites in the Nyanza Province in Kenya and three districts in Malawi. In the first wave of the KDICP survey in 1994-5 (Kenya 1) interviews were conducted with 925 ever-married women of childbearing age and 859 men (of which 672 were husbands of the women married at the time of interview). Follow-up interviews were conducted in 1996-7 (Kenya 2) and 2000 (Kenya 3).

The first wave of the MDICP survey (Malawi 1) was administered in 1998: interviews were completed with 1,541 ever-married women of childbearing age and 1,198 men (of which 1,065 were their husbands). An initial follow-up was conducted in 2001 (Malawi 2), and two more waves are scheduled for 2004 and 2006.

Two particular characteristics of the research protocol deserve mentioning for the purposes of the present analysis. First, a "gifting" strategy—that is, the donation of soap and a bag of salt or sugar as a token of appreciation for the respondent's cooperation—was introduced in Kenya 3 and Malawi 2. Second, questionnaires were fully translated into the dominant local languages in Kenay 1 and both rounds of MDICP (Luo in Kenya, and Yao, Chichewa, and Tumbuka in Malawi). They were not translated in Kenya 2 and Kenya 3. The possible impact of each of these factors will be discussed below.

3. Interviewer effects

3.1 Definitions and methodology

Interviewers, the "primary measuring instrument in social science" (Hyman et al. 1954), affect answers in two ways. The first, most commonly termed "role-restricted interviewer effects," refers to the effects of interviewers' *conduct* on responses. Conduct typically refers to the effects of different types of greetings, different ways of asking questions, and differences in interviewers' coding behavior (Sudman and Bradburn 1974). Role-restricted interviewer effects are considered to be a major source of random error in the aggregate pattern of responses. Moreover, in the absence of data that can be used to externally validate individuals' responses, estimates of role-restricted error are the best indicator of the level of random error in survey data. The second way that interviewers affect answers is through "role-independent interviewers' effects." These refer to possible effects of interviewers' *social characteristics* such as race or gender on respondents' answers. There is an extensive literature on both types of interviewer effects in relation to research in developed countries (summary monographs include Hyman et al. 1954; Sudman and Bradburn 1974; Fowler and Mangione 1990). On the contrary, the literature on such effects in developing societies is limited. The exceptions, which are mostly non-experimental, mainly deal with role-independent interviewer effects (e.g., Axinn 1991; Blanc and Croft 1992; Becker et al. 1995; Javeline 1999).

In this section, we explore role-restricted and role-independent interviewer effects in the KDICP and MDICP data. Our assessment of role-restricted effects uses data from all waves of both projects. The analysis of role-independent interviewer effects

uses data from Kenya 3 and from Malawi 2, the only two surveys for which interviewer-level characteristics are available. We begin, however, with a description of the interviewers.

3.2 Interviewer hiring and training policies

In all survey rounds of both the KDICP and MDICP, between five and six mixed gender teams were used. Each team contained between four and six interviewers. They were selected from a pool of Form-4 (high school) graduates who lived in the immediate vicinity of each research site. New teams of interviewers were selected and trained at each site before each survey wave (some interviewers had worked in prior rounds, Note 1).

Interviewer-training itself followed standard procedures. Aside from working through the nuts and bolts of the survey instrument, we repeatedly emphasized the importance of neutral questioning and non-directive probing.

3.3 Role-restricted interviewer effects

To estimate the size of role-restricted interviewer effects, we use the intraclass correlation coefficient, ρ (Fowler and Mangione 1990, Note 2). Where interviewer behavior is perfectly standardized, there should be no clustering of responses on the interviewer, generating an intraclass correlation of zero. In contrast, a positive non-zero coefficient indicates that some of the variance in the data is related to the interviewer rather than to natural response variation. Typically, there is always some interviewer-related error in survey research. Standard values of ρ are in the range of 0.01-0.07, which means that between one and seven percent of the variance in these parameter estimates is attributable to the interviewers (Fowler and Mangione 1990: 27-28).

Because the level of ρ tends to be related to a question's sensitivity, the classical response-effects literature treats sensitive questions as a trigger for "noisy" responses. This noise can stem from the interviewer's discomfort, from the discomfort of the respondent, or from a combination of both. In either case, the discomfort may encourage both the interviewer and respondent to attempt to rush through the difficult section to the next topic. The respondent therefore proffers censored and perhaps somewhat ambiguous answers; and the interviewer codes rather than probes, potentially falling into a personal default coding pattern. This practice has been observed via the analysis of sensitive questions in fertility research (e.g., Thompson, Ali and Casterline 1984).

The most important assumption of ρ is that the interviewers are randomly assigned to respondents (Note 3). This is easy to guarantee in experimental conditions, slightly less so in survey fieldwork. In the case of the KDICP and MDICP this requirement was dealt with by assigning each village to a team of interviewers rather than to a single interviewer (where a single interviewer is used, interviewer-related ρ is indistinguishable from village-level difference) and by randomly assigning teams to multiple villages. Within each research site, we are therefore confident that the assignment of interviewers to respondents was sufficiently random to generate valid estimates of ρ.

3.4 Results

Several variables (sensitive and non-sensitive) were selected from each of the main sections of the KDICP and MDICP questionnaires, allowing us to compare the level of ρ across different substantive areas and across survey waves. The broad categories of questions include those related to the respondent's background, questions about wealth, family planning, gender attitudes, and AIDS. To provide an external standard for estimated ρ in the KDICP and MDICP, ρ was also calculated for identical questions used in the South Nyanza women's subsample of the 1989 and 1998 Kenya Demographic and Health Surveys (KDHS).

A full list of the selected variables, along with variable-specific estimates of ρ by sex and survey wave, is reported in Appendix 1. The following discussion is mainly based on fluctuations in the mean category-specific level of ρ in the KDICP and MDICP, as presented in Tables 1 and 2.

We emphasize three sets of results, each of which points to a different dimension of instability. First, the *mean level of* ρ *varies across categories of questions.* Although there is considerable variation in the average value of ρ by category, in any given wave of the survey in any given research site, it tends to be in the standard range of 0.01-0.07 on questions about background and wealth, and slightly higher on questions about family planning. Comparable absolute levels of ρ, and slightly elevated levels in questions related to family planning are also observed in the KDHS South Nyanza subsample.

Estimates of ρ are markedly higher for questions about gender relations and AIDS. In particular, the mean ρ for AIDS questions is greater than the mean ρ for family planning questions in 7 of the 8 surveys of the KDICP women's sample, and in 5 of the 6 surveys of the MDICP women's sample. Up to 15 percent of the mean variance in selected AIDS-related questions is accounted for by interviewer's role-restricted error

Table 1: *Mean intraclass correlation coefficients for selected questions in the KDICP data, by gender of respondent, category of questions, sublocation, and wave of survey*[1]

	Oyugis			Gwassi			Kawadghone			Wakula South		
Variables	K1	K2	K3	K1	K2	K3	K1	K2	K3	K1	K2	K3
MEN												
Background	0.087	0.032	0.076	0.019	0.047	0.013	0.039	0.036	0.073	0.054	0.052	0.096
Wealth		0.035	0.27		0.016	0.1	0.042	0.081	0.059	0.028	0.175	0.18
Family planning	0.078	0.05	0.079	0.031	0.048	0.068	0.104	0.156	0.125	0.195	0.156	0.253
Gender		0.176	0.046		0.106	0.118		0.108	0.128		0.161	0.136
AIDS		0.096	0.164		0.177	0.072		0.144	0.087		0.214	0.186
Sample size (respondents)	200	150	186	195	128	177	172	152	171	176	125	163
WOMEN												
Background	0.05	0.027	0.034	0.094	0.061	0.029	0.027	0.042	0.055	0.032	0.043	0.029
Wealth		0.037	0.041		0.023	0.053		0.038	0.075		0.051	0.125
Family planning	0.072	0.109	0.078	0.119	0.035	0.108	0.089	0.081	0.126	0.071	0.116	0.133
Gender		0.145	0.054		0.043	0.098		0.101	0.081		0.225	0.121
AIDS		0.233	0.105		0.114	0.129		0.149	0.085		0.177	0.22
Sample size (respondents)	259	207	240	190	152	182	254	219	264	239	160	203

[1] Detailed results are presented in Appendix 1.

Table 2: *Mean intraclass correlation coefficients for selected questions in the MDICP data, by gender of respondent, category of questions, district, and wave of survey*

	Balaka		Mchinji		Rumphi	
Variables	M1	M2	M1	M2	M1	M2
MEN						
Background	0.059	0.017	0.004	0.016	0.038	0.033
Wealth	0.045	0.036	0.022	0.017	0.044	0.042
Family planning	0.145	0.089	0.049	0.057	0.058	0.040
Gender	0.215	0.243	0.109	0.107	0.047	0.176
AIDS	0.138	0.130	0.094	0.077	0.115	0.070
Sample size (respondents)	356	421	379	408	326	338
WOMEN						
Background	0.031	0.028	0.020	0.099	0.019	0.045
Wealth	0.042	0.036	0.030	0.061	0.023	0.037
Family planning	0.084	0.070	0.042	0.103	0.074	0.043
Gender	0.190	0.198	0.094	0.114	0.048	0.091
AIDS	0.108	0.154	0.093	0.080	0.123	0.109
Sample size (respondents)	487	542	542	528	507	494

in the MDICP (as can be seen in Appendix 1, the level of ρ tends to be particularly high—more than 25 percent of total variance—on questions about "perceived risk of catching AIDS" and "number of AIDS network partners"). Measurement of AIDS-related information is particularly weak in the KDICP, where role-restricted interviewer error accounts for more than 20 percent of the variance in the Kenya 2 women's sample in Oyugis, and in the Kenya 3 women's sample in Wakula South.

Second, the *mean level of ρ varies across research sites.* Role-restricted interviewer effects tend to be lower in Malawi than in Kenya. The differences between research sites are also greater for the KDICP than for the MDICP: in Kenya, the mean ρ across all categories of questions is highest in Wakula South; in Malawi it is highest for Balaka and roughly equal for the other two districts.

The greater regional contrast in the KDICP could be related to a number of factors. First, Wakula South is geographically the most remote of the KDICP research sites. Its residents therefore have the least exposure to outsiders, to public health pronouncements and campaigns, and so on. We suspect that this lack of exposure makes AIDS-related questions somewhat more sensitive, in the sense discussed above. Second, the higher levels of ρ in the KDICP as compared to the MDICP may be related to the political problems that the project faced in a couple of its larger villages in Kenya 2 (related to perceived inequities in employment opportunities). This resulted in a greater reluctance to participate in the project that was mitigated more effectively by some interviewers than by others.

In Malawi, in contrast, there is no obvious reason why ρ should be highest in Balaka. One possible explanation is the low level of education in Balaka relatively to the other research sites. Some questions might lack clarity for respondents with less schooling, and in such circumstances it is not unlikely that interviewers are be more tempted to 'fill in', or steer answers. Another possible explanation is that the Balaka sub-sample of the MDICP is the most diverse in terms of religious and ethnic identity. In particular, it is the only site where a majority of respondents are either Muslim or belong to an ethnic group where postmarital residence is normatively matrilocal. Comparative research in Muslim and non-Muslim communities elsewhere has shown that measurement of gender constructs in Muslim communities may be less valid than among their non-Muslim neighbors (Ghuman, Lee and Smith 2001).

Third, the *mean level of* ρ *does not seem to vary in a systematic manner across survey waves*. This observation holds for both the KDICP and the MDICP. It is worth noting that fluctuations of the same magnitude can be observed across the two KDHS waves. The absence of obvious changes in mean ρ in the KDICP are important given the transition from a questionnaire that was fully translated into the dominant language (Luo) into an English-language questionnaire that the interviewer was trained to translate on the spot. Standard methodological approaches suggest that the lack of

standardization increases the level of role-restricted error (e.g., Fowler and Mangione 1990). In this context it does not seem to have a great effect. There is no general pattern in the changes in average value of ρ across Kenya 1 and Kenya 2 in either women's or men's data, or in relation to background or family planning questions. It suggests that, at least in these contexts, a thorough and standardized training of interviewers can negate the adverse and unwanted effects that their subsequent simultaneous translation of questions will have on responses.

In sum, the levels of role-restricted interviewer effects in the KDICP and MDICP are in the standard 0.01-0.07 range for the most commonly asked questions. The same range of values is observed in the KDHS. Interviewer effects are, however, more elevated for questions related to AIDS and gender relations. As noted above, this is consistent with the classical response-effects literature in the sense that sensitive questions usually trigger "noisy" responses. It is also likely that some of the variation between types of questions, between research sites, and between survey waves, reflects natural fluctuations in the quality of interviewing. This is notwithstanding the fact that interviewers were, in all cases, drawn from the same educational class, and subjected to the same training procedures by the same trainers.

These results have some implications for analysis. On the one hand, they imply that data from the KDICP, and more especially the MDICP, do not have significant problems with random error. On the other hand, they indicate that there are some variables on which there is a significant level of random error and that these are more likely to be related to AIDS or gender. Analysts should therefore take considerable care in their choice of key variables, since significant levels of random error make it more difficult to identify analytic relationships (irrespective of the level of bias). Similarly, analyses that aim to compare relationships across research sites or time may be affected where the random error varies considerably across those same research sites or time.

3.5 Role-independent interviewer effects

If role-restricted interviewer effects identify a major source of random error in the aggregate pattern of responses, role-independent effects give us a window onto the identification of bias. This is because role-independent interviewer effects on a given question are said to arise if and only if a particular interviewer characteristic is "salient" to that question (Sudman and Bradburn 1974).

Interviewer characteristics were collected in Kenya 3 and in Malawi 1 (Appendix 2 presents the distribution of the interviewers by some of these characteristics). We explore the effects of these characteristics by regressing the same

Table 3: *Statistically significant bivariate relationships between interviewer's social characteristics and selected questions in the Kenya 3 data, by characteristic, category of question, and wave of survey: Men*

MEN	***Interviewer's characteristics***				
Variables	age	married	has children	male	knows R's family
Background					
ever attended school	–0.060*	n.s.	–0.682*	n.s.	n.s.
number of children ever born	n.s.	n.s.	n.s.	n.s.	n.s.
number of children who died	n.s.	n.s.	n.s.	n.s.	n.s.
desires more children	n.s.	n.s.	n.s.	n.s.	n.s.
ideal number of children	n.s.	n.s.	n.s.	n.s.	n.s.
Wealth					
HH has radio	n.s.	–0.451**	–0.533**	n.s.	n.s.
HH has bicycle	n.s.	–0.420*	n.s.	n.s.	n.s.
HH has pit latrine	n.s.	–0.408*	n.s.	n.s.	n.s.
HH has plough	n.s.	n.s.	n.s.	n.s.	–0.187*
HH has fishing net	–0.080**	n.s.	n.s.	n.s.	0.533***
Family planning					
number of people chatted about FP	n.s.	n.s.	n.s.	n.s.	n.s.
has disagreed with spouse about FP	n.s.	n.s.	n.s.	–0.729**	n.s.
ever used any modern method	n.s.	n.s.	n.s.	n.s.	n.s.
is currently using modern method	n.s.	n.s.	n.s.	n.s.	n.s.
heard about women using FP secretly	n.s.	–0.400*	n.s.	n.s.	n.s.
Gender (asserts that wife can leave husband if he..)					
does not support financially	n.s.	n.s.	n.s.	n.s.	n.s.
beats the children frequently	n.s.	n.s.	n.s.	n.s.	n.s.
beats her frequently	n.s.	n.s.	n.s.	n.s.	n.s.
drinks too much	n.s.	n.s.	n.s.	–0.556**	n.s.
is sexually unfaithful	n.s.	n.s.	n.s.	n.s.	n.s.
is infected with AIDS	n.s.	n.s.	n.s.	0.615**	n.s.
does not support financially	–0.036*	–0.515**	–0.513**	0.368*	n.s.
AIDS					
total number chatted with about AIDS	n.s.	n.s.	n.s.	n.s.	n.s.
has talked w/ spouse about catching AIDS	n.s.	n.s.	n.s.	n.s.	n.s.
feels comfortable suggesting condom use w/ spouse	n.s.	–0.361*	n.s.	n.s.	n.s.
degree of perceived risk of catching AIDS	–0.014*	n.s.	n.s.	n.s.	n.s.

Notes: Significant at *** 0.1% level; ** 1% level; *5% level; n.s. = no statistically significant relationship.

Table 3: *(continued): Women*

WOMEN	***Interviewer's characteristics***				
Variables	***age***	***married***	***has children***	***male***	***knows R's family***
Background					
ever attended school	n.s.	n.s.	n.s.	–0.370*	n.s.
number of children ever born	n.s.	n.s.	n.s.	n.s.	n.s.
number of children who died	n.s.	n.s.	n.s.	n.s.	n.s.
desires more children	n.s.	n.s.	n.s.	0.281*	n.s.
ideal number of children	n.s.	n.s.	n.s.	n.s.	–4.09**
Wealth					
HH has radio	n.s.	n.s.	–0.276*	n.s.	n.s.
HH has bicycle	n.s.	n.s.	n.s.	n.s.	n.s.
HH has pit latrine	n.s.	n.s.	n.s.	n.s.	n.s.
HH has plough	n.s.	–0.348*	n.s.	n.s.	n.s.
HH has fishing net	n.s.	n.s.	n.s.	n.s.	0.444***
Family planning					
number of people chatted about FP	n.s.	n.s.	n.s.	n.s.	0.822***
has disagreed with spouse about FP	n.s.	n.s.	n.s.	–0406*	n.s.
husband agreed to use FP	n.s.	n.s.	n.s.	n.s.	n.s.
ever used any modern method	0.035*	n.s.	n.s.	n.s.	0.208*
is currently using modern method	n.s.	n.s.	n.s.	n.s.	0.317*
heard about women using FP secretly	n.s.	–0.331*	n.s.	n.s.	0.198*
Gender (asserts that wife can leave husband if he..)					
does not support financially	n.s.	n.s.	n.s.	n.s.	n.s.
beats the children frequently	n.s.	n.s.	n.s.	n.s.	n.s.
beats her frequently	n.s.	n.s.	–0.281*	n.s.	n.s.
drinks too much	n.s.	n.s.	n.s.	–0.363*	n.s.
is sexually unfaithful	–0.055**	n.s.	n.s.	n.s.	n.s.
is infected with AIDS	–0.047**	–0.372*	–0.307*	n.s.	n.s.
does not support financially	–0.057***	–0.724***	–0.882***	0.322*	n.s.
AIDS					
total number chatted with about AIDS	n.s.	n.s.	n.s.	n.s.	n.s.
has talked w/ spouse about catching AIDS	n.s.	n.s.	n.s.	n.s.	.204*
feels comfortable suggesting condom use w/ spouse	n.s.	–0.444**	–0.405**	n.s.	n.s.
degree of perceived risk of catching AIDS	n.s.	n.s.	–0.147*	–0.255***	n.s.

Notes: Significant at *** 0.1% level; ** 1% level; *5% level; n.s. = no statistically significant relationship.

Table 4: *Statistically significant bivariate relationships between interviewer's social characteristics and selected questions in the Malawi 1 data, by characteristic, category of question, and wave of survey: Men*

MEN	**Interviewer's characteristics**					
Variables	***age***	***married***	***has children***	***male***	***mother from other district***	***father from other district***
Background						
Ever attended school	0.066**	0.880***	0.894***	-0.443*	n.s.	n.s.
Number of children ever born	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Number of children who died	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Desires more children	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Ideal number of children	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Wealth						
Household has radio	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Household has bicycle	n.s.	-0.475***	-0.430**	n.s.	n.s.	n.s.
Household has pit latrine	n.s.	0.428*	n.s.	n.s.	n.s.	n.s.
Family planning						
Number of people chatted with about FP	n.s.	-1.08***	-0.648*	n.s.	n.s.	n.s.
Thinks that husband would agree to use FP	n.s.	n.s.	n.s.	0.348*	n.s.	n.s.
Has ever used any modern method of FP	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Is currently using modern method of FP	-0.041*	-0.517**	-0.511**	n.s.	0.460*	n.s.
Gender (asserts that wife can leave husband if he..)						
Does not support financially	n.s.	-0.290*	-0.456**	n.s.	n.s.	n.s.
Beats her frequently	-0.036*	-0.274*	-0.336*	n.s.	n.s.	n.s.
Is sexually unfaithful	-0.068**	-0.588*	-0.999***	0.863**	n.s.	n.s.
Is infected with AIDS	-0.048*	-0.377*	-0.494*	n.s.	n.s.	n.s.
AIDS						
Total number chatted with about AIDS	n.s.	-1.56***	-1.23**	n.s.	-1.03*	n.s.
Acceptable to use condom w/ spouse	n.s.	-0.746**	-0.514*	n.s.	1.35***	n.s.
Degree of perceived risk of catching AIDS	-0.017**	n.s.	n.s.	n.s.	0.333***	0.228***
Number of people thinks have died from AIDS	n.s.	n.s.	n.s.	n.s.	1.53***	n.s.
Best friend had other sexual partner	n.s.	n.s.	n.s.	n.s.	n.s.	0.070*
Talked to spouse about getting AIDS	n.s.	n.s.	n.s.	0.365*	n.s.	n.s.
Thinks spouse had sex w/ other partner	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Admits having sex w/ other partner	n.s.	n.s.	n.s.	-0.459*	n.s.	n.s.

Notes: Significant at *** 0.1% level; ** 1% level; *5% level; n.s. = no statistically significant relationship.

Table 4: *(continued): Women*

WOMEN	***Interviewer's characteristics***					
Variables	***age***	***married***	***has children***	***male***	***mother from other district***	***father from other district***
Background						
Ever attended school	n.s.	0.135**	n.s.	-0.301*	n.s.	n.s.
Number of children ever born	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Number of children who died	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Desires more children	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Ideal number of children	n.s.	n.s.	n.s.	n.s.	-0.295*	n.s.
Wealth						
Household has radio	n.s.	n.s.	n.s.	-0.270*	0.232*	n.s.
Household has bicycle	-0.047***	0.310**	-0.247*	n.s.	0.250**	n.s.
Household has pit latrine	0.063	0.617***	0.442***	-.0336**	n.s.	n.s.
Family planning						
Number of people chatted with about FP	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Thinks that husband would agree to use FP	n.s.	n.s.	n.s.	-0.427***	n.s.	n.s.
Has ever used any modern method of FP	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Is currently using modern method of FP	n.s.	n.s.	0.463**	n.s.	0.394*	n.s.
Gender (asserts that wife can leave husband if he..)						
Does not support financially	-0.026*	n.s.	n.s.	n.s.	n.s.	0.261*
Beats her frequently	n.s.	n.s.	n.s.	n.s.	n.s.	0.419*
Is sexually unfaithful	n.s.	-0.334*	-0.383**	n.s.	0.278*	0.310*
Is infected with AIDS	n.s.	n.s.	0.394**	0.541***	0.279*	n.s.
AIDS						
Total number chatted with about AIDS	n.s.	n.s.	n.s.	0.523*	n.s.	n.s.
Acceptable to use condom w/ spouse	n.s.	-0.445**	n.s.	0.644***	0.965***	n.s.
Degree of perceived risk of catching AIDS	n.s.	n.s.	0.117**	0.089*	0.104*	n.s.
Number of people thinks have died from AIDS	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Best friend had other sexual partner	-0.006*	n.s.	0.074**	0.054*	n.s.	n.s.
Talked to spouse about getting AIDS	n.s.	n.s.	0.350**	-0.365**	n.s.	n.s.
Thinks spouse had sex w/ other partner	n.s.	0.157*	-0.137*	0.123*	n.s.	n.s.
Admits having sex w/ other partner	-0.043*	n.s.	n.s.	n.s.	n.s.	n.s.

Notes: Significant at *** 0.1% level; ** 1% level; *5% level; n.s. = no statistically significant relationship.

set of sensitive variables used in the construction of Tables 1 and 2 on each of these interviewer characteristics (depending on the distribution of the dependent variable, we specified either OLS or logit models). Separate sets of analysis are presented for men and women, and for the MDICP and KDICP. Throughout, we maintain our assumption that the assignment of interviewers to respondents was sufficiently random to generate meaningful data (Note 4).

The results of the analysis are presented in Tables 3 and 4. Again, we emphasize three main results:

1) *Role-independent effects appear to be more extensive in the MDICP than in the KDICP*. This difference is particularly noteworthy in the men's data in sections on AIDS, gender attitudes and, to a smaller extent, family planning. In the women's data it appears to be restricted to questions about AIDS and wealth.
2) *The most influential role-independent interviewer characteristics vary across the two research projects and by sex of the respondent.* For example, interviewers' gender and fertility status are the most important covariates of response patterns in the women's Malawi 1 data (though age, marital status and parents' place of origin are also associated with a substantial number of variables). The most important covariates of response patterns in the women's Kenya 3 data are gender, marriage and fertility status, and the degree of familiarity with the respondent's family. The gender of the interviewer also seems to have a more tangible effect on the responses of women as compared to men.
3) *The most systematically biased categories of responses vary by sex of the respondent*. Among female respondents, role-independent interviewer effects are most common in relation to questions about gender and AIDS. Among men, they are most frequent in relation to questions about gender issues.

These results index context-specific differences in the salience of given types of interviewer characteristics to individual questions. These differences are related to the acceptability of given types of conversations in given pairs of interviewer-respondent interactions. These results therefore have some implications for methodological choices with respect to data collection since, at the least, they bring into question current preferences for using urban female interviewers (for example, in most Demographic and Health Surveys in sub-Saharan Africa). Until validation studies are conducted, we are unlikely to know what types of interviewers collect the most accurate data on given topics (Note 5). Meanwhile, a heterogeneous team of interviewers of the type used in both the KDICP and MDICP may be the most effective way to judge the size of the possible bias in responses and also to identify the most sensitive questions.

4. Response reliability

In the context of survey research, reliability refers to the degree of agreement between individual reports in different interviews. The analysis of reliability is one way to quantify response error since unreliable results demonstrate a lack of validity (Becker et al. 1995). Response reliability is of particular concern when attitudinal questions or questions requiring a considerable span of recall are a major focus of the research (Brackbill 1974).

One aspect of measurement reliability is the extent to which similar survey conditions elicit different responses (O'Muircheartaigh 1982:7). This is referred to as *test-retest reliability* and is assessed by measures of the reproducibility of a given set of results (Litwin 2003:7). In this section, we first present test-retest reliability of the responses to a few comparable items in the different waves of the KDICP and MDICP. Then, we discuss how well survey questions elicit the same response over a short time interval through the analysis of reinterview data from Malawi 2.

4.1 Between waves test-retest reliability

We assessed test-retest reliability between the first and second wave of the KDICP and MDICP by means of the percentage of inconsistent answers on a few key survey items (Table 5).

In both Kenya and Malawi, about 10 percent of the respondents report an age in the two waves of the surveys that implies a year of birth five years or more apart. Less than 5 percent of respondents report an age in the second round more than 10 years apart from the answer in the first wave, and this figure declines if answers obtained after probing are excluded. Inconsistencies in reported educational level also vary between 5 and 10 percent. The reporting of the total number of children seems less reliable. Men appear more consistent than women in Kenya, and vice versa in Malawi. Similarly, reporting about child mortality is not very reliable, especially in Malawi. Perhaps the greater consistency in the reporting of child mortality in Kenya is related to the different questionnaire wording. In the KDICP, the question explicitly referred to the number of deceased children, whereas in the MDICP it was asked how many of the reported number of children were still alive (Note 6).

Overall, these results do not allow for any definitive conclusions about patterns in the reliability of answers in the KDICP and MDICP surveys, but they give some indication of the order of magnitude of the consistency in the recorded answers over time.

Table 5: *Percentages of inconsistent respondents between the first and second wave of the KDICP and MDICP for selected survey items*[*]

Question	KDICP		MDICP	
	Men	**Women**	**Men**	**Women**
Difference in reported age				
≥ 5 years	12.04	10.17	9.76	7.98
	(490)	(660)	(830)	(1216)
≥ 10 years	4.08	3.87	4.10	3.29
	(490)	(660)	(830)	(1216)
Excluding responses obtained after probing				
≥ 5 years	(n/a)	(n/a)	7.45	4.79
			(752)	(940)
≥ 10 years	(n/a)	(n/a)	2.66	1.91
			(752)	(940)
Educational level (3 cat) [a]	8.11	8.61	5.44	3.59
	(481)	(662)	(809)	(1198)
Reported # of children [b]	7.75	12.42	18.86	14.44
	(490)	(660)	(827)	(1212)
Underreporting of child mortality [c]	14.05	10.51	27.21	25.55
	(306)	(371)	(441)	(634)

* Sample sizes in parentheses.

[a] Considered inconsistent if the reported educational level in wave 2 is lower than in wave 1, or, if the reported educational level was 2 categories higher (e.g., from no education to secondary education)

[b] Considered inconsistent if the number of children reported in wave 2 is smaller than in wave 1, or, if the number of children in wave two is higher than the number of children reported in wave 1 plus an additional child for each year that the 2 surveys were apart (2 children for polygamous men).

[c] Of all parents who experienced at least one child death, the proportion who reported fewer child deaths in wave 2 compared to wave 1. In the MDIC-surveys, the question was formulated in terms of surviving children rather than child deaths.

4.2 Within wave test-retest reliability

For a precise reliability assessment, the "instant replay" of the survey conditions would be necessary, but this is rarely possible to achieve outside a laboratory (Coombs 1977: 218). However, Malawi 2 provided for a set of re-interviews with 96 women and 38 men after a relatively short time interval —not more than three weeks— following the first interview (Note 7). To assess reliability we calculated kappa statistics for all questions in the Malawi 2 questionnaire (Note 8) and we grouped them according to the questions' typology (attitudinal, behavioral and factual).

The expected amount of agreement varies with the type of question. It is generally assumed that factual and behavioral questions —with the important exception of those that deal with sensitive issues— should be more reliable than attitudinal questions, which are more overtly susceptible to temporary emotional fluctuations (e.g., Ryder and Westoff 1971).

Expectations about the reliability of survey items by gender are more complex. On the one hand, most existing studies on survey reliability focus only on women, so that gender differences cannot be assessed. On the other hand, the few studies that have analyzed re-interview data for both sexes have generally found no substantial gender differences (e.g., Brackbill 1974; Knodel and Piampiti 1977), but this is mostly because women and men were asked different questions (in the main interview and/or the re-interview), and because the comparison of men's and women's reports was limited to not more than a few survey items.

Table 6: *Distribution of survey items by reliability level within a single survey, as a percentage of the total number of survey items in the questionnaire*

	Low	Good	High	N
MEN				
Attitudinal	72.2	16.7	11.1	18
Behavioral	42.9	28.6	28.6	14
Factual	41.7	29.2	29.2	24
All questions	51.8	25.0	23.2	56
WOMEN				
Attitudinal	100.0	0.0	0.0	28
Behavioral	57.1	42.9	0.0	14
Factual	50.0	40.0	10.0	20
All questions	74.2	22.6	3.2	62

Notes: High reliability: kappa>0.75. Good reliability: 0.5<kappa<0.75. Low reliability: kappa<0.5. The sample size for the calculation of the percentages in the table can exceed the number of questions in each section because some questions allowed multiple responses (i.e. included more than one survey item).

Table 6 shows the distribution of the survey items asked in both surveys by their type (attitudinal, behavioral and factual) and reliability level, as a percentage of the total number of survey items in the questionnaire. It is evident that most survey items tend to be of very low reliability. In accordance with our expectations, factual questions exhibit the highest reliability and behavioral questions tend to be more reliable than attitudinal questions. These general considerations apply to both sexes although men seem to be more consistent than women for all types of questions considered. Our results are also in the same range of those reported by Knodel and Piampiti (1977) with reference to the National Longitudinal Survey of Thailand, which varied from quite high for several factual questions (80 per cent or better) to quite low for several attitudinal questions (under 30 per cent).

The analysis of the intraobserver reliability of the MDICP questions is therefore consistent with the results of previous studies in the sense that it highlights the low reliability of survey items in general, and in illustrating that factual questions tend to be more reliable than attitudinal and behavioral questions. Perhaps surprisingly, men provide more stable answers than women.

5. Sample attrition

Sample attrition refers to the percentage of respondents interviewed in the first but not in the subsequent waves of a panel survey. Some level of attrition is to be expected in any longitudinal research, since it reflects the natural fluctuations and mobility in a society and there is generally no follow-up of individuals who moved between survey waves. Attrition is considered a problem because it can introduce distortions in parameter estimates if it is selective on characteristics that are either observed or unobserved (for a detailed discussion of the effects of attrition, see Alderman et al. 2001).

In rural areas of sub-Saharan Africa like the ones sampled in the KDICP and MDICP, high levels of attrition are to be expected. There is not only substantial labor-related migration (Segal 1985; Kalipeni 1996) but high levels of marital instability also lead to migration out of the sample sites (Reniers, same volume). Adult mortality is another source of attrition, and this is of particular concern because the research sites are located in settings with high HIV prevalence (Note 9).

Attrition rates between the first and second waves of the KDICP are indeed high: 33 and 28 percent of Kenya 1 men and women were not successfully re-interviewed in Kenya 2 (Alderman et al. 2001:90); and 16 and 19 percent of Malawi 1 men and women were lost between the first and second waves of the MDICP (Table 7, Note 10). The key analytic question is not what caused these relatively high levels of attrition, but whether the attrition is selective, and if so, whether it affects parameter estimates in multivariate models (Note 11).

Table 7: *Reported reasons for attrition in completed interviews between first and second wave of KDICP and MDICP survey*

	KDICP[a]				MDICP			
Reasons for attrition	Men		Women		Men		Women	
	Number	%	Number	%	Number	%	Number	%
Away or moved elsewhere	96	47.8	119	58.6	154	78.6	218	73.7
Unknown or not found	36	17.9	32	15.8	14	7.2	24	8.1
Refused	26	12.9	20	9.9	4	2.0	1	0.2
Sick or hospitalized	6	3.0	3	1.5	1	0.5	4	1.4
Deceased	37	18.4	20	9.9	22	11.2	42	14.2
Other	0	0.0	11	4.4	1	0.5	7	2.4
Total	201		205		196		296	

Notes: n/a=not available.

[a] Source: Our calculations from Alderman et al. (2001), Table 2, p.91. Note that reasons for attrition are not reported for 22.4 percent of the men and 21.8 percent of the women interviewed in Kenya 1 but not in Kenya 2.

5.1 The characteristics of attritors

We explored the characteristics of attritors and non-attritors by comparing the means of major outcome and control variables for those who were re-interviewed in the second wave of the KDICP and MDICP versus those who were not re-interviewed. Results (Tables 8 and 9) indicate that there are substantial differences between attritors and non-attritors.

In the Kenyan and the Malawian samples, and for both men and women, attritors tend to be younger, more educated, and have fewer children than non-attritors, and they are more likely to live in households with males who receive salaries. Respondents lost to follow-up in Malawi are also more mobile (i.e., they are more likely to have lived elsewhere for six or more months since the age of 15) and more worried about getting AIDS.

For a few variables the means differ significantly between attritors and non-attritors for men but not for women (in Kenya, ever-use of contraception and residence in the sublocation of Owich; in Malawi, to live in Balaka and to be polygamous), or for women but not for men (in Kenya, wanting no more children, residing in the sublocation of Wakula South; in Malawi, age, wanting no more children, desired family size, ever use of contraceptives, and whether the spouse has extramarital relationships).

Table 8: *T-test for differences in means in Kenya 2 data for those re-interviewed versus not re-interviewed: Men*

MEN	Re-interviewed		Not re-interviewed		Difference	
Variables	Mean	Std. Dev.	Mean	Std. Dev.	Mean	t-test[a]
Fertility-related outcome variables						
Number of surviving children	4.76	(0.171)	3.94	(0.277)	0.817**	(2.46)
Want no more children	0.208	(0.017)	0.237	(0.031)	–0.029	(–0.83)
Family planning variables						
Currently using contraceptives	0.196	(0.017)		(0.031)	–0.033	(–0.95)
Ever used contraceptives	0.233	(0.018)	0.311	(0.052)	–0.077*	(–1.79)
Control variables						
Age (years)	40.1	(0.52)	36.8	(0.78)	3.3**	(3.24)
Education						
No schooling	0.112	(0.013)	0.063	(0.018)	0.049*	(1.94)
Some primary schooling	0.577	(0.021)	0.537	(0.036)	0.040	(0.96)
Secondary schooling	0.298	(0.019)	0.379	(0.035)	–0.08**	(–2.06)
Sublocation of residence						
Gwassi	0.278	(0.019)	0.216	(0.030)	0.063*	(1.69)
Kawadhgone	0.230	(0.018)	0.237	(0.031)	–0.007	(–0.20)
Oyugis	0.259	(0.019)	0.300	(0.033)	–0.041	(–1.11)
Ugina	0.233	(0.018)	0.247	(0.032)	–0.014	(–0.39)
Residence						
Lived outside of province	0.591	(0.021)	0.653	(0.035)	0.061	(1.49)
Lived in Nairobi or Mombasa	0.336	(0.020)	0.400	(0.036)	–0.064	(–1.58)
Household characteristics						
Polygamous household	0.293	(0.019)	0.238	(0.031)	0.055	(1.45)
Self does work generating income	0.170	(0.016)	0.255	(0.032)	–0.09**	(–2.56)
Household has radio	—	—	—	—	—	

Table 8: *(continued):Women*

WOMEN	Re-interviewed		Not re-interviewed		Difference	
Variables	Mean	Std. Dev.	Mean	Std. Dev.	Mean	t-test
Fertility-related outcome variables						
Number of surviving children	3.88	(0.089)	2.78	(0.138)	1.10**	(5.90)
Want no more children	0.351	(0.018)	0.220	(0.037)	0.132**	(3.59)
Family planning variables						
Currently using contraceptives	0.126	(0.012)	0.103	(0.021)	0.024	(0.91)
Ever used contraceptives	0.238	(0.016)	0.196	(0.027)	0.042	(1.25)
Control variables						
Age (years)	29.7	(0.332)	26.3	(0.488)	3.4**	(5.04)
Education						
No schooling	0.214	(0.015)	0.141	(0.024)	0.072*	(2.30)
Some primary schooling	0.669	(0.018)	0.668	(0.033)	0.001	(0.03)
Secondary schooling	0.117	(0.012)	0.190	(0.027)	–0.07**	(–2.75)
Sublocation of residence						
Gwassi	0.213	(0.015)	0.210	(0.029)	0.003	(0.008)
Kawadhgone	0.240	(0.015)	0.205	(0.028)	0.035	(1.06)
Oyugis	0.286	(0.017)	0.263	(0.031)	0.023	(0.63)
Ugina	0.261	(0.016)	0.322	(0.033)	–0.061*	(–1.72)
Residence						
Lived outside of province	0.370	(0.018)	0.371	(0.034)	–0.001	(–0.02)
Lived in Nairobi or Mombasa	0.214	(0.015)	0.205	(0.028)	0.009	(0.29)
Household characteristics						
Polygamous household	0.350	(0.018)	0.371	(0.034)	–0.021	(–0.56)
Self does work generating income	0.334	(0.019)	0.402	(0.037)	–0.068*	(–7.66)
Household has radio	0.765	(0.016)	0.752	(0.029)	0.013	(0.41)

Notes: * indicates significance at the 10 percent level, and ** at the 5 percent level.
[a] Values of two sample t-test with unequal variances.

Source: Alderman et al. (2001), Table 4, pp.96-7.

Table 9: *T-test for differences in means in Malawi 2 data for those re-interviewed versus not re-interviewed: Men*

MEN	**Re-interviewed**		**Not re-interviewed**		**Difference**	
Variables	Mean	Std. Dev.	Mean	Std. Dev.	Mean	t-test[a]
Fertility-related outcome variables						
Number of surviving children	3.994	(2.725)	3.608	(2.559)	0.386**	1.8
Want no more children	0.326	(0.469)	0.313	(0.465)	–0.397	–0.3
Desired family size	5.226	(2.393)	5.012	(2.012)	0.214	1.2
After birth of last child:						
Length of breastfeeding (months)	—	—	—	—	—	—
Postpartum abstinence (months)	—	—	—	—	—	—
Use of family planning	—	—	—	—	—	—
Family planning variables						
Currently using contraceptives	0.652	(0.477)	0.681	(0.468)	–0.029	–0.6
Ever used contraceptives	0.590	(0.492)	0.594	(0.492)	–0.004	–0.1
AIDS variables						
Worry about AIDS						
Not worried	0.280	(0.449)	0.230	(0.422)	0.049*	1.4
Worried a lot	0.524	(0.500)	0.618	(0.487)	-0.094**	-2.3
Worried a little	0.194	(0.396)	0.152	(0.360)	0.042*	1.4
Self has extramarital relationships	0.090	(0.287)	0.084	(0.278)	0.006	0.3
Spouse has extramarital relationships	0.080	(0.271)	0.063	(0.244)	0.016	0.8
Control variables						
Age (years)	34.64	(8.388)	34.84	(8.371)	–0.197	-0.3
Education						
No schooling	0.781	(0.414)	0.731	(0.445)	0.050*	1.4
Some primary schooling	0.641	(0.480)	0.591	(0.493)	0.051*	1.3
Secondary schooling	0.167	(0.373)	0.184	(0.389)	–0.017	-0.5
Religion						
Catholic	0.206	(0.404)	0.176	(0.382)	0.029	0.9
Protestant	0.516	(0.500)	0.420	(0.495)	0.097**	2.4
Revivalist	0.047	(0.213)	0.067	(0.251)	–0.020	-1
Moslem	0.212	(0.409)	0.285	(0.453)	-0.073**	-2
Sublocation of residence						
Balaka	0.334	(0.472)	0.403	(0.492)	-0.069**	-1.7
Mchinji	0.376	(0.485)	0.342	(0.476)	0.034	0.9
Rumphi	0.290	(0.454)	0.255	(0.437)	0.035	1
Residence						
Usually lives elsewhere	0.948	(0.222)	0.922	(0.268)	0.026	1.2
Has lived elsewhere 6+ months	0.619	(0.486)	0.736	(0.442)	-0.117**	-3.2
Household characteristics						
Polygamous household	0.066	(0.249)	0.099	(0.300)	–0.033*	-1.4
Self does work generating income	0.973	(0.161)	0.974	(0.159)	–0.00	-0.1
Household has radio	0.663	(0.473)	0.627	(0.485)	0.036	0.9

Table 9: *(continued): Women*

WOMEN	**Re-interviewed**		**Not re-interviewed**		**Difference**	
Variables	Mean	Std. Dev.	Mean	Std. Dev.	Mean	t-test
Fertility-related outcome variables						
Number of surviving children	3.468	(2.171)	2.720	(2.024)	0.748**	5.4
Want no more children	0.374	(0.484)	0.357	(0.480)	1.543**	2.0
Desired family size	4.938	(1.936)	4.386	(1.604)	0.551**	4.6
After birth of last child:						
Length of breastfeeding (months)	20.362	(8.672)	20.083	(9.116)	0.279	0.3
Postpartum abstinence (months)	7.358	(5.496)	7.918	(6.023)	–0.561	–1.1
Use of family planning	0.527	(0.500)	0.513	(0.501)	0.014	0.4
Family planning variables						
Currently using contraceptives	0.590	(0.492)	0.566	(0.497)	0.024	0.5
Ever used contraceptives	0.513	(0.500)	0.470	(0.500)	0.044*	1.4
AIDS variables						
Worry about AIDS						
Not worried	0.172	(0.377)	0.139	(0.347)	0.033*	1.4
Worried a lot	0.616	(0.486)	0.651	(0.478)	–0.035	–1.1
Worried a little	0.210	(0.408)	0.210	(0.408)	0.000	0.0
Self has extramarital relationships	0.022	(0.145)	0.034	(0.181)	–0.01	–1.1
Spouse has extramarital relationships	0.294	(0.456)	0.356	(0.480)	-0.061**	–1.9
Control variables						
Age (years)	30.768	(8.707)	29.047	(7.982)	1.721**	3.3
Education						
No schooling	0.630	(0.483)	0.709	(0.455)	-0.079**	–2.7
Some primary schooling	0.612	(0.488)	0.683	(0.466)	-0.071**	–2.2
Secondary schooling	0.111	(0.315)	0.225	(0.420)	-0.114**	–2.7
Religion						
Catholic	0.185	(0.388)	0.193	(0.395)	–0.008	–0.3
Protestant	0.541	(0.499)	0.527	(0.500)	0.014	0.4
Revivalist	0.041	(0.197)	0.061	(0.239)	–0.020*	–1.4
Moslem	0.218	(0.413)	0.182	(0.387)	0.035*	1.4
Sublocation of residence						
Balaka	0.320	(0.467)	0.351	(0.478)	–0.032	–1.0
Mchinji	0.359	(0.480)	0.348	(0.477)	0.011	0.4
Rumphi	0.321	(0.467)	0.301	(0.459)	0.021	0.7
Residence						
Usually lives elsewhere	0.822	(0.383)	0.740	(0.440)	0.082**	3.0
Has lived elsewhere 6+ months	0.441	(0.497)	0.503	(0.501)	-0.063**	–1.9
Household characteristics						
Polygamous household	0.243	(0.429)	0.208	(0.407)	0.035	1.2
Self does work generating income	0.570	(0.495)	0.561	(0.497)	0.048**	1.6
Household has radio	0.748	(0.435)	0.699	(0.459)	0.009	0.3

Notes: * indicates significance at the 10 percent level, and ** at the 5 percent level.
[a] Values of two sample t-test with unequal variances.

5.2 Correlates of attrition

To identify correlates of attrition, we fitted several probit models, first including only one outcome variable at a time, and then including all outcome variables, and all outcome variables plus some controls (Table 10).

In the full model for Kenya, where all primary outcome and control variables are included, there are only two variables that remain significantly related to attrition: the number of surviving children for women (negative); and wanting no more children for men (positive). For the Malawian survey, none of the variables considered is a significant predictor of attrition in the full model for men; whereas for women only desired family size (negative) and, to a lesser extent, whether or not the respondent suspects the spouse to have had an extramarital relationship in the past 12 months (positive) are significantly related to attrition.

5.3 Impact of attrition on coefficient estimates

To explore the effect of attrition on parameter estimates, we conducted a series of BGLW tests (Note 12). First (top part of Table 11), we estimated the coefficients for the control variables for the non-attritors. Then (bottom part of Table 11) we calculated the F tests (for OLS regressions) or χ^2 tests (for probit models) to verify whether there are significant differences between attritors and non-attritors for all the slope coefficients and the constant, or for the slopes alone (without the constant).

In the KDICP data, the coefficients on 'standard' variables in Probit or OLS equations are unaffected by attrition. Tests for the significance of attrition always fail to reject the null hypothesis, except for its effects on the estimated intercept in the women's data (Alderman et al. 2001: 104-5).

In the MDICP data, in contrast, attrition has a significant effect on both the estimated intercept and the slopes in OLS equations for women. For males there is a stronger effect of attrition in Malawi compared to Kenya. The test for the effect of attrition is marginally significant in the OLS equation. In the Probit models, there is a highly significant effect of attrition on both the slopes and intercepts.

Table 10: *Probits for predicting attrition between the first and second round of the KDICP and MDICP surveys*

	KDICP				MDICP					
	Men		**Women**		**Men**			**Women**		
Outcome variables	Outcome variables, one at a time	All outcome variables + controls[b]	Outcome variables, one at a time	All outcome variables + controls[c]	Outcome variables, one at a time	All outcome variables	All outcome variables + controls[d]	Outcome variables, one at a time	All outcome variables	All outcome variables + controls[e]
Number of surviving children	–0.033** (–2.46)	–0.017 (–0.78)	–0.139** (5.82)	–0.136** (3.73)	–0.032** (0.02)	–0.034 (0.04)	–0.080 (0.06)	–0.096*** (0.02)	–0.008 (0.04)	0.072 (0.06)
Want no more children	0.099 (0.83)	0.245* (1.69)	–0.374** (3.60)	–0.010 (0.07)	–0.033 (0.12)	[f]	[f]	–0.042 (0.09)	[f]	[f]
Desired family size	n/a	n/a	n/a	n/a	–0.025 (0.02)	0.020 (0.04)	0.009 (0.05)	–0.099*** (0.02)	–0.112* (0.05)	–0.109** (0.05)
Current contraceptive use	0.118 (0.95)	–0.065 (0.34)	–0.134 (0.92)	0.004 (0.02)	0.076 (0.13)	0.015 (0.15)	–0.041 (0.16)	–0.056 (0.11)	–0.055 (0.12)	–0.036 (0.13)
Self has extramarital relationships	n/a	n/a	n/a	n/a	–0.047 (0.17)	0.082 (0.22)	0.104 0.23)	0.270 (0.23)	0.607* (0.37)	0.826 (0.53)
Spouse has extramarital relationships	n/a	n/a	n/a	n/a	–0.141 (0.19)	–0.242 (0.27)	–0.215 (0.01)	0.160** (0.08)	0.211* (0.12)	0.261* (0.14)
Constant		–0.239 (–0.70)		–0.097 (0.29)		–0.686*** (0.21)	–0.925 (0.83)		–0.336 (0.21)	0.075 (0.41)
χ^2 test		25.13		54.49		0.71	7.16		17.07	28.10
[prob > χ^2]		[0.068]		[0.001]		[0.899]	[0.017]		[0.009]	[0.002]

Notes: * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level; n/a= not available.

[a] *Source*: Alderman et al. (2001), Table 6, p.100.

[b] Age is the only predetermined variable that is significant at the 5 percent level. All other controls considered (primary schooling, secondary schooling, Luo only, English, lived in Nairobi or Mombasa, polygamous household, earns a monthly salary, sub-location of residence) are not significant even at the 10 percent level.

[c] For women, whether the husband was interviewed is significant at the 5 percent level, and resided in Oyugnis relative to Ugina is significant at the 10 percent level. All other controls are not significant even at the 10 percent level.

[d] None of the control variables included (age, education, polygamous household, household possession of a radio, and income-generating activity carried out by the respondent) is significant even at the 10 percent level.

[e] Of all control variables included, age and education result to be significant at the 5 percent level and polygamous household at the 10 percent level. Household possession of a radio and income-generating activity carried out by the respondent result not to be significant even at the 10 percent level.

[f] Excluded due to multicollinearity.

Table 11: *Multivariate probits and OLS regressions for testing impact of attrition between the first and second round of the KDICP and MDICP surveys on three key fertility-related outcome variables[*]: Men*

MEN	KDCIP [a]			MDICP		
	Probits		OLS regression	Probits		OLS regression
Control variables	Currently using contraceptives	Want no more children[d]	Number of surviving children[d]	Currently using contraceptives	Want no more children	Number of surviving children
Age (years)	0.004	0.013**	0.200**	0.011	0.084**	0.287**
	(0.74)	(8.58)	(20.26)	(1.20)	(8.89)	(24.54)
Education (relative to none)						
Some primary	0.075	0.133	0.955**	0.126	–0.065	–0.864
schooling	(0.36)	(0.69)	(2.85)	(0.61)	(–0.38)	(–0.65)
Secondary schooling	0.310	0.197	0.736*	0.428	0.149	–1.361
	(1.22)	(0.81)	(1.77)	(1.46)	(0.57)	(–1.00)
Lived outside village [b]	0.130	0.324**	0.086	–0.303	–0.096	0.343*
	(1.12)	(2.74)	(0.41)	(–1.98)	(–0.68)	(1.77)
Household characteristics						
Polygamous	0.091	–0.296**	2.386**	–0.064	0.453	1.402**
household	(0.65)	(2.10)	(9.69)	(0.19)	(1.71)	(3.49)
Earns monthly salary	0.058	0.251	0.312	–0.251	0.957	–0.116
	(0.38)	(1.63)	(1.13)	(–0.48)	(1.77)	(–0.20)
Household has radio	n/a	n/a	n/a	–0.333	0.127	0.231
				(–2.01)	(0.86)	(1.14)
Sublocation of residence [c]						
Sublocation 1	–0.639**	–0.630**	–0.032	1.041**	–0.170	–0.178
	(3.42)	(3.42)	(0.11)	(4.72)	(–0.86)	(–0.65)
Sublocation 2	0.145	0.153	0.165	0.806**	0.204	0.502
	(0.88)	(0.93)	(0.57)	(4.54)	(1.11)	(2.07)
Sublocation 3	0.256	0.328**	0.229	n/a	n/a	n/a
	(1.62)	(2.10)	(0.82)			
Constant	–1.53**	–3.34**	–4.96**	–0.300	–4.659**	
	(4.38)	(9.31)	(8.94)	(–0.04)	(–6.78)	
χ^2 test for overall relation	48.87**	134.25**		43.45**	108.00**	
[prob > χ^2]	[0.0001]	[0.0001]		[0.0000]	[0.0000]	
R-squared / F-test			0.560 / 82.81**			69.96**
[probability > F]			[0.0001]			[0.0000]
Effect of attrition on constant	0.027	0.150	–0.065	4.94	–5.87**	1.496
	(0.21)	(1.13)	(0.29)	(1.97)	(-6.17)	(0.84)
χ^2 test for joint effect of attrition on [prob > χ^2]:						
Constant and all coeff. est.	12.11	16.79	1.11	982.11**	1.40	1.62
	[0.437]	[0.158]	[0.352]	[0.000]	[0.994]	[0.104]
All coefficients estimates	11.90	15.27	1.20	992.11**	431.43**	2.37*
	[0.371]	[0.171]	[0.824]	[0.000]	[0.000]	[0.009]

Table 11: *(continued): Women*

WOMEN	KDCIP			MDICP		
	Probits		OLS regression	Probits		OLS regression
Control variables	Currently using contraceptives [e]	Want no more children [f]	Number of surviving children [g]	Currently using contraceptives	Want no more children	Number of surviving children
Age (years)	0.014**	0.079**	0.161**	–0.009	0.115**	0.264**
	(2.03)	(11.80)	(20.82)	(–1.33)	(14.88)	(37.16)
Education (relative to none)						
Some primary	0.122	–0.004	–0.440**	0.026	–0.124	–0.545**
schooling	(0.72)	(0.03)	(2.66)	(0.18)	(–0.87)	(–3.60)
Secondary schooling	0.125	–0.107	–0.447	0.317	–0.329	–1.596**
	(0.47)	(0.46)	(1.60)	(1.04)	(–1.06)	(–5.02)
Lived outside village	0.311**	0.240**	0.144	–0.388	–0.007	–0.252
	(2.33)	(2.01)	(0.97)	(–0.04)	(–0.06)	(–2.10)
Household characteristics						
Polygamous	–0.161	0.187*	–0.201	0.002	0.010	0.002
household	(1.28)	(1.79)	(1.57)	(0.17)	(1.09)	(0.18)
Earns monthly salary	n/a	n/a	n/a	0.213	0.165	0.349**
				(1.63)	(–1.28)	(2.61)
Household has radio	–0.019	0.046	–0.106	–0.156	–0.054	0.050
	(0.16)	(0.44)	(0.85)	(–0.14)	(–0.48)	(0.42)
Sublocation of residence						
Sublocation 1	–0.441**	0.169	0.357*	–0.397	–0.674**	0.714**
	(2.37)	(1.13)	(2.03)	(2.24)	(–4.02)	(4.79)
Sublocation 2	–0.170	0.130	0.240	0.078	–0.182	0.587
	(0.99)	(0.85)	(1.34)	(0.58)	(–1.26)	(3.33)
Sublocation 3	0.013	0.437**	0.218	n/a	n/a	n/a
	(0.08)	(2.93)	(1.23)			
Constant	–1.85**	–3.03**	–0.90**	0.346	–3.529**	–3.944**
	(5.50)	(10.01)	(2.57)	(1.10)	(–11.06)	(–14.32)
χ^2 test for overall relation	44.22**	234.12**		14.58	322.38**	
[prob > χ^2]	[0.0001]	[0.0001]		[0.1030]	[0.000]	
R-squared or F-test			0.469 / 50.36**			185.09**
[probability > F]			[0.0001]			[0.0000]
Effect of attrition on constant	0.126*	–0.189	–0.549**	–0.187	–0.478	–0.109
	(1.90)	(1.50)	(3.77)	(0.26)	(–0.66)	(–0.15)
χ^2 test for joint effect of attrition on [prob > χ^2]:						
Constant and all coeff. est.	10.85	10.68	2.08**	12.52	10.55	3.19**
	[0.763]	[0.775]	[0.009]	[0.186]	[0.308]	[0.001]
All coefficients estimates	10.74	9.20	1.05	12.62	3.40	4.10**
	[0.706]	[0.818]	[0.397]	[0.246]	[0.202]	[0.000]

(Notes for Table 11:)

Notes: * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level; n/a= not available.
*Values of t-tests (for regressions) and z-tests (for probits) are in parentheses beneath the point estimates.

[a] Source: Alderman et al. (2001), Table 8, pp.110-11.

[b] For Kenya, this control variable refers to "lived in Nairobi or Mombasa"; for Malawi, it refers to the variable "has lived elsewhere 6+ months".

[c] Sublocation of residence relative to sublocation 4 (omitted). For Kenya, the categories of this control variable are: sublocation 1=Gwassi; sublocation 2=Kawadhgone; sublocation 3=Oyugis; sublocation 4=Ugina. For Malawi: sublocation 1=Balaka; sublocation 2=Mchinji; sublocation 3=Rumphi.

[d] The variable "language" was also included as a control in their model, but it was not significant.

[e] Other controls included in the model that were significant the 10 percent level and at the 5 percent level were, respectively, "speaks Luo only" and "woman sells in market". The controls "speaks English" and "house has a metal roof" were not significant even at the 10 percent level

[f] "Speaks Luo only" was also significant at the 10 percent level; the other controls included in the model (woman sells in market, speaks English, house has a metal roof) were not significant even at the 10 percent level.

[g] "House has a metal roof" was also significant at the 5 percent level; the other controls included in the model (woman sells in market, speaks Luo only) were not significant even at the 10 percent level.

5.4 Concluding remarks on attrition

The analysis of sample attrition leads to three conclusions. First, the level of attrition is higher in Kenya than in Malawi. We argue that this might be related to the gifting strategy adopted in the MDICP and not in the KDICP. In survey research carried out in the developed world, "gifting" is sometimes used to minimize attrition in various types of surveys (Ferber and Sudman, 1974; Whitmore, 1976; McDaniel and Rao, 1980; Berk et al., 1987; Willimack et al., 1995). As mentioned above, the MDICP has chosen to employ this methodology since the second round of data collection, and we suspect that it has kept the MDICP attrition at lower levels than those observed in the KDICP. This hypothesis is, however, purely speculative, since migration, mortality and marriage patterns are different in the Kenyan and Malawian research sites.

Second, for both the KDICP and MDICP there is some association between attrition, the outcome variables, and the major control variables. In Table 10, five of the six probits are significant, thus suggesting that the corresponding variables in the first wave of the two surveys are significant predictors of attrition.

Third, in both the KDICP and MDICP survey attrition appears to be selective. Those who remain in the sample are different from those who are lost to follow-up. This has some implications for analyses of its effects on univariate distributions, part of which is reflected in the changes in intercepts identified in multivariate models in Table 11. Perhaps more meaningful are the effects on parameter estimates in multivariate analyses. The Kenyan data appear to be less affected by attrition than the Malawian data, despite the higher levels of attrition in the KDICP. One possible reason for this is

the smaller sample size for the KDICP (hence the power of our tests); another reason is the greater degree of response error in the KDICP relative to the MDICP. This deduction follows from the fact that, if it is more difficult to identify associations between variables that are badly measured, then the identification of significant attrition effects may be more difficult as well. The motivational problems that may have contributed to higher attrition in the KDICP by elevating levels of "covert non-response" (Weinreb et al. 1998) may also have triggered relatively high levels of response effects in other areas, reducing the quality of the KDICP data.

6. Conclusion

Research on the social and behavioral aspects of AIDS is an emerging sub-field in the social sciences. In this paper, we have assessed the impact of different sources of non-sampling error on the type of data that will be necessary to nourish that sub-field. The results of our analysis are mixed. On one hand, the absolute level of measurement error is relatively high on some measures, especially on measures that are important to AIDS-related research, suggesting that only modest claims should be made about the accuracy of these types of data, at least at the individual level. Similarly, attrition can affect analytic outcomes (as in the MDICP), though it does not always do so (as in the KDICP).

On the other hand, the problems we have identified are of a similar order of magnitude to those identified in comparable studies. First, the level of response clustering by interviewer in the KDICP is comparable to that on the same items in the South Nyanza subsample of the 1989 and 1998 KDHS. Second, the within wave test-retest reliability of the MDICP questions is consistent with the results of a previous study in confirming the relatively low reliability of survey items in general, and in showing that factual questions tend to be more reliable than attitudinal and behavioral questions. Finally, the analysis of sample attrition is consistent with analyses for other developing and developed countries, in the sense that it shows that estimated coefficients in the KDICP are unaffected by attrition.

Most of the weaknesses identified in these data are related to the sensitivity of the research topics. The elevated levels of intraclass correlation coefficients on AIDS-related questions, the susceptibility of those questions to role-independent interviewer effects, and the low reliability of AIDS questions suggest that AIDS-related research may fall victim to the same type of mismeasurement that has traditionally affected variables related to the use of contraception (Lê and Verma 1997) and to gender relations (Ghuman, Lee and Smith 2001).

Perhaps the primary task for AIDS-related behavioral researchers is therefore to develop more reliable measures of behavior or attitudes. This may require departures from the standard and highly structured survey research format. It may also mean building other types of validation into the overall structure of research projects. The MDICP will attempt both of these in the next two rounds of data collection: anecdote-style questions or vignettes will be introduced to assess attitudes, and biomarker data on selected sexually transmitted diseases will be collected in order to check on the validity of responses to questions about sexual behavior.

Our results also point to potentially weak areas in current methodological practice in the collection and interpretation of survey data. First, there is no significant difference in levels of intraclass correlation coefficients between survey waves where a questionnaire was formally translated and where it was rendered into local language by the interviewers themselves. Translating a questionnaire seems, therefore, to be less important than, for example, the selection, training, and supervision of interviewers. Second, our results seem to contradict a common stance in which women's reports are privileged over men's (e.g., Miller et al. 2001). MDICP men's responses to questions about AIDS are, for example, less sensitive to role-independent interviewer effects than the responses of their wives. Moreover, MDICP men appear to give more stable answers on attitudinal and behavioral questions than their wives. On other aspects (e.g., age), however, men's reporting seems less consistent that that of their wives. Third, our results are consistent with assertions that gifting, which is not standard practice in survey research in developing countries, reduces non-migration related attrition, thereby minimizing the danger of selective no-shows in follow-up waves of survey research projects.

Finally, we return to a theme broached at the beginning of the paper, the relationship between interviewer effects, question reliability and sample attrition. The analyses presented in this paper suggest that there are two types of relationships between these three effects relevant for data collection and analysis.

First, the greater the random measurement error on a given variable, the harder it is to identify both role-independent interviewer effects and the impact of attrition on that variable. Measurement with minimal random error, in other words, makes it easier to identify *other* sources of non-sampling error. This is, we believe, one way to pull together two set of results in our analysis. The first is the inverse relationship between the relative size of role-restricted interviewer effects—a standard indicator of random error—and the size of role-independent interview effects. The second is the fact that even though attrition was much higher in the KDICP than in the MDICP, it was only in the latter—where random error was lower—that it was selective at any significant level.

The second relationship between these sources of non-sampling error is between interviewer effects (both role-restricted and role-independent) and the reliability of

measurement. Standard measures of reliability are premised on the idea that the essential survey conditions are replicated. This is a decent assumption to make when projects ask relatively simple and non-sensitive questions. As questions become more sensitive, however, the assumption weakens. Interviewers are variable stimuli. And interviewer teams with diverse social characteristics are even more so. Test-retest scenarios are therefore harder to establish across these diverse stimuli. Hence the positive relationship between the estimated interviewer effect on a given type of question and its unreliability.

In summary, this relationship, and others described above, suggests that the collection of AIDS-related survey data demands a concomitant investment in data collection methodology and procedures in order to ensure that the data minimize mismeasurement of variables and sample attrition. Ultimately, this is the only way to ensure that such data are sufficiently accurate and representative to allow for valid tests of hypotheses.

7. Acknowledgements

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Notes

1. A three-stage selection procedure was used. First, a basic written test was administered. Applicants who passed a threshold score were given a brief personal interview by a panel of two survey supervisors— mostly university graduates and experienced field researchers—in order to test their interactional skills. Finally, the weakest candidates were weeded out at each site during the interviewer-training or the first couple days of fieldwork.

2. The intraclass correlation coefficient is directly related to linear regression and analysis of variance. It is calculated as: ρ = (Model MS-Error MS)/(Model MS + (n-1) Error MS), where *n* is the average number of interviews per interviewer and the Model MS and Error MS are obtained from the ANOVA output.

3. Non-random assignment means that ρ is likely be overestimated, since it will capture part of natural clustering among respondents.

4. Weinreb (2002) has explored the effects of selectivity on these estimates, that is, the extent to which observed role-independent interviewer effects are the result of non-random assignment of interviewers to respondents. The estimates change only marginally. He also discusses the effect of interactions between interviewers' characteristics.

5. For example, male respondents are less likely to assert that a wife has a right to leave home (under specified conditions) where the interviewer is older, married, and has children. They tend to be more likely to agree that she has a right to leave when interviewed by a man, where the interviewer's parents are from the area (Malawi 1), or where they know the respondent's family (Kenya 3).

6. In Kenya, it was first asked: "How many children have you had in all your life, including children from before marriage, or other husbands including children who died?" and then "How many of your children have died?". In Malawi, in contrast, it was first asked "Can you give me the total number of children you have had?" and then "How many are still living?"

7. Bignami (this volume) describes in detail the conditions under which these re-interview data were collected, and uses them to assess the implications of inconsistencies for univariate and multivariate analyses of the Malawi 2 data.

8. The simplest measure to assess question reliability is to calculate the proportion of responses for a given item that are the same in the two survey interviews (e.g. Ryder and Westoff, 1971; Brackbill, 1974; Muckerjee, 1975; and table 5 in this paper). However, this measure is influenced by the marginal distribution of

responses, which makes assessing the relative reliability of variables with different categories difficult. For categorical variables, reliability is measured by the kappa statistic, which takes into account the marginal distributions of the items being evaluated (Fleiss, 1981). Kappa is a measure of agreement that is positive when observed agreement exceeds that expected due to chance under the hypothesis of independence (Cohen 1960).

9. HIV prevalence is around 30 percent in the Kisumu district, an area of Nyanza neighboring to the ones in which the KDICP sample was drawn (Weiss et al. 2001); and the national adult prevalence rate in Malawi, as of 1999, was around 16 percent (UNAIDS 2002).

10. Non-response in the first wave of the KDICP and MDICP was, in both cases, less than 2%.

11. The causes of the attrition in Kenya have been addressed elsewhere (Weinreb et al. 1998; Alderman et al. 2001). They appear to be a function of migratory patterns as well as fluctuations in respondents' motivation to participate in the research project.

12. Based on Becketti, Gould, Lillard and Welch (1988). In the BGLW test, the value of an outcome variable in the initial wave of the survey is regressed on predetermined variables for the initial wave and on subsequent attrition. The test for attrition is based on the significance of the coefficient for subsequent attrition in that equation.

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Appendix Tables

Appendix 1: Role-restricted interviewer effects

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Appendix 1: Role-restricted interviewer effects

Appendix 1.1: *Intraclass correlation coefficients for selected questions in the KDICP data, by category of question, sublocation, and wave of survey*

MEN	**Oyugis**			**Gwassi**			**Kawadhgone**			**Wakula South**		
Selected questions	**K1**	**K2**	**K3**	**K1**	**K2**	**K3**	**K1**	**K2**	**K3**	**K1**	**K2**	**K3**
Background												
Ever attended school	.067	n.c.	n.c.	.027	n.c.	n.c.	.018	.031	.056	.042	n.c.	n.c.
Number of children ever born	n.c.	n.c.	n.c.	.008	.037	.003	n.c.	.009	n.c.	n.c.	.009	.041
Number of children who died	n.c.	.021	n.c.	.004	n.c.	n.c.	n.c.	.090	n.c.	.046	n.c.	n.c.
Desires more children	.043	.032	.056	.009	n.c.	.023	.006	.038	n.c.	.091	n.c.	.072
Ideal number of children	.152	.042	.096	.045	.057	n.c.	.094	.014	.089	.037	.095	.175
Wealth												
Household has radio		.035	.089		n.c.	n.c.		.034	n.c.		.010	n.c.
Household has bicycle	n.c.	n.c.	.095	n.c.	n.c.	n.c.	.042	.005	.023	.028	n.c.	n.c.
Household has pit latrine		n.c.	.086		n.c.	.118		.010	.075		.140	.175
Household has plough		n.c.	n.c.		n.c.	.041		n.c.	.079		.503	.316
Household has fishing net		n/a	n.c.		.016	.142		.273	n.c.		.047	.048
Family planning												
Number of people chatted about FP	.074	.019	.067	.031	.097	.082	.178	.207	.144	n.c.	.280	.215
Has disagreed with spouse about FP		n.c.	.064		.038	n.c.		n.c.	.009		.005	.094
Husband agreed to use FP	.049	.070	.068	n.c.	.008	.055	n.c.	n.c.	.123	.169	.037	n.c.
Ever used any modern method of FP	.081	.071	.165	n.c.	n.c.	.120	n.c.	.126	.209	.348	.318	.383
Is currently using modern method of FP	.108	.039	.031	n.c.	.048	.016	.029	.136	.141	.067	.139	.318
Heard about women using FP secretly												
Gender (asserts that wife can leave husband if he..)		.060	.021		.004	.157		.044	.114		.092	.122
Is disrespectful to family		.060	.021		.004	.157		.044	.114		.092	.122
Does not support financially		.318	.024		.134	.249		.137	.081		.200	.185
Beats the children frequently		.138	.029		n.c.	.091		.092	.109		.075	.073
Beats her frequently		.241	.071		.120	.134		.210	.127		.056	.083
Drinks too much		.057	.050		.138	.051		.002	.164		.257	.169
Is sexually unfaithful		.085	.087		.110	.019		.187	.108		.239	.134
Is infected with AIDS		.332	.040		.129	.122		.083	.192		.211	.188
AIDS												
Total number chatted with about AIDS		.081	.075		.294	.123		.185	.123		.230	.248
Has talked w/ spouse about catching AIDS		.029	.189		.041	.031		.116	.037		n.c.	n.c.
Feels comfortable suggesting condom use w/ spouse		.133	.204		.135	.029		.014	.098		.277	.142
Degree of perceived risk of catching AIDS		.142	.188		.239	.105		.260	.088		.134	.169
Sample size	200	150	186	195	128	177	172	152	171	176	125	163

Notes: n.c. = estimates truncated and did not converge; n/a = no respondents claimed to own a fishing net in Oyugis and Kawadhgone.

Appendix 1.1 (cont.):

WOMEN	Oyugis			Gwassi			Kawadhgone			Wakula South		
Selected questions	K1	K2	K3	K1	K2	K3	K1	K2	K3	K1	K2	K3
Background												
Ever attended school	0.063	0.001	0.017	0.066	n.c.	n.c.	0.005	0.073	0.085	n.c.	0.006	0.041
Number of children ever born	n.c.	0.018	0.038	n.c.	0.045	0.028	0.024	n.c.	0.015	n.c.	0.046	n.c.
Number of children who died	0.001	0.049	0.038	n.c.	0.054	0.022	n.c.	0.001	0.065	n.c.	n.c.	n.c.
Desires more children	0.029	0.051	0.055	n.c.	0.071	0.036	0.051	0.076	0.023	0.018	0.076	0.006
Ideal number of children	0.106	0.015	0.020	0.121	0.075	n.c.	n.c.	0.018	0.085	0.045	n.c.	0.040
Wealth												
Household has radio	0.017	0.064	0.073	0.108	n.c.	0.023	n.c.	0.013	0.025	0.032	0.097	0.058
Household has bicycle		n.c.	0.027		0.012	0.066		0.034	n.c.		0.074	0.026
Household has pit latrine		0.031	0.056		0.037	0.078		0.075	0.096		0.016	0.116
Household has plough		0.015	0.013		n.c.	0.058		0.029	0.103		n.c.	0.289
Household has fishing net		n/a	0.034		0.020	0.042		n/a	n.c.		0.018	0.134
Family planning												
Number of people chatted about FP	0.063	0.215	0.145	0.287	0.041	0.131	0.229	0.241	0.152	0.139	0.395	0.266
Has disagreed with spouse about FP		0.034	0.004		n.c.	0.049		0.021	n.c.		0.029	0.125
Husband agreed to use FP		0.022	0.083		n.c.	0.024		0.053	0.087		n.c.	0.153
Ever used any modern method of FP	0.039	0.026	0.017	0.058	0.028	n.c.	0.014	0.041	0.026	0.002	0.010	0.007
Is currently using modern method of FP	0.184	0.176	0.146	n.c.	n.c.	0.263	n.c.	0.127	0.325	n.c.	0.015	0.171
Heard about women using FP secretly	0.003	0.182	0.071	0.011	n.c.	0.072	0.024	0.001	0.041	n.c.	0.130	0.078
Gender (asserts that wife can leave husband if he..)												
Is disrespectful to family		0.132	0.026		0.037	n.c.		0.003	0.012		0.222	0.143
Does not support financially		0.048	0.062		0.117	0.084		0.125	0.159		0.059	0.086
Beats the children frequently		0.159	0.067		n.c.	n.c.		0.013	0.036		0.362	0.192
Beats her frequently		0.181	0.021		0.021	0.114		0.154	0.029		0.115	0.087
Drinks too much		0.091	0.012		0.033	0.106		0.117	0.081		0.246	0.074
Is sexually unfaithful		0.058	0.063		0.015	0.092		0.083	0.071		0.284	0.075
Is infected with AIDS		0.349	0.125		0.036	0.094		0.210	0.179		0.290	0.189
AIDS												
Total number chatted with about AIDS		0.259	0.158		0.081	0.140		0.223	0.165		0.272	0.323
Has talked w/ spouse about catching AIDS		n.c.	0.144		n.c.	0.073		n.c.	0.071		n.c.	n.c.
Feels comfortable suggesting condom use w/ spouse		0.013	0.038		0.151	0.092		0.063	0.078		0.101	0.125
Degree of perceived risk of catching AIDS		0.428	0.078		0.110	0.210		0.162	0.025		0.157	0.212
Sample size	259	207	240	190	152	182	254	219	264	239	160	203

Notes: n.c. = estimates truncated and did not converge; n/a = no respondents claimed to own a fishing net in Oyugis and Kawadhgone.

Appendix 1.2: *Intraclass correlation coefficients for selected questions in the MDICP data, by category of question, district, and wave of survey*

MEN	**Balaka**		**Mchinji**		**Rumphi**	
Selected Questions	**M1**	**M2**	**M1**	**M2**	**M1**	**M2**
Background						
Ever attended school	0.055	0.027	0.015	0.042	0.043	0.04
Number of children ever born	0.045	0.03	n.c.	n.c.	0.019	0.007
Number of children who died	0.002	0.012	0.006	n.c.	0.036	0.008
Desires more children	0.098	0.013	n.c.	n.c.	0.059	n.c.
Ideal number of children	0.093	0.001	n.c.	0.037	0.031	0.109
Wealth						
Household has radio	0.034	0.014	0.004	0.016	0.003	0.043
Household has bicycle	n.c.	0.014	n.c.	0.006	n.c.	0.006
Household has pit latrine	0.055	0.079	0.039	0.029	0.085	0.078
Family planning						
Number of people chatted with about FP	0.071	0.209	0.079	0.112	n.c.	0.067
Thinks that wife would agree to use FP	0.149	0.047	n.c.	0.033	0.071	0.018
Has ever used any modern method of FP	0.071	0.045	0.019	0.033	0.075	0.038
Is currently using modern method of FP	0.289	0.056	n.c.	0.05	0.027	0.035
Gender (asserts that wife can leave husband if he ..)						
Does not support financially	0.172	0.243	0.03	0.16	0.019	0.132
Beats her frequently	0.182	0.222	n.c.	0.088	0.066	0.136
Is sexually unfaithful	0.29	0.225	n.c.	0.103	0.065	0.146
Is infected with AIDS	0.218	0.28	0.187	0.075	0.037	0.291
AIDS						
Total number chatted with about AIDS	0.112	0.234	0.13	0.073	0.069	0.072
Acceptable to use condom w/ spouse	n.c.	0.045	0.121	0.051	n.c.	n.c.
Degree of perceived risk of catching AIDS	0.166	0.344	0.126	0.132	0.327	0.339
Number of people think have died from AIDS	0.043	0.025	0.125	0.069	0.053	0.002
Best friend had other sexual partner	0.11	0.063	0.023	0.085	0.016	n.c.
Talked to spouse about getting AIDS	0.158	n/a	0.083	n/a	0.084	n/a
Thinks spouse had sex w/ other partner	0.358	n/a	0.049	n/a	0.138	n/a
Admits having sex w/ other partner	0.017	0.067	n.c.	0.053	n.c.	0.005
Sample size	356	421	379	408	326	338

Notes: n.c. = estimates truncated and did not converge.

Appendix 1.2 (continued):

WOMEN	**Balaka**		**Mchinji**		**Rumphi**	
Selected questions	**M1**	**M2**	**M1**	**M2**	**M1**	**M2**
Background						
Ever attended school	0.045	0.047	0.019	0.016	0.005	0.011
Number of children ever born	0.021	0.024	0.018	0.002	0.019	0.004
Number of children who died	0.021	0.002	0.004	n.c.	0.03	0.006
Desires more children	n.c.	n.c.	0.038	0.265	0.013	0.123
Ideal number of children	0.068	0.065	0.023	0.212	0.03	0.079
Wealth						
Household has radio	0.037	0.026	n.c.	0.012	0.009	0.016
Household has bicycle	0.011	0.027	0.017	n.c.	0.034	n.c.
Household has pit latrine	0.077	0.054	0.043	0.109	0.027	0.057
Family planning						
Number of people chatted with about FP	0.017	0.108	0.08	0.118	0.124	0.094
Thinks that wife would agree to use FP	0.047	0.116	0.034	0.026	0.081	0.011
Has ever used any modern method of FP	0.095	0.032	0.006	0.147	0.082	0.041
Is currently using modern method of FP	0.175	0.025	0.049	0.12	0.01	0.026
Gender (asserts that wife can leave husband if he ..)						
Does not support financially	0.222	0.198	0.118	0.151	0.048	0.018
Beats her frequently	0.217	0.144	0.119	0.07	0.041	0.05
Is sexually unfaithful	0.105	0.185	0.014	0.106	0.063	0.044
Is infected with AIDS	0.215	0.263	0.125	0.13	0.038	0.253
AIDS						
Total number chatted with about AIDS	0.054	0.19	0.157	0.156	0.122	0.218
Acceptable to use condom w/ spouse	n.c.	0.028	0.053	0.034	0.006	0.033
Degree of perceived risk of catching AIDS	0.071	0.444	0.11	0.145	0.332	0.229
Number of people think have died from AIDS	0.073	0.063	0.151	0.073	0.038	0.08
Best friend had other sexual partner	0.072	0.175	0.06	0.072	0.08	0.075
Talked to spouse about getting AIDS	n.c.	n/a	0.094	n/a	0.147	n/a
Thinks spouse had sex w/ other partner	0.266	n/a	0.027	n/a	0.26	n/a
Admits having sex w/ other partner	0.113	0.024	n.c.	0.0002	0.002	0.018
Sample size	487	542	542	528	507	494

Notes: n.c. = estimates truncated and did not converge

Appendix 1.3: *Intraclass correlation coefficients for South Nyanza women's subsample of 1989 and 1998 Kenya Demographic and Health Survey (KDHS)*

	KDHS 1989	**KDHS 1998**
Has radio	.058	.014
Has bicycle	.041	.016
Number of children ever born	n.c.	n.c.
Ever used any contraceptive method	.046	n.c.
Currently using family planning[1]	n.c.	.082
Has never discussed family planning with	.052	.096
Ideal number of children[2]	.038	.054
Sample size	348	343

Notes: n.c. = estimates truncated and did not converge. [1] Only women who claimed to have ever-used family planning were asked this question. [2] Net of "non-numeric" responses".

Appendix 2

Interviewers' characteristics

Appendix 2.1: *Percentage distribution of KDICP-3 interviews by interviewer' familiarity with the respondent's family*

	Men	Women
Knows the respondent's family:		
- not at all	34.3	40.5
- by name only	38.7	39.2
- quite well	19.6	16.4
- very well	7.4	3.8
Sample size	592	888

Appendix 2.2: *Distribution of KDICP-3 and MDICP-1 interviewers by social characteristics*

Interviewer's characteristics	KDICP-3	MDICP-1
Mean age (years)	24.0	23.8
Sex	37	44
- Male	61	45
- Female		
Mother's family from:		
- same district	n/a	60
- other district	n/a	29
Father's family from:		
- same district	n/a	63
- other district	n/a	26
Marital status:		
- single	64	58
- married	34	31
Fertility		
- childless	63	62
- has children	35	26
Sample size	98	89

Notes: n/a = not available.