Demographic Research a free, expedited, online journal
of peer-reviewed research and commentary
in the population sciences published by the
Max Planck Institute for Demographic Research
Konrad-Zuse Str. 1, D-18057 Rostock · GERMANY
www.demographic-research.org

DEMOGRAPHIC RESEARCH
SPECIAL COLLECTION 1, ARTICLE 3
PUBLISHED 19 September 2003, PAGES 77-108
www.demographic-research.org/special/1/3/
DOI: 10.4054/DemRes.2003.S1.3

Research Article

Are we measuring what we want to measure? Individual consistency in survey response in rural Malawi

Simona Bignami-Van Assche

This special collection is edited by Susan Watkins, Eliya M. Zulu, Hans-Peter Kohler and Jere Behrman. The papers in this special collection were presented at the conference "Research on Demographic Aspects of HIV/AIDS in Rural Africa", held at the Population Studies Center, University of Pennsylvania, October 28, 2002.

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Table of Contents

1	Introduction	78
2	Data and methods	81
2.1	Data sources	81
2.2	Reinterviews	83
2.3	Methods	86
3	Are the MDICP respondents consistent in their answers?	86
3.1	Consistency scores	86
3.2	Consistency in reporting on HIV/AIDS	90
4	Covariates of individual consistency	91
5	Implications of individual inconsistency for data analysis	95
5.1	Comparison of distributions and means for selected outcome and control variables	95
5.2	Effects on multivariate regression coefficients	99
6	Conclusion	100
7	Acknowledgements	101
	Notes	102
	References	105

Demographic Research – Special Collection 1: Article 3
-- Social Interactions and HIV/AIDS in Rural Africa --

Research Article

Are we measuring what we want to measure? Individual consistency in survey response in rural Malawi

Simona Bignami-Van Assche [1]

Abstract

This paper uses reinterview data collected by a household survey conducted in rural Malawi in 2001 to examine the extent of individual consistency in response to questions about HIV/AIDS and other topics. The nature and implications of individual inconsistency in survey response are further analyzed by evaluating covariates of individual consistency, and the implications of inconsistency for univariate and multivariate estimates. I find that the reinterviewed respondents are overall consistent in their answers and that, when there are inconsistencies, they do not significantly affect the conclusions that can be drawn from multivariate analyses of the survey data.

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1. Introduction

Since the earliest days of social science research, there has been a methodological interest in the possible biasing effects of the data collection process, particularly individual response error and response effects (Note 1). This interest was ultimately related to the validity concerns that measurement raises in the social sciences, that is, the degree to which a set of indicators measures the concept it is intended to measure (Zeller and Carmines 1980: 13-14).

In the 1960s, the increasingly widespread use of the survey interview method for fertility studies in developing countries highlighted the need to assess the results of these studies in terms of the reliability and stability of the responses obtained. Following the pioneer work of Westoff, Potter and Sagi (1961) in the US, reinterview studies were done on the reliability and stability of questions about knowledge, attitude and practice of contraception (Poti, Chakraborti and Malaker 1962; Mauldin 1965; Green 1969; Stoeckel and Choudhury 1969; Coombs 1977) and family planning (Stycos and Back 1964; Freedman and Takeshita 1969; Muckerjee 1975; Knodel and Piampiti 1977). These studies shared several conclusions about survey response error in demographic surveys carried out in developing countries. First, response error varies according to respondent characteristics, and to the content and psychological nature of the questions asked. More personal, sensitive questions tend to be less reliable than questions pertaining to relatively concrete factual matters (Knodel and Piampiti 1977). Second, although reporting at the aggregate level may appear to be relatively reliable, it often masks a high level of individual-level inconsistency. There is contradictory evidence, however, about whether these individual errors are randomly or systematically distributed (Coombs 1977: 255). Third, response error is high enough for some variables (even in factual data) to give reasons for concern (Muckerjee 1975: 142; Knodel and Piampiti 1977: 65). Fourth, response error might be seriously affected by differences in the willingness of respondents to participate in the survey process and to answer questions truthfully, and the respondents vary in the tendency to distort their responses (Stycos and Back 1964). Finally, reports of female respondents on factual items (such as age, number of pregnancies, number of children ever born) are as stable as male reports, but reports on behavioral items (such as ideal family size and contraceptive use) are more stable for males than for females, and reports on attitudinal items are more stable for females than males (Mukherjee 1975: 140-141).

This spate of studies culminated in the Response Error Project of the World Fertility Survey (WFS) that, right from the start, placed great emphasis on the need for assessing non-sampling error in survey data (O'Muircheartaigh 1982:5). The Response Error Project comprised studies in Peru (O'Muircheartaigh 1984a), Lesotho (O'Muircheartaigh 1984b), the Dominican Republic and Turkey (Note 2), and used

reinterview designs to determine response reliability of key measures, such as children ever born, birth intervals and ever-use of contraception. The Response Error Project, and a separate evaluation of the data collected by the WFS in Indonesia (MacDonald, Simpson and Whitfield 1978), obtained encouraging results on the quality of the WFS data, most often confirming the conclusions reached by previous analyses on the reliability of demographic surveys. For this reason, when the Demographic and Health Surveys (DHS) succeeded the WFS and became the most widely used demographic surveys in developing countries, there were fewer reinterview studies to assess the reliability and stability of demographic data collected. As it can be seen in Table 1, the most recent demographic literature contains only sparse attempts in that direction (Note 3).

Table 1: *A selection of studies addressing individual consistency of survey response in developing countries by means of re-interviews*

Authors	Data source(s)	Sample size	Type of reliability assessment	Re-interview period	Scope/Focus
WFS Response error project:					
- O'Muircheartaigh 1984a	Peru (1977)	1198	Within survey round	3-6 months	
- O'Muircheartaigh 1984b	Lesotho (1977)	609	Within survey round	1-4 months	Reporting on birth spacing and ever-use of contraception
- O'Muircheartaigh 1982	Turkey (?*)	657	Within survey round	?*	
- O'Muircheartaigh 1982	Dominican Republic (1980)	936	Within survey round	1-4 months	
Haaga (1988)	Malaysian Family Life Survey (1976-77)	1200	Between survey rounds	4-8 months	Reporting on breastfeeding duration
Westoff, Goldman and Moreno (1990)	Dominican Republic DHS (1984)	423	Within survey round	2-3 months	Evaluation of contraceptive calendars
Curtis and Arnold (1994)	Pakistan DHS (1991)	474	Within survey round	5-11 months	Reporting on fertility and FP
Becker et al. (1995)	Nigerian Family Health Services Project (1990)	159	Within survey round	3 months	Effect of interviewers' sex on data quality
Strickler et al. (1997)	Morocco DHS (1992 and 1995)	1694	Between survey rounds	3 years	Evaluation of contraceptive calendars
Jackson et al. (1997)	Jamaica Longitudinal Survey (1995-1997)	698	Between survey rounds	About 1 year	Consistency of self-reported sexual activity

* See footnote 2 in the text.

The studies shown in Table 1 tend to focus on the reliability and stability of few survey items, such as ages and dates, number of children ever born and contraceptive use. This circumstance is particularly relevant for survey questions on HIV/AIDS. Most of the currently available information on attitudes and behaviors towards HIV/AIDS and on patterns and trends in HIV/AIDS in developing countries comes from reports in sample surveys: the DHS, the Behavioral Surveillance Surveys, and the Multiple Indicator Cluster Surveys (Note 4). The questions asked in these surveys are extremely sensitive, and thus prone to high response error (Bignami et al., this volume). However, a thorough examination of the survey literature reveals that the reliability and stability of questions on HIV/AIDS has never been evaluated. Besides, in the literature little attention is paid to evaluate the implications of individual inconsistency not only for univariate distributions and means, but also for multivariate estimates. This might be an important problem for analyses that use the DHS data or data from similar surveys.

In addition, the studies shown in Table 1 adopt survey designs that differ from the main survey in both the choice of the interviewers, the respondents, and the length (and sometimes even wording) of the questionnaire (Note 5). Existing studies on the reliability and stability of survey data generally use a shortened version of the original questionnaire in the reinterviews (with few exceptions, e.g. Westoff, Goldman and Moreno 1990), so that the questions that are repeated are necessarily taken out of the questionnaire context in which they had been asked originally. Besides, the interviewers who carry out the reinterviews have normally undergone different selection procedures than the interviewers employed in the main survey. For example, it is not uncommon that only the best interviewers (Curtis and Arnold 1994) or the interviewer supervisory staff (Coombs 1977) are chosen to carry out the reinterviews, so that the general reliability of the data are likely to be overestimated. Finally, existing studies that have evaluated response reliability have sometimes been based on specialized samples (e.g. Muckerjee 1975; Westoff, Goldman and Moreno 1990; Curtis and Arnold 1994), which reduces the generalizability of the results to the whole sample included in the original survey.

The 2001 wave of the Malawi Diffusion and Ideational Change Project collected reinterview data for a small subsample of respondents in the southern region of Malawi, because an initial error in drawing the sample for the survey led to the duplication of some respondents' names on the lists used by the interviewers, so that some respondents were accidentally selected twice to participate in the survey. This unplanned selection procedure guaranteed that respondents were reinterviewed under the exact same survey conditions of the first interview. The reinterview data permit measuring individual consistency in response to survey questions on HIV/AIDS, as well as other topics. In addition, it is possible to evaluate the impact of individual inconsistency in univariate as well as multivariate estimates.

The paper is organized as follows. Section 2 describes the data and methods used for the analysis. The evidence concerning the individual consistency in survey response of the respondents in the selected sample (with particular focus on questions on HIV/AIDS) is then presented in Section 3. In Section 4 and 5, respectively, the covariates and implications of individual inconsistency in survey response are analyzed. Finally, the results are discussed and a brief conclusion is provided.

2. Data and methods

2.1 Data sources

The data for the analysis come from reinterviews carried out in the context of the second wave of the Malawi Diffusion and Ideational Change Project (MDICP), a household panel survey that examines the role of social networks in changing attitudes and behavior regarding family size, family planning, and HIV/AIDS in rural Malawi. The first round of the MDICP (Malawi 1) was carried out in the summer of 1998, and interviewed 1541 ever-married women of childbearing age and 1065 husbands of the currently married women in three Malawi districts: Balaka in South, Mchinji in the Centre and Rumphi in the North. In the summer of 2001, the second round of the survey (Malawi 2) followed-up the same respondents (if still eligible), and also interviewed all their new spouses (Watkins et al., this volume).

The focus of the MDICP questionnaire is on family planning, AIDS and social networks, with other questions about basic socio-economic information (age, education, income and wealth), and about women's autonomy, children, contraception and marriage. Most questions on background characteristics, family planning and attitudes and behaviors towards HIV/AIDS are modeled on WHS/DHS questions (Note 6). The questionnaire for Malawi 2 also included a section on sexual partnerships, which was expected to be a sensitive issue given the magnitude of the HIV/AIDS epidemic in the country and the emphasis of prevention programs on marital fidelity (Table 2). All questions are fixed-coded, and there are no open-ended questions asked to the respondents. The questionnaire was first designed in English, by drawing on qualitative research (semi-structured interviews, focus groups, and field-testing) that had been carried out in the research areas to refine the questions' content and wording. The questionnaire was then translated in the local languages (Yao, Chichewa, and Tumbuka) from the original English-language model by a group of university-educated English-speaking supervisors who had first been extensively trained with respect to the objectives of the project and the meanings of the questions.

***Table 2**: Malawi 2 questionnaire's structure*

Section	Topic	Type	Number of questions	
			Males	Females
Background	Background characteristics: age, religion, education, residence	Factual	25	25
Economic questions	Household possessions; respondents' occupation and earnings	Factual	10	10
Marriage History	Marriage history for the current, previous and first spouse	Factual	31–93[a]	31–93[a]
Children	Number of CEB and CES; birth spacing; orphans	Factual	11	12
Family planning* & social networks	Attitudes towards FP; social networks on FP	Attitudinal/Behavioral	33–75[b]	33–75[b]
Gender	Attitudes towards gender roles	Attitudinal	3	7
Partnerships*	Age at first sex; partnerships history	Factual	29	29
Sexually Transmitted Diseases*	Knowledge and attitudes towards sexually transmitted diseases	Attitudinal/Behavioral	9	n.a.
AIDS*	AIDS knowledge and worry; social networks on AIDS	Attitudinal/Behavioral	34-95[c]	34-95[c]

* The section contains sensitive questions.

[a] For both males and females, the number of questions in the marriage history section is 31, which can all refer to up to three spouses. The total number of questions in this section thus might range from 31 (one spouse) to 93 (three spouses).

[b] In 2001, for both males and females the total number of questions in the family planning section is 33, which includes a subset of questions (14) that could refer up to four network partners. The total number of questions in this section thus ranges from 33 (one network partner) to 75 (four network partners).

[c] The total number of questions in the AIDS section is 34, which includes a subset of questions (16) that could refer up to four network partners. Within this subset of questions, however, 13 questions were not asked if the network partners were the same as those in the family planning section. The total number of questions for the AIDS section thus ranges from 34 (one network partner, same as that in the family planning section) to 95 (four network partners, all different from those in the family planning section).

The interviewers were males and females hired locally, so that they were generally of the same ethnic group and engaged in the same type of occupation of the respondents (e.g. farming, small businesses). Before fieldwork started in each region, the interviewers were given formal training conducted in the local language of the questionnaires (Chichewa and Yao in the Southern region; Chichewa in the Central Region; and Tumbuka in the Northern region). Because of these linguistic differences across the three Malawian regions, the interviewing teams were not the same for the two rounds or even for the three districts in each round, although some interviewers participated in more than one district (if they were able to speak more than one language) and/or in more than one round.

The questionnaires were closely checked for missing responses, first in the field by supervisors, then by the home office at the end of each day of fieldwork. The data entry team had been instructed to carry on an additional quality check on the questionnaires before they were entered in electronic form, and automatic checks for errors had been built into the data entry program. The multiple checks permitted sending the interviewer

back to the respondent if missing or inconsistent answers were discovered at any stage of the quality-check process and, ultimately, ensured a high quality of the data collected (Watkins et al., this volume).

2.2 Reinterviews

The primary data for this paper consist of a set of reinterviews carried out between June 10 and July 5, 2001, by administering more than once (Note 7) the same Malawi 2 questionnaire to 96 women and 38 men in Balaka District, the first of the three sites to be surveyed (Table 3).

Table 3: *Reinterviews: descriptive statistics*

	Respondents	
	Males	Females
Total sample size*	386	456
Reinterviews	38	96
Re-interview period (days):		
- Min and max	(0, 21)	(0, 18)
- Mean	9.7	9.2
- Standard deviation	5.4	4.8

*Sample sizes refer to respondents interviewed in Balaka District.

The reinterviews were not planned—rather, they were carried out as a result of one of the problems that may arise while doing survey research. At the beginning of fieldwork, a glitch in the software used to draw the sampling frame led to a duplication of respondents' names on the lists used by the interviewers in Balaka District (Note 8). As a result, some male respondents were re-interviewed in 11 villages of the 22 sampled, and some female respondents were re-interviewed in 15 villages of the 32 sampled (Note 9). The problem was eventually identified and solved during the initial weeks of fieldwork (Note 10). Since the reinterviews were unplanned, their study design was the same as that of the main survey in the choice of the respondents and the interviewers, and in the length and wording of the questionnaire.

To verify that interviews were carried out with the same person, five identifying characteristics had to be the same in the main interview and in the reinterview: respondent's name, father's name, spouse's name, residence and birthplace. On the basis of these criteria, the reinterviews carried out with 11 women and 11 men were

deleted because they appeared, despite the same claimed name, not to be the same individual.

Background characteristics for respondents interviewed once in the Malawi 2 sample for Balaka District and for the final sample of respondents interviewed twice in 2001 are displayed in Table 4. It can be noticed that male and female reinterviewed respondents tend to be less educated and poorer (as measured by the possession of a radio) than the respondents who were interviewed only once. Re-interviewed male respondents are also slightly older and re-interviewed females slightly younger than respondents interviewed once. Similar selectivity effects among the reinterviewed respondents are found by most reinterview studies (e.g. O'Muircheartaigh 1984a, 1984b; Westoff, Goldman and Moreno 1990; Curtis and Arnold 1994; Note 11).

Given the unplanned design of the experiment the reinterview period for the duplicate interviews varied, being on average 9.7 days for males and 9.2 days for females (*see* Table 3). By minimizing the chances for genuine change to occur in attitudes and in behavioral characteristics between interviews (Note 12), such a short time interval approximates quite well the "instant replay" of the original survey conditions, which provides the best indicator of reliability but is rarely possible to achieve outside the laboratory (Coombs 1977: 218). However, such a short interval between interviews increases the chance that the respondent (or the interviewer, if the same) will remember the responses given in the original interview and simply repeat them in the duplicate interview.

Another consequence of the unplanned design of the reinterview was that the interviewers were not aware if a certain respondent had already been interviewed, unless the interviewer was the same in both interviews or the respondents themselves told the interviewer they had already been interviewed. This happened only in few cases, however. The interviewer was the same in 9 cases; in only 26 cases did the respondents explicitly state they had already been interviewed when the interviewer went to reinterview them (these were generally the more educated and richer respondents). Interestingly enough, in only one case an interviewer who reinterviewed the same respondent mentioned the first interview in a comment at the end of the questionnaire ("The interview was good, as it was a revision for what we did a week ago", H91003).

Table 4: *Percentage distribution of respondents interviewed once and twice in 2001, by sex and background characteristics in 2001*

	Males		Females	
	Interviewed once in 2001	Interviewed twice in 2001	Interviewed once in 2001	Interviewed twice in 2001
Age group				
<20	0.0	0.0	1.7	1.1
20-29	13.3	10.5	29.9	24.0
30-39	29.9	29.0	36.1	40.6
40-49	30.3	29.0	22.6	19.8
50+	26.5	31.6	9.7	9.4
Education				
None	36.4	42.1	60.1	69.8
Primary	59.5	52.6	38.2	29.2
Secondary	3.1	0.0	2.0	1.0
Has radio	70.0	55.3	56.6	43.8
Children ever born				
0	1.0	2.6	2.3	1.0
1	2.4	10.5	4.3	1.0
2	8.2	13.2	12.5	13.5
3	12.2	15.8	16.5	19.8
4	14.6	0.6	12.0	9.4
5+	61.6	57.9	52.4	55.3
Ever use of contraception	56.6	65.8	56.9	55.8
Age at first sex				
<10	3.4	2.6	1.3	3.1
10-14	8.1	21.1	26.8	25.0
15-19	47.4	39.5	40.9	37.5
20-24	15.7	10.5	4.3	6.3
25+	5.5	7.9	1.0	3.1
Sample size	294*	38	402*	96

* See footnote 9 in the text.
Note. For respondents interviewed twice in 2001, the indicated characteristics are tabulated as reported in the main interview

2.3 Methods

The analysis of individual consistency in responses for the Malawi 2 reinterview data is divided in three parts.

First, for all pairs of non-missing responses provided by the reinterviewed respondents in both the main and the duplicate interview, individual consistency is estimated by means of an *ad hoc* scoring system, which assigns "consistency scores" to each respondent in the following way. The survey items are grouped according to questionnaire section (Note 13) and, for each section, the maximum consistency score is set equal to the total number of survey items in that section. From this maximum value, a "point" is deducted for each inconsistent (Note 14) answer. For each section, the minimum consistency score that can be achieved is thus zero, if the respondent answers inconsistently to all survey items in the section. The sum of the score totals within each section and across all sections gives the individual's total consistency score, and allows sorting respondents by their level of inconsistency and type of questions. Ultimately, this scoring system allows assessing individual consistency with reference to the 'whole' survey experience, rather than for isolated questions as it is normally done in the literature. However, in order to contrast the results of this study with those of other studies, the percentages of inconsistent respondents for a selected number of comparable survey items are also calculated.

Then, special attention is devoted to assessing the reliability and stability of questions about attitudes and behaviors towards HIV/AIDS. In order to do so, I calculate the crude index of disagreement (Note 15) for a set of ten questions asked in the Malawi 2 questionnaire, which include three questions asked in DHS surveys.

Finally, in order to gain a deeper understanding of the nature and implications of individual inconsistencies in survey response, some covariates of individual consistency (the reinterview period, individual item non-response, and the questions' content) are analyzed, and the implications of inconsistencies for univariate and multivariate data analyses are evaluated

3. Are the MDICP respondents consistent in their answers?

3.1 Consistency scores

Descriptive statistics for the consistency scores are presented in Table 5. The minimum consistency score is slightly lower for males than for females whereas the opposite is true for the maximum score, thus indicating that males exhibit higher variability in response than females.

Table 5: *Consistency scores of reinterviewed respondents, by sex and questionnaire section: Descriptive statistics*

	Total number of survey items	Males (N=38)				Females (N=96)			
		Min score	Max score	Mean score	S.D.	Min score	Max score	Mean score	S.D.
Background	63	35	55	44.5	5.6	33	60	48.5	6.0
Economic questions	19	8	16	12.3	1.8	5	17	12.0	2.5
Children	12	3	12	8.4	2.3	1	12	6.8	2.1
Family Planning	11	2	10	6.0	2.3	2	11	7.0	2.1
Gender	7	0	7	4.5	1.6	1	7	4.8	1.4
Partnerships	24	0	24	13.4	6.8	0	24	16.1	7.2
AIDS	31	9	24	17.4	3.6	8	26	16.4	3.1
All sections	167	79	136	106.5	14.1	86	148	111.6	12.8

Note. The total number of survey items coincides with the maximum achievable consistency score for each questionnaire section.

In Table 6, individual consistency scores for each questionnaire section are grouped into score quintiles, thus allowing identifying the percentage of respondents with 0-20, 20-40, 40-60 and 80-100 % of consistent answers.

Table 6: *Percentage distribution of reinterviewed respondents by consistency score quintile, sex and questionnaire section*

	Males (N=38)					Females (N=96)				
	First Quintile	Second Quintile	Third Quintile	Fourth Quintile	Fifth Quintile	First Quintile	Second Quintile	Third Quintile	Fourth Quintile	Fifth Quintile
Background	0.0	0.0	13.2	71.1	15.8	0.0	0.0	4.2	55.2	40.6
Economic questions	0.0	0.0	31.6	60.5	7.9	0.0	5.2	38.5	46.9	9.4
Children	0.0	7.9	21.1	36.8	34.2	2.1	11.5	50.0	27.1	9.4
Family Planning	2.6	31.6	21.1	26.3	18.4	1.0	15.6	20.8	34.4	28.1
Gender	5.3	2.6	36.8	26.3	29.0	1.0	5.2	34.4	27.1	32.3
Partnerships	13.2	5.3	39.5	18.4	23.7	10.4	6.3	26.0	6.3	51.0
AIDS	0.0	10.5	47.4	42.1	0.0	0.0	8.3	70.8	18.8	2.1
All sections	0.0	0.0	29.0	68.4	2.6	0.0	0.0	18.8	76.0	5.2

Note. The total number of survey items coincides with the maximum achievable consistency score for each questionnaire section.

The table shows that overall respondents interviewed twice in 2001 tend to be fairly consistent in their answers. Across all questionnaire sections, for both men and women there are no respondents with less than 40% of consistent answers. Correspondingly, between 60% and 80% of the answers given by the greatest majority of respondents interviewed twice in 2001 are consistent. Only for questions on partnerships does the percentage of respondents in the first quintile exceed 10% of the total number of reinterviewed respondents; and only for questions on HIV/AIDS the percentage of individuals in the top quintile is close to zero. The lowest consistency is therefore observed for the most sensitive questions, namely those on partnerships and on HIV/AIDS.

It can also be seen in Table 6 that the level of individual consistency exhibits significant differences by gender. Comparing the bottom, intermediate and top score quintiles, shows that males are less consistent than females in reporting about family planning, gender and partnerships, but more consistent in reporting about children. However, when the data in Table 6 are graphed (Figure 1), the pattern of individual consistency is quite similar for men and women, with the exception of questions on family planning, children and HIV/AIDS.

To compare individual consistency in rural Malawi with the results of other studies, Table 7 presents the crude index of disagreement for selected survey items for Malawi together with those obtained from the WFS reinterview studies in Indonesia, Peru and Lesotho, and from the DHS reinterview study carried out in Pakistan. The comparison is limited to women, since the indicated WFS and DHS did not sample men. The table shows that the percentage of discrepant cases is equivalent in Malawi and in the other countries considered for family planning variables. Discrepant responses on ages and dates of birth are fewer in Indonesia and in Malawi than in any other country, thus suggesting that a low level of female education and literacy in Malawi is not associated with poor date reporting, as it happens in Pakistan (Curtis and Arnold 1994: 17). In contrast, reporting of dates of marriage in Malawi is worse only in Pakistan. This is most likely due to the high marital mobility in Malawi (Reniers, this volume) as compared to the other countries considered, which is supported by the fact that the percentage of discrepant cases on current marital status and number of times married is consistently higher in Malawi than in the other studies. Finally, the reporting on the number of children ever born tends to be worse in Malawi, although the reporting on the number of living children is identical in Malawi and in Pakistan. This suggests that underreporting of dead children might be particularly serious in Malawi.

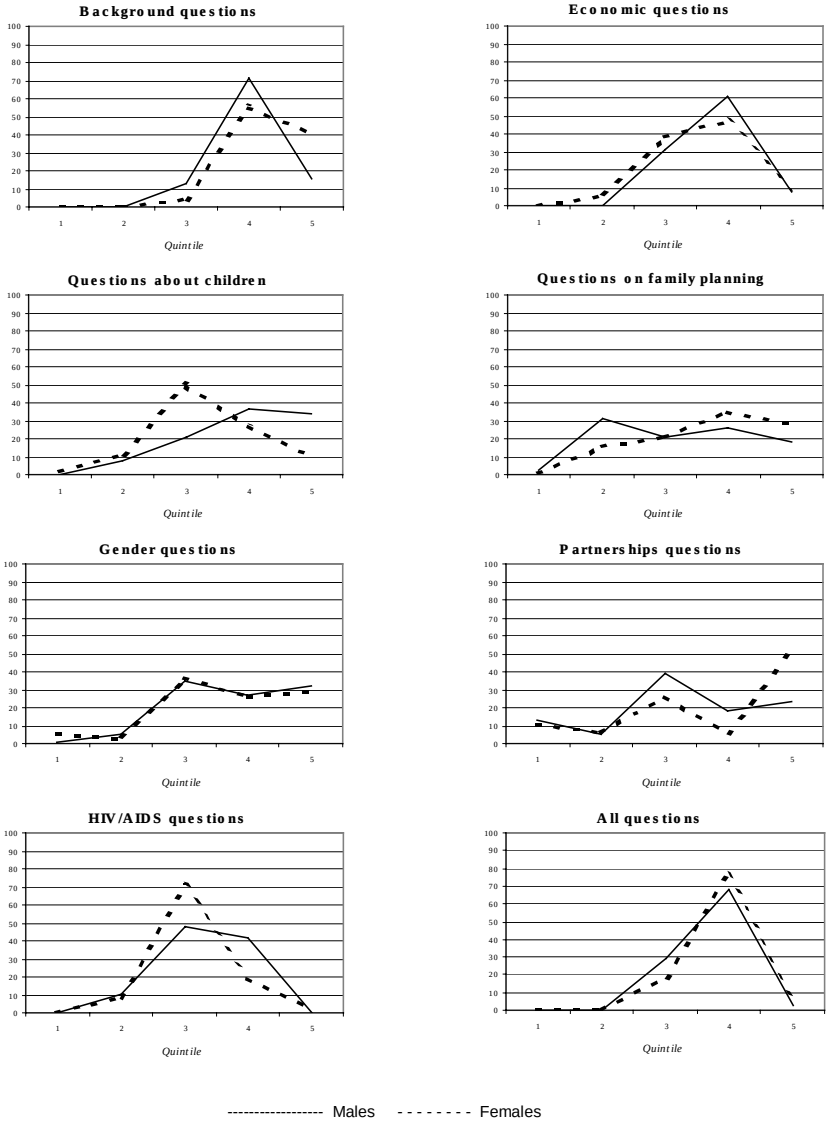


Figure 1: *Percentage distribution of reinterviewed respondents by consistency score quintile, sex and questionnaire section*

Table 7: *Percentages of women with inconsistent answers to the indicated questions for Malawi, Indonesia, Peru, Lesotho and Pakistan*

	Malawi	Indonesia	Peru	Lesotho	Pakistan
Age and dates					
Year of birth	33.3	21.3	46*	40*	81.2
Year of first marriage	61.5	24	49	29	72.8
Children					
Children ever born	42.7	10	12	19	25.2
Living children	21.9	---	---	---	21.7
Marital status					
Current marital status	5.3	2.4	---	---	1.2
Number of times married	21.9	5.9	---	---	2.2
Family Planning					
Ever use of contraception	24.0	---	19.0	18.9	16.0
Ideal family size	56.3	---	59.3	57.1	55.0
Sample size	96	495	1198	609	474

* Refers to responses on current age.
Sources. Indonesia: MacDonald, Simpson and Whitfield, 1978, Tables 5 & 14; Peru: O' Muircheartaigh, 1984a, Tables 1 & 4; Lesotho: O' Muircheartaigh, 1984b, Tables 1 & 4. Pakistan: Curtis and Arnold, 1994, Tables 5.1, 4.1, 6.1 & 7.2

3.2 Consistency in reporting on HIV/AIDS

The crude index of disagreement for questions on HIV/AIDS is presented in Table 8. It can first be noticed that individual inconsistency is always higher for females than for males, with the exception of two questions. However, the pattern of inconsistencies is similar for both sexes. Questions on the respondent's sources of information about AIDS (clinic/radio) are the most reliable, with more than 95 per cent of respondents answering they had heard about AIDS from at least one of these sources. Respondents are also highly consistent in responding to the question on whether they think a healthy-looking person can be infected with AIDS. The percentage of inconsistent responses is highest for questions about the respondent's own chance of being currently infected with AIDS, or becoming infected in the future. For both sexes, the main cause for the high inconsistency rate is the shift of "don't know" answers to "no likelihood" or "some likelihood" answers in the reinterview (not shown). Since there is no evidence that the interviewers were better trained in the reinterview survey, it is difficult to interpret this result. The percentage of respondents with discrepant responses on worry about getting AIDS is also high. The inconsistencies are mostly due to the fact that, in the

reinterview, respondents' worry changes towards more extreme categories; those who were worried a little move towards being not worried at all or worried a lot (not shown). This trend to extremes parallels that of the question on becoming infected with AIDS in the future, and it is difficult to interpret since there is no systematic tendency for the respondents in the aggregate to be more (or less) worried in the reinterview. Finally, men are more consistent than women in answering whether STDs increase chances of getting AIDS, and whether it is acceptable to use a condom with the spouse. In Section 5, the implications of these discrepancies for the aggregate distribution of the survey items considered are discussed.

Table 8: *Percentage of respondents with discrepant responses on HIV/AIDS, by sex*

	Males	Females
Sources of information on AIDS		
- Ever heard at clinic about AIDS	7.9	9.4
- Ever heard from radio about AIDS*	0.0	6.3
Can get AIDS from healthy-looking person**	5.3	14.6
Chances of getting AIDS		
- Chances you have AIDS now**	39.5	68.8
- Chances you will become infected with AIDS	68.4	81.3
- STDs affect chances to get AIDS	15.8	29.2
- Chances to get AIDS from one-time sex worker	48.7	45.8
How worried to get AIDS	47.4	65.6
Safe sex		
- Acceptable to use condom with spouse	28.9	51.0
Sample size	38	96

* Question asked in 1988 Botswana DHS.
** Question asked in DHS-III core questionnaire.

4. Covariates of individual consistency

To identify covariates of individual consistency net of the bias introduced by the choice of the relevant individual characteristics to include for the analysis (those reported in the first interview, rather than in the reinterview), I focus on three variables independent of the choice of the relevant interview: the reinterview period, individual item non-response, and the questions' content (if the question asks the respondents to report about themselves or about third parties).

For both males and females, the length of the reinterview period does not seem to be an important covariate of individual consistency. Indeed, the average consistency score does not vary much with the length of the reinterview period (Table 9a), and the individual scores of most reinterviewed respondents fall into the fourth quintile, regardless of the reinterview period (Table 9b).

***Table 9a**: Average consistency score (and standard deviation) of reinterviewed respondents, by length of re-interview period and sex*

	Males			Females		
Length of re-interview period	Mean	SD	N	Mean	SD	N
Less than 5 days	3.6	0.5	9	3.9	0.5	16
5-9 days	3.9	0.4	7	4.0	0.5	29
10-14 days	3.8	0.6	13	3.8	0.4	37
More than 15 days	3.7	0.5	9	3.7	0.5	14
Total	3.7	0.5	38	3.9	0.5	96

***Table 9b**: Percentage distribution of reinterviewed respondents by consistency score quintile, sex and re-interview period*

	Males (N=38)					Females (N=96)				
Length of re-interview period	First Quintile	Second Quintile	Third Quintile	Fourth Quintile	Fifth Quintile	First Quintile	Second Quintile	Third Quintile	Fourth Quintile	Fifth Quintile
Less than 5 days	0.0	0.0	10.5	13.2	0.0	0.0	0.0	3.1	12.5	1.0
5-9 days	0.0	0.0	2.6	15.8	0.0	0.0	0.0	4.2	22.9	3.1
10-14 days	0.0	0.0	7.9	23.7	2.6	0.0	0.0	7.3	30.2	1.0
More than 15 days	0.0	0.0	7.9	15.8	0.0	0.0	0.0	4.2	10.4	0.0
Total	0.0	0.0	28.9	68.4	2.6	0.0	0.0	18.8	76.0	5.2

Item non-response differs between reinterviewed respondents and respondents interviewed only once in 2001, although item non-response is overall quite low (less than 1%, Note 16). Reinterviewed respondents (and, especially, females) give in fact less complete answers than respondents interviewed only once in 2001 (Table 10).

Table 10: *Pattern of nonresponse for respondents interviewed once and twice in 2001, by sex and questionnaire section*

	Interviewed once in 2001	Interviewed twice in 2001	
		Main Interview	Duplicate Interview
Males			
Background	0.1	0.6	0.3
Economic questions	2.4	2.1	0.1
Children	1.4	2.2	0.0
Family Planning	0.4	0.0	1.8
Gender	0.1	0.0	2.6
Partnership	0.7	3.4	3.0
AIDS	1.5	2.4	1.9
All questions	0.8	1.6	1.1
Females			
Background	0.1	0.1	0.3
Economic questions	0.9	1.7	0.3
Children	2.9	6.1	8.5
Family Planning	2.8	2.7	2.9
Gender	1.3	0.0	0.6
Partnership	1.6	0.1	0.1
AIDS	1.6	3.2	3.0
All questions	1.1	1.5	1.6

Note. The percentages illustrate above are standardized for the number of respondents with whom a complete interview was carried out and the number of questions within each section (or in the whole questionnaire).

On the one hand, this might be due to a genuine difference in non-response, and thus ultimately be related to the different willingness of respondents to answer the questions a second time. If this is the case, non-response should be associated with individual inconsistency. On the other hand, the observed differences in non-response might be random, or be generated by the different effectiveness of the checking of questionnaires for errors that was done in the field. In this case, non-response should show no association with individual consistency. A close analysis reveals that the first hypothesis is the correct one (Table 11). The greatest percentage of inconsistent answers (between 20 and 40%) is, in fact, concentrated among respondents with less than 2% of missing answers in main and/or duplicate interview—these percentage of missing answers being the highest recorded in the sample (*see* Table 10). Item non-response it thus an importance covariate of individual consistency.

Table 11: *Percentage distribution of inconsistent answers, by number of missing answers in main survey and reinterview*

Males

	% of inconsistent answers				% of inconsistent answers		
	less than 20	20-40	40-60		less than 20	20-40	40-60
% of answers missing in main interview:				% of answers missing in reinterview			
less than 1	2.6	63.2	5.3	less than 1	2.6	23.7	5.3
1-2	2.6	10.5	7.9	1-2	0.0	26.3	7.9
2-3	0.0	0.0	2.6	2-3	0.0	13.2	2.6
more than 3	0.0	5.3	0.0	more than 3	2.6	15.8	0.0

Females

	% of inconsistent answers				% of inconsistent answers		
	less than 20	20-40	40-60		less than 20	20-40	40-60
% of answers missing in main interview:				% of answers missing in reinterview			
less than 1	3.1	42.7	5.2	less than 1	5.2	44.8	6.3
1-2	4.2	30.2	2.1	1-2	2.1	32.3	2.1
2-3	0.0	8.3	2.1	2-3	0.0	5.2	0.0
more than 3	0.0	2.1	0.0	more than 3	0.0	1.0	1.0

In the Malawi 2 questionnaire respondents were asked questions about their best friends' extramarital relationships, use of family planning and worry about AIDS. In order to assess if respondents tend to be more consistent in reports about their own characteristics rather than others' characteristics, I focus on a set of three fixed-coded questions about extramarital relationships and worry of AIDS that were asked to each respondent, with the same wording, in reference to themselves and their best married friends (Note 17).

As can be seen in Table 12, the questions' content is an important covariate of individual consistency. When reinterviewed, more than 90% of respondents provide the same answer when questioned whether or not they had an extramarital relationship; whereas only 60% of females and 32% of males provides the same answer when questioned whether or not their best married friend had an extramarital relationship. In addition, more males than females assess consistently their own and their best married friend's chance of being infected with AIDS; although overall consistency about the present and future chance of being infected with AIDS is quite low (as discussed earlier). Lower consistency in reporting about others can be related to the fact that the "best married" friend identified in the two interviews was different; or to the fact that the respondents are genuinely uncertain about the AIDS worry of their friends.

***Table 12**: Percentages of reinterviewed respondents who gave the same answer to the indicated questions, by sex*

	Males	Females
Questions about best married friend:		
Has he/she had sex with anyone other than her husband/his wife in the last 12 months?	31.6	59.4
What does he/she think is the likelihood (chance) that he/she is infected with HIV/AIDS now?	23.7	18.8
What does he/she think is the likelihood (chance) that he/she will become infected with AIDS in the future?	21.1	12.5
Questions about self:		
Have you yourself slept with anyone other than your wife/husband in the last 12 months?	92.1	94.8
In your opinion, what is the likelihood (chance) that you are infected with HIV/AIDS now?	57.9	31.3
In your opinion, what is the likelihood (chance) that you will become infected with AIDS in the future?	28.9	18.8
Sample size	38	96

5. Implications of individual inconsistency for data analysis

Even if most Malawi 2 reinterviewed respondents are consistent in their answers, what are the implications of inconsistency for the conclusions that can be drawn from the data? In order to answer this question, I focus on reporting of selected outcome and control variables. I begin with univariate comparisons of distributions and means. Then, I also test whether multivariate regression coefficients are affected by the degree of consistency in the duplicate interview.

5.1 Comparison of distributions and means for selected outcome and control variables

For respondent's age, number of children ever born and age at first sex intercourse, the comparison of reports given in the main and the duplicate interview presented in Figure 2 shows that the difference in the selected characteristics is very symmetrical around the central peak: this suggests that, if there is misreporting, it is random rather than systematic (Curtis and Arnold 1994).

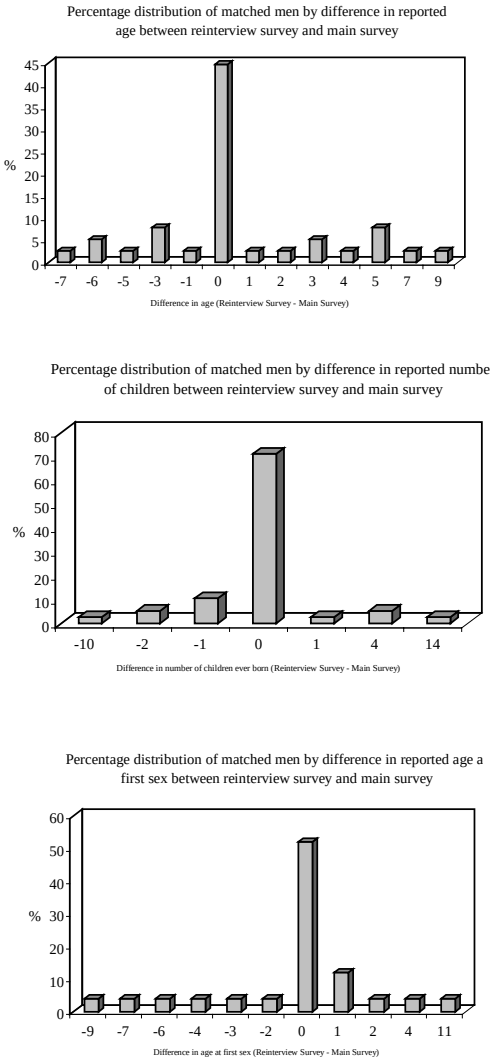
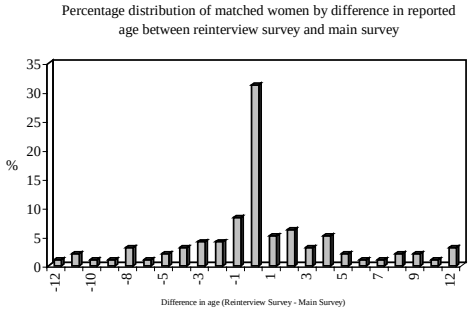
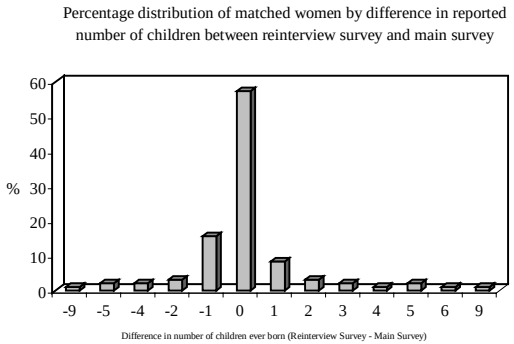


Figure 2: *Comparison of distributions for selected survey items between reinterview and main survey, Males*





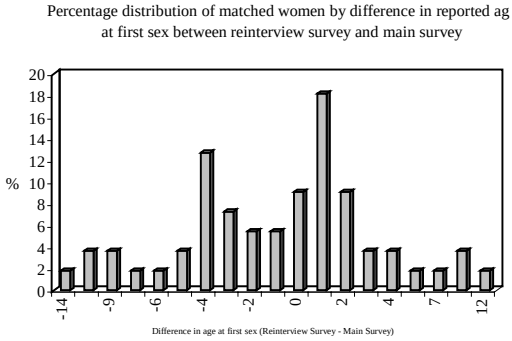


Figure 2: *Continued, Females*

In addition, the means of the control variables whose distribution is graphed in Figure 2 do not differ significantly between the main survey and the reinterview (Table 13). The same consideration applies to the means of all other variables considered in Table 13 with the exception of some questions on HIV/AIDS, which, for females, differ significantly between the main interview and the reinterview. These questions are those for which the percentage of inconsistent responses is highest (see Table 8).

Table 13: *Difference in means for selected control and outcome variables between main survey and reinterview, by sex of the respondent**

	Males			Females		
	Main interview	Reinterview	Difference (M-R)	Main interview	Reinterview	Difference (M-R)
Control variables						
Age (years)	42.1 (11.5)	43.0 (11.3)	–.87 (–.33)	36.9 (9.4)	35.7 (9.4)	–.354 (–.26)
Age at first sex (years)	30.5 (28.0)	27.9(27.0)	2.6 (.40)	33.7 (31.7)	38.2 (34.1)	–4.55 (–.96)
Education						
None	.42 (.50)	.39 (.50)	.03 (.23)	.70 (.46)	.70 (.46)	0 (0)
Some primary	.56 (.50)	.61 (.50)	–.05 (–.43)	.29 (.46)	.27 (.45)	.023 (.35)
Some secondary	0	0	0	.02 (.12)	.03 (.17)	–.014 (–.57)
Lived outside village	.61 (.50)	.61 (.50)	0 (0)	.44 (.50)	.43 (.50)	.016 (.23)
Household characteristics						
Polygamous household	.13 (.34)	.16 (.37)	–.03 (–.32)	.31 (.47)	.34 (.48)	–.024 (–.33)
Earns monthly salary	1 (0)	.95 (.32)	–.05 (–1.0)	.79 (.48)	.74 (.44)	.058 (.86)
Household has radio	.55 (.50)	.61 (.50)	–.05 (–.46)	.44 (.50)	.49 (.50)	–.052 (–.72)
Outcome variables						
Children ever born	6.1 (3.4)	6.2 (4.2)	–.13 (–.15)	5.4 (3.0)	5.5 (3.3)	–.010 (–.02)
Surviving children	4.3 (2.4)	4.5 (3.5)	–.18 (–.27)	4.8 (9.7)	4.9 (9.7)	–.104 (.07)
Want no more children	.57 (.50)	.55 (.51)	.02 (.11)	.46 (.50)	.51 (.50)	–.051 (–.63)
Current use of contraception	.66 (.48)	.76 (.43)	–.10 (–.93)	.56 (.50)	.58 (.50)	–.021 (–.29)
Chances you have AIDS now						
No chance	.58 (.50)	.68 (.48)	–.10 (–.86)	.39 (.49)	.59 (.49)	–.208*** (–2.93)
Low	.16 (.37)	.19 (.40)	–.03 (–.35)	.29 (.46)	.16 (.36)	.135*** (2.27)
Medium	.08 (.27)	.05 (.23)	.03 (.43)	0 (0)	.07 (.26)	–.073*** (–2.70)
High	.16 (.68)	.24 (.83)	–.09 (–.49)	.13 (.60)	.34 (.96)	–.219** (–1.89)
Chances you will get AIDS						
No chance	.42 (.50)	.38 (.50)	.04 (.37)	.24 (.43)	.31 (.47)	–.073 (–1.12)
Low	.24 (.43)	.24 (.44)	–.01 (–.06)	.34 (.48)	.21 (.41)	.135** (2.11)
Medium	.1 (.31)	.08 (.28)	.02 (.36)	.14 (.34)	.14 (.34)	0 (0)
High	.05(.23)	.05 (.23)	–.00 (–.02)	.07 (.26)	.10 (.31)	–.031 (–.76)
Worry to get AIDS						
Not worried	.41 (.50)	.43 (.50)	–.03 (–.23)	.28 (.45)	.31 (.47)	–.031 (–.47)
Worried a little	.11 (32)	.16 (.37)	–.05 (–.67)	.23 (.42)	.16 (.36)	.073* (1.28)
Worried a lot	.49 (.51)	.41 (.50)	.08 (.69)	.47 (.50)	.53 (.50)	–.063 (–.86)

* Standard deviations (for means) and two-sample t-tests with unequal variances (for differences) in parentheses.
Notes: * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.

5.2 Effects on multivariate regression coefficients

To test whether multivariate regression coefficients are affected by inconsistency I conducted a series of BGLW tests, in which the value of an outcome variable in the main survey was regressed on predetermined control variables for the main survey and individual inconsistency on the outcome variable considered (Note 18). In other terms, the test is whether the slope coefficients of the outcome variable and the constant differ when the value of the outcome variable is reported inconsistently between the main interview and the reinterview (Note 19). The analysis is limited to women, since the main aim is to investigate whether the univariate difference in means observed above (*see* Table 13) is associated with significant difference in multivariate estimates.

Table 14: *Multivariate probits and OLS regressions for testing impact of inconsistency on three outcome variables, Women*[*]

	Probits		**OLS regression**
Control variables	Currently using contraceptives	Worried of getting AIDS	Number of surviving children
Age (years)	-.022 (-.91)	-.009 (-.19)	.251 (1.46)
Age at first sex (years)	-.004 (-.68)	.264 (1.41)	-.034 (-.72)
Education (relative to none)			
Some primary schooling	.273 (.56)	-1.19 (-1.47)	4.45 (.143)
Lived outside village	.641 (1.46)	.152 (.21)	-4.41 (-1.58)
Household characteristics			
Polygamous household	-.605 (-1.51)	.598 (.54)	-1.90 (-.64)
Earns monthly salary	.075 (.17)	-.583 (-.78)	.178 (.07)
Household has radio	-.529 (-1.31)	-.955 (-1.10)	2.63 (.96)
Constant	1.66** (1.93)	-.755 (-.26)	-2.29 (-.33)
χ^2 test for overall relation [prob > χ^2]	20.42 [.117]	33.10*** [.005]	
R-squared / F-test [probability > F]			.58 [.878]
Effect of inconsistency on constant	.26 [.609]	.02 [.878]	.01 [.915]
χ^2 test for joint effect of inconsistency on [prob > χ^2]:			
Constant and all coeff. est.	6.21 [.515]	10.48 [.233]	.38 [.927]
All coefficients estimates	5.61 [.469]	7.80 [.351]	.34 [.932]

*Values of t-tests (for regressions) and z-tests (for probits) are in parentheses beneath the point estimates.
Notes: * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.

Multivariate probits and OLS regressions for testing impact of inconsistency on currently using contraceptives, being worried of getting AIDS and the number of children surviving are displayed in Table 14. It can be noticed that no BGLW test is significant: individual inconsistency on the outcome variable of interest does not bias multivariate regression coefficients for the variables considered.

6. Conclusion

There is considerable consistency in the answers of the respondents interviewed twice in the 2001 Malawi Diffusion and Ideational Change Project: for most of them, between 60% and 80% of their responses are consistent. Consistency shows significant differences by gender: males are less consistent than females in reporting about family planning, gender and partnerships, but they are more consistent in reporting about children.

The level of inconsistencies found in Malawi for family planning variables is within the same range of that calculated by other reinterview studies in developing countries. In addition, discrepancies on ages and dates of birth suggest that a low level of female education and literacy in Malawi is not associated with poor date reporting in Malawi 2, as it happens in other cases (such as in the Pakistan DHS). However, inconsistency in reporting of dates of marriage is more serious for Malawi 2 than for other studies, which is most likely due to higher marital mobility in Malawi.

In the Malawi 2 reinterview data, the lowest consistency is observed for the most sensitive questions, namely those on HIV/AIDS. The percentage of inconsistent responses is highest for questions about the respondent's own chance of being currently infected with AIDS or becoming infected in the future, and the question on respondent's worry of getting AIDS. Individual inconsistency is always higher for females than for males, but the pattern of inconsistencies is similar for both sexes. Several of the AIDS questions were taken from the core questionnaire of the DHS, which have been asked in many African countries. Although to my knowledge the DHS has not conducted reinterview studies to evaluate the consistency of these questions, the results of the present analysis suggest that analysts of AIDS questions in the DHS need to be cautious in the interpretation of their descriptive results (especially for females).

Clearly, consistency cannot be taken as a guarantee of accuracy (to give answers that reflect the "true" value of a certain variable), because stereotypical responses and intentional misstatements could be repeated, and because some individuals who gave consistent reports may have remembered the answers they gave in the first interview (Knodel and Piampiti 1977:55). The latter possibility can reasonably be excluded, however, since the length of the reinterview period is virtually uncorrelated with

individual consistency. In the majority of cases, respondents are inconsistent on questions they are probably genuinely ambivalent or anxious about, or for which they do not have a firm answer: for example, sensitive questions and reports about characteristics of others. In addition, only a small percentage of inconsistent individuals (less than 2%) show also higher item non-response, or a lower willingness to answer the questions altogether.

An important results of the analysis presented in this paper is that inconsistency does not affect the conclusions that can be drawn from the survey data, since: (a) the distribution and means of a number of outcome and control variables do not differ significantly between the main interview and the reinterview, with the exception of some questions on HIV/AIDS for which the percentage of discrepant responses is highest; and (b) even when the means differ, the coefficients estimates for standard family background variables in regression and probit equations are not biased by individual inconsistency.

7. Acknowledgements

The data used in this paper were collected by the research team of the Malawi Diffusion and Ideational Change Project with support from The Rockefeller Foundation, NICHD, NIA, and the University of Pennsylvania Center for AIDS Research. I gratefully acknowledge valuable comments and suggestions received from three anonymous referees of this paper. I am also grateful for comments from Jere Behrman, Hans-Peter Kohler and Susan Watkins, for conversations with Ari Van Assche, and for the assistance of all members of the research team in Malawi.

Notes

1. Individual response error is the inaccurate measurement that occurs when a recorded answer deviates from the 'true' value for the individual. Response effects are represented by anything that causes inaccurate measurement.

2. According to O'Muircheartaigh (1982), a total of 560 and 936 respondents from, respectively, the Turkish Fertility Study and the Dominican Republic Fertility Survey were successfully reinterviewed. Country reports on these two reinterview studies were, however, never published.

3. Some of the recent literature on survey response error in developing countries has evaluated data accuracy in terms of expected patterns in demographic behaviors. For example, reports of contraceptive use from contraceptive histories have been used to recreate estimates of current use from a prior survey and then compared to the observed data to evaluate accuracy in reporting at the earlier date (Curtis 1995; Stanton et al. 1997).

4. These surveys (together with the Reproductive Health Surveys and the Sexual Behavior Surveys) are the main sources of HIV/AIDS indicators for the *HIV/AIDS Survey Indicators Database*, implemented by Macro International with support from USAID and UNICEF (http://www.measuredhs.com/hivdata/start.cfm). The indicators included are derived from the "UNAIDS National AIDS Programmes: Guide to Monitoring and Evaluation" (UNAIDS 2000) and include a number of indicators identified to monitor the goals set at the UN General Assembly Special Session on HIV/AIDS in 2000.

5. Even when reliability studies are designed to ensure that the fieldwork conditions resemble those of the main survey (such as in the WFS Response Error Project), in practice "the basic condition of comparability—the essential survey conditions being the same for the two interviews" is generally violated (O' Muircheartaigh, 1984b: 11).

6. Various questions on knowledge, attitudes and behaviors towards HIV/AIDS were first introduced in the 1988 Botswana DHS (Botswana Central Statistical Office and ORC/Macro 1989) and in the 1988 Zimbabwe DHS (Zimbabwe Central Statistical Office and ORC/Macro 1989). A set of eight questions on HIV/AIDS (heard of AIDS; sources of information on HIV/AIDS; what to do to avoid AIDS; safe sex; healthy-looking person can have AIDS; is AIDS a fatal disease; personal chances of getting AIDS; changed behavior because of AIDS) was then introduced as standard in the third phase of the DHS (Institute for Resource Development/Macro International 1995a, 1995b).

7. In two cases the interview was carried out three times with the same woman. The two triplets were, however, discarded from the total number of reinterviews for the purposes of the present analysis.

8. It is difficult to evaluate if the duplication of respondents' names occurred randomly, since the supervisors did not keep track of the respondents who refused to be reinterviewed. However, the reinterviewed respondents do not show any clustering by place of residence, marital status or other identifying characteristics. In addition, there was likely no systematic bias due to the interviewers: each day they were given a list of those to interview and, if the respondent refused, they would have reported that to the survey team.

9. The villages not subject to the duplication problem are excluded when comparisons are made between those interviewed twice and those interviewed only once.

10. The difficulty in identifying the problem was complicated by the fact that another research project (not related to the MDICP) was being carried out in the research area at the same time of Malawi 2, so that when respondents began to declare that they had already been interviewed it was unclear by which project.

11. It is unclear why some respondents agreed to be reinterviewed in Malawi 2. The fact that reinterviewed respondents are less educated than the other respondents in the sample suggests that they were perhaps less confident in refusing the second interview, or less able to understand that they had already participated in the same survey. The fact that respondents interviewed twice are poorer than respondents interviewed once might also indicate that their decision to participate again in the survey was dictated by the additional gift they were provided for the second interview.

12. Indeed, one of the main purposes of the MDICP is to measure change in a number of key variables, so that when interpreting the extent of inconsistency in responses, it is necessary to consider the influence of any real change that might have taken place. Of course, some characteristics of respondents (such as year of birth, age at first marriage, or ethnicity) are fixed and cannot change over time, while others (such as education or occupation) may change.

13. The grouping by questionnaire's section was chosen because each section refers to a specific topic and contains a particular type of questions (factual and attitudinal/behavioral; *see* Table 2).

14. An answer is coded as inconsistent if the value recorded in the first interview is different from the value recorded in the second interview, regardless of the response categories. The individual consistency score is, in fact, not sensitive to

different ways of defining inconsistency across questions with different response categories.

15. The crude index of disagreement measures the percentage of cases with different responses in the main interview and in the reinterview (Curtis and Arnold 1994: 7).

16. Item non-response for selected questions (such as age, education, age at first intercourse) falls within the same range of that calculated by the 2000 Malawi Demographic and Health Survey (National Statistical Office and ORC Macro 2001).

17. For males, these questions were asked with reference to the best male married friend; for females, they were asked with reference to the best female married friend.

18. Based on Becketti, Gould, Lillard and Welch (1988). BGLW tests are used in attrition analysis to test whether the coefficients of the predetermined variables and the constant differ for those respondents who are subsequently lost to follow-up versus those who are re-interviewed (Alderman et al. 2001: 103).

19. All the control variables considered are measured consistently for at least 70% of the respondents.

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