Community Based HIV Screening in Pregnant Women and Provision of Prevention of Mother to Child Transmission Care in Rural Zambia

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ABSTRACT

Background: Providing care for pregnancy is compounded by high HIV prevalence in Zambia. Approximately 10% of new HIV infections in children 0-14 years old occur as mother to child transmission (MTCT). Objective: To establish the capacity of the community to screen for HIV in pregnant women with saliva test and provide PMTCT, in a continuum of care. Methods: This study is a sub-set of a community based prospective cluster randomized controlled trial, (RCT) conducted 2008 to 2013. Oraquick, an FDA approved technology uses saliva to screen for HIV1 and HIV2. CBAs were trained, supervised and provided with job aids. Results: From 3846 pregnant women in the RCT, 2018 were screened. Among the 2018, 1089 (45.8%) were screened using Oraquick saliva test. Of the total tested for HIV, 23.8% had Oraquick only testing, 46% routine tests only and 30.2% had both tests done. Of the 1089, 608 participants (55.85%) screened using Oraquick, also had their test results confirmed with routine antibody tests at nearby health centers. The community based agents counselled, screened, dispensed nevirapine and referred appropriately. Eighty two (4%) out of the 2018 women were recorded as HIV positive. These include 47 (5.93%) women tested with Oraquick and 35 who were tested at the health centres using routine HIV testing. Conclusion: CBAs demonstrated that when trained, equiped and supported with incentives, they are able to screen the community for HIV utilizing Oraquick saliva testing and provide PMTCT. They provided increased access to HIV screening and PMTCT services.

Keywords: Community, HIV Screening, Prevention Mother to Child Transmission, Oraquick
1. INTRODUCTION

The estimated HIV seroprevalence in pregnant women aged between 15 and 49 attending antenatal clinics (ANC) in Zambia is 21%, almost 10% higher than males in the same age bracket\(^{(1,2)}\). Zambia has an HIV prevalence of 13.5% among adults aged 15 to 49 years, one of the highest in the world; with approximately 10% of all new HIV infections occurring in children aged 0-14 years old and mainly through mother to child transmission (MTCT)\(^{(3)}\). Though highest in urban areas, prevalence also relatively high in rural and remote areas.

Over 60% of deliveries in Zambia are not attended by trained medical personnel; but are conducted by traditional birth attendants (TBAs). Zambia faces a critical shortage of health personnel particularly in rural areas where over 60% of the population reside. In the absence of preventative prophylaxis, safe birthing practices and breast feeding practices the chance of transmission of HIV is up to 60%. However adequate prevention strategies can reduce risk of transmission to less than 10%\(^{(7)}\).

As a standard of care, pregnant women are screened for HIV during ANC visits\(^{(4)}\). Our Knowledge Attitudes and Practices (KAP)\(^{(5)}\) baseline report demonstrated that over 95% of the women attended at least one ANC during their last pregnancy, with less than 50% receiving routine HIV tests\(^{(6)}\). This represents a missed opportunity for PMTCT and treatment of HIV in the mother and infant.

Out of 1882 health facilities across Zambia (MOH, 2010), 936 facilities (49.7%), were offering the treatment of HIV in the mother and infant. Though highest in urban areas, prevalence also relatively high in rural and remote areas. Barriers to access healthcare in rural areas include geographical distance and lack of services or service providers\(^{(9)}\).

The Zambian Ministry of Health responded by increasing coverage of safe motherhood interventions including PMTCT by utilizing community-based agents (CBAs), mainly community health workers (CHW) and TBAs\(^{(10)}\). In this vein, the World Health Organization, National AIDS Council of Zambia and research by Butlery et al\(^{(10)}\) highly motivate the use of Oraquick in the community by CBAs to alleviate the low access to HIV screening by pregnant women. In some areas, traditional birth attendants already offer preventive health services to pregnant women and their newborns in rural settings\(^{(17)}\).

The objective of our study was to establish the capacity of CBAs in screening pregnant women for HIV and the provision of PMTCT, as part of a continuum of care within the RCT.

2. METHODOLOGY

This study is a sub-set of a community based prospective cluster randomized controlled trial, (RCT), from the intervention arm, conducted 2008 to 2013. Oraquick, an FDA approved technology uses saliva to screen for HIV1 and HIV2. CBAs were trained, provided with kits and supervised to screen for HIV and provide PMTCT to women and newborn infants in intervention sites. The control sites were not equipped. This paper describes findings from intervention sites.

A methodology paper describes in detail of the KAP Baseline and community based cluster randomized interventional trial.

**Study definitions**

Community Based Agents (CBAs): These are community volunteers, selected by community members, to function as TBAs (all female) or CHWs (often male). They are recommended to the Neighbourhood Health Committee (NHC), trained and equipped to provide healthcare within the community and in homes. Community Health Worker (CHW): Male or female volunteers selected by the community, trained and equipped to provide appropriate health interventions to the community in which he or she lives. Traditional Birth Attendant (TBA): Usually a female volunteer, selected by the community, trained and equipped to attend to deliveries and provide perinatal care to the mother, within the community in which she lives.

**Study sites**

Two rural pilot districts, Chongwe in Lusaka Province and Mpongwe on the Copperbelt Province of Zambia, were identified to demonstrate the feasibility of implementing community based newborn care. The two districts had a predominantly rural profile. Access to emergency care was a challenge in the two areas for about 30% of the community. Most participants lived more than one hour from the nearest health center. This fitted well with the study’s objectives for using community based agents to improve women’s access to healthcare during pregnancy.

The basic unit of randomization was the NHC. We sampled health centre catchment areas and from each health centre catchment from which we selected 40 Neighborhood Health Committees (NHCs). In the
absence of official maps, visits to study sites were conducted to identify boundaries and locations of the NHCs in order to ensure that the intervention and control sites did not overlap, thereby avoiding contamination across boundaries. Each NHC provides basic health care to approximately 150 to 200 households (a population of 900 to 1200).20 The study worked with a total of 40 NHCs, 20 in each district, supervised by 10 Rural Health Centres (RHC), 5 in each district. The RHCs offered supervision and distribution of equipment and supplies. The NHC selected CBAs from their communities based on CBAs being resident in the NHC, acceptable to the community and with basic literacy, or access to someone who could assist in recording the data form. The NHCs were represented by 1 to 2 CBAs depending on the size of the population.

Participants
Participants consisted of local rural agrarian pregnant women in the selected NHC, to be tracked during pregnancy to the neonatal period. The participants were aged 12 to 58 years, majority married. The mean age for participants was 26.2 years in both districts. Most respondents attained primary education. The women consisted of dominant and heterogeneous ethnic groups. Chongwe used Nyanja and Soli and Mpongwe, Lamba. Both areas also spoke some Bemba and Tonga. A subset of 2376 pregnant women identified, 2018 were actually screened for HIV. CBAs screened 1089 women.

Data Management and Analysis
CBAs collected the data from the community during visits. The District Health Management Team provided clinical supervisors, the Maternal Child Health focal point and data collectors who are Environmental Health Technicians. They transmit the data to national level for collation. The national team visited study sites monthly. Data collected was entered in EPI software database, cleaned and exported to Statistical package for Social Sciences (SPSS) version 12 and Stata software version 8 for analysis.

Ethical Consideration
The study protocol was approved by the University of Zambia Bio-Medical Research and Ethics Committee, clearance number FWA00000338. Permissions were obtained from the office of the Permanent Secretary Ministry of Health, the Provincial Health Offices Lusaka and Copperbelt Provinces and Chongwe and Mpongwe District Health Management offices to conduct the field trials. NHC groups gave consent. The mothers gave oral consent to the community based agents (CBAs).

Interventions
Training
Training was conducted for trainers and CBAs in both the control and intervention sites. Intervention CBAs were equipped, supervised and retrained every four months, while CBAs in the control sites continued with “business as usual” after the initial training. The CBAs attended a seven day participatory training workshop followed by one month’s attachment at the Rural Health Centres (RHCs) for continued hands on...
training on clinical skills. Further five-day refresher trainings were held every four months in both districts. CBAs received at least two supervisory visits per month from District Clinical Data officers and on job training was provided during supervisory visits to intervention agents. This was reinforced with monthly national supervisory visits during which new challenges were reviewed one on one, or in small group discussions. During training, the CBAs were given critical ANC, perinatal, and newborn care strategies and interventions namely, identifying and tracking pregnant women, screening for HIV, interpreting and recording the results, counseling women spouses or family, based on the test and results, as well as referral to the next level of care. The training sessions on provision of PMTCT included rigorous practical sessions on the use of Oraquick, to test, interpret results and refer clients appropriately.

OraQuick HIV Test
The CBAs were provided with a test stand, developer container test strip and a dried up pack. They were guided to set the test stand on a flat level surface then tear open the foil pouch and ensure all contents are present, especially the desiccant. If not, they had to throw away the packet. They carefully took off the lid of the developer container, gently rocking back and forth, then removed the test strip from the packaging without touching the pad at the end of the strip. They then swabbed the outer gum of the client, by gently wiping completely across the upper and lower gums. The client was then placed the padded end of the strip all into the developer container. The results were read between 20-40 minutes, with the result end facing forward. The test strip and container were then thrown into a bin.

Positive reading denoted the presence of anti-HIV antibodies with two red lines. A negative result had only one red line. A discarded test either had no line at all or only a line on the test item. Health centres used the Determine rapid HIV test on blood serum or plasma stored at 2-30 degrees centigrade.

The CBAs were also trained to administer antiretroviral drugs Niverapine (NVP) and AZT on both mother and baby for PMTCT and at labor, as prescribed by MOH guidelines at the time; that is, a single dose of Nevirapine 200mg at the onset of labor followed by 7 days of AZT/3TC. If the mother had not taken her dose of NVP at the onset of labor or if 48 hours had passed since she last took her NVP she was to receive a second dose.

CBAs were reminded of the sensitive nature of HIV related care, to always practice confidentiality, respect and privacy to all clients.

Ethical Consideration
The study protocol was approved by the University of Zambia Bio-Medical Research and Ethics Committee, Federal Wide Authorization number FWA00000338. Permission was obtained from the office of the Permanent Secretary Ministry of Health and from the Provincial Health Offices in Lusaka and Copperbelt Provinces. Further permission was obtained from Chongwe and Mpongwe District Health Management offices to conduct the field trials.

As the study’s main focus was on interventions on the mother and neonates in the communities, the districts and NHC groups gave permission and consent. The mothers themselves had the option to be entered in the study and gave oral consent to the community based agents (CBAs).

The training also addressed confidentiality and privacy. The issue of male CBAs attending to pregnant women was discussed and resolved in each study district.

3. RESULTS

Screening for HIV
From the 2376 women consenting to be tested, 2018 were actually tested for HIV. Figure 2 shows type of test, with 1537 (64.1%) women having routine antibody HIV tests at the RHC while 1089 (45.8%) were screened by CBAs using Oraquick saliva test, within the communities.

The 1537 women comprised 929 (46%) screened using routine tests only and 608 who had both routine and Oraquick tests. The 1089 women comprised 23.8% (n=481) screened using Oraquick saliva test only, while 30.2% (n=608) were tested using both routine blood tests for HIV (at the RHCs) and Oraquick used within the community (by CBAs).

Oraquick technology was used to detect 53% of the participants that were on preventative prophylaxis; increasing the proportion of participants on PMTCT prophylaxis by 46%.

Results indicate that where Oraquick was available, a larger proportion of participants were screened for HIV in the first and second trimester of pregnancy, 11% vs. 8% for routine screening. CBAs referred participants to the RHC for routine antibody tests for HIV where no Oraquick was available.
Results for the newborn tests are less than mothers screened, with 47 seropositive mothers achieving 30 newborns screened. 14 (47%) were screened using Oraquick, while 12 (40%) were screened routinely by the health facility and 4 (13%) had DBS tests done.

Table 1: Trimester at which testing for HIV was done

<table>
<thead>
<tr>
<th>Trimester</th>
<th>Oraquick Rapid test</th>
<th>Regular HIV Screening</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Trimester</td>
<td>106 (11.2%)</td>
<td>113 (8.8%)</td>
<td>0.033</td>
</tr>
<tr>
<td>Second Trimester</td>
<td>518 (54.7%)</td>
<td>655 (51.1%)</td>
<td>0.006</td>
</tr>
<tr>
<td>Trimester</td>
<td>322 (34%)</td>
<td>512 (40%)</td>
<td>0.038</td>
</tr>
<tr>
<td>Total</td>
<td>946</td>
<td>1280</td>
<td></td>
</tr>
</tbody>
</table>

**Fig. 2: Flow chart showing HIV screening and PMTCT service for pregnant women**

**HIV Serostatus determined by CBAs**

CBAs provided counselling and testing in the community. Of women tested, 1674 had their results recorded (Figure 1). These clients were informed of their results and were either counseled or referred for counselling.
Eighty-two women were HIV positive on both routine and Oraquick tests (4.9%). Forty seven, (57%) were tested with Oraquick only, while 43% (n=35) were tested using both routine and Oraquick tests. Those who tested negative accounted for 87% while 8.1% did not know their status. More pregnant women (99%) knew their HIV status when screened by Oraquick than with regular screening, (97.8%).

**Provision of PMTCT by CBAs**
The CBAs identified 47 more HIV positive mothers, none of whom were on chemoprophylaxis, and initiated 26 (55.3%) on prophylaxis as per current NAC guidelines (300mg AZT twice a day) thereby increasing the proportion of participants on PMTCT prophylaxis by 46%. Furthermore, the CBAs successfully carried out the oral HIV test, read and interpreted the results correctly. No sero-conversions or corrections were reported from the 608 pregnant women that confirmed HIV status with HIV determine at the Health Centers.

CBAs initiated PMTCT services resulted in 45% (n=49) of HIV positive women who receiving PMTCT at onset of labor. Results indicate that more than half, 58% (18/31) of the HIV seropositive women received NVP from CBAs in the community. Formally trained RHC staff gave NVP to 39% (12/31) of the participants.

<table>
<thead>
<tr>
<th>Participants Screened</th>
<th>Routine</th>
<th>Both</th>
<th>Oraquick</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV Positive</td>
<td>35</td>
<td>30</td>
<td>17</td>
<td>82</td>
</tr>
<tr>
<td>Started PMTCT</td>
<td>19</td>
<td>19</td>
<td>7</td>
<td>49</td>
</tr>
<tr>
<td>PMTCT initiated by CBA</td>
<td>3</td>
<td>13</td>
<td>6</td>
<td>22</td>
</tr>
<tr>
<td>Delivered</td>
<td>18</td>
<td>17</td>
<td>11</td>
<td>46</td>
</tr>
<tr>
<td>Delivered at Home</td>
<td>15</td>
<td>14</td>
<td>6</td>
<td>35</td>
</tr>
<tr>
<td>Delivered by trained TBA</td>
<td>5</td>
<td>11</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Took NVP at Onset of Labor</td>
<td>12</td>
<td>14</td>
<td>5</td>
<td>31</td>
</tr>
<tr>
<td>Received NVP from CBA</td>
<td>6</td>
<td>10</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>Received NVP from Health Centre Staff</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Newborns that received NVP</td>
<td>12</td>
<td>14</td>
<td>4</td>
<td>30</td>
</tr>
</tbody>
</table>

CBAs dispensed NVP. A total of 30 (64%) neonates born from HIV positive women received paediatric oral NVP within the recommended period, 0-72 hours of delivery. 40% (n=12) of the newborns received NVP within one hour, 37% (n=11) within 1-24 hours and 27% (n=8) within 24-72 hours. The majority 77% (37/48) of seropositive women delivered at home, and 40% (12/30) were not attended by a skilled birth attendant.

4. **DISCUSSION**
The role of TBA in improving maternal health has been extensively debated, in line with the fifth Millennium Development Goal (MDG 5). There is evidence for the role of Community Health Workers (CHWs) in PMTCT. For example, a recent cluster randomized trial by le Roux IM, et al, found significant overall benefits in the study arm supported by CHWs through home visits compared to standard of care among women living with HIV and among all participants. In addition, the women with HIV in the CHWs intervention arm were more likely to complete tasks to prevent vertical transmission, use one feeding method for 6 months, avoid birth-related medical complications, and had infants with healthy height-for-age measurements\(^3\).

Data on the role of Traditional Birth Attendants in PMTCT is scanty. Samson Kironde and others in a study in Uganda assert that the utilization of traditional birth attendants in those areas where they carry out the bulk of child delivery could be used to further expand the availability of PMTCT\(^6\).

**Screening for HIV**
Screening for HIV is the backbone of prevention of the vertical transmission of HIV from mother to child. For
the PMTCT prophylaxis to be optimally effective and reduce risk of infection, the time at which pregnant women are screened is vital. A report by UNICEF1 indicates that over 90% of pregnant women visit Antenatal Care (ANC) services at least once during their pregnancy. However, out of these only 60% report going to ANC clinics at least four times. Local research in the last three years shows that access to HIV testing by pregnant women during routine antenatal visits at Health Centers is low, ranging between 48.5% and 59%. According to Ngoma et al pregnant women in Mpongwe and Chongwe districts begin ANC late in the second trimester of pregnancy and a small percentage in the third trimester; while some do not attend at all. This represents missed opportunities to start PMTCT prophylaxis early(4).

In this study 65% of participants received facility based HIV test; an increase from 48.5% during the KAP baselines. In the intervention site this was further increased by 8.8%, bringing a total to 2018 (72.9%) pregnant women that received this standard of care. Early screening by CBAs in the community allowed 55.3% of these women to start ART at the health centres and within the community. The screening provided by the CBAs facilitated participants to seek prophylaxis from both CBAs in the community and from health facilities. However, the increase at these sites, may also be attributed to an increase in facilities offering PMTCT services(4).

CBAs successfully screened 1089 women using Oraquick. The use of Oraquick HIV screening has been well documented with high specificity and sensitivity in India, Cameroon and Zambia, by Likoya-Chunda etal15 who reported sensitivity and specificity of 100% and 99.3% respectively in a Zambian hospital setting. There also was a preference for the oral fluid test, 81% over the invasive blood test. Findings of our study indicate that the Oraquick HIV testing technology was accepted by both the community and CBAs. CBAs reported “overwhelming acceptance” and desire of the community to receive oral tests not only by the participants but from their partners as well. All the participants approached accepted to be screened for HIV with Oraquick. Testing in the community transcends barriers such as geographic distance, limited transport, fear of user fees, stigma and the opt-out option that is offered at facility based HIV testing. This technology proved to be simple and reliable enough to be used at first level facilities, thus helping to increase uptake of PMTCT and ART.

Our study demonstrates that screening for HIV among pregnant women in the community is feasible, acceptable and is done earlier in pregnancy using Oraquick.

The rapid nature of the test gives results in less than 15 minutes, allowing CBAs to test and reveal test results during the same home visit. More (47) HIV positive women were detected. Those who did not know their status readily experienced the convenience of immediacy.

Providing PMTCT services

Recognizing the importance of an integrated approach to increasing PMTCT coverage through an effective continuum of care between health facilities and community based services, WHO in its strategic vision has put as one of its key activities, support to countries to strengthen the capacity of community health workers to help deliver PMTCT services(5,6,11).

Although our study showed that integrated care improved Nevirapine coverage of women and infants more than non-integrated care, empirical evidence of the effect of PMTCT programs on maternal health care is scarce, and there is need for further research. There was no resistance to CBAs performing home based HIV testing. According to Walvaren and Weeks 5, acceptance of CBAs within communities is high because they share cultural and health beliefs with the women and have strong ties with the community. Poor integration of PMTCT services into routine care, lack of clarity about health worker roles can create barriers to accessing services post-delivery. The results obtained from the Kwazulu-Natal and Kenya studies showed that nurses and lay counselors disagreed about their roles and responsibilities, particularly in the postnatal period and that although there was high coverage of PMTCT interventions during pregnancy and delivery, follow up of mothers and infants is poor. However, such problems did not arise in our case because both the community and health personnel knew the CBAs and trusted them(5,6,11,12,13,14,16).

5. CONCLUSION

Community based health workers in rural settings, demonstrated the ability to provide care with knowledge and understanding of HIV, for pregnant women. They screened for HIV, using Oraquick saliva test, interpreted results, referred appropriately and or counseled pregnant women with the approval, acceptance and positive participation of the community. They provided PMTCT to the mother and
baby at the appropriate times during pregnancy and delivery. Where necessary, community based agents, should be trained and equipped to provide HIV screening and PMTCT care, as part of the continuum of care for pregnant women.

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