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Key Findings from an Evaluation of the mothers2mothers Program in KwaZulu-Natal, South Africa



Horizons Program
Health Systems Trust

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Acknowledgments

The principal investigators for this study were Carolyn Baek and Naomi Rutenberg (Horizons/Population Council, New York), Vuyiswa Mathambo (formerly Health Systems Trust, Durban, South Africa; now Human Sciences Research Council, Durban, South Africa), and Sibongile Mkhize (Health Systems Trust, Durban, South Africa). Louis Apicella (Horizons/Population Council, Washington, DC) was the data analyst for the study and Irwin Friedman (Health Systems Trust, Durban, South Africa) provided valuable technical support.

The research team would like to thank Mitchell Besser, Chloe Teasdale, Nora Kenworthy, Nomvula Radebe, Thembisile Mofokeng, and Erin Blake from the **mothers2mothers** program for their support on this evaluation, and all of the program staff at **mothers2mothers** for providing input into project activities.

Thanks are also extended to the interviewers and to the many women who were willing to participate in the study.

The authors would like to acknowledge the Elizabeth Glaser Pediatric AIDS Foundation for funding the intervention, and the United States Agency for International Development and the President's Emergency Plan for AIDS Relief for providing funding support for the evaluation.



This study and final report were made possible by the President's Emergency Plan for AIDS Relief and the generous support of the American people through the United States Agency for International Development (USAID) under the terms of Cooperative Agreement No. HRN-A-00-97-00012-00. The contents are the responsibility of the Horizons Program and do not necessarily reflect the views of USAID or the United States Government.

Published in June 2007.



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Suggested citation: Baek, Carolyn, Vuyiswa Mathambo, Sibongile Mkhize, Irwin Friedman, Louis Apicella, and Naomi Rutenberg. 2007. "Key findings from an evaluation of the **mothers2mothers** program in KwaZulu-Natal, South Africa," *Horizons Final Report*. Washington, DC: Population Council.

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Executive Summary

mothers2mothers (m2m) is a peer support program that aims to provide education and psychosocial support to HIV-positive pregnant women and new mothers, help women access existing health care services to prevent mother-to-child transmission of HIV (PMTCT), and follow up with mothers and babies to ensure they receive appropriate medical care after delivery. While there has been much interest in innovative psychosocial support programs that complement PMTCT clinical services, only a few such programs exist, and there is very little data about their effectiveness. Although **m2m** is a well known program with anecdotal accounts of successfully supporting HIV-positive women, the program had yet to undergo an external evaluation. The Horizons Program of Population Council, in collaboration with Health Systems Trust, completed the first evaluation of **m2m** as part of its introduction in KwaZulu-Natal Province, South Africa.

Study Design and Methods

The researchers used a pre-post, quasi-experimental study design to assess program effectiveness. There were three evaluation sites in the Pietermaritzburg area of KwaZulu-Natal. These sites drew women from urban and peri-urban settings. The eligibility criteria for the study included being between the ages of 18 and 49 years, knowing one's HIV status, and either 6–9 months pregnant or 12 weeks or less postpartum. Two cross-sectional surveys were conducted. At baseline data collection in 2005 before **m2m** was introduced, 183 HIV-positive pregnant women and 178 HIV-positive postpartum women were interviewed using a structured questionnaire. At follow up data collection in 2006, one year after **m2m** was introduced, 345 HIV-positive pregnant women and 350 HIV-positive postpartum women were interviewed using the same questionnaire but with additional questions about program exposure and interaction. The sample size at follow up was larger in order to examine potential differences between those who participated in the program and those who did not participate. Program participation was defined as two or more contacts with **m2m**.

Outcomes for the study included knowledge about mother-to-child transmission (MTCT) and its prevention, disclosure of HIV status to another person, Nevirapine receipt and uptake, infant feeding intentions and practice, family planning intentions and practice, referral and follow up for care, and psychosocial well-being. The study assessed whether there were better outcomes for program participants versus non-participants at the follow-up data collection, and examined potential changes between the two rounds of data collection—before the introduction of the **m2m** program and after the program was in place for one year. Bivariate and multivariate analyses were conducted.

Key Findings

The program achieved substantial coverage of both pregnant and postpartum women, with almost 60 percent of women reporting that a mentor mother talked with them at least once while the women were pregnant or during their last pregnancy. Nearly half of all pregnant and postpartum women interviewed reported two or more interactions with a mentor mother.

The sociodemographic characteristics of participants (women who had two or more contacts with the program) versus non-participants (women who had no contact with **m2m**) were similar. With respect to

MTCT knowledge, overall respondents knew more basic information about how and when MTCT occurs than how to prevent it. Comparing the two groups, **m2m** participants had greater MTCT knowledge than non-participants, but most differences were not statistically significant.

There were high rates of disclosure in the study population. Among postpartum women, **m2m** participants were significantly more likely to have disclosed to someone than non-participants (97 percent vs. 85 percent; $p < 0.01$), and to have done so prior to delivery. The person HIV-positive women, regardless of program exposure, disclosed most often to was their partner or husband.

There was no difference in Nevirapine receipt by program exposure for pregnant women. But **m2m** program participants interviewed postpartum were more likely to report receipt and ingestion of Nevirapine, and receipt of the infant dose than non-participants, with about 9 out of 10 participants reporting as such.

Formula feeding was the most common method of infant feeding mentioned, although neither the facility nor the program distributed formula. Pregnant and postpartum program participants were more likely to report intending or actually giving infant formula exclusively than their counterparts who had no exposure to the program.

The vast majority (70 percent) of postpartum program participants (4–12 weeks after delivery) reported using contraception, with injection mentioned as the most common method. They were more likely to use contraception than non-participants.

Program participants interviewed postpartum reported significantly higher rates of having undergone CD4 testing during their last pregnancy (79 percent vs. 57 percent; $p < 0.01$) and knowing their CD4 count after testing (88 percent vs. 72 percent; $p < 0.01$) than non-participants.

With respect to psychosocial well-being, pregnant participants were significantly more likely to report feeling they could do things to help themselves, cope with taking care of the baby, and live positively in comparison to non-participants. Postpartum participants reported feeling less alone in the world, overwhelmed by problems, and hopeless about the future compared to non-participants.

The multivariate analysis controlled for age, existence of partner, education, employment, number of live births, number of antenatal care visits, and site. With these controls, program participation continued to be positively and significantly related to key PMTCT knowledge and behaviors, or there was a positive association that was not statistically significant.

The data were also analyzed to assess whether the changes associated with program participation among postpartum women occurred between baseline and follow up data collection. Most findings were in the same direction, suggesting that the program contributed to positive changes at the site level after one year of implementation.

Conclusions

m2m plays an important role in providing a continuum of care for HIV-positive women and infants. Compared to non-participants, **m2m** participants had greater psychosocial well-being, greater use of PMTCT services, and better PMTCT outcomes. Postpartum participants had more positive changes than

pregnant participants, suggesting that with more contacts and time with the program, there is greater impact. Lastly, **m2m** keeps women linked to health facilities, which is especially important after delivery as that has been an identified weakness of many PMTCT services.

Introduction

The medical recommendations for the prevention of mother-to-child transmission (PMTCT) of HIV made by PMTCT programs are often difficult for women to implement because of community norms, values, and beliefs. For example, taking medication during pregnancy and using a breast milk substitute or exclusively breastfeeding and then early weaning are not normative practices for women. Many women are uncertain of the effect of these recommendations on their pregnancy and infant. Moreover, women may face stigma and other social costs if they follow providers' PMTCT recommendations.

Another barrier that interferes with the prevention of vertical transmission is that health providers are often overextended. HIV services have been added to existing responsibilities even as the number of nurses has declined in most African health facilities. In numerous settings, there are not enough nurses and midwives to give needed information and support to patients because of high rates of migration, and in high HIV prevalence settings, many providers themselves may suffer from AIDS-related illnesses.

PMTCT programs have also found it difficult to follow up with women after delivery to address infant feeding, infant health, family planning, and women's health. In many countries, once women deliver, most do not return to the antenatal care (ANC) or maternal child health (MCH) clinics where they received PMTCT services. This lack of participation in PMTCT-related programs during the postpartum period contributes to pediatric HIV infections. However, this can be reduced by improving the follow-up of HIV-positive mothers and their infants and fostering their utilization of health services.

The **mothers2mothers (m2m)** program was created to respond to these PMTCT challenges. Recognizing that women need psychosocial support upon learning that they are HIV-positive, **m2m** provides peer support not only to help women accept their HIV status, but, together with information and education, to help women adhere to PMTCT recommendations. The program aims to supplement existing health services so that HIV-positive women and their infants receive comprehensive care and are able to access the full range of services available to them, as well as successfully carry out recommended practices.

While anecdotal information suggested that **m2m** filled an important gap, the program had not been formally evaluated to determine whether it improved HIV-positive women's psychosocial well-being, and to assess its added value in increasing the uptake of PMTCT services and in improving PMTCT knowledge and behaviors. In response, the Horizons Program, in collaboration with Health Systems Trust, conducted an evaluation of the program.

Description of the Intervention

m2m is a community-based education and mentoring program for HIV-positive pregnant women and new mothers. **m2m** trains and employs new mothers, who have themselves benefited from services, to become "mentor mothers." These mentors form a team of facility-based, grassroots caregivers and educators of HIV-positive mothers and are an integral part of clinical PMTCT care. **m2m** works to achieve the following goals:

- Reduce the number of babies born with HIV.
- Empower pregnant women and new mothers living with HIV to improve their health and the health of their babies.
- Fight the stigma associated with HIV, and encourage and support disclosure.

m2m is based on the concept that peer support is an optimal model for effective education and social empowerment, and that mothers themselves are the best vehicle to provide support to other mothers. Through education and community-based outreach activities, the program helps women learn to advocate for their own health and the health of their families; it also works to destigmatize HIV/AIDS within communities. Finally, the program provides employment and professional development for local women living with HIV who serve as mentors and educators on HIV/AIDS-related issues.

Program Staff

m2m employs experienced health care professionals as program managers to oversee local programs based in individual healthcare facilities. Each site is headed by a full-time site coordinator—usually a mentor mother who has come through the program. Site coordinators are responsible for supervising the delivery of care provided by mentor mothers.

Mentor mothers participate in two weeks of training that covers basic medical knowledge about HIV infection and antiretroviral therapy (ART), behaviors that help prevent mother-to-child transmission, safer feeding options for infants, counseling methods that can help women to disclose their status, strategies for negotiating safer sexual practices, and nutritional guidelines for women living with HIV. Mentor mothers and site coordinators also help clients negotiate the healthcare system by giving them information about where to seek services and how to apply for grants.

m2m Activities

The **m2m** service model exists in partnership with provincial, district, and municipal initiatives to support the delivery of ANC, HIV testing and counseling, and treatment services. The program is designed to serve women throughout the entire PMTCT process—from the beginning of pregnancy through the first year of motherhood. **m2m** sites, including the sites where this evaluation was conducted, adhere to a common operating structure, linking and integrating closely with a clinic-based PMTCT program and also reaching into the community to work with women, their partners, and their family members both during pregnancy and after delivery.

Health talks

Site coordinators and mentor mothers conduct daily outreach activities on days when there are clinic hours for ANC and/or MCH services in order to inform pregnant and newly delivered women coming to the health facility about the program. The general health talks are conducted in waiting rooms and cover information on **m2m** services, including the hours of operation, location of a designated **m2m** space within the clinic, schedule of support groups, and details about other activities offered by the program. These talks are generally a woman's first exposure to **m2m**, although at some sites referral to **m2m** is part of the first ANC visit for all HIV-positive pregnant women.

Counseling and support groups

Mentor mothers and site coordinators provide one-on-one counseling for women in an **m2m**-designated space in the health facility on a daily basis. Mentor mothers also make daily visits to the labor and delivery wards to speak with expecting mothers who may be inpatients or newly delivered mothers who are awaiting discharge. **m2m** also conducts regular support group meetings within the clinic and provides nutritious lunches to the women who visit the site. Individual counseling and support group sessions address the PMTCT and self-care topics covered in the comprehensive two week training that mentor mothers receive from the program.

Community outreach

Mentor mothers and site coordinators also visit women at home to assist with disclosure, support women in their choice of an exclusive infant feeding method¹, promote safer sex and family planning, and encourage mothers to return for wellness HIV care or ART and to bring their baby back for HIV testing and care.

m2m in the Study Sites

m2m provides services in 17 sites in KwaZulu-Natal. HIV prevalence among pregnant women in KwaZulu-Natal, South Africa's most populous province, is approximately 39 percent, the highest in the country (Department of Health, Republic of South Africa 2005). PMTCT services are offered through government-supported health facilities, which provide rapid HIV testing at the first prenatal care visit, Nevirapine for women in labor and Nevirapine syrup for infants after delivery, and infant testing for HIV at six weeks of age using HIV DNA PCR tests.

Among the 17 **m2m** sites in KwaZulu-Natal, ten are in Pietermaritzburg, the province's second largest city (estimated population: 350,000–500,000). The Pietermaritzburg sites are funded by a President's Emergency Plan for AIDS Relief (PEPFAR) grant administered through the Elizabeth Glaser Pediatric AIDS Foundation (EGPAF). Three of these sites were selected for the evaluation: Edendale Hospital, a tertiary care hospital in central Pietermaritzburg; Imbalenhle Community Health Center (CHC), a multi-

¹In accordance with the WHO recommendations, **m2m** does not advocate either breast or formula feeding but rather educates women about the importance of selecting an exclusive feeding method, ideally during pregnancy, and then supports women's decisions and helps them maintain their choice post-delivery.

disciplinary health center in a peri-urban area close to Edendale Hospital; and Mpophomeni Clinic, a primary care clinic close to Pietermaritzburg. Each facility provides basic ANC and delivery services, though few deliveries are done at Mpophomeni Clinic—most women who arrive in labor are referred to Imbalenhle CHC and Edendale Hospital.

Each facility provides general adult and pediatric medical services with an emphasis on primary care and preventive services at Mpophomeni; primary and secondary care, preventive, and curative services at Imbalenhle CHC; and tertiary care curative services at Edendale Hospital. Comprehensive HIV care, including ART programs, was introduced at each facility during the course of the evaluation.

m2m has dedicated program space in Edendale Hospital where women can meet both individually and in groups. Space constraints have been a challenge at Imbalenhle CHC, where individual meetings take place in ad hoc spaces and group sessions are held in an X-ray file room. At Mpophomeni Clinic **m2m** first used an open courtyard which was suitable during good weather but lacked privacy; the nurses' tea room, which was available except during the nurses' tea time, and the postpartum ward beds, which were rarely occupied by patients, were also used. Toward the end of the evaluation a parkhome (mobile home) was erected for PMTCT services and **m2m** was given dedicated space for its program.

At each facility **m2m** provides service five days per week to women attending ANC, to women in the postpartum wards, and when mothers return to the facility after delivery for self care and baby care. During the evaluation, there were six **m2m** program staff at Edendale and Imbalenhle, and five at Mpophomeni.

Site coordinators and mentor mothers are present throughout the clinic day engaging women in individual and group sessions. A hot or cold meal, prepared by the site coordinator and mentor mothers at each site, is served to all mothers attending **m2m** services each day. **m2m** staff are also available to go home with a mother who requests support for disclosure to a partner and/or other family members.

Methods

Research Question and Study Design

The central research question of the evaluation was, “Does **m2m** increase HIV-positive women’s utilization of key PMTCT services, and improve their psychosocial well-being and PMTCT knowledge and behaviors?” The research team used a quasi-experimental design to answer this question. Using a structured survey, the research team collected baseline data from a cross-section of pregnant and postpartum women attending ANC/MCH services prior to the introduction of the **m2m** program in the three sites (September–November 2005) and from a second cross-sectional sample of pregnant and postpartum women after the program was in place for approximately one year (August–October 2006) at Edendale Hospital, Imbalenhle CHC, and Mpophomeni Clinic.

To determine the effects of the program, the investigators compared data from baseline to follow-up among pregnant and post-partum women and between participants and non-participants in the program at follow-up for the following indicators:

- PMTCT knowledge
- Disclosure of HIV status
- Receipt and ingestion of Nevirapine
- Infant feeding intentions and practices
- Family planning intentions and practices
- Referral and follow-up for care
- Psychosocial well-being

The study hypothesized that women who participated in the **m2m** program, and thus received additional psychosocial support from peers, would have higher levels of knowledge and psychosocial wellbeing, and higher rates of disclosure, family planning use, appropriate infant feeding practices, and follow up care.

Eligibility, Recruitment, and Data Collection Procedures

Women were eligible for the study if they were between the ages of 18 and 49 years (inclusive) and they knew their HIV status. To participate in the study, pregnant women had to be between 6 and 9 months gestation. For new mothers, the eligibility criteria were slightly different at baseline (1–12 weeks postpartum) than at follow up (4–12 weeks postpartum). Clinic providers identified women who might qualify for the evaluation, briefly introduced the study to them, and referred them to the interviewers, who provided more information about the study.

Although the main focus of the study was on HIV-positive women since they were the intended beneficiaries of the **m2m** program, a small number of HIV-negative women were also interviewed so that the study would not compromise the confidentiality of women’s HIV status by only enrolling HIV-positive women. Data from the HIV-negative women are reported separately.

Study sample

The sample size of HIV-positive women was determined to detect a 15 percentage point difference between baseline and follow-up at a 5 percent significance level for the following key indicators of program impact: exclusive breastfeeding at six weeks and disclosure of HIV results to partner. Because the study design also called for comparing program participants and non-participants, the follow-up sample size was doubled in order to have statistical power to make similar comparisons in key indicators.

At baseline, 10 percent of the women approached were not eligible because they did not know their HIV status. The refusal rate among those who were eligible to participate was 6 percent. At follow-up, 1 percent of the individuals approached were not eligible because of unknown HIV status. The refusal rate among those who were eligible to participate was 3 percent.

Due to slight delays in obtaining the necessary approvals for conducting the research activities at the sites, and the need to start program activities, there was some overlap of baseline data collection with intervention activities. Therefore, a question about program exposure was included in the baseline questionnaire, and 18 HIV-positive pregnant and 46 HIV-positive postpartum women who reported interacting with the program were removed from the baseline sample. Table 1 summarizes the total number of HIV-positive pregnant and post-partum women interviewed at baseline and at follow-up that were used for analysis.

Table 1 Baseline and follow-up sample sizes

	Baseline (n)	Follow-up (n)
HIV-positive pregnant women	183	345
HIV-positive postpartum women	178	350

Development of evaluation instruments and training of interviewers

The principal investigators from the Horizons Program and Health Systems Trust jointly developed the evaluation protocol and instruments. Staff from **m2m** reviewed the protocol and instruments.

Health Systems Trust translated the questionnaire into Zulu and back translated it into English. The questionnaire was pre-tested to ensure that the study population understood the questions and that culturally appropriate phrases were used.

Health Systems Trust recruited university graduates with previous work experience to be interviewers. All of the interviewers were female because it was deemed culturally appropriate to have only women in the health facilities conducting the interviews with female respondents. The interviewers completed two weeks of training prior to each round of data collection. Staff from the Horizons Program and Health Systems Trust jointly conducted the interviewer training. The training covered the importance of following ethical guidelines, the content of the questionnaire, and how to use handheld computers for data collection.

Participants' responses were captured electronically using Perseus MobileSurvey software operating on a Dell Azim x51 handheld computer. This programming allowed for all of the questionnaire's skip patterns and range checks to execute automatically during the interview, which greatly facilitated the appropriate flow through the questionnaire and speedy recording of responses by the interviewers. If questions required any length of free text entry, it was entered using the onscreen keyboard. The use of handheld computers for recording the survey responses decreased interview time with respect to paper instruments and eliminated the need for data entry. On a daily basis, after the interviews were completed, the data manager uploaded the data to a desktop computer then converted the data to SPSS for quality control, management, analysis, and storage. Backup files were encrypted and emailed offsite nightly to the research team, who were the only ones who had access to the data.

Ethical procedures

The evaluation protocol was approved by the Population Council's IRB, USAID, and the University of Stellenbosch in South Africa. The Horizons Program obtained ethical approval in the United States, while Health Systems Trust obtained in-country approval. The study's interviewers were trained on the importance of following ethical guidelines, including maintaining confidentiality. Written informed consent was obtained from all women who were interviewed. Participants were compensated 40 Rand (approximately \$6 US dollars) in recognition of costs such as travel, child care, and other expenses associated with participation in the study. Interviews were conducted at the clinics in a private space. Participants were not asked to give their names except to sign the written informed consent form. These forms were stored in a locked office, and kept separately from the data, which were in an electronic format.

Data analysis

The study examined how PMTCT knowledge and behaviors, and uptake of services changed over time (baseline to follow-up) and differed based on whether or not women participated in **m2m** activities. The **m2m** program considered a minimum of two contacts between a mentor mother and an antenatal or postpartum client to be programmatically meaningful; therefore, study respondents were considered program participants if they spoke with a mentor mother two or more times. The definition of a contact was broad; a contact could occur either before or after delivery, and could involve participation in a one-on-one interaction or a group session.

At follow-up, 42 percent of the 345 pregnant women and 49 percent of the 350 postpartum women interviewed were considered program participants. For each of the key outcomes, the research team compared program participants to women who had no contact with the program. For clarity in presenting the study results and for understanding the potential impact of the program, data from women who had only one contact (16 percent of pregnant women and 9 percent of postpartum women) were removed from the analyses.

SPSS (v12.0.2) and STATA (v9.2) were used process the data. Frequencies and means were used to describe the population and cross tabulations were used for bivariate analysis. As appropriate, the following statistical tests were conducted to compare differences between groups: chi-square, t test, fisher's exact test, and two-sample test of proportions. After reviewing the bivariate results, multivariate analyses were conducted to explore the relationship between program participation and the following

outcomes: disclosure of HIV status, Nevirapine intake by women, receipt of infant dose of Nevirapine, infant feeding practice, contraceptive use, and CD4 test taken during last pregnancy (see Appendix 1).

The variables selected for inclusion in the multivariate model were determined by conducting a literature review of factors associated with uptake of PMTCT services as well as results of the analyses of the key significant bivariate relationships between program exposure and program outcomes. The multivariate model controlled for age, existence of partner², education, employment, number of live births (proxy for a previous pregnancy), number of ANC visits, and study site. The same model was used for each of the outcomes.

In addition to assessing differences between program participants and non-participants, the study explored whether changes occurred from baseline to follow-up. This included examining data regardless of program participation from the cross section at baseline and the cross section at follow up. These data can be interpreted as a diffusion effect to see whether the changes sought by the introduction of the **m2m** program are measurable at the site level. Such changes could occur because of temporal changes related to other HIV-related initiatives or activities in the study sites or **m2m** program impact at the site level.

For these analyses (multivariate and baseline to follow-up), only the results from postpartum women are presented. By this time, women had already completed their pregnancy and had the opportunity to go through the various steps to reduce vertical transmission during pregnancy and also to begin carrying out recommended health practices after delivery. This analysis allows for the documentation of practice rather than intention.

Sociodemographic Profile of Respondents

The sociodemographic profile of pregnant and postpartum women interviewed at follow-up who had no contact with the program was very similar to those who had two or more contacts. Overall, more than half of the women interviewed had a partner or husband. The mean age was in the late twenties. On average, pregnant women were in their seventh month of gestation and had one child, while postpartum women were two months past delivery and had two children. Most women had at least some secondary schooling; more than half reported no income. The vast majority used electricity for cooking, and access to clean water was nearly universal. Pregnant women who participated in the **m2m** program were somewhat younger and better educated than those who did not participate (Table 2).

Among HIV-positive postpartum women, the sociodemographic characteristics of those interviewed at baseline and those interviewed at follow-up were similar on some measures and different on others. At both rounds of data collection, the mean age was about 27, the mean number of living children was two, and women were, on average, in their second month post delivery. Access to clean water was nearly universal, with almost all women reporting access to a tap. The sociodemographic differences that were both statistically significant and programmatically important are as follows: women interviewed at follow-up had higher levels of education, were more likely to be employed, and a greater proportion had electricity in the household for cooking compared to women interviewed at baseline (Table 3).

²Only for postpartum 0 vs. 2 contacts comparison

Table 2 Sociodemographic comparison of non-participants with program participants

	Pregnant women: 0 contact (n = 143)	Pregnant women: 2 or more contacts (n = 146)	Postpartum women: 0 contact (n = 147)	Postpartum women: 2 or more contacts (n = 173)
Marital status				
Single/never married	43%	45%	37%	45%
Partner/husband	56%	53%	62%	54%
Separated or widowed	1%	3% [†]	1%	1%
Mean age	28.1	26.1**	26.8	27.6
Mean number of living children	1.0	1.0	1.8	1.9
Mean number of months gestation	7.6	7.6	N/A	N/A
Mean number of weeks postpartum	N/A	N/A	8.1	8.6
Education: at least some secondary	77%	87%*	83%	87%
Unemployed	55%	64%	60%	57%
Access to clean water: tap for individual house or several households	97%	99%	99%	99%
Fuel for cooking: electric	85%	88%	86%	90%

* p < .05

** p < .01

[†]The total does not add up to 100 percent due to rounding.

NA = Not applicable

Table 3 Sociodemographic characteristics of postpartum women: baseline to follow-up comparison

	Postpartum women: Baseline (n = 178)	Postpartum women: Follow-up (n = 350)
Mean age	26.8	27.2
Mean number of living children	2.0	1.9
Mean number of weeks postpartum	5.5 [§]	8.3 [§]
Education: at least some secondary	80%	87%*
Unemployed	70%	58%*
Access to clean water: tap for individual house or several households	96%	99%*
Fuel for cooking: electric	74%	88%**

* p < .05

** p < .01

[§]The eligibility criteria were slightly different for postpartum women interviewed at baseline (1–12 weeks postpartum) compared to those interviewed at follow-up (4–12 weeks postpartum)

The study took place within the context of a relatively strong health care infrastructure. Baseline findings revealed that most women had already established contact with ANC/MCH services. Overall, there was regular ANC attendance, nearly universal rates of delivery at a health facility, and very high levels of HIV testing among the study population. Most of the women interviewed at baseline were newly diagnosed as HIV-positive, having learned their status either during this pregnancy for pregnant women, or their last pregnancy for postpartum women.

Results

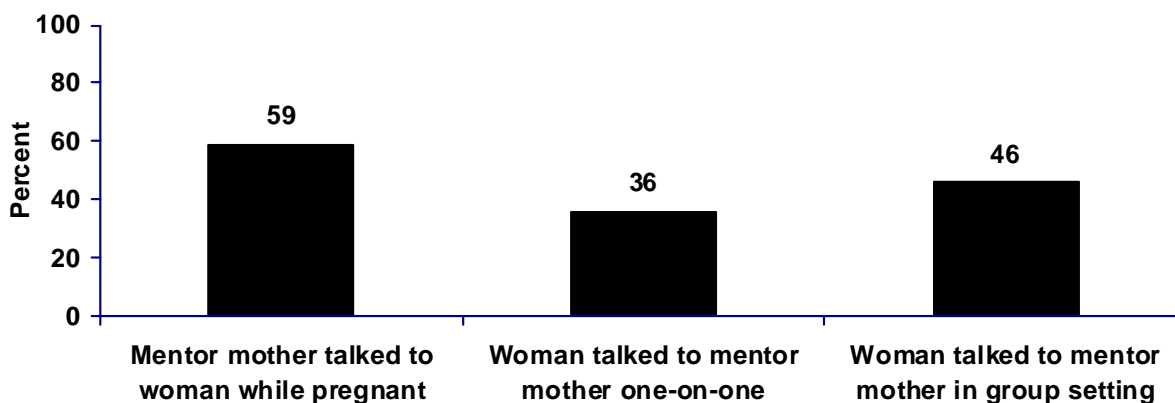
Coverage

m2m achieved substantial coverage at the three evaluation sites with high rates of program participation by both pregnant and postpartum women.

Awareness of the program was high among respondents from the three study sites. Two-thirds of HIV-positive women interviewed (n = 695) at follow-up reported that they had heard about a program called “**mothers2mothers**.” Seven out of 10 women reported that they had met an individual wearing a “**mothers2mothers**” T-shirt.

Beyond building program recognition, **m2m** staff made a substantial number of contacts among both pregnant and postpartum HIV-positive women. Among the 345 HIV-positive pregnant women who were interviewed at follow-up, 6 out of 10 women reported that a mentor mother had talked to them. For those who reported this type of contact, the median number of reported contacts was two (range 1–22)³. More than a third of all HIV-positive pregnant women interviewed indicated that they talked to a mentor mother one-on-one while nearly half participated in a group session held at the clinic (Figure 1).

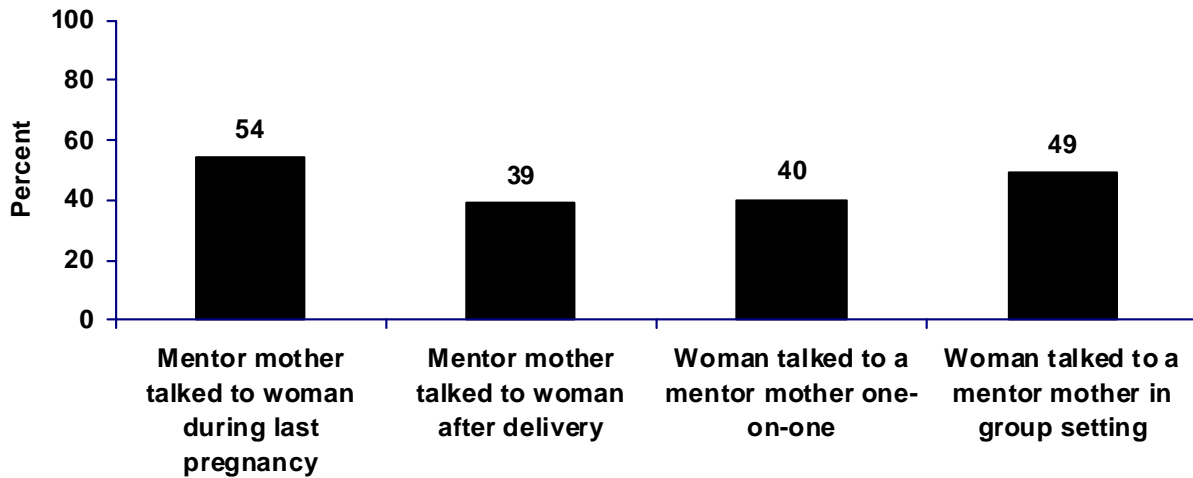
Figure 1 Participation rates among HIV-positive pregnant women



For HIV-positive postpartum women (n = 350), 54 percent reported that a mentor mother spoke to them during their most recent pregnancy, and 39 percent reported that this occurred at least once after delivery. Among those who established contact with a mentor mother, the median number of contacts was four during pregnancy (range 1–10) and two after delivery (range 1–15). With respect to the type of interaction, 40 percent of all HIV-positive postpartum women interviewed at follow-up engaged in a one-on-one discussion, and half participated in a group session either during pregnancy or after delivery (Figure 2).

³Since women interviewed were on average in their seventh month of pregnancy, there was potential for more interactions with the program to occur during women’s last trimester of pregnancy.

Figure 2 Participation rates among HIV-positive postpartum women



PMTCT Knowledge

m2m participants had greater knowledge about mother-to-child transmission than non-participants, but most differences were not significant.

Overall, there was greater knowledge about MTCT and its prevention among pregnant and postpartum women who participated in the program. However, most of the differences between program participants and non-participants were not statistically significant. On the whole women had more information about the risk of vertical transmission than about how to prevent it (Table 4).

Table 4 MTCT knowledge among HIV-positive pregnant and postpartum women: Non-participants vs. program participants

	Pregnant women: 0 contact (n = 143) Percent	Pregnant women: 2 or more contacts (n = 146) Percent	Postpartum women: 0 contact (n = 147) Percent	Postpartum women: 2 or more contacts (n = 173) Percent
Pregnant women who are HIV+ transmit HIV to their babies	83	91*	79	86
HIV+ mother can infect her baby with HIV during pregnancy	55	66	57	65
HIV+ mother can infect her baby with HIV during delivery	80	86	77	83
HIV+ mother can infect her baby with HIV during breastfeeding	64	75*	72	82
How can infection be prevented in babies of HIV+ women? Mentioned drugs at antenatal, delivery, or after delivery	64	62	59	60
How can infection be prevented in babies of HIV+ women? Mentioned only give formula or only give breast milk	51	52	50	56

* p < .05

Serostatus Disclosure

Postpartum m2m participants were significantly more likely to have disclosed their status to someone than non-participants, and to have done so prior to delivery.

The study examined disclosure of serostatus among respondents because disclosure may facilitate adherence to PMTCT recommendations, and because it is an explicit goal of m2m to encourage and support women to disclose to at least one person.

Postpartum women who had two or more contacts with m2m were significantly more likely to have disclosed than non-participants (97 percent vs. 85 percent; p < .01). Furthermore, among those who disclosed, program participants were more likely to have disclosed prior to delivery than non-participants (91 percent vs. 81 percent; p < .05). Finally, program participants reported disclosure to more people than non-participants (median of 3 vs. 2).

However, among pregnant women there were similarly high rates of disclosure between women who had two or more contacts with the program in comparison to those who had no contact (88 percent vs. 80 percent). Among those who disclosed to someone, participants and non-participants reported having told a median of two people (range 1–25).

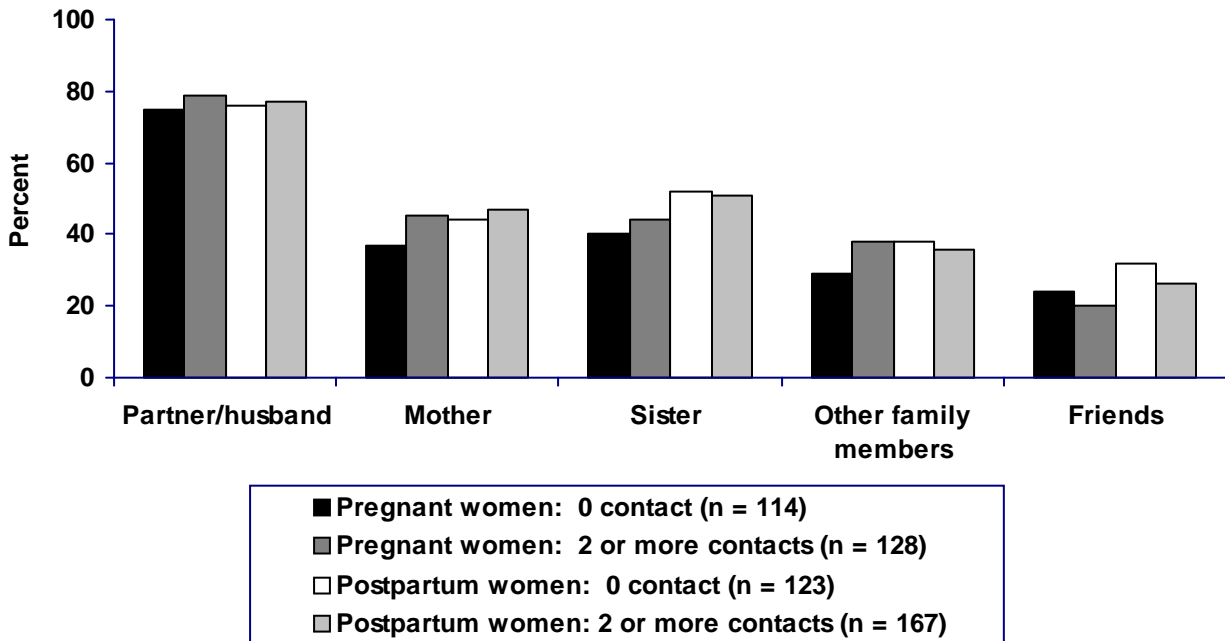
Women were asked, “After you received your test results, were you afraid of disclosing your status?” Nearly 6 out of 10 pregnant and post-partum women (both program participants and non-participants)

responded affirmatively. Despite the fear of telling someone about being diagnosed as HIV-positive, more than 8 out of 10 pregnant women disclosed their serostatus to someone.

Logistic regression analysis was conducted to determine the degree of association between program exposure and disclosure. After having controlled for potential confounders, postpartum program participants were 4.4 times more likely to have disclosed than non-participants (adjusted odds ratio: 4.4; 95 percent CI: 1.6–11.9; $p < .05$). These multivariate results and the nearly universal rate of disclosure among postpartum women who are **m2m** participants suggest that a central goal of the program is being met.

The overall pattern of which individuals to whom HIV-positive women disclosed is broadly similar between program and non-program participants, with partner/husband the most frequently mentioned individual (Figure 3). Consistent with this finding is the fact that more than 8 out of 10 pregnant and postpartum women stated that they had ever discussed the importance of faithfulness with their partner/husband as well as the importance of condom use.

Figure 3 Individuals to whom HIV-positive pregnant and postpartum women disclosed: Non-participants vs. program participants



Receiving Ingestion of Nevirapine

Postpartum program participants were more likely to report receipt and ingestion of Nevirapine, as well as receipt of the infant dose.

Postpartum women were asked if they were taking ARVs for their own health. Approximately 25 percent of women reported that they had accessed ARVs, with no difference between program participants and

non-participants. These data suggest that the study sites are successfully enrolling eligible women for treatment. Among those who were not on ARVs, program participants were significantly more likely to have received a prophylactic drug to prevent MTCT and to have ingested the drug in comparison to women who did not participate in the program. Finally, program participants were significantly more likely to report that they had received the infant dose within three days (Table 5).

Table 5 Nevirapine receipt for postpartum women and infants: Non-participants vs. program participants

	Postpartum women: 0 contact (n = 111) Percent	Postpartum women: 2 or more contacts (n = 125) Percent
Provided with a drug to prevent MTCT	86*	95*
Drug taken by woman	83**	93**
	(n = 147)	(n = 173)
Received infant dose of Nevirapine within 3 days of delivery	78*	88*

* p < .05
** p < .01

In the multivariate analysis, program participants were nearly two times more likely to have taken a prophylactic drug (adjusted odds ratio: 1.9; 95 percent CI: 0.7–5.1) and received the infant dose (adjusted odds ratio: 1.9; 95 percent CI: 1.0–3.7) than non-participants, although these differences were not statistically significant.

With regard to pregnant women, nearly two-thirds reported that they had received Nevirapine, but there was no statistically significant difference between program participants and non-participants. However, among those who received it, program participants were significantly more likely to be able to state the correct name of the drug (Table 6).

Table 6 Nevirapine receipt and knowledge among pregnant women: Non-participants vs. program participants

	Pregnant women: 0 contact (n = 143) Percent	Pregnant women: 2 or more contacts (n = 146) Percent
Provided with a drug to prevent MTCT	59	63
	(n = 85)	(n = 92)
Woman able to state correct name of drug	88	97*

* p < .05

Infant Feeding

Postpartum program participants were more likely to report practicing an exclusive method of feeding, with most feeding their child infant formula without giving breast milk.

The evaluation examined infant feeding intentions (two months post-delivery) among pregnant women and practice among postpartum women who were 4-12 weeks postpartum. The data were analyzed to explore rates of an exclusive method of feeding recommended by international guidelines (WHO 2006c). Program participants (both pregnant and postpartum) were significantly more likely to state that they were intending to give or actually had given only infant formula to their baby. Among pregnant women, the intention to breastfeed exclusively was significantly less among program participants than among non-participants. However, postpartum **m2m** participants were significantly more likely to report practicing an exclusive method of feeding than non-participants (Table 7).

Table 7 Exclusive method of infant feeding: Intentions among pregnant and practice among postpartum women; non-participants vs. participants

	Pregnant women: 0 contact (n = 143) Percent	Pregnant women: 2 or more contacts (n = 146) Percent	Postpartum women: 0 contact (n = 147) Percent	Postpartum women: 2 or more contacts (n = 173) Percent
Infant formula but no breast milk	60	73*	61	78**
Exclusive breastfeeding	27	17*	15	11
Exclusive method of feeding (total of above)	87	90	76	89**

* p < .05

** p < .01

In light of the bivariate results indicating that postpartum program participants were more likely to report infant formula but no breast milk, logistic regression analysis was conducted to determine the degree of association after controlling for potential confounders. The multivariate model demonstrated that postpartum program participants were 2.4 times more likely to report having given infant formula but no breast milk (2.4; 95 percent CI: 1.4–4.1; p < .05).

These results of reported greater adherence to recommended feeding practices are supported by postpartum program participants being more likely to have decided on a feeding method before delivery than non-participants (87 percent vs. 71 percent, p < .01). Among those who decided on a feeding method before delivery, 9 out of 10 postpartum women (both program participants and non-participants) indicated that they were feeding their infant using the method they had previously selected, suggesting that in this study population almost all women are able to execute their plans if they make a decision prior to delivery. This may be facilitated by the context of low stigma around formula feeding in the study communities. Among postpartum women who were giving infant formula, women were asked, “Have you ever put your baby to your breast so that someone around you would not suspect you are HIV-positive?” Only about 15 percent of women regardless of program exposure responded affirmatively.

Contraception

The vast majority of postpartum program participants reported using contraception, and injection was the most commonly mentioned method.

Because the prevention of unintended pregnancy among HIV-positive women is a key strategy to reduce vertical transmission (UNFPA 2004; WHO 2004), and since birth spacing is a public health recommendation for all women regardless of HIV status (WHO 2006a), the study explored family planning intention and practice.

About 9 out of 10 pregnant women regardless of program participation reported intending to use family planning after the infant was born. Moreover, nearly 8 out of 10 pregnant women (no difference by program participation) intended to begin family planning within the first month after delivery versus a later time frame.

Women who were 4–12 weeks postpartum were asked whether they were using contraception. A minority of women interviewed (23 percent of program participants and 18 percent of non-participants) had resumed sexual activity since the birth of the infant. In the bivariate analysis, postpartum program participants were significantly more likely to report using contraception than non-participants (70 percent vs. 58 percent, $p < .05$). The multivariate model also showed greater use of contraception among program participants, though this finding did not quite reach statistical significance (adjusted odds ratio: 1.6; 95 percent CI: 0.9–2.6).

CD4 Testing

Postpartum program participants reported substantially higher rates of having a CD4 test during their last pregnancy and knowing their CD4 count.

The most recent WHO recommendations for PMTCT include the importance of eligible women accessing ARV treatment during pregnancy both for their own health as well as for a more effective means of preventing vertical transmission (WHO 2006b).

For pregnant women, there was no difference between participants and non-participants with respect to CD4 testing and knowledge of their CD4 count among those who tested, with roughly two-thirds answering affirmatively to these questions (Table 8). It is understandable that there were no differences given that women were just beginning to participate in **m2m** activities and that the first type of support given by the program is focused on helping women to accept their HIV status, followed by information and support around adherence to the medical recommendations to decrease vertical transmission.

Postpartum program participants had more exposure to the program, with a median of four contacts during pregnancy compared to two contacts reported by the sample of pregnant women. As shown in Table 8, there was a significant difference between postpartum program participants and non-participants regarding CD4 testing during their last pregnancy (79 percent vs. 57 percent, $p < .01$). Logistic regression analysis further supported the relationship between program exposure and CD4 testing, as postpartum program participants were 3.3 times more likely to have undergone CD4 testing during their last pregnancy compared to non-participants (adjusted odds ratio: 3.3; 95 percent CI 1.9–5.9; $p < .01$).

Moreover, among those who had a CD4 test, bivariate results demonstrated that postpartum program participants were more likely to know their CD4 count (Table 8). These results suggest that **m2m** may be filling a gap by helping women to follow medical recommendations.

Table 8 CD4 testing among pregnant and post-partum women: Non-participants vs. program participants

	Pregnant women: 0 contact (n = 143) Percent	Pregnant women: 2 or more contacts (n = 146) Percent	Postpartum women: 0 contact (n = 147) Percent	Postpartum women: 2 or more contacts (n = 173) Percent
CD4 test taken during pregnancy	66 (n = 95)	69 (n = 101)	57** (n = 83)	79** (n = 136)
Knew CD4 count among those who tested	62	67	72**	88**

** p < .01

Psychosocial Well-being

Program participants report significantly greater psychosocial well-being than their counterparts on several measures.

The study explored women’s psychosocial well-being by asking them to respond to a series of statements about how they were feeling in the last two weeks. Table 9 shows the percentage of women who reported the feeling most of the time or sometimes in the past two weeks versus once in a while or never. Pregnant women who participated in the program felt better than non-participants with respect to positive statements around agency. More than 9 out of 10 pregnant program participants felt that they could do things to help themselves, cope with taking care of their infants, and live positively. On the other hand fewer postpartum program participants reported having negative feelings compared to non-participants, such as feeling alone in the world, overwhelmed by problems, and hopeless about the future.

Table 9 Psychosocial well-being: Non-participants vs. participants

Had this feeling most of the time or sometimes in the past two weeks	Pregnant women: 0 contact (n = 143) Percent	Pregnant women: 2 or more contacts (n = 146) Percent	Postpartum women: 0 contact (n = 147) Percent	Postpartum women: 2 or more contacts (n = 173) Percent
Felt alone in the world	36	40	49*	36*
Felt overwhelmed by problems	61	62	67*	55*
Felt hopeless about future	50	46	65*	53*
Felt could do things to help oneself	80**	92**	91	89
Felt could cope with taking care of baby	85*	93*	89	90
Felt could live positively	80**	93**	87	87

* p < .05

** p < .01

Changes from Baseline to Follow-up

There were also positive changes among postpartum women from baseline to follow-up on some measures.

Table 10 summarizes and compares the findings among postpartum respondents by program participation and from baseline to follow-up. Most findings were in the same direction, including knowledge, disclosure, receipt of infant dose of Nevirapine, exclusive use of infant formula, CD4 testing, and women’s knowledge of their CD4 count among those who tested.

But there were a few measures where the changes were not consistent by program participation and over time. For example, while program participants were significantly more likely to be using contraception, this finding did not hold when analyzing the responses from baseline to follow-up. This is not surprising because family planning programs have been in place for a long time in South Africa and have generally not been an emphasis of traditional PMTCT services.

Another notable difference was that while program participants reported having less negative feelings about their own lives compared to non-participants, there was no change in these measures of psychosocial well-being between the two rounds of data collection. Given that only program participants received psychosocial support, changes were not expected in the entire study population.

The findings that were consistent across both analyses are more robust than those found in only one analysis.

Table 10 Summary of results for postpartum women by program participation and baseline to follow-up

	Non-participants (n = 147) vs. Program participants (n = 173)	Baseline (n = 178) vs. Follow up (n = 350)
Knowledge about MTCT and its prevention	0	0
Disclosed to at least one person	+	+
Nevirapine ingestion	+	Not available
Infant dose receipt	+	+
Infant feeding practice:		
Formula, no breast milk	+	+
Exclusive breast milk	0	-
Exclusive method of feeding	+	0
Using family planning	+	0
Referral and follow up for care		
CD4 tested during pregnancy	+	+
Women knew count among those tested	+	+
Sought treatment among those who knew count and eligible	0	+
Psychosocial well-being		
Felt alone in the world	+	-
Felt overwhelmed by problems	+	0
Felt hopeless about future	+	0
Felt could do things to help oneself	0	+
Felt could cope with taking care of baby	0	0
Felt could live positively	0	0

Key: + statistically significant difference in expected direction
 0 no statistically significant difference
 - statistically significant difference not in expected direction

After reviewing the bivariate results with regard to changes over time, logistic regression analysis was carried out to ascertain if the relationships held within the multivariate model, particularly because there were some differences in the sociodemographic profiles between the baseline and follow-up samples. The multivariate model included the following variables: age, education, employment, number of live births, number of antenatal care visits, and site. Key outcomes such as disclosure, giving infant formula but no breast milk, receipt of infant dose of Nevirapine, and CD4 count tested during pregnancy held within the multivariate model, demonstrating a significant difference between baseline and follow-up after controlling for these variables.

While the implementation of the **m2m** program was a very important intervention at the site level, as in all real world scenarios, there may be additional possible factors that contributed to the changes among respondents from baseline to follow-up. In general there was greater emphasis on ARVs at the study sites during the course of the evaluation. For example, Edendale Hospital benefited from technical and financial assistance provided by the Elizabeth Glaser Pediatric AIDS Foundation, which included for instance, supporting additional providers.

Conclusions and Recommendations

The findings suggest that **m2m** plays an important role in providing a continuum of care for HIV-positive women and their infants. The program strives to keep women linked to health facilities, which is especially important after delivery since that is an identified weakness of traditional PMTCT services, where there are no established systems to follow up women and their infants. This evaluation found that there was an association between participation in the program and greater psychosocial well-being, increased uptake of PMTCT services, and more positive PMTCT behaviors, particularly among postpartum women. The fact that a greater number of positive outcomes were found within postpartum women is understandable given that they had more contacts with **m2m** staff than pregnant women, and also had more time to come to terms with being HIV-positive and take steps to protect their health as well as the health of their infants. This suggests that there is a dose effect and more contacts and time with the program may lead to greater impact.

The findings of significant differences on several important variables between postpartum program participants and non-participants are strengthened by the accompanying improvements among postpartum women between baseline and follow-up. These results suggest that **m2m** may also be contributing to changes at the site level.

With respect to MTCT knowledge, program participants were not more likely to have greater knowledge than non-participants, and there are still important information gaps among respondents. Given that HIV-positive women should be fully informed about MTCT and its prevention, and that this knowledge may motivate women to adhere more closely to medical recommendations, **m2m** should do more to ensure that program participants receive and retain information.

The study found high disclosure rates at baseline; nonetheless program participants reported even higher rates of disclosure than non-participants. The vast majority of HIV-positive women disclosed to someone, and shared their status most often with their partner/husband. The disclosure rates from this study are higher than those reported from a synthesis of studies, which found that women testing in ANC as part of nascent PMTCT programs reported lower rates of disclosure than at free-standing VCT centers (Medley et al. 2004). This suggests that disclosure is now more common than what had been reported during the beginning stages of PMTCT programs and that the way individuals have responded to the epidemic has changed over time. The findings from this study likely reflect that in the facilities—and likely in the study communities—counseling and testing for HIV has become routine and normalized in ANC.

The finding that postpartum program participants disclosed to more individuals than non-participants underlies the importance of considering disclosure of HIV status as an ongoing process (Varga, Sherman, and Jones 2006). This suggests that with more time and greater comfort with one's HIV status, which is an important psychosocial support provided by **m2m**, women may be increasingly open about their HIV status. Increased rates of disclosure may in turn facilitate other positive behaviors around HIV and AIDS, such as adherence to ARV prophylaxis and treatment, and an exclusive method of infant feeding.

In two important areas, receipt and ingestion of short course antiretroviral prophylaxis and exclusive infant feeding practice, postpartum program participants were more likely to adhere to PMTCT program recommendations than non-participants. These findings suggest that the program contributes to helping women to reduce vertical transmission through ensuring receipt of necessary drugs and maintaining an exclusive method of infant feeding.

With respect to infant feeding, services at these sites can build on their success by directing attention toward the women who are practicing mixed feeding and the challenges these women face in maintaining an exclusive feeding method. Infant feeding counseling and postpartum support are important in helping women make appropriate feeding choices and adhere to these choices (Bland et al. 2007; Doherty et al. 2006). The continuation of one-on-one and group sessions provided by the program up to six weeks post-delivery is an optimal opportunity to provide such support.

Continued interaction with women after delivery also enables the program to support HIV-positive women to adopt strategies to prevent unintended pregnancy when considerations of family planning are more relevant. This is in marked contrast to traditional PMTCT services which typically only interact with women while they are pregnant. Family planning information and services are often overlooked in traditional PMTCT programs as most programs are not able to provide a quality continuum of care for HIV-positive women after delivery nor provide adequate services to help HIV-positive women access family planning should they desire it. (Baek and Rutenberg 2005; Rutenberg and Baek 2005).

The greater rates of referral and follow-up around CD4 testing found among program participants and improvements between baseline and follow up data collection are encouraging and demonstrate that necessary protocol changes at sites can be implemented within a short time. Services at these sites can build on this success and work toward ensuring that all HIV-positive women are tested for their CD4 count during pregnancy, and those who are eligible begin ARVs while pregnant.

The significant differences between program participants and non-participants regarding psychosocial well-being suggest that there is a role for programs such as **m2m** in helping women accept what it means to be HIV-positive for themselves and their families.

In terms of limitations, the study used non-randomized samples. The number of sites included in the evaluation and the sample sizes were small, in major part due to cost considerations of conducting research activities in South Africa. Despite positive associations between program participation and key indicators, given the cross-sectional nature of the study, cause and effect cannot be determined. Moreover, this evaluation relied on self-reported data and there were no biological markers such as PCR testing. So while the findings presented in this evaluation are proxy measures for reducing vertical transmission, it would be important to directly assess whether participation in **m2m** contributes to lower HIV transmission rates among infants born to HIV-positive mothers. In addition, the background rates of antenatal care attendance, health facility delivery, HIV testing, and disclosure were high prior to the introduction of **m2m**. It will be important to replicate and expand this study to a sub-Saharan African setting where the infrastructure for ANC/MCH is fundamentally weaker with lower rates of ANC attendance and delivery, and where there are deeper levels of poverty and underdevelopment.

Despite the limitations, the study has a number of strengths. It is the first external evaluation that provides quantitative evidence about the role of the well-known **m2m** program in complementing PMTCT services. The study examined what contribution peer support can make toward improving psychosocial well-being among HIV-positive women, uptake of PMTCT services, and PMTCT knowledge and behaviors. The prospective design took into account temporal changes and reduced recall bias. Data were analyzed in two major ways: both pre-and post-intervention as well as a dose response in terms of program participation. Moreover, the evaluation was conducted in a real world setting rather than a controlled clinical environment, which results in data that are more useful in terms of application for policymakers, program managers, and other key PMTCT stakeholders.

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Appendix 1

Multivariate Regression Methods

To explore associations between knowledge and behaviors measured at pre- and post-intervention and between women who were and were not exposed to the **m2m** program with respect to the study's main outcomes, researchers selected and included a limited number of key variables to control for non-program factors that may have affected program outcomes. They were determined by conducting a literature review of factors associated with uptake of PMTCT services as well as examining the results of the analyses of the key significant bivariate relationships between program exposure and program outcomes. Logistic regression was chosen as it can describe the relationship of exposure to an intervention with a dichotomous outcome while controlling for a number of independent covariates. Logistic regression is based on the logistic function, which ranges between zero and one. It models the probability that the exposure leads to the outcome, one being always associated while zero deems no association. Furthermore, it allows for a variety of formats to be used when quantifying exposure and covariates such as ordinal, nominal, and continuous constructs as well as combinations of these variables to be included in a model. The multivariate model controlled for age, existence of partner, education, employment, number of live births (proxy for a previous pregnancy), number of ANC visits, and study site. The same model was used for each of the outcomes. Log likelihood chi-square and Hosmer and Lemeshow's goodness of fit tests confirmed that this one logistic model adequately fit all outcomes of interest. Muticollinearity was assessed by computing variance inflation factors (an indicator of how much of the inflation of the standard error could be caused by collinearity) for each variable included in the model; none reported a value above our threshold value of 10.

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