Low Proportion of Women who came knowing their HIV Status at First Antenatal Care Visit, Uganda, 2012-2016: A Descriptive Analysis of Surveillance Data

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BMC Pregnancy and Childbirth  BMC Series

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DOI:
10.21203/rs.2.12401/v1

SUBJECT AREAS
Maternal & Fetal Medicine

KEYWORDS
Antenatal care, HIV Testing, Known HIV Status, Women, Family planning, Uganda
Abstract

Background

HIV testing is the cornerstone for all HIV care and support services, including Prevention of Mother to Child Transmission of HIV (PMTCT). The earlier women of reproductive age know their HIV status, the better informed their reproductive decisions and their infants’ outcomes may be. We analyzed trends in known current HIV status among pregnant women attending their first antenatal care visit (ANC1) in Uganda, 2012-2016.

Methods

We conducted secondary data analysis using District Health Information Software2 data on all pregnant women who came for ANC1 during 2012-2016. Women who brought documentation with them to ANC1 of an HIV test within the previous four weeks or an HIV care card as evidence of being in HIV care were considered as knowing their HIV status in antenatal care clinics. We calculated proportions of women with known current HIV status at ANC1, and described the linear trends both nationally and regionally. We used improved Poisson regression with generalized linear models to test the statistical significance of the trend.

Results

There was no significant difference in the number of women that attended ANC1 visits over the years 2012 to 2016. The proportion of women that came with known HIV status was highest at 6.9% in 2016 and this was an increasing trend (p<0.001). Most of the regions had an increase in trend except the West Nile and Mid-Eastern (p<0.001). The proportion of women that came knowing their HIV positive status at ANC1 is slightly higher than that of women that were newly tested HIV positive at ANC1 in 2015 and 2016.

Conclusion

Although the gap in women that come at ANC1 without knowing their HIV positive status might be reducing, still a large proportion of women who were infected with HIV did not know their status before their ANC1 HIV test, indicating a major public health gap. Therefore, more efforts are still required to achieve full PMTCT. In light of the considerable number that comes not knowing their HIV
positive status at ANC1, we recommend advocacy for early ANC attendance and hence HIV testing so that timely PMTCT interventions can be made.

Introduction

A known HIV status is the cornerstone for HIV prevention, treatment and support services [1, 2] including services for Prevention of Mother to Child Transmission of HIV (PMTCT) [3,4,5]. Prevention of mother-to-child transmission of HIV (PMTCT) is contingent on four pillars that make up the global World Health Organization (WHO) Strategy for PMTCT: 1) Primary prevention of HIV among women of reproductive age which can be achieved through behavioral interventions, 2) Prevention of unintended pregnancies in women who are HIV positive, which relies on meeting the family planning needs of this population group, 3) prevention of mother to child transmission of HIV (PMTCT) through offering antiretroviral therapy (ART) to HIV-infected pregnant women and their babies and 4) care and treatment for the children that turn HIV positive through follow-up of infants born to HIV-infected mothers as well as support to their families [6].

With an HIV prevalence among women of reproductive age of 7.6% in Uganda in 2016 [7], it is critical that HIV testing is emphasized at every possible opportunity in this sub-population group. In Uganda, HIV testing services are offered in facility and community settings, and opt-out HIV testing at first antenatal care (ANC1) visits. The latter are facility-based and focus on provider-initiated testing and counseling [8].

In Uganda, where >95% of women make at least one antenatal care (ANC) visit, the ANC1 visit has been promoted as a critical gateway for PMTCT. At ANC1 visits, all women receive provider-initiated, opt-out HIV counseling and testing [5,9,10]. This measure has been effective in reducing mother-to-child transmission of HIV (MTCT) in Uganda [11,12] with an 86% reduction in the number of new paediatric HIV infections during 2010-2016.

However, there are increasingly lower yields of HIV positive persons at HIV testing facilities and communities. The average HIV positive yield has stagnated at 3.5% among the general population in the HIV testing services program [8]. This may imply that more innovative measures may be needed to increase the yield of HIV positive persons when tests are done. However, it could also be that
Uganda has made strides towards achieving UNAIDS’ first 90, which is ensuring that at least 90% of all people infected with HIV know their status [13] and this may include even the sub population groups such as pregnant women.

We described the trends in the proportion of pregnant women who came to ANC1 with a recent documented HIV test result and therefore known HIV status at ANC1 in Uganda during 2012-2016. We also compared proportions of women that came with known HIV positive status versus newly identified HIV positive status at ANC1.

Methods

Study setting

Uganda is located in East Africa and is composed of 34.6 million people [14]. As of 2018, there were an estimated 9 million women of reproductive age [15]. In 2016, Uganda’s fertility rate was 5.4 children per woman [16].

Among Ugandan adults, the HIV prevalence declined from 7.3% in 2011 [17] to 6.2% in 2016 [7]. In two national surveys conducted 5 years apart, the HIV prevalence was higher among women than men (8.2% versus 6.1%) in 2011 [17] and 7.6% versus 4.7% in 2016 [7]. HIV prevalence is also higher among women living in urban areas (9.8%) than those in rural areas (6.7%) [7].

Administratively, Uganda was divided into 116 districts at the time of the study. These districts were categorized into 10 regions on which HIV programming was and still is based [17]. The HIV prevalence differs in the 10 HIV regions, with Central 1 having the highest prevalence at 8.0% and West Nile having the lowest prevalence at 3.1% [7] (Figure 1).

Study design

We conducted secondary data analysis of ANC1 attendance obtained from the Uganda National Health Management Information System (HMIS). Health facilities collect information on different health variables and summarize them on various standardized HMIS forms. These are submitted to the districts, where the information is entered in the web-based District Health Information Software version 2 (DHIS2) [18]. The DHIS2 is managed by the Ministry of Health and collates data from all health facilities in Uganda.
**Data sources**

Our data source was DHIS2 from the HMIS 105 report. The HMIS 105 report is an integrated monthly health facility report that contains, among other variables, monthly attendance figures for the Maternal and Child Health Services (MCH). The MCH section contains sub-sections on antenatal services including ANC1 attendance and HIV status at ANC1. Starting in 2015, the indicator of ‘pregnant women who knew status before ANC1’ was further revised to also include ‘pregnant women who came with known HIV-positive status’ [18]. Thus the difference between ‘pregnant women who knew status before ANC1’ and ‘pregnant women who came with known HIV-positive status at ANC1’ (KHIV+) were the pregnant women who came with known HIV-negative status at ANC1 (KHIV-). Women who attended ANC1 with documentation of an HIV test result obtained within the past four weeks were considered to have a ‘known HIV status at ANC1’[8]. Women who had an HIV care card or a documented HIV-positive test result from a test done at any point in the past were also considered to have a ‘known HIV status at ANC1’ [8].

We extracted data on total ANC1 attendance and pregnant women who knew their HIV status at ANC1 for all 116 districts in Uganda during 2012-2016. For KHIV+, we could only extract data for 2015 and 2016 for the reason above. We also extracted data on pregnant women who newly tested HIV-positive for the first time at the time of their ANC1 visit during 2015 and 2016.

**Data management and statistical analysis**

We used Microsoft Excel, Epi info, and STATA version 14 for analyses. Prior to analysis, we categorized the districts into the 10 regions used for HIV programming in Uganda, adapted from the AIDS Indicator Survey of 2010-2011 (Figure 1) [17]. We used frequencies and proportions to report sample characteristics at national level. We calculated proportions of women with known HIV status at ANC1 at national and regional levels and used line graphs to describe the trend of known HIV status at ANC1 for the period 2012-2016.

We determined the annual incidence of women with known HIV status by calculating the proportion of women that came with known HIV status at ANC1 of the total ANC1 attendance for that year. To determine the significance of the trends, we used the improved Poisson regression with generalized
linear models, with known HIV status at ANC1 as the outcome of interest and year as the independent variable. We interpreted the resulting incident rate ratio (IRR) as the average change in the proportion of women who came with a known HIV status at ANC1 and used the 95% confidence interval to ascertain significance.

We also calculated proportions of women with KHIV+ at national and regional levels and compared these for 2015 and 2016. However, we could not describe their trends because of the very short time frame of available data of only two years.

We calculated and compared the proportions of pregnant women that tested HIV-positive for the first time at their current pregnancy at national level for 2015-2016. This was for comparability with KHIV+ in the two years.

Results

Population characteristics

There was no significant difference in the number of women that attended ANC1 visits over the years 2012 to 2016. The proportion of women that came with known HIV status was highest at 6.9% in 2016. The proportion of KHIV+ is slightly higher than that of women that were newly tested HIV positive at ANC1 in 2015 and 2016 (Table 1).

National trend of known current HIV status at ANC1

During 2012 to 2016, there was a very slight increase in trend of the proportions of women that came with known HIV status at ANC1 (Figure 2). This proportion increased significantly from 4.4% in 2012 to 6.9% in 2016 (IRR=1.14, 95% CI 1.14-1.14).

Regional trends of known HIV status at ANC1

During 2012 to 2016, the proportions of women that came with known HIV status varied in the different regions and were less than 10% in all the regions except Kampala. Most of the regions had an increase in trend of known HIV status except the West Nile and Mid-Eastern (Figure 3).

Discussion

Overall, although Uganda had a significant increase in the proportion of women who came to ANC1 with known current HIV status during 2012-2016, this increase was small. There was also regional
variation in trends of women coming with known HIV status at ANC1. The proportion of women who came to ANC1 with a known HIV status was low over the years of study, with fewer than 10% of women knowing their current status nationally. The proportion of KHIV+ is slightly higher than that of women that were newly tested HIV positive at ANC1 in 2015 and 2016 nationally.

National surveys show that most Ugandans have been tested for HIV at some point in the past. The 2011 Uganda AIDS Indicator Survey showed that 83% of women and 70% of men had ever been tested and had received the results of their last test [17], and information from the National HIV Testing Services showed that 42-51% of the population aged 15-49 years knew their HIV status in 2016, and that about 60% of these were women [8]. However, for purposes of early identification of all the HIV positive women so as to implement timely PMTCT interventions in Uganda, one is considered to be KHIV- when the documented test was done within four weeks of the visit [18]. This stringent measure of the known HIV negative status at ANC1 is likely to have skewed the overall proportions of women that came with known HIV status at ANC1 towards the unknown. Thus it is possible that more than 5-10% of the women attending ANC1 knew their HIV status, but either did the test outside the required window of time or attended ANC1 without any document verifying their status, and so were considered to be of unknown HIV status.

The proportion of KHIV+ is slightly higher than that of women that were newly tested HIV positive at ANC1 in 2015 and 2016. This could be due to the nationwide progress towards achieving UNAIDS first 90 which is 90% of the HIV-positive persons in a given population knowing their HIV- positive status [13]. In Uganda, between July 2015 and June 2016, 69% of persons living with HIV (PLHIV) knew their (HIV-positive) status [19] and this had increased to 73% between July 2016 and June 2017 [20]. Thus, the nationwide progress possibly also included the women of reproductive age.

However, the yield of those newly testing HIV positive at ANC1 was less than that observed in the general population of 3.5% [8]. This contradicts evidence that a big proportion of new HIV infections in Uganda are among women of reproductive age [7]. However, it is possible that some women do not attend ANC and thus may miss HIV testing. This therefore calls for innovative measures to identify all new HIV positive individuals especially women of reproductive age to achieve elimination of
mother-to-child transmission of HIV (EMTCT).

The variations in trends in proportions of women that come with a known current HIV status at ANC1 regionally may be attributed to the differences in the HIV prevalence in the different regions. The 2016 Uganda Population-based HIV Impact Assessment puts the highest prevalence at 7.7% in South Western region, 6.6% in Kampala and the lowest at 2.8% in West-Nile [7]. This regional variation of prevalence is similar to the one of the 2011 Uganda AIDS Indicator Survey [17]. The fact that the more highly-prevalent regions also had higher proportions of women attending ANC1 with known current HIV status could be because HIV testing campaigns and services are more emphasized in these regions. This is because testing goals are shifting to places/populations with a high yield of HIV-positive persons [8].

**Limitations and strengths**

Our findings should be interpreted with the following limitations. We used DHIS2 data which is aggregate data and so we could not look out for individual effects such as repeat pregnancies in the same woman during the study period. Also, some variables were new and could not be assessed over the whole study. Relatedly, the new variables (data elements) are initially not very accurate because the health workers that often double as data entrants take some time getting accustomed to looking out for and reporting them.

Our estimate of the proportion of women who knew their current HIV status at ANC1 is likely an underestimate due to the documentation required to determine a known HIV status at ANC1. In addition, ANC data in DHIS2 have potential selection biases such as: distribution of public and private ANC services, misrepresentation since not all women attend ANC in DHIS2 reporting facilities and a small proportion opts not to attend professional ANC at all [21,22,23]. Nevertheless, a large proportion of Uganda’s population attends public health facilities [24] and so the results can be generalized to the entire country.

Finally in countries with a mature and generalized HIV epidemic such as Uganda, ANC indicators are important sources of data in HIV surveillance and provide good data on epidemic trends over time [21,22,23]. Our findings therefore can be used as proxy indicator of adult Ugandan women’s seeking
behavior to know their HIV status, thus reflecting the national and sub-national trends of women of reproductive age who know their HIV-positive status in Uganda.

Conclusions And Recommendations
Although the gap in women that come at ANC1 without knowing their HIV positive status might be reducing, still a considerable proportion of women who were infected with HIV did not know their status before their ANC1 HIV test, indicating a major public health gap. We therefore recommend advocacy for timely ANC1 attendance to facilitate early HIV diagnosis as a previous study has shown that often women come late for ANC1 visits [25] and yet this seems the most opportune moment for those whose HIV positive status is unknown yet they are pregnant. In addition, innovative measures need to be sought to identify all the HIV positive pregnant women in order to achieve UNAIDS’ first 90 and ultimately to achieve EMTCT.

Abbreviations
- **AIDS**: Acquired Immune-Deficiency Syndrome
- **ANC**: Antenatal care
- **ANC1**: First antenatal care visit
- **DHIS2**: District Health Information system version 2
- **EMTCT**: Elimination of Mother to Child Transmission of HIV
- **KHIV+**: Known HIV positive status at ANC1
- **KHIV−**: Known HIV negative at ANC1
- **HIV**: Human Immunodeficiency Virus
- **HMIS**: Health Management Information System
- **HTS**: HIV Testing Services
- **MCH**: Maternal and Child Health
- **MTCT**: Mother-to-Child Transmission of HIV
- **PITC**: Provider Initiated Testing and Counseling
- **PLHIV**: People Living with HIV
- **PMTCT**: Prevention of Mother to Child Transmission of HIV
- **UNAIDS**: United Nations Joint program on AIDS
- **VCT**: Voluntary Counseling and Testing

Declarations

**Ethics approval and consent to participate**
This study used routine program data that is collected for program monitoring and evaluation. We sought permission to use the data from the Ugandan Ministry of Health. Additional clearance and approval for the study was obtained from the Center for Global Health, Centers for Disease Control and Prevention. The data that were analyzed had no personal identifiers for the individuals from whom it was collected and thus posed minimal ethical issues. Data was only accessible to the study team.
Consent for Publication

Not applicable.

Availability of data and material

The data that support the findings of this study are held at the Ministry of Health Resource Centre, Uganda but restrictions apply to the availability of these data and so are not publicly available. Data are however available from the corresponding author upon reasonable request and with permission of Ministry of Health Resource Centre, Uganda.

Competing interests

The authors declare that they have no competing interests.

Funding

This project was funded by the Cooperative Agreement - Provision of Comprehensive HIV/AIDS services and Developing National Capacity to manage HIV/AIDS Programs in the Republic of Uganda under the President’s Emergency Plan for AIDS Relief (grant number 5U2GGH000817-03) with the United States Centers for Disease Control and Prevention. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Author’s contributions

MN developed the study concept, participated in its design, and coordinated the data extraction process and drafting of the manuscript. ARA, LB, BK, participated in the drafting of the manuscript. IL extracted the data and participated in the drafting of the manuscript. DAB JBM, GT, LN, SM and JM participated in the design and coordination of the study. All authors read and approved the final manuscript.

Acknowledgments

We thank Ministry of Health Resource Centre for granting us the permission to use the data. Author’s information

At the writing of this manuscript, the corresponding author, MN, is a medical officer and a Fellow in the Uganda Public Health Fellowship Program, placed at the AIDS Control Program, Ministry of Health. She is very passionate about PMTCT.
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Table 1
Due to technical limitations, table 1 is only available as a download in the supplemental files section.

Figures
Figure 1

A map showing the 10 HIV regions in Uganda with the respective HIV prevalence of 2016.
Figure 2

Trends of women with known HIV status at first antenatal care, Uganda, 2012–2016
Trends of women with known HIV status at first antenatal care, Uganda, 2012 – 2016

Supplementary Files
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