HIV/STI Testing in the 2004 Malawi Diffusion and Ideational Change Project: Lessons Learned

Philip Anglewicz, *Population Studies Center, University of Pennsylvania*
Simona Bignami-Van Assche, *Harvard Initiative for Global Health, Harvard University*
Li-Wei Chao, *Wharton School, University of Pennsylvania*
David Chilongozi, *UNC Project at Lilongwe Central Hospital*
Irving Hoffman, *University of North Carolina at Chapel Hill*
Hans-Peter Kohler, *Population Studies Center, University of Pennsylvania*
Martinson, Francis, *University of North Carolina at Chapel Hill*
Francis Onyango, *Population Studies Center, University of Pennsylvania*
Georges Reniers, *Population Studies Center, University of Pennsylvania*
Kirsten Smith, *Population Studies Center, University of Pennsylvania*

Protocol and Biomarker Collection Project Design

The 2004 Malawi Diffusion and Ideational Change Project (MDICP-3) collected and analyzed biomarkers for sexually transmitted infections (STIs) and HIV. The testing would be conducted for all respondents from the original MDICP sample (1998), new spouses for those from the original sample, plus an additional sample of adolescents that was added in 2004. In this paper I first outline the testing protocol and design that was implemented to collect the STI/HIV specimens during the 2004 fieldwork operations[1]. In this section, I briefly describe the procedures determined in advance of fieldwork (for a more detailed description, please see Bignami-Van Assche et al, 2004). In the second section I then return to the procedures that were not implemented as planned and discuss why they were not implemented. In this section I focus on issues regarding data organization, logistics, and community responses to testing.

MDICP Project Background

When all the countries of the world are ranked by their HIV prevalence, Malawi is the eighth highest, with an estimated national prevalence of 14.6% of adults infected. Malawi thus provides a suitable location for HIV biomarker collection. The data for the analysis come from the second and third wave of the Malawi Diffusion and Ideational Change Project (MDICP), a survey focused on social networks and their influence on behavior related to HIV transmission. MDICP is a 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 (MDICP-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 Center and Rumphi in the North. In 2001 and 2004, the second and third rounds of the survey (MDICP-2 and MDICP-3) re-interviewed the same respondents and interviewed all their new spouses, if they had remarried

[1] Full version is described in Bignami-Van Assche, Simona, Kirsten Smith, Li-Wei Chao, Georges Reniers, Rebecca Thornton, Philip Anglewicz, Susan Watkins, Alex Weinreb, and the MDICP Biomarker Team (2004). "2004 Malawi Diffusion and Ideational Change Project: STI and HIV Testing Protocol." SNP Working Paper No. 6, Philadelphia: University of Pennsylvania.

between the two survey waves (more detailed information about fieldwork and sampling procedures can be found at http://malawi.pop.upenn.edu).

Testing Protocol

The rationale for the collection of behavioral information and STI/HIV biomarkers for the same individual in the MDICP-3 was threefold:

1) Monitoring disease burden and behavior change over time,

2) Assessing and calibrating self-reported data,

3) Explicating pathways and elaborating linkages between social environment and health.

The study provides rare population-based information on prevalence of STIs. Although little is known about the distribution of non-HIV STIs in rural Malawi, local health professionals and national experts said that they are (in order) genital ulcer disease, gonorrhea, chlamydia, trichomonas, syphilis, and herpes (from interviews conducted by Kirsten Smith and Susan Watkins). In the interest of investigating behavior change, the focus of the MDICP-3 was on treatable[2] STIs. Therefore, for females biomarkers were collected for chlamydia, gonorrhea and trichomonas; and for males, chlamydia and gonorrhea. HIV prevalence data provided an opportunity to compare with estimates from pregnant women in antenatal surveillance clinics.

The testing method used by MDICP was not anonymous. The respondents' unique biomarker ID was kept on every specimen collected from them, and it was linked to the respondent's computerized data. Identifying individuals who were tested was necessary to inform them of their test results. However, we ensured confidentiality of the respondents who agreed to be tested. No personal identifier (such as the name of the respondent or the village where he or she lives) was kept on the specimens.

Tests- For women, vaginal swabs were used to test for chlamydia, gonorrhea and trichomonas. For men, urine was used to test for chlamydia and gonorrhea. The HIV tests

[2] Namely STIs for which treatment will cure the symptoms. Non-treatable STIs are, for example, syphilis, herpes or HIV.

were done with oral swabs.[3] These tests were selected according to guidelines of the Malawian Ministry of Health and in conjunction with specialists at Lilongwe Central Hospital. The MDICP STI/HIV testing protocol was approved by the IRB in Malawi and the United States.

Design of MDICP Data Collection

In each survey site, the team involved in the MDIPC-3 data collection included survey supervisors and interviewers, responsible for coordination of the main survey; a group of trained nurses, responsible for the collection of biomarkers and the biomarker survey; and scouts, who were selected from each village to assist in the identification of respondents from MDICP sample lists.

The Survey Team- The main survey representatives arrived first in the village. Upon arrival, team supervisors met with village representatives to reintroduce the MDICP project and receive permission to carry out the survey. Next, with the help of village leadership representatives, one or more scouts were identified based on knowledge of the village geography. Once scouts were identified and lists of respondents by village were compiled, the survey supervisors and interviewers approached all respondents in the village.

The Biomarker Team- Approximately two days after the survey team completed surveys for respondents in a village, the biomarker team would enter the village. The collection of biomarkers was preceded by visits to each of the village chiefs in the sample to inform the community about the coming survey. An experienced supervisor who was trained specifically for the purpose would carry out these visits.

Since the communities were quite familiar with the MDICP, emphasis was placed upon explaining the reasons for testing for STIs and HIV, the procedures for specimen collection and results dissemination, and the confidentiality of the results. Village heads were also briefed about the timetable of the survey and STI/HIV testing.

[3] Roche PCR was used for gonorrhea, chlamydia, and trichomonas. ORASURE saliva test was used for HIV; positive results were confirmed through Western Blot on the same specimen.

After meeting with community representatives, the biomarker team would use the same village scout as the survey team to identify respondents, and approached the same respondents as those approached by the survey team.

The nurses completed the STI questionnaire, discussed the tests with the respondents, obtained their informed consent and collected the STI/HIV specimens. If the respondent consented to be tested for HIV, the nurse also provided pre-counseling. In sum, the primary responsibilities of the nurse included:

- Completing the STI questionnaire;
- Informing eligible respondents about the test and asking for consent;
- Collecting the specimens—urine samples and oral swabs for men; vaginal and oral swabs for women—and filling the necessary forms;
- Informing respondents when they will receive results.

At the end of each visit, the nurse supervisor completed a form to keep track of the issues raised, to improve communication and explanations for the succeeding villages and field sites, and ultimately to give back the results of the testing.

Results dissemination- Results would be communicated to respondents within four weeks of collection of the specimens them by the nurses. For the dissemination of results, MDICP used temporary Voluntary Counseling and Testing (VCT) centers set up in each village, staffed by nurses trained in HIV testing and counseling.

The nurse had a list of biomarker ID numbers with corresponding test results, but without names or any other identifying information. In order to get their results, respondents had to present to the nurse the picture they had taken when the specimens where collected. The nurse used the picture to make sure that nobody else other than the respondent was given the test results. These procedures should preserve confidentiality, as the respondent will only know the results.

When all respondents received their test results, the nurse also informed the communities about the overall prevalence of STIs and HIV in the district.

Treatment- One single-dose treatment for each non-HIV STI was provided to all respondents who are infected. Infected respondents also received treatment for up to two

of their sexual partners. All respondents who came to get their test results also received vitamins. Respondents who were HIV positive were offered counseling.

By providing all with some treatment, we hoped to preserve confidentiality and prevent speculation about who is infected. All respondents, whether they are infected or not, were counseled by the nurses about the symptoms of STIs and encouraged to go to the local clinic should they experience these symptoms.

Collection of biomarkers

Creation of identification numbers for STI/HIV testing- In order to ensure confidentiality, a new set of identification numbers was created for each respondent. This set of biomarker IDs was different from the IDs used for the survey data collection ('survey IDs') and was used to label all specimens, so that at no point would it be possible for the survey personnel to link the survey information with the biomarker data. The MDICP biomarker coordinator kept a master file that linked this set of biomarker IDs with the original IDs of respondents in the sample. Only after the end of data collection the survey IDs was linked with the biomarker IDs.

Labeling of STI questionnaire and specimens- Using the biomarker IDs described above, the biomarker coordinator was responsible for giving each nurse all labels necessary for specimen collection.

For each respondent there were 15 printed labels for each respondent. The supervisor cut the relevant portion of the label sheet and gave the appropriate labels to the nurse. Upon meeting a respondent, the supervisor peeled off the first label of the first row (i.e. the label with the respondent's name) and pasted it onto his/her log sheet.

Informed consent for STI and HIV testing- The nurse was responsible for explaining the purpose of the testing to the respondents and to obtain their consent before collecting any specimens. In order to ensure that the respondents made an informed decision about participating in the testing, the MDICP-3 questionnaire included separate statements that explained the nature of the STI/HIV tests and requested prospective respondents' permission to collect urine samples, vaginal swabs and oral swabs for these tests. Consent

for STI and HIV testing was asked for separately, such that respondents gave (or refused) consent for any or none of the components.

After filling the STI questionnaire, the nurse read the appropriate informed consent statement:

-- if the respondent was age 18 or over, the nurse obtained the respondent's consent to the testing before any specimen collection was done. If the respondent agreed to be tested, he/she indicated consent by signing, or inscribing his/her thumbprint on the consent form;

-- if the respondent was between 15 and 17 years old, the nurse first obtained the consent of one of the respondent's parents. If the parent agreed to the test for the adolescent, he/she indicated consent by signing or inscribing his/her thumbprint in the space provided. After receiving consent from the parent, the nurse read the consent statement to the adolescent, asked the adolescent whether he/she agreed to the test, and had the adolescent indicate consent by signing or inscribing his/her thumbprint. The only exceptions were if the adolescent was married, lived alone, or resided in a household in which there were no adults. In such cases, the consent of the adolescent was sufficient.

When consent was given, the nurse pasted a label with the respondent's unique ID number at the bottom of each informed consent form.

Each consent statement began by describing the objectives of the test and the procedures to be followed. The nurse emphasized that every effort was made to protect the confidentiality of the information. The nurse also made it clear that the respondent had the right to refuse to participate in the study, to withdraw at any time, and to refuse to answer any individual questions. Respondents were finally told that, when the nurses returned to provide the results of the STI testing, they had only the identification number of the respondent (each respondent who participated in the testing was given a personal picture with this biomarker ID number on a label pasted on the back).

Specimen collection- After the respondent gave their informed consent to participate to the STI and/or HIV testing, the nurse took their picture by using the Polaroid camera. The nurse then pasted a label with the respondent's unique biomarker ID onto the back of the picture, and instructed the respondent to present this picture to collect the results of the test(s).

If a male respondent agreed to be tested for STI, the nurse took a urine cup, pasted a label with the respondent's biomarker ID on it and gave it to the respondent. The nurse instructed him to go in a private place and fill the cup to the pre-marked line (20cc) and then to tighten the cap. When the respondent returned with the cup, the nurse placed it in a Ziploc plastic bag and transferred it into the cooler.

If a female respondent agreed to be tested for STI, the nurse took a vaginal swab, pasted a label with the respondent's biomarker ID on the tube and gave the swab to the respondent, instructing her about its use. When the respondent returned with the swab, the nurse put the swab into the culture tube, broke the stick, and capped the tube. The nurse then placed the tube in a Ziploc plastic bag and transferred it into the cooler.

If the respondent (male or female) also agreed to be tested for HIV, the nurse took an oral swab, pasted a label with the respondent's biomarker ID on the tube and gave the swab to the respondent. The nurse then told the respondent to place the swab between his/her gum and cheek until moist, for at least two minutes. The nurse used the timer to check that the respondent kept the swab at least 2 minutes between his/her cheek and gum. After this time has elapsed, the nurse put the swab into the culture tube, broke the stick, and capped the tube. The nurse placed the tube in a Ziploc plastic bag and transferred it to the cooler.

Recording specimens taken- When the nurse was finished collecting the specimens, he/she filled the necessary sections in the STI/HIV testing sheet. Each nurse carried only one testing sheet, as there was enough room for the maximum number of specimens a nurse collected each day.

The following information was on the testing sheet:

- One label with the respondent's biomarker ID number;
- Code indicating whether STI and HIV sample was taken, or if respondent refused;

- The date and time of collection.

In general, if the respondent was found for the main survey he/she was also be found for the STI/HIV testing. Therefore, if a respondent was not found after 3 callbacks, no STI/HIV Testing Sheet was filled, since the inability of contacting the respondent would already be noted on the survey questionnaire.[4]

STI questionnaire- The nurse filled the STI questionnaire immediately upon meeting respondent and regardless of specimen collection. After completion of meeting with a respondent, the nurse gave the nursing supervisor the completed questionnaire for checking.

Delivery of specimens to the nurses' supervisors- At the end of each day, when the nurses returned from the field, the nurses' supervisors collected all STI questionnaires, all informed consent forms, and testing sheets. The nurse initialed the testing sheets at the bottom before giving them to the supervisor. Upon receipt of the testing sheets, the supervisor checked the information and then initialed them at the bottom.

The nurses' supervisor first checked that the STI questionnaire was filled correctly (i.e. that all fields are completed, that the skips were used properly, and so on). If the entry was correct, the supervisor gave the questionnaire to the data entry person. If the STI questionnaire was not filled correctly, the supervisor first asked the nurse to clarify and, if not satisfied, requested a call-back carried out the following day by the same nurse.

The supervisor then checked that the number of tests recorded on the STI/HIV Testing Sheet corresponded to the number of urine cups, vaginal swabs and oral swabs placed in the cooler handed by the nurse. The supervisor also checked that, for every specimen that was collected, an informed consent form was been filled in. If there was any inconsistency, the supervisor asked the nurse to clarify it and, if necessary, sent the nurse for a callback.

After these checks, the supervisor proceeded to store all specimens in one of the study fridges. The supervisor also removed the cold packs from the coolers and placed

[4] Informed consent for participating in the survey interview will be noted on the first page of the main questionnaire, as it has been done in previous rounds of the MDICP.

them in the study freezer, where they were kept frozen until the next day.[5] The supervisor locked the fridge and the freezer with the lock provided after all specimens and all cold packs were stored.

Delivery of specimens to Lilongwe Central Hospital- Specimens were delivered for analysis to the UNC laboratory in Lilongwe Central Hospital (LCH) three times a week. Because of the varying distance of the survey sites from Lilongwe, the following describes the specific delivery procedures.

In all cases, a nurse ('transfer nurse') accompanied the samples and was responsible for the delivery of the specimens to the lab technicians. For each trip, the transfer nurse received from the nurses' supervisor one large sealed cooler containing all urine cups, vaginal swabs and oral swabs, together with cold packs. The accompanying documentation was contained in the STI/HIV Transfer Sheet. When the transfer nurse received the large cooler, they and the nurses' supervisor initialed the Transfer Sheet at the bottom. At the lab, the person accepting the samples initialed the Transfer Sheet and made a copy of it. The transfer nurse handed the copy of the Transfer Sheet to a designed staff member after coming back from LCH.

The three sites are of varying distances from LCH, which led to different strategies for delivery of samples. Mchinji is about 100km from LCH, so the transfers were prepared and checked the morning of a transfer. The driver and nurse left in mid-morning for LCH and returned the same day. In Balaka (about 300km from LCH), the transfer sheet and specimens were prepared the evening before the transfer. Rumphi, the farthest site from LCH, required that the transfer nurse and drive spend the night in Lilongwe before returning to the field the day after the transfer.

[5] The cold packs had to be replaced with newly froze ice packs once per day.

Section Two: Lessons Learned in Biomarker Collection

During biomarker collection for MDICP-3, there were a number of challenges that forced us to amend the project design we developed prior to fieldwork. Some of these challenges led to immediate changes in the project protocol, while others we keep in mind for the implementation of fieldwork in 2006 and illustrate for the benefit of other biomarker collection projects. In this report, we focus on three areas where the unexpected occurred: community reactions to testing, data organization, and logistics. Based on information gained from conversations with University of Pennsylvania and University of North Carolina staff, Malawian MDICP staff, and survey respondents, we have compiled these lessons for the benefit of similar projects.

Community Reactions to Testing

One of our most important findings from biomarker collection was the great enthusiasm to be tested by respondents in almost all villages at all three sites. Furthermore, the enthusiasm was usually not in response to the monetary incentives or pictures offered, but from a concern about HIV/AIDS status. The testing refusal rate for the entire sample was less than 8%, much lower than we had expected and had been led to believe by reports from other projects. We found that, rural Malawians are indeed ready and eager for HIV/AIDS testing, which contradicts some reports that rural African populations are not ready for testing, or that there is silence and stoicism regarding HIV/AIDS (Caldwell, 2000).

This eagerness for testing was not only from MDICP respondents. Many people who were not in the MDICP sample also wanted to be tested. The nurses reported being approached by numerous relatives and friends of those in the sample, asking the nurses to test them as well. In fact, respondents were eager despite the fact that there was testing available for respondents in both Mchinji and Balaka (either at a donor-funded clinic or at the district hospital). Only in Rumphi was there no feasible nearby testing, and we found demand for testing that was at least as great as the previous two sites. Faced with this great enthusiasm, it was difficult to reconcile our interest in helping rural Malawians to know their HIV status with the limitations of time, supplies, and study design.

Although this enthusiasm was beneficial for the intentions of the project, there were some complications caused by the eagerness to be tested. In Balaka, the enthusiasm to be tested caused complications in being able to properly identify respondents. Many people pretended to be respondents in order to be tested, and we had to confirm their identity with the survey team and the scouts in order to be sure that we tested and surveyed the same person. In addition, some respondents consented to be tested twice, often in attempts to increase the incentive amount. In other cases, some wanted to be tested twice in order to receive another picture of themselves.

Some villages in Balaka had some extreme reactions to the testing team. One village called the nurses "bloodsuckers," apparently because of the experience of a previous biomarker collection project that tested for HIV by drawing blood. As this spread throughout the village, Chingwalungwalu had a much higher rejection rate for testing. In order to address this problem, the nurse supervisors met again with village headman, explained the misconception in the village, and requested assistance in dispelling the inaccuracies. The village headmen agreed, and this seemed to help the reception of the nurses in these villages.

The nurse supervisors indicated that, in addition to satisfying the concern over HIV status, our testing was considered by respondents to be a sign of development, and their involvement in some way included them in the process of rural development in Malawi. This sentiment was expressed in all three sites.

In Balaka we also found different reactions to testing in different areas of the site. In villages on the road to Balaka, there were fewer adolescents attending school, and the reactions of respondents (such as the "bloodsuckers," mentioned above) were more extreme. The nurses also seemed to feel that there was more witchcraft in these areas as well. Most villages on the road to Mangochi were more receptive to testing and more children were going to school.

The primary problem in biomarker collection in Rumphi was the inability to find respondents. The nurses explained that many of the respondents were from outside Rumphi and were working there on tobacco plantations. Since tobacco had been harvested, baled and most of it already sent to the auction floors, many of the respondents had moved back to their homes. It seemed that we found and tested only about 65% of

respondents in Rumphi from the original sample. Because this sample was from 6 years ago, and many of the original respondents were working on plantations, this low rate isn't totally unlikely. In addition, attrition was a problem, as the patrilineal tradition of the northern region of Malawi dictates that women return to their original home upon divorce.

Lessons Learned- We were skeptical of reports of Africans not being ready for HIV testing, but were still surprised by the high level of enthusiasm for testing. Knowing the low refusal rate will allow us to be specific in ordering testing supplies for MDICP 2006. The few challenges faced in biomarker collection were largely due to misconceptions, which were effectively addressed through communication with local authorities.

Data Organization

An organized system of data entry and validity checks was vital for the project. For example, outcomes of visits to respondents by the survey and biomarker teams needed to be merged together in order to make sure that the same respondent was both tested and surveyed. Also, the HIV/AIDS and STI ID's carried by the nurses and supervisors had to match the biomarker ID's on specimens transferred to LCH. These biomarker ID's tied together many databases, but this information had to be kept separate for purposes of confidentiality. For example, only one file, held by the testing results coordinator, allowed one to connect respondent names with testing results. Because confidentiality and the project design led to a large number of databases used, data management of these databases was a central issue to the project.

Initially in Mchinji, the process of data entry and checking was not properly systematized. Field logs were generated using Stata, transferred into Excel and Word files, and then given to nurse supervisors. Testing sheets forms were created in Word, given to nurses, and entered in Excel upon completion in the field. Transfer logs were generated from listing the samples in the refrigerator prior to delivery to LCH. As biomarker collection progressed, the number large of disconnected forms (testing sheets, field logs, transfer sheets, labels) brought us to the conclusion that the use of an Access

database could 1) generate the necessary templates for various forms, and 2) tie together all data entry, allowing for data checks.

Using a database that allowed integration of all files was tremendously beneficial. For example, after testing sheets were entered, a transfer log form could be created without entering any additional information in to the database. This transfer sheet, created based on data entry, could be crosschecked with actual samples in the refrigerator prior to delivery to LCH to verify that data entry of specimen was done correctly. Corrections could be made on a draft transfer sheet, entered into the database, and then a new transfer sheet could be generated.

In addition, changes to field logs could be improved using the Access database. Initially, nurse supervisors used the same field logs throughout time spent in a village, and recorded the outcome of each visit on the form. If there were a large number of respondents in a particular village, organization of return visits, completed respondents, and those not yet visited became problematic. In addition, this system led to potential problems created by lost or damaged field logs. In using the Access database, visit outcomes could be entered regularly, therefore solving the problem of lost or damaged forms; and new field logs could be created, eliminating those already visited, leading to better organization.

Once the new database was in place, we immediately found additional ways to ensure better data organization. For example, the logging system used by the lab at LCH was similar to our previous system. Through our database we were able to print additional labels with biomarker ID's to accompany each specimen to the lab. As a result, the lab did not have to rely on handwritten biomarker ID's on logging forms throughout the testing process.

Lessons Learned- The final databases used for the project were efficient, comprehensive and flexible. For fieldwork in 2006, we will use similar databases from the beginning of fieldwork. We also need to emphasize preparation of samples and databases well in advance of fieldwork.

Logistics- Supplies and Transfer of Biomarker Specimens

Supplies- Frequently through the first few months of fieldwork, MDICP experienced difficulty in procurement of biomarker collection supplies, and in the coordination of biomarker delivery at the testing laboratory in LCH. These problems were due to the large scale of the MDICP testing and general logistical difficulties involved with biomarker collection in developing countries (summarized by Boerma et al, 2001, see also National Academy of Sciences, 2000). Difficulties related to the project size, described first, then resulted in the logistical challenges also described below.

After we had completed about half of the fieldwork in Balaka, the testing office ran out of vaginal swabs. We rush-ordered more vaginal swabs, but the delay between ordering and arrival meant that there would be about four days between when we would run out and be replenished. As a result, there was no option but to send some nurses home and others on vacation while we waited for supplies. The supplies did finally come in, although at the last minute, just prior to the nurses were returning. When we resumed fieldwork, we retained a smaller number of nurses than those originally in the Balaka group.

Ordering procedures prevented the testing office from ordering the full amount of vaginal swabs at one time, so we were unable to order the full amount at the project onset. From this point on, we communicated regularly with the testing office to make sure that their store of supplies was full, or that necessary testing supplies were regularly ordered.

A similar supply problem occurred regarding testing reagents for HIV/AIDS and STI tests. Reagents for testing had to be ordered from the U.S. to the University of North Carolina (UNC) office in the United States and then sent to Malawi, and there were restrictions placed on the amount that could be ordered at one time. Although a sufficient amount of reagents were available for all samples from the first site, Mchinji, we found out towards the end of fieldwork in Balaka that UNC would not have enough reagents to complete testing by the time we had expected to give results: approximately four weeks after the completion of biomarker collection. Because of these problems in ordering, we were forced to postpone the time of giving results to October. This led to a restructuring

of the project schedule. Project representatives were forced to unexpectedly return to the field later than expected to give results.

In addition, we were required to inform the villages in Balaka and Rumphi that we would not be returning testing results until about three months after what was originally told to respondents. We recognized that this was a serious issue to communities, and feared that respondents wouldn't trust that we were coming back at all. To address this, biomarker coordinators and nurse supervisors went to the homes of all village headmen to explain the supply problem, and request that they pass the word in their communities that results would be returned later than expected. The village headmen were very understanding of the problem, and promised to inform their communities in a sensitive manner.

Specimen Transfer- Due to the distance from the lab in Lilongwe (approximately 480km), Rumphi presented a challenge for organizing the specimen transfer. As a result of this distance, transfers would have to be prepared the night before delivery, a larger amount of money would be used for gas, and driver and transfer nurse would have to stay overnight in Lilongwe. In addition, due to the distances traveled, we recruited and trained another transfer nurse (for a total of three), and rotated drivers so that no one nurse or driver made the trip more than once a week. Staying overnight for three transfers/week meant that one vehicle was occupied for 6 days of the week. As a result, a fifth vehicle was hired to ensure that the nurse teams were not sharing- the distances between villages (and houses within villages) were much too great to make sharing vehicles an efficient option.

An additional challenge in the transfer came from crossing the roadblock at Jenda, which separates the Northern and Central regions. The guards gave our driver and transfer nurse difficulty in crossing the roadblock on the Rumphi first transfer due to a lack of documentation. To address this problem, an official project letter that explained the purpose of the project and reason for the transfer accompanied future transfers.

Transportation within villages was also an issue that we addressed. The villages in Mchinji were spread out and the nurses became tired after walking long distances. This was also not an efficient use of their time. Since the terrain was flat in Mchinji, the

nurses hired bicyclists from the local villages to travel to respondents. The nurses reported that this worked very well and allowed them to visit more respondents per day. The additional cost of these bicyclists was minimal, and the hiring of individuals from villages in our sample helped the reputation of the project at each site.

Conclusion

As is often the case with unpredictable fieldwork conditions, some anticipated problems were immediately addressed, particularly regarding data management, supplies, and community reactions to testing. When confronted with such difficulties, the method used to decide a solution first prioritized the best interest of the respondent and the community, before considering the needs of the project and the interests of MDICP team members. Although balancing these interests was often difficult, we feel that our fieldwork was a success, and the result is a set of biomarkers that will further the understanding of infection and sexual behavior in sub-Saharan Africa, and benefit the lives of individuals living in rural Malawi.

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Bibliography

Bignami-Van Assche, Simona, Kirsten Smith, Li-Wei Chao, Georges Reniers, Rebecca Thornton, Philip Anglewicz, Susan Watkins, Alex Weinreb, and the MDICP Biomarker Team (2004). "2004 Malawi Diffusion and Ideational Change Project: STI and HIV Testing Protocol." SNP Working Paper No. 6, Philadelphia: University of Pennsylvania.

Boerma, J. Ties, Elizabeth Holt, Robert Black. 2001. "Measurement of Biomarkers in Surveys in Developing Countries: Opportunities and Problems" *Population and Development Review*, 27(2): 303-314.

Caldwell, John C. "Rethinking the African AIDS Epidemic". *Population and Development Review* 26(1): 117-135.

National Academy of Sciences, 2000. "Biological and Clinical Data Collection in Population Surveys in Less Developed Countries" National Academy of Sciences, Washington D.C. January 24-25th, 2000.