Assessing Patient Satisfaction at Health Care Facilities in Zambézia Province, Mozambique

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Executive Summary

Introduction

In Mozambique, in 2018, adult 12-month antiretroviral treatment (ART) retention was 68% and equally challenging early retention rates were reported. Retention in care is known to be influenced by many factors and may be compromised by multiple factors. Patient satisfaction, reflecting service quality, potentially acts as an influencing factor. This study aimed to assess patient satisfaction among adults receiving HIV services in Zambézia Province, Mozambique, as well as understand patient satisfaction's relationship with time spent in the health facility and its association with 6- and 12-month retention.

Methods

Exit interviews with HIV-positive adults (≥15 years of age) were completed between August 2017 to January 2019 in 20 health facilities in Zambézia province to assess their satisfaction with services. Patient satisfaction surveys, scored using a 4-tiered Likert scale, assessed eight items/components: wait time, availability of health professionals, respect, attention received, information received, opportunity to ask questions, usefulness of providers, and overall evaluation. Patient clinical data were extracted from electronic patient files. Overall satisfaction was measured and correlated with self-reported time spent in health facility (defined as time from arrival to exit at health facility) via a generalized linear regression model, using restricted cubic splines, adjusted for health facility type and locale. Mediation analysis, with overall scores as the mediation variable, was used to estimate the indirect effect of time spent in health facility on six- and twelve- month retention. Regression analyses assessed the effect of combined patient satisfaction scores on retention using restricted cubic splines, adjusting for age, sex, education, and health facility type. Individual logistic regressions measured the impact of individual satisfaction questions on retention, adjusting for the same factors. Missing variables were imputed 20 times, for all analyses. Additionally, between August and September 2019, the survey included questions regarding health communication and in-depth interviews, which were completed with a subgroup of survey participants. Focus group discussions were done among HIV-positive adults who defaulted from care in the selected health facilities. The interviews and focus group discussions were transcribed into Word and analyzed using content analysis, supported by the software MAXQDA. Descriptive analysis was performed for the health communication interviews.

Results

A total of 5040 patients were interviewed over the period of 18 months. Among those, data of clinical files were matched for 3325 patients and were used for analysis. The overall median satisfaction score was 80% (IQR 54%-87%), which is equivalent to 24 points out of 30. The overall 6- and 12-month retention in services were 92% and 86%, respectively. By varying the patient satisfaction score from 15 to 25, the odds of being retained at 6 months was 0.95 (95% CI: 0.71; 1.26) and at 12 months 1.15 (95% CI: 0.89; 1.50). Overall, individual questions were not associated with higher chances of being retained at 6 months. However, questions related to having the opportunity to ask questions were associated with higher odds of being retained in care at 12 months. Patients that felt satisfied with the information provided or with the

opportunity to ask questions were, on average, 1.86 (95% CI = [1.04; 3.32]) times more likely to be retained at 12-months, respectively, when compared to patients that were not satisfied. Patient's satisfaction was inversely associated with total time spent in the health facility (Spearman correlation = -0.63).

Participants reported liking the visit when they received a quick and timely attendance with information/explanations from healthcare workers (HCW), including counseling. Participants disliked long wait times, absence of a HCW or lack of HCW attention, and lack of covered waiting area to sit. Suggestions mentioned for improvement included: starting consultations on time; increased human resources (with more personnel who speak local languages); improved respect for patients; better organization of pharmacy and of clinical files; rapid flow for patients (especially ART delivery at point-of-care); and better infrastructure.

Regarding health communication, sources for health information in the community noted by respondents were mainly conversations with peer educators (80, 30%) or family members (71, 27%), or discussion sessions (75, 28%) facilitated through lectures. Ninety (34%) respondents said they remember 'a lot' of the informational content received, 89 (33%) reported they 'reasonably' remember, and 61 (23%) remember 'a little'. Although 214 (80%) reported that the information was not clear, 255 (96%) considered the information to be reliable.

Conclusions

Patient satisfaction in general was relatively high, with some variation over the period. While no significant association at the 5% level was seen between individual satisfaction scores and retention, interpersonal factors related to the provider-patient interaction appeared to be the main drivers of long-term retention. A positive health worker's attitude, provision of undivided attention towards patients, and delivering accurate information about the patient's health increased satisfaction and retention in care. Patient satisfaction was driven largely by time spent at the health facility. Differentiated models of care to decongest crowded health facilities (e.g., 3-monthly or community drug dispensation, 6-monthly clinical consultations, or other models) need to be urgently taken to scale to decrease patient wait times.

Contents

Project Background 5

Evaluation Purpose and Questions 6

Evaluation Design, Methods and Limitations 7

- Evaluation type 7
- Evaluation setting 7
- Evaluation design 8
- Stakeholder engagement 9
- Sample size 9
- Sampling strategy 10
- Procedures 11
- Ethical aspects 12
- Deviations from the protocol 12
- Quality Assurance 12
- Analysis plan 13
- Limitations of the study 14

Results 14

- 1. Sociodemographic characteristics 14
- 2. Patient satisfaction scores 16
- 3. Satisfaction score and retention in care 17
- 4. Effect of time spent at HF on probability of being retained in care 22
- 5. Qualitative impressions on satisfaction 24
- 6. Health Communication 33

Discussion 35

Conclusions/Recommendations 37

Dissemination Plan 38

Acknowledgements 38

References 39

Appendices 41

- Appendix 1: Evaluation protocol 41
- Appendix 2. Communication survey - Additional Tables 41
- Appendix 3: Evaluation framework 46
- Appendix 4: Principal Investigator's Bio-sketches 46

Project Background

The greatest burden of the HIV/AIDS epidemic continues to be shouldered by the sub-Saharan African region, where approximately 43% of all new cases occurred in 2020 (1). Mozambique continues to rank among the ten countries most severely affected by the disease. The Joint United Nations Programme on HIV/AIDS (UNAIDS) estimated that over 2.2 million Mozambicans were HIV-positive in 2019 (1). The same report indicates HIV prevalence in Mozambique among adults aged 15 to 49 years old was estimated at 12.4%, though this is down from the reported estimate of 13.2% among the same age group in Mozambique's 2015 population-based survey on HIV/AIDS (2).

In 2013, the government of Mozambique Ministry of Health (MOH) announced their commitment to a new National HIV and AIDS Response Acceleration Plan (2013-2015), which prioritized increasing access to combination antiretroviral therapy (ART) as a key method for prevention of new infections and for decreasing rates of morbidity and mortality among persons living with HIV (PLWH) (3). The plan outlined specific target goals, which included increasing ART coverage to 80% of eligible PLWH by the end of 2017, and 80% by the end of 2018 according to the updated national strategic plan (2015-2019) (4). As of 2018, ART coverage had reached 55%, a notable improvement though considerably short of the Plan's goal (4). The achievement of this goal, the second of the 95-95-95 UNAIDS goals, and the success of the country's HIV program in general, are integrally linked with patient retention in long-term HIV care and adherence to medication regimens.

Health system responsiveness (HSR) is based on patients' experiences within the health system and focuses on eight domains: autonomy, support systems, confidentiality, quality of basic amenities, communication, access, promptness, and dignity (5). Patient satisfaction, a construct related to several HSR domains, is a more subjective measure of a patient's perceived needs and expectations for health system interactions and has been described in several studies (6–8). Efforts to improve understanding of patient satisfaction at target sites are important not only for use as an independent indicator of health system effectiveness, but also for its strong association with increased retention in care. However, associations between HSR, patient satisfaction, and retention in HIV care and treatment have not been well documented in low resource settings, especially rural areas of Mozambique.

In rural Zambézia province, central Mozambique, one of the most populated regions in the country, HIV prevalence in 2015 was estimated at 15.1% (15-49 years of age), 16.8% among females, and 12.5% among males (2). Zambézia had a coverage of HIV testing (ever tested for HIV) of 30% among men and 51% among women (2). Retention to HIV services has been varying between 70% in 2017 and 67% in 2019 on national level and between 68% and 71% in Zambézia province (9–11).

With the President's Emergency Plan for AIDS Relief (PEPFAR) funding from the Centers for Disease Control and Prevention (CDC), Vanderbilt University Medical Center/Friends in Global Health (VUMC/FGH) has been providing support in Zambézia since 2006. Despite many efforts to improve retention such as data triangulation, support to pharmacy file update, and incentives to peer educators and community health volunteers, rates remained well below World Health Organization (WHO) recommendations for 90% retention in care in 2016, at the time this evaluation was designed (12).

Retention in care continues to be an area of focus as we implement novel clinical and community interventions. Recognizing the dearth of information regarding levels of satisfaction among HIV patient populations in FGH-supported districts, as well as the poor rates of retention in care among this population, FGH conducted this evaluation to better understand patients' levels of satisfaction with their received care at supported health facilities and perceptions of system responsiveness, and the effect this may have on continuation in care.

The survey was implemented between June 2017 and February 2020, where the first 2 months were rather a pilot of the use of tablets, before data collection period between August 2017 and February 2019. In the period February 2019 – February 2020, data review of individual patient medical records was done through extraction from the OpenMRS electronic patient database. The protocol had an approved budget of $US 166,812 for the estimated cost of this evaluation.

Evaluation Purpose and Questions

In line with PEPFAR and MOH guidelines, FGH's HIV program goals include ensuring that the health facilities we support are able to provide comprehensive HIV services in a competent and efficient manner such that patients feel supported and respected by providers, understand the care they need and/or are receiving, and are generally satisfied with their care.

As one strategy for better understanding patient retention, we assessed patient satisfaction among HIV-positive adults seeking and/or continuing care at the selected FGH-supported health facilities. We wished to identify factors that may influence patients' satisfaction with the services provided and to ascertain if patients' perceptions of care received are associated with their behaviors related to retention in care.

The specific objectives of this program evaluation were:

1) To assess patient satisfaction with the HIV care and treatment services at FGH-supported health facilities in Zambézia Province.

2) To assess changes in patient satisfaction over 18 months at each health facility (HF) and estimate patient satisfaction across sites.

3) To characterize the association between patient satisfaction scores and ART retention (measured by timely medication pick-up) 6 and 12 months post-interview at each HF.

Through assessing our primary and secondary outcomes of interest (**Table 1**), this evaluation was meant to inform FGH and MOH's current HIV prevention, care and treatment programming so that we may continue to improve available services and promote patient utilization and adherence.

Table 1. Outcomes of Interest

Primary Outcomes
1. Patient satisfaction scores regarding HIV care and treatment services
2. Retention in HIV care (attendance of clinical visits)
3. On-time pick up of medications (for those enrolled on ART)
Secondary Outcomes
1. Self-reported wait time at clinical visit
2. Patient suggestions for clinical improvements
3. Access and use of health communication media/channels

Evaluation Design, Methods and Limitations

Evaluation type

The evaluation completed was an internal process evaluation.

Evaluation setting

The assessment was implemented in the select FGH-supported health facilities in rural district headquarters and the district of provincial capital Quelimane City in Zambézia province, central Mozambique. Exit interviews with HIV-positive adults were completed between August 2017 and February 2019 in 24 FGH/VUMC-supported health facilities (**Table 2**). FGH support in the districts of Mopeia, Morrumbala, Derre and Luabo was interrupted at the end of September 2017; as of October 1, 2017, these health facilities were excluded from the evaluation. Thus, results are reported from 20 health facilities.

Table 2. List of selected health facilities, with implementation period and methods

Evaluation Sites	**Implementation Period**	**Exit Interviews (surveys)**	**In-depth Interviews (IDI)**	**Focus Group Discussions (FGD)**
(Rural) District headquarter health facilities: Pebane, Alto Molócuè, Gile, Maganja da Costa, Mocubela, Inhassunge, and Namacurra	August 2017 – January 2019; September 2019 (amendment activities)	All HF (7)	All HF (7)	All HF (7)
(Provincial capital) Quelimane District health facilities:	August 2017 – January 2019;	All HF (13)	All HF (13)	HF Coalane

Zalala, Maquival Sede, Madal, Namuinho, Sangariveira, Chabeco, Micajune, Incidua, 17 de Setembro, 24 de Julho, 4 de Dezembro, Coalane, and Malanha	September 2019 (amendment activities)			HF 24 de Julho HF Namuinho
(Rural) District headquarter health facilities: Mopeia, Morrumbala, Derre, and Luabo	August – September 2017	All (4)*	N/A	N/A

*Data covering 2 months of data collection were excluded due to support changes.

Evaluation design

The evaluation used a mixed-method design:

- ***Exit surveys (via interviewer-assisted survey administration)*** to collect patient satisfaction indicators with a convenience sampling of consenting HIV-positive patients to assess patient satisfaction with the HIV care and treatment services at FGH-supported health facilities in Zambézia Province. Through an amended protocol, a short component on communication was added to better understand the media used/accessed and the information received by patients to help align the communication activities.
- ***Individual In-Depth Interviews*** (IDI) with open-ended questions about the factors that may contribute to the satisfaction or dissatisfaction rates in HIV-positive patients who previously responded to the quantitative interview of satisfaction indicators to explore factors that contribute to patient satisfaction or dissatisfaction.
- ***Focus Group Discussions***(FGD) with HIV-positive patients identified as lost-to-follow-up (LTFU) for HIV treatment to further explore factors that contribute to patient satisfaction or dissatisfaction.

Eligibility criteria for the survey and IDI participants included: i. being 18 years or older, ii. known HIV-positive, iii. enrolled in HIV care and treatment (if eligible) at the HF where they were interviewed, and iv. providing written informed consent for the respective interview(s). For the FGD, the additional inclusion criteria of having missed their last visit(s) to the health facility (and thus being on the list for active tracing) was used. Patients who received positive HIV test results the day they were met/approached by evaluation personnel were eligible for interview participation if they had also enrolled in HIV care that day. Enrollment in HIV services was verified on the patient's HIV care identification number (NID) card.

While these target health facilities offer the same comprehensive HIV services for individuals of all ages, we excluded children and youth from this evaluation based on their additional vulnerabilities and inability to provide informed consent for participation without parent/guardian consent. Individuals unable to provide informed consent due to mental limitations and/or intoxication were also excluded.

Stakeholder engagement

Various staff and counterparts from the MOH and FGH/VUMC have been involved in these program evaluation activities. From the MOH, this included the Provincial Health Director and the Nutrition Program Monitoring & Evaluation Focal Point/Planning Technician of Provincial Health Directorate of Zambézia (DPS-Z, Quelimane). Both individuals have been involved since the design of the study, through the monitoring of the evaluation implementation, and throughout discussion of evaluation results. At FGH, aside from the Evaluation team members who have led and managed the pilot and evaluation activities, the Country Director, Technical Director, and Quality Improvement Advisor have been involved since the design of the evaluation.

Sample size

We powered our evaluation sample size based on the larger sample calculated for Objective 2 (**Table 3**). To compare the results of a patient satisfaction score in each clinical HF over time (month to month), we estimated that 14 patients should be enrolled every month and for each site, to detect a 2-point change in patient satisfaction score. We assumed a standard deviation [sd] of 1.8 in the satisfaction scale, 80% power and a type 1 error set to 5%. With the intended 24 clinical sites providing data over 18 months, this resulted in an estimated sample size of 6048. We assumed that interviews were independent, ignoring any intracluster correlation or repeat interviews, if any.

For Objective 3, we hypothesized that the patient satisfaction scores would be highest for patients with the highest retention and that the converse is true, so planned to power this analysis to detect a difference in retention of 19% (58% among dissatisfied patients and 77% among satisfied patients). We estimated that if the true retention rate for satisfied patients is 0.77, we would need to enroll 768 participants (with 5:1 dissatisfied: satisfied ratio) to be able to reject the null hypothesis that the retention rates for dissatisfied and satisfied patients are equal with probability (power) 0.99. The Type I error probability associated with this test of this null hypothesis is 0.05.

No additional power calculation was required for Objective 1 (describing patient satisfaction scores). With a sample size of 6048 and a continuous patient satisfaction scale, we had robust precision of population estimates. For practical reasons, we determined 14 participants per health facility, in order to reach the desired sample size.

For IDI and FGD qualitative activities, sample size calculation was based on saturation level. Following accepted qualitative methodologies, we estimated that 3 participants per each of the 20 HFs for a maximum period of 3 months (we anticipated 60-90 interviews) and 2 focus groups (with 5-10 participants per group) per HF (for a total of 20 groups) would provide sufficient information to reach data saturation, whereby no further unique responses would be attained with increased sample size.

Table 3. Estimated and actual sample size for recruitment, by objective

Objective	***Estimated sample size***	***Sample size reached***
To assess patient satisfaction with the HIV care and treatment services at FGH-supported health facilities in Zambézia Province	Quantitative: 6048 (14 per month, per HF) (**5040***)	5040 (83%) (100%*)
	Qualitative: • 3 interviews (IDI) per HF (total of **60** interviews) • 2 focus groups (FGD) per HF in the 7 districts outside of Quelimane and 2 per Quelimane HF (3 HFs in Quelimane selected) (total of **20** FGD)	• 55 interviews • 11 focus groups (79 participants)†
To assess changes in patient satisfaction over 18 months at each HF and estimate patient satisfaction across sites.	6048 (**5040***)	5040 (83%) (**100**%*)
To determine if there exists any association between patient satisfaction scores and ART retention (measured by timely ART pick-up) six months and 12 months post-interview at each HF.	6048 (**5040***)	3325 (55%) (**66**%*)

*The sample size was calculated for an intended 24 health facilities; however, 4 of those only had 2 months of follow-up (i.e., data collection) due to change in support (see *Evaluation setting* above), resulting in a sample size target of 5040 for the 20 HFs that completed the study period.
†Nine health facilities did not have a minimum of five participants for the focus group discussions.

Sampling strategy

A convenience sampling strategy was used for the patient satisfaction survey: 3 groups of 2 interviewers rotated to all evaluation sites and conducted interviews for approximately 2-3 days at each HF with the goal of capturing at least 14 interviews before moving to the next HF. With this sampling strategy, recruitment could yield as many as 6048 interviews (14 interviews × 18 months × 24 sites). Patients were approached as they left the HF, and interviewers explained participation and consent for survey involvement and assessed patient eligibility for survey. The survey was conducted after confirming eligibility and obtaining informed consent from each participant.

For IDIs, systematic sampling was used whereby 3 patients were recruited from the total number (14 x HF) of patients who agreed to participate in the exit interview surveys over a 3-month period. We invited one man from the ART service (the first man who participated in the exit interview survey), one woman from the ART service (the first woman who participated in the exit interview survey), and one woman from ANC services (the first pregnant woman who participated in the exit interview survey). If the first participant from respective service sectors declined IDI participation, the next eligible person was invited for IDI participation.

Convenience sampling was also used for creating focus groups, whereby research team members invited those who met eligibility criteria and provided informed consent to participation in the FGD. We recruited 5-10 of the patients identified at the HF as LTFU from scheduled routine HIV service appointments. The intent was to form 2 mixed FG (5 men and 5 women) or 2 separate groups (1 group of men and 1 group of women), depending on the sociocultural gender issues, of participants from district capital HF outside of Quelimane (Alto Molócuè, Gilé, Pebane, Mocubela, Maganja da Costa, Namacurra and Inhassunge). Within the district of Quelimane, the intention was to hold two FGD in three HF with larger patient volumes (24 de Julho, Coalane, and Namuinho).

Procedures

The recruitment and enrollment procedures were the same for Objectives 1-3 (quantitative component) as the same patients who consented to do the patient satisfaction survey were also consented to have their HIV care and treatment data (approximately 12 months from the time of the survey) linked with their baseline satisfaction scores.

To recruit patients enrolled in HIV services to participate in the exit interview survey, FGH interviewers approached male and female adults exiting the HF regarding participation in the survey. Without any mechanistic way to approach patients for potential participation in this evaluation and to avoid introducing any interviewer or participant bias regarding who was approached for recruitment, interviewers approached the first available patient leaving the HF. After verification of the eligibility criteria, the interviewer read the consent form aloud to each participant in either Portuguese or their preferred local language to ensure that patients who cannot read would understand the content of the consent form and their rights as potential participants. Informed consent was obtained from all eligible participants prior to survey initiation. Study ID numbers were also generated and documented for each participant. The interviewer then asked the survey questions. Once the survey was completed and the previous participant had departed, the interviewers approached the very next available patient leaving the HF for potential survey participation.

For IDIs, the first man, first non-pregnant woman, and first pregnant woman who accepted to participate in the satisfaction exit interview (survey) were invited for an IDI. If the individual declined to participate in the IDI, the next eligible person was invited. Participants in the IDI were not recruited to the communication component, to avoid taking too much time from participating patients and risk them not accepting.

For FGDs, patients defaulting from care were identified with support from staff involved in home visits/active search for missing patients, based on the HF targets. Through the contact tracing activities, health care workers informed potential candidates of the FGD and invited them to participate. If the patient agreed to participate, they were referred to the interview staff who explained the FGD, including purpose of the group interview, duration of session, confidentiality, and privacy aspects, and obtained informed consent from participant. Recruitment was done in a consecutive manner. Once the number of participants desired for each FGD had been reached, evaluation staff scheduled a date/time of convenience to conduct the FGD and a consensus was reached on a location in the community to hold the activity.

Clinical data were extracted from electronic patient files.

Ethical aspects

The protocol and instruments were approved by the provincial-level local ethics committee (CIBS-Z, Reference letter 03/CIBS/16) and the VUMC Institutional Review Board (IRB) (updated #181945; initial #160777) and was reviewed in accordance with the CDC human research protection procedures and was determined to be research, but CDC investigators did not interact with human subjects or have access to identifiable data or specimens for research purposes. All participants gave written informed consent prior to data collection (for respective activities).

The following protocol amendments were approved since evaluation implementation began in 2017:

- May 2017 (03/CIBS-Z/17): alteration of the health facilities, with the inclusion of the health facilities in Quelimane District;
- November 2017 (06/CIBS-Z/17): correction to the informed consent form;
- September 2018 (09/CIBS-Z/18): inclusion of the communication component to the exit interview survey and the qualitative component to the protocol;
- June 2019 (03/CIBS-Z/19): language correction in informed consent forms and data collection instruments.

Deviations from the protocol

No protocol deviations were reported during implementation of the study.

Quality Assurance

Training

The training of the evaluation team members took place in May 2017. The study team, including 10 interviewers, were trained on the implementation of the study protocol procedures and activities (surveys, IDIs, FGDs). In June 2017, the study pilot started in the selected health facilities, and testing the REDCap application for data entry. Monthly meetings with the surveyor team were held where refresher training was built in when necessary and support was available. Training for the qualitative component and communication component (Amendment 3 of original protocol) was carried out in August 2019.

Monitoring and data safety

Continuous monitoring and mentoring were done by the FGH Survey Implementation Director and Assistant and the FGH Director of Evaluations, all in coordination with the DPS-Z Focal Point. Survey data were entered in a password-secured cloud-based repository (REDCap), only accessible to the study investigators. Monthly reports at provincial and HF level were prepared and shared with health authority officials in each participating district throughout the evaluation period.

To aid in data quality assurance for activities related to Objectives 1 and 2, each survey had a unique identification number and each survey question was programmed as a mandatory field for completion. Interviewers read the survey question aloud to each participant and personally marked the appropriate response with a stylus pen on behalf of the respondent.

The data collected related to Objective 3 was securely housed within the OpenMRS database and is routinely monitored for data quality assurance through procedures of data triangulation against related clinical registers and patient clinical files to ensure that all necessary data is captured and accurate.

Analysis plan

For the purposes of this evaluation and results interpretation, we defined *patient satisfaction* as a patient's perception that their expectations were met for health care-related services they received and interactions with providers, where eight components were considered: waiting time, availability of health professionals, respect, attention received, information received, opportunity to ask questions, usefulness of providers, and overall evaluation. *Time at health facility* was defined as the self-reported length of time from when the patient arrived at the HF to the time they exited the facility complex.

Retention outcomes were defined as having a scheduled ART pick-up that is within the time interval of 59 days to end of the evaluation period. For example, a patient is retained at 6 or 12 months if he/she had a scheduled ART pick-up within [180-59, 180] or [365-59, 365] days after interview date, respectively.

Repeated interviews were excluded from all analyses to avoid potential bias and only the last interview was used. Continuous variables were presented as medians (with interquartile ranges [IQR]) and frequency tables (percentages) were used to summarize categorical variables. Categorical and numerical baseline characteristics of patients retained in care and patients not retained in care were compared via chi-squared or Mann-Whitney tests, respectively.

Overall satisfaction was measured via surveys assessing eight components: wait time, availability of health professionals, respect, attention received, information received, opportunity to ask questions, usefulness of providers, and overall evaluation. Satisfaction was scored using a 4-tiered Likert scale, varying from 1 to 4, leading to a maximum score of 32. Spearman correlation was used to assess the correlation between satisfaction scores and self-reported time spent in the HF. Regression analyses assessed the effect of combined patient satisfaction scores on 6- and 12-month retention, using restricted cubic splines, adjusting for age, sex, education, and HF type. Individual logistic regressions measured the impact of individual satisfaction questions on retention, adjusting for the same factors. Missing variables were imputed 20 times, for all analyses.

The software R statistical software [R Core Team (2018)](13) supported the quantitative analysis.
Qualitative data were analyzed using content analysis. Coding was done by two independent researchers and results were compared to assess inter-rater reliability. The software MAXQDA Standard 12 (Verbi GmbH Berlin, Germany) was used in the qualitative analysis.

Limitations of the study

A notable limitation is that data are not representative for the population across Mozambique, as the evaluation took place in only select districts in one of eleven provinces, and only patients of a portion of health facilities were included in the survey. There might have occurred a bias in the measurement "time spent in the health facility" as some patients arrive very early due to transport issues, and not because of delays in attendance. Exit-interviews were done at or near the health facility, response bias could have occurred. Finally, a number of planned focus group discussions were not done due to limited number of participants. However, the data showed a certain degree of saturation, indicating that the opinions were valid in the different locations.

Results

Data collection of the satisfaction surveys at exit interviews were carried out monthly in the selected HF starting in August 2017 and concluded in January 2019. Data extraction from patient clinical files (regarding participant follow-up for 6- and 12-month retention periods) was completed in April 2020. The activities of the amendment to the protocol, which included a qualitative component, were implemented in August to September 2019.

For Objectives 1 and 2, 87% of the total sample size was reached, due to the withdrawal of 4 HFs from the evaluation (as a result of the termination of FGH support in these districts). At the remaining health facilities, we reached our goal of 14 participants per HF each month. For Objective 3, the sample size reached was 3325.

For the qualitative component, 55 IDIs and 11 FGD were conducted. It was not possible to conduct FGD in three health facilities of Quelimane, as the minimum number of participants was not reached within the planned data collection period.

1. Sociodemographic characteristics

Of the study population of 5040 participants, median age was 30 years (IQR 25-38), 3769 (75%) were female, and 1085 (22%) had no formal education (**Table 4**).

Table 4. Characteristics of the interviewed study population (n=5040)

	N (%)
District	
Alto Molócuè	253 (5%)
Quelimane	3275 (65%)
Gilé	252 (5%)
Inhassunge	252 (5%)
Maganja da Costa	252 (5%)

Mocubela	252 (5%)
Namacurra	252 (5%)
Pebane	252 (5%)
Gender	
Female	3769 (75%)
Male	1271 (25%)
Age, years (median, IQR)	30 (25-38)
Level of education	
No education	1085 (22%)
Primary education	2647 (53%)
Secondary education	1079 (21%)
University	53 (1%)
Other	174 (3%)
No response	2 (0%)
Native language	
Portuguese	65 (1%)
Other	4973 (99%)
No response	2 (0%)
Self-reported comprehension of spoken Portuguese	
Fluent	2451 (49%)
A little	2243 (46%)
Not	346 (7%)
Attendance at HF in the preferred language?	
Yes	2510 (50%)
No	2527 (50%)
no response	3 (0%)
Median time spent at the health facility (hours, IQR)	2h52 (1h45-4h10)
Reason for HF visit*	
HIV testing	221 (4%)
ART care	260 (5%)
Routine HIV care	4658 (92%)
Non-routine HIV care	128 (3%)
Other non-HIV care	227 (5%)
Services received*	
Adult ART Care	3652 (73%)
Pediatric ART Care	446 (9%)
TB-HIV coinfection	492 (10%)
SAAJ	44 (1%)
ANC	748 (15%)
Child at risk clinic	924 (18%)
Lab	1006 (20%)
Pharmacy	4119 (82%)
Psychosocial support	2382 (47%)
Other	617 (12%)
Number of services received	
0	3 (0%)
1	110 (2%)

2	1809 (36%)
3	1975 (39%)
4	945 (19%)
5	191 (4%)
6	7 (0%)
*All that apply.	

2. Patient satisfaction scores

The overall median patient satisfaction score was 24 out of 32, or 75% (IQR 50%-81%). The score varied between the districts, with the lowest median satisfaction in Gilé and Pebane (59%, IQR 47%-78%) and the highest in Quelimane district 78% (69%-91%).

We observed a variation between districts and a decrease in satisfaction scores over the evaluation period (**Figure 1**). A decline was observed in almost all the districts after February 2018. At this time, a strategy of intensified monitoring visits to improve HIV services was initiated in all provinces by the Ministry of Health, CDC, and clinical partners.

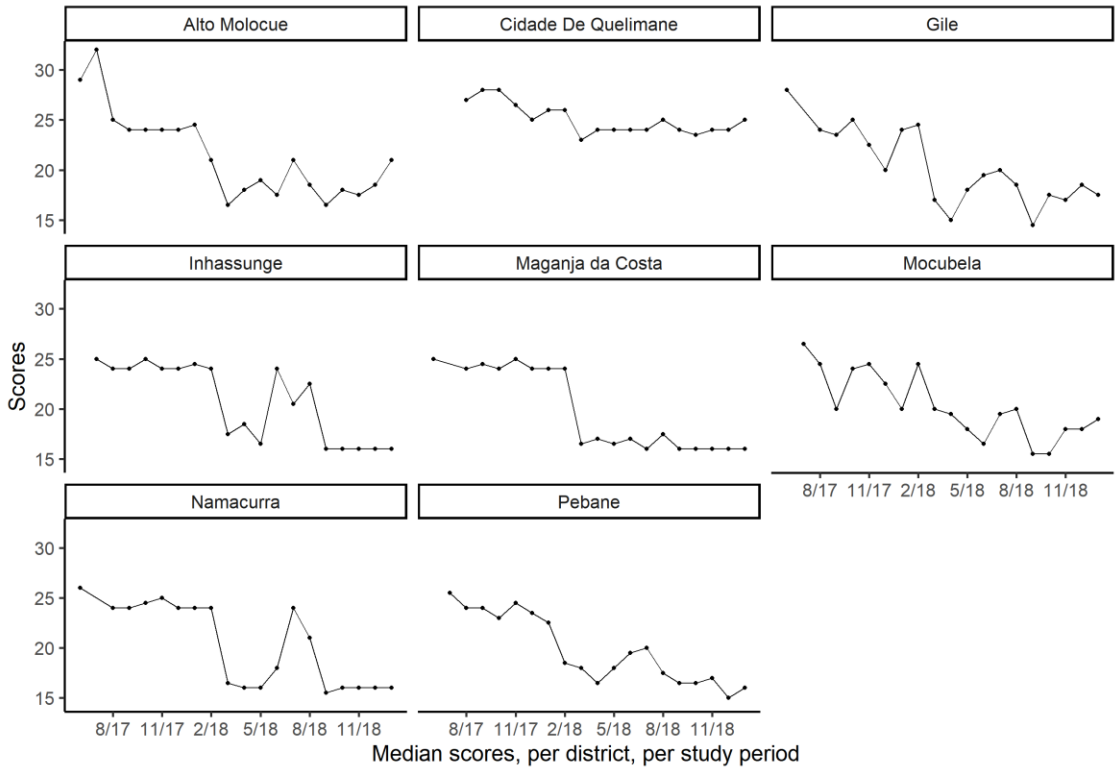


Figure 1. Median patient satisfaction scores, by district and by month.

3. Satisfaction score and retention in care

Among the interviewed, 3325 patients had clinical data available which were further used to assess the impact of satisfaction scores on retention in care. As shown in **Table 5**, the median age at enrollment was 30 years (IQR 25-38 years), 2365 (71%) were female, and 454 (14%) had no formal education. Approximately two-thirds (2002; 60%) were from urban areas. The median satisfaction score was 80% (IQR 53%-87%).

Table 5. Sociodemographic data among participants with survey and clinical data available (n=3325)

	N (%)
Age at baseline	30.0 [25.0;38.0]
Sex	
Female	2365 (71.1%)
Male	960 (28.9%)
Marital status	
Living with partner	1147 (34.5%)
Married	453 (13.6%)
Single	632 (19.0%)
Widowed	153 (4.6%)
Separated	2 (0.1%)
No information	938 (28.2%)
Education level	
Primary or Less	2024 (60.9%)
Secondary or higher	721 (21.7%)
No information	580 (17.4%)
Rural/ Urban	
Rural	1323 (39.8%)
Urban	2002 (60.2%)
Enrolled in CAG	
No	2902 (87.3%)
Yes	423 (12.7%)
Pregnancy at enrollment	
No	2051 (65.0%)
Yes	1105 (35.0%)

Out of the 3325 patients in the analysis, retention 6 months post-interview was 92%, and at 12 months post-interview 86% (**Table 6)**. Women were more retained compared to men at 6 months post-interview (93% versus 90%, p=0.002) and 12 months post-interview (88% versus 83%, p<0.001). Being a CAG (Community Adherence Support Group) member was associated with a higher retention at 6- and 12-months post-interview.

Table 6. Retention status at a) 6- and b) 12-months post-exit interview

a) 6-month retention

	Not retained (n, %)	Retained (n, %)	p-value
	N=261	*N=3064*	
Sex			0.002
Female	163 (6.9%)	2202 (93.1%)	
Male	98 (10.2%)	862 (89.8%)	
Age at baseline	29 [24;34]	30 [25;38]	<0.001
Marital status			0.096
Living with partner	85 (7.4%)	1062 (92.6%)	
Married	37 (8.2%)	416 (91.8%)	
Single	63 (6.7%)	875 (93.3%)	
Widowed	0	2 (100%)	
Separated	67 (10.6%)	565 (89.4%)	
No information	9 (5.9%)	144 (94.1%)	
Education level			0.011
Primary or less	138 (6.8%)	1886 (93.2%)	
Secondary or higher	74 (10.3%)	647 (89.7%)	
Missing	49 (8.5%)	531 (91.6%)	
Rural/ Urban			0.828
Rural	106 (8%)	1217 (92%)	
Urban	155 (7.7%)	1847 (92.3%)	
Enrolled in CAG			<0.001
No	250 (8.6%)	2652 (91.4%)	
Yes	11 (2.6%)	412 (97.4%)	
Pregnancy at enrollment			0.002
No	185 (9%)	1866 (91%)	
Yes	66 (5.8%)	1040 (94.2%)	
TB co-infection			0.018
No	163 (8.5%)	1751 (91.5%)	
Yes	11 (13.6%)	70 (86.4%)	
No information	87 (6.5%)	1243 (93.5%)	
Scores	23 [17;27]	24 [16;26]	0.652
Time in spent in the HF (hours)	3.15 [2.00;4.33]	2.88 [1.67;4.25]	0.056

b) 12-month retention

	Not retained (n, %)	Retained (n, %)	p-value
	N=468	*N=2857*	
Sex:			<0.001
Female	286 (12.1%)	2079 (87.9%)	
Male	165 (17.2%)	795 (82.8%)	
Age at baseline	29 [24;35]	30 [25;38.8]	<0.001

Marital status			0.058
Living with partner	132 (11.5%)	1015 (88.5%)	
Married	63 (13.9%)	390 (86.1%)	
Single	106 (16.8%)	526 (83.2%)	
Widowed	18 (11.8%)	135 (88.2%)	
Separated	0	2 (100%)	
No information	132 (14.1%)	806 (85.9%)	
Education level			0.017
Primary or less	247 (12.2%)	1777 (87.8%)	
Secondary or higher	113 (15.7%)	608 (84.3%)	
Missing	91 (15.7%)	489 (84.3%)	
Urban/ Rural			0.298
Rural	190 (14.4%)	2472 (85.6%)	
Urban	261 (13%)	1741 (87%)	
Enrolled in CAG			<0.001
No	430 (14.8%)	2472 (85.2%)	
Yes	21 (5%)	402 (95%)	
Pregnancy status at enrollment			0.013
No or no information	298 (14.5%)	1753 (85.5%)	
Yes	125 (11.3%)	980 (88.7%)	
TB co-infection			<0.001
No	282 (14.7%)	1632 (85.3%)	
Yes	21 (25.9%)	60 (74.1%)	
No information	148 (11.1%)	1182 (88.9%)	
Scores	24 [16;27]	24 [16;26]	0.323
Time in spent in the HF (hours)	2.93 [1.79;4.25]	2.88 [1.67;4.25]	0.403

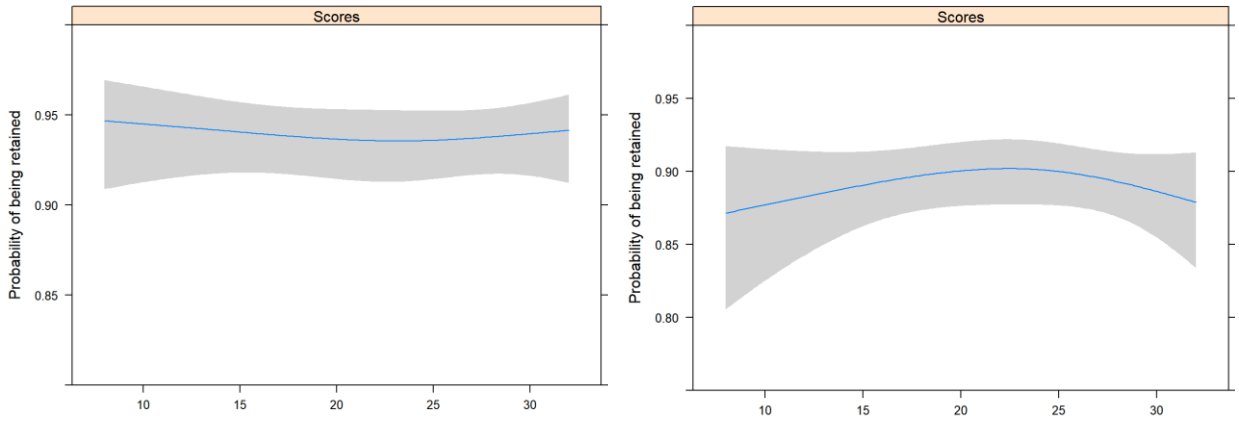
Multivariable logistic regression was used to assess the effect of patient scores on 6- and 12-months retention. Patient scores were model using restricted cubic splines to alleviate linearity assumptions. Results for the multivariable regressions are displayed in **Table 7**.

Table 7. Multivariable regression to assess the impact of patient scores on 6- and 12-months post-exit interview

	6-month retention		12-month retention	
Scores				
10	1.07	(0.84-1.38)	0.85	(0.67-1.07)
15	Ref		Ref	
20	0.94	(0.77-1.17)	1.14	(0.94-1.39)

25	0.95	(0.71-1.26)	1.15	(0.89-1.50)
Age				
20	0.82	(0.60-1.13)	0.67	(0.52-0.86)
30	Ref		Ref	
40	1.42	(1.21-1.67)	1.31	(1.18-1.47)
50	2.22	(1.45-3.42)	1.59	(1.20-2.12)
Sex: Male	0.55	(0.42-0.73)	0.45	(0.33-0.62)
Urban: No	1.11	(0.83-1.49)	1.09	(0.87-1.37)
Education: Secondary or higher	0.74	(0.54-1.02)	0.86	(0.66-1.11)
Living alone: Yes	0.76	(0.55-1.06)	0.69	(0.53-0.90)

By varying the patient satisfaction score from first to third quartile, the odds of being retained at 6 months was 0.95 (95% CI: 0.71-1.26) and at 12 months 1.15 (95% CI: 0.89-1.50) (**Figure 2**).



a) 6-month retention b) 12-month retention

Figure 2. Association between satisfaction scores and probability of being retained.

The odds of being retained at 6 months was not correlated with a higher patient satisfaction score regarding the different questions, at the 5% level. There was a weak correlation between both satisfaction on information received and opportunity to ask questions and receive responses with the probability of retention at 12 months (**Table 8**). Results for all individual factors investigated are shown in **Table 8** as well as in the forest plot depicted in **Figure 3**.

Table 8. Odds ratio of being retained, for each individual question (compared to baseline score), adjusted for sex, age, education level, marital status, and type of HF (urban/rural).

a) 6-month retention

Satisfaction score	**Respect**	**Attention given to patient concerns**	**Information received about your disease**	**Opportunity to ask questions and receive responses**	**Time spent with provider to talk about concerns**	**Wait time**	**Opinion on overall service quality**	**Overall helpfulness of providers**
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Not satisfied	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Somewhat satisfied	0.73 (0.34-1.54)	1.30 (0.63-2.70)	1.14 (0.48-2.72)	1.30 (0.58-2.92)	0.95 (0.57-1.56)	1.56 (1.10-2.22)	1.64 (0.56-4.81)	0.73 (0.17-3.12)
Satisfied	0.82 (0.39-1.73)	1.27 (0.61-2.83)	1.12 (0.47-2.65)	1.37 (0.61-3.08)	0.57 (0.35-0.92)	0.73 (0.51-1.05)	1.51 (0.52-4.35)	0.70 (0.16-2.98)
Very satisfied	0.78 (0.36-1.69)	1.31 (0.61-2.83)	1.00 (0.40-2.52)	1.18 (0.49-2.81)	0.94 (0.63-1.41)	1.30 (0.89-1.90)	1.43 (0.48-4.28)	0.70 (0.16-2.98)

b) 12-month retention

Satisfaction score	**Respect**	**Attention given to patient concerns**	**Information received about your disease**	**Opportunity to ask questions and receive responses**	**Time spent with provider to talk about concerns**	**Wait time**	**Opinion on overall service quality**	**Overall helpfulness of providers**
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Not satisfied	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Somewhat satisfied	1.09 (0.65-1.84)	1.11 (0.61-2.02)	1.75 (0.97-3.18)	**1.82 (1.02-3.25)**	0.81 (0.55-1.19)	1.16 (0.89-1.50)	1.58 (0.68-3.71)	1.01 (0.38-2.68)
Satisfied	1.13 (0.67-1.90)	1.15 (0.63-2.10)	1.70 (0.94-3.07)	**1.86 (1.04-3.32)**	0.74 (0.50-1.10)	0.79 (0.58-1.07)	1.56 (0.68-3.61)	1.16 (0.44-3.04)
Very satisfied	1.02 (0.59-1.75)	1.13 (0.60-2.13)	1.50 (0.79-2.86)	1.63 (0.87-3.06)	0.88 (0.64-1.21)	1.03 (0.77-1.38)	1.29 (0.54-3.05)	0.98 (0.37-2.56)

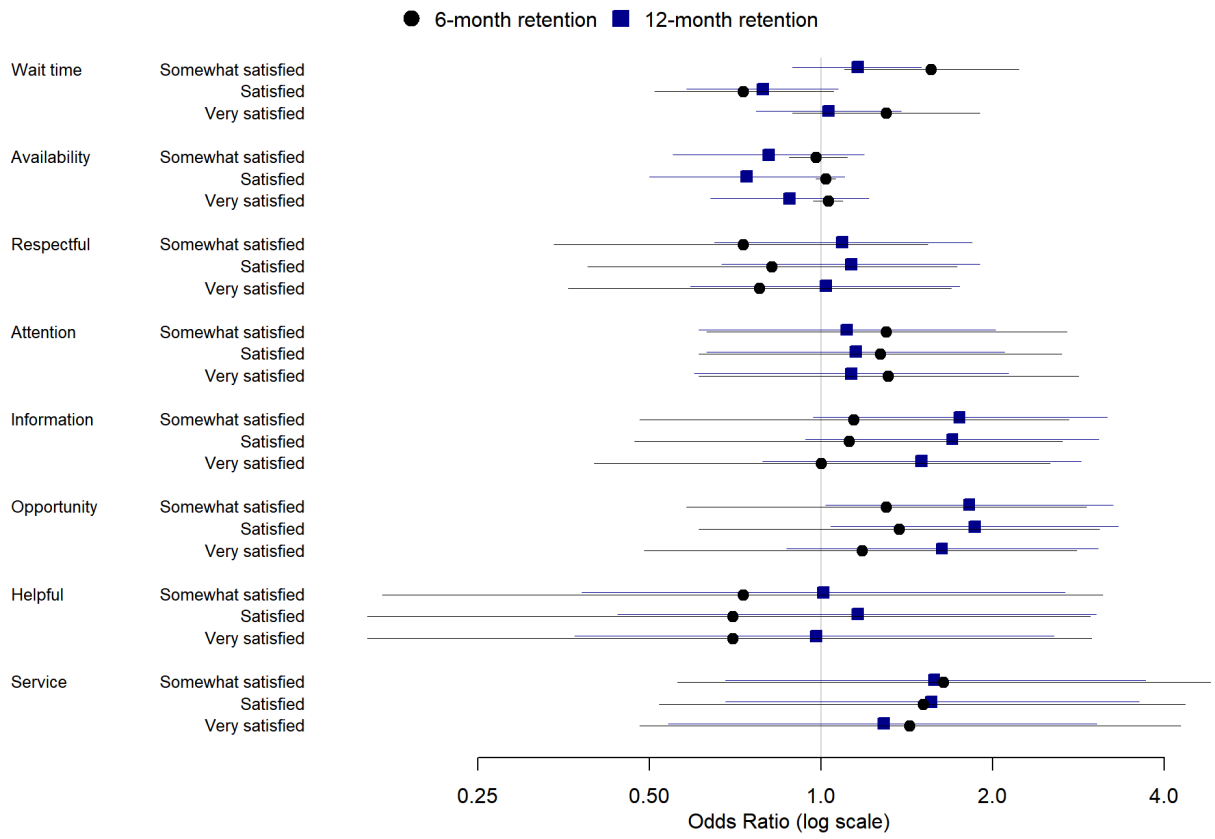


Figure 3. Effect of patient satisfaction score on 6- and 12-month retention, adjusted regression analysis.

4. Effect of time spent at HF on probability of being retained in care

Time spent at the health facility, defined as the difference between the time reported by the participant from the moment he/she arrived until he/she left the clinic visit, was discretized in three groups: short (<150 minutes), medium (150-300 minutes), long (>300 minutes). As per **Figure 4**, the satisfaction scores are higher over time with a shorter time spent at the HF, and the trend remained the same over time. This effect was seen in all districts.

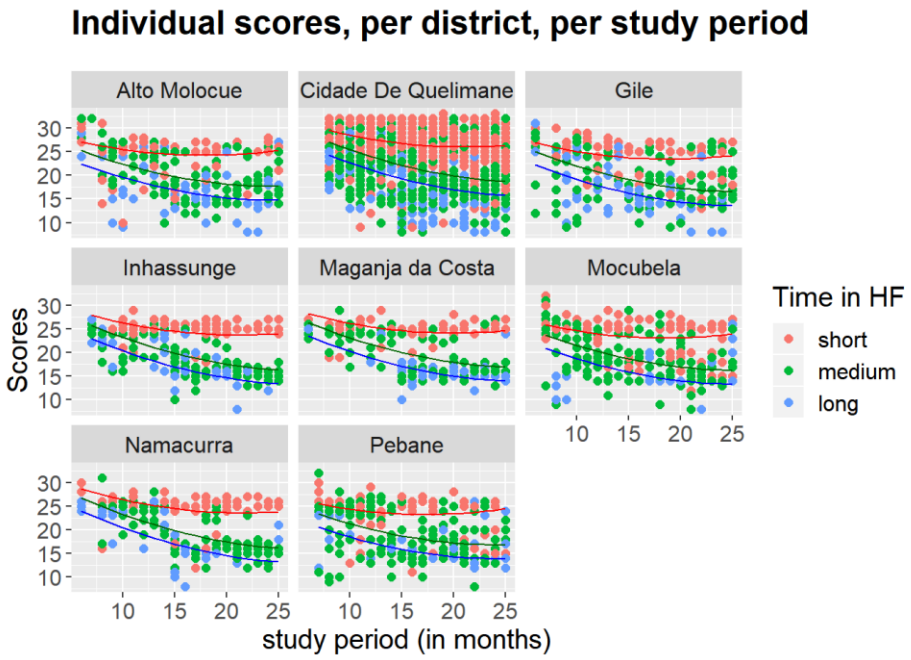


Figure 4. Trend of satisfaction score for short, medium and long time period spent at the health facility, per district.

Time spent at the HF was inversely correlated with satisfaction (Spearman correlation = -0.63). Varying the time spent in HF from 1.7 to 4.3 hours (first to third quartile) led to a decrease in the overall satisfaction score of 17% (95% CI: 16% - 18%) (**Figure 5**). We also regressed satisfaction score on the time spent in health facility using a linear model, while adjusting for age, sex, education level and whether the patient leaves alone or not. Results are displayed on **Table 9** below. Results did not differ significantly by sex education or age.

Table 9: Multivariable regression to assess factors associated with satisfaction score

	Estimate	95% Confidence interval
Time spent on health facility		
1.7 hours	Ref	
4.3 hours	-5.37	(-5.67, -5.08)
Age:		
25 years	Ref	
38 years	-0.06	(-0.43, 0.32)
Sex: Male	0.41	(-0.07, 0.32)
Education: Secondary or higher	-0.08	(-0.65, 0.49)
Living alone: Yes	-0.06	(-0.48, 0.36)

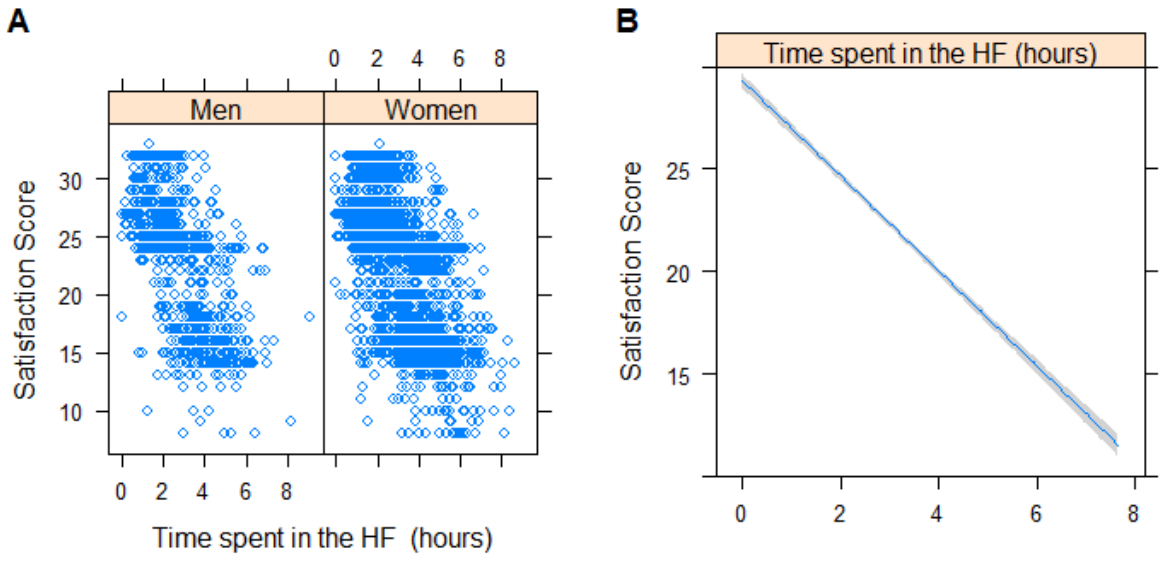


Figure 5. Satisfaction score as a function of time spent in health facility; (A) observations stratified by sex and (B) predicted values estimated via linear regression, with a 95% confidence interval.

5. Qualitative impressions on satisfaction

1. *Perceptions on patient satisfaction*

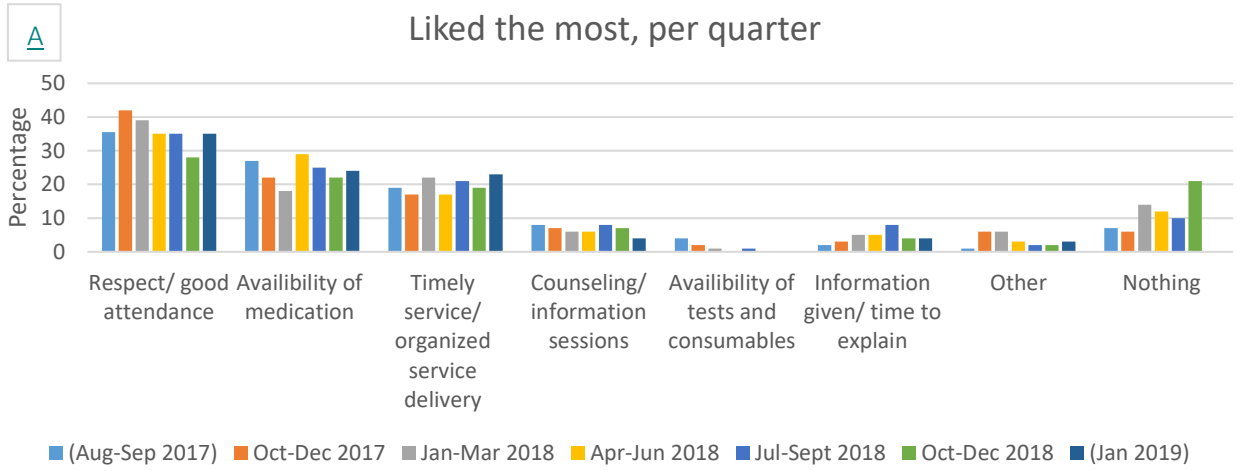
The survey included open-ended questions on patient satisfaction, with the following questions:

1) What did you like of the visit?
2) What did you not like of the visit?
3) What are the suggestions for improvement?

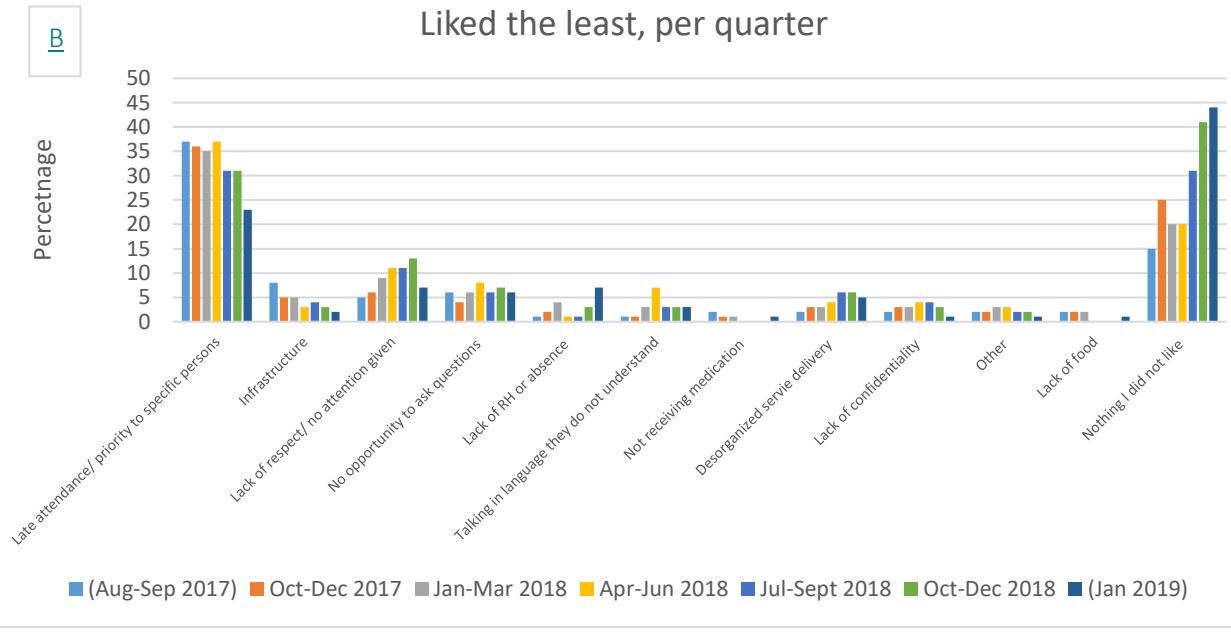
Responses were categorized and presented in **Figure 6**. For each month, 280 participants were asked this question. Over time, the reasons to like or dislike the visit had a similar frequency over time. Participants liked the visit when they receive information/explanation from HCW; receive counseling; receive their medication (and for family members); and get a quick and timely attendance. Participants disliked when there is a long waiting time (for different sectors); the HCW is absent or leaves their office; the HCW does not pay attention; and there is no space to sit, no space in the shade, or no space protected from rain.

Suggestions for improvement mentioned were: keep to working hours (starting on time); more HR (and who speak local language); respect; organization of pharmacy; organization of clinical files; rapid flow for patients (especially ART delivery at point-of-care); and better infrastructure (i.e., more space in clinic rooms and waiting area; benches; clean bathrooms).

A


Liked the most, per quarter
Percentage
50
40
30
20
10
0
Respect/ good attendance
Availibility of medication
Timely service/ organized service delivery
Counseling/ information sessions
Availibility of tests and consumables
Information given/ time to explain
Other
Nothing
(Aug-Sep 2017)
Oct-Dec 2017
Jan-Mar 2018
Apr-Jun 2018
Jul-Sept 2018
Oct-Dec 2018
(Jan 2019)

B


Liked the least, per quarter
Percetnage
50
45
40
35
30
25
20
15
10
5
0
Late attendance/ priority to specific persons
Infrastructure
Lack of respect/ no attention given
No opportunity to ask questions
Lack of RH or absence
Talking in language they do not understand
Not receiving medication
Desorganized servie delivery
Lack of confidentiality
Other
Lack of food
Nothing I did not like
(Aug-Sep 2017)
Oct-Dec 2017
Jan-Mar 2018
Apr-Jun 2018
Jul-Sept 2018
Oct-Dec 2018
(Jan 2019)

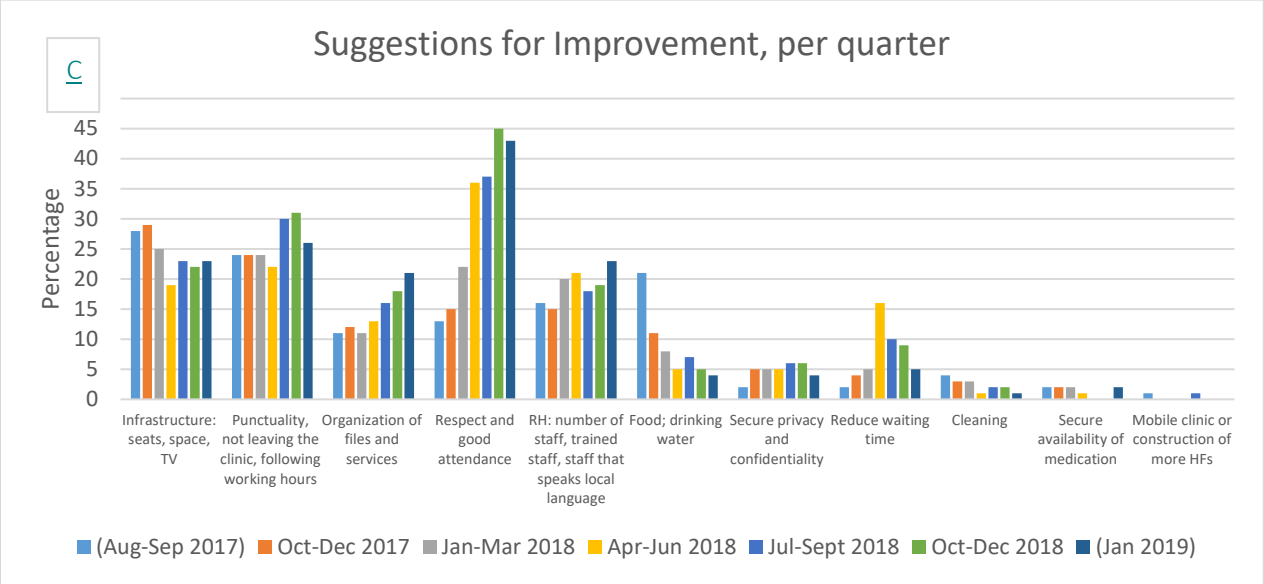


Figure 6. Reasons for satisfaction (A) and not-satisfaction (B) and suggestions for improvement (C) as per survey responses, October 2017-December 2018. (Percentage of those who responded affirmatively.)

2. In-depth interviews and focus group discussions

A qualitative study was done to understand perceptions and satisfaction among patients who are attending services and among those who missed a visit. Participants were also interviewed about their experiences at the health facility and about facilitators and barriers for adherence to care, as a possible result of non-satisfaction at the clinic.

Eleven focus group discussions (FGD were held with a total of 79 participants and 55 IDIs between August 30, 2019 and October 1, 2019. Among the 134 participants, 49 (37%) were male and 85 (63 %) female; 109 (81%) lived in rural areas and 25 (19%) in urban areas. The median age was 32 years (IQR 25-40 years). The average duration of the focus groups was 81 minutes, and the in-depth interviews were 28 minutes.

All participants demonstrated knowledge of the HIV services available in the study health facilities. Participants reported that the services they use frequently are TARV consultation, laboratory, pharmacy, and ANC.

a. Experiences of quality of service delivery

Positive experiences / satisfaction with the HF

In general, the respondents indicated that they felt satisfied at the HF when the waiting time to be attended was short, because this allows patients to return home and do their activities.

Participants from rural areas felt satisfied because of the availability of antiretroviral drugs, and the existence of the different models of care, specifically the “fast-track”, that, according to the participants,

makes service more flexible and reduces waiting time at the HF. This was more frequently mentioned by women.

> *"It was the time that I did the fast flow, my scheduled time was 13h, I arrived there and was immediately attended, and returned to continue with the other jobs". (IDI, Female, Alto Molócuè).*

Another factor that contributed to the interviewees' satisfaction was when providers give good information and explanation about HIV, about the importance of medication and how it should be taken, when providers explain the consequences of poor adherence to drugs and when they are explained about side effects of medications.

> *"It was at the moment when I became aware of the test result the way, the way health professionals motivated me enough to start immediately with ART treatment, because I didn't want to, through them I had a good explanation about HIV treatment, I took all my doubts related to this disease". (IDI, Female, Mocubela).*

Mainly women from rural areas said that they were satisfied at the HF when healthcare providers were attentive to the consultation and asked how patients were feeling, heard their concerns, clarified their doubts, and met their needs.

Some participants reported that they felt well attended at the clinician's visit, in the consultation with the nurse and with the counselor (VCT). Participants from rural areas said they feel well cared for in the pharmacy.

> *"I heard that there are nurses like the pharmacy that explains how to take the medications, others I also heard that they explain the patient about their concerns and needs during the care in case of doubts, they clarify the patients well, and by assisting when they went to look for patient who would have abandoned treatment ". (IDI, Female, Pebane).*

Another satisfaction experience reported by the participants was the respect of health providers. Respect included healthcare providers arriving timely at their workplace, not being angry when a patient missed an appointment, and keep attention to the patient (rather than talking on the phone during the clinic visits).

> *"Of all the services I received in this hospital where I was attended and I felt happy is in the pregnant women (ANC) the people who work there do not insult us or get angry with us, we can be late, they treat us with great affection. I remember one time I missed my appointment date but when I arrived, they took care of me well, they did not insult me, they only advised me that since I am pregnant I cannot be missing for my baby to be born healthy, that marked me a lot". (IDI, Female, Maganja da Costa).*

Other factors that contribute to the satisfaction of users in rural areas were the active tracing of patients missing their visit, and the introduction of new drugs with less side effects.

> *"I had a good experience for a year that marked me was that I abandoned treatment and they came to pick me up at home to start HIV treatment again as their own health, when it is mine. This concern of educating counselors of couples coming to my house to ask me the reasons that lead me to not adhere to the treatment, I see as something generous or considerate". (FGD, Female, Pebane).*

"The experience was good that when I started taking HIV treatment, the state of my health improved a lot and that the pills that are now coming are good because they do not cause itching, vomiting, nausea or fatigue, I hear comments from my fellow HIV patients, in this health unit". (FGD, Male, Pebane).

Other factors less frequently mentioned were the confidentiality of health professionals, providers giving priority to care for patients who are serious, receiving nutritional supplements, e.g., soy, having lectures before the consultation, having well-organized medical files so they are being easily located. Participants reported that they felt satisfied when the clinician informed that the level of CD4 cell count is high and viral load results are low/undetectable, health providers speak the local language or have someone who speaks the local language translate if the provider does not speak that language, there is space to sit while they wait and watch television, and all patients are always attended despite the delay.

Negative experiences/dissatisfaction

The main factor for not being satisfied with health services reported by the participants was the delay in receiving service. Another factor was the lack of respect, characterized by the fact that health providers are talking on the phone while patients wait or during the consultation, prioritizing attendance of family and friends (while other patients arrive earlier), arriving late at the health facilities, delaying the start of consultations, or interrupting the work by leaving the health facility. Additionally, poor service, described as lack of attention from the provider in relation to the participants' concerns, anger or insults by the provider, especially when the patient missed an appointment, or lack of manners when speaking with a patient during the consultation.

"Yes, they lose respect with us patients, just look at an individual who arrives at the hospital at 7 am, the clinician arrives at the hospital at 8 or 9 am, it is not a loss of respect? The clinician is treating the patient while talking to someone on the phone, is seeing pictures on the phone this is not a lack of respect?" (*IDI, Male, Gilé*)

"There are nurses who answer when they want, they start appointments late, like ten o'clock, others leave the sector, talking on the phone, others give priority to attending friends." (*IDI, Female, Mocubela*)

The lack of confidentiality (strangers enter the consultation or receive medication in an exposed place) was mentioned as a factor that contributes to the dissatisfaction. According to the participants, (especially women from rural areas), they were dissatisfied with care at the HF when providers do not give advice or clarify patients' doubts, when they do not ask how they are doing and do not give space for patients to voice their concerns. Male participants from rural areas stated that they are dissatisfied when providers collect blood for laboratory tests and do not give the results, and when there is loss of clinical files (resulting in a delay of attendance). One woman complained that health providers let patients wait longer when they had missed a visit or abandoned them at some time.

"I'm (...), with this question I'm going to regret a little, last month I also had these problems of losing processes, I don't know how they lose these processes, I was the first to arrive and I was the last to leave. We left the house early saying that I will be back early, but I end up leaving late, this causes the patient to end up giving up". (FGD, Male, Inhassunge).

*"There is a lot of lack of respect mainly on the part of nurses, this is because sometimes the files [*clinical records*] disappear, the patient waits too long to be able to find the process. If the file stays there [*in the health facility*] it disappears; so, where did it go?". (FGD, Female, Pebane)*

Other factors that contribute to the negative experience at the health facility and patient dissatisfaction included: distribution of soy (i.e., nutritional supplement) to only a few patients, or interrupting the distribution of the soy. Patients also expressed dissatisfaction with being asked to return to the health facility after the clinic visit for a separate blood collection, instead of completing all services on the same day. Patients reported being unsatisfied with the fact that their health care provider did not speak the same language as the patient, and some shared an impression that they received medication that would not relieve the specific pain/complaint. Other less mentioned factors were priority attendance given to patients who reportedly paid an (informal) fee (presumably to a health care worker), a perceived lack of interest from the clinician in the patient's well-being, and an absence of health care providers at the health facility. One person said that nurses take the medications/drugs and sell them on the market.

b. Adherence to HIV care and treatment

Facilitators of adherence to services

Few respondents mentioned factors that motivated them not to give up care. Some participants (often women from rural areas) reported that they take antiretroviral treatment (ART) to feel healthy, others mentioned that before starting ART they were very sick and did not expect to improve, but after starting the medication they improved, so they did not stop the treatment. Fear of relapse was another reason to adhere to care, according to respondents (mostly women from rural areas). According to them, health providers advised not to drop out because if they do, they could get worse and even die. Some women interviewed reported that they adhered to the treatment so that their babies would be born healthy.

"We may be missing, but we never stop doing the treatment because if we leave the treatment we can get worse". (FGD, Male, Maganja da Costa).

"When I stop coming here, I will be leaving my health". (*IDI, Female, Quelimane).*

"The motivation started with a lot of counseling, psychosocial support and I was also thinking about my health and the child as it would be". (*IDI, Female, Quelimane).*

Barriers to adherence to services

Overall, respondents reported that feeling better after starting ART made patients believe they are already well and therefore abandoned treatment. Another factor that contributes to absence or abandonment is the shame that other people may know they are undergoing treatment and the neglect of patients.

"Because we also feel ashamed in the community every time we leave each month, people ask where we go to and we don't have a response" (FGD, Male, Maganja da Costa)

On the other hand, participants from rural areas reported that patients gave up care because of the distance from home to the HF combined with lack of transportation and lack of food.

"Long waiting times against people who go from far away looking for health care and without eating anything and with strong medications are very complicated". (IDI, Female, Mocubela).

Respondents reported that the delay in service at the HF made patients prefer to stay at home or seek care at another HF. This was frequently mentioned by respondents in rural areas and by women. According to the participants, they traveled long distances and still made an effort to arrive at the HF early while the health providers arrived late at the HF causing the service to start late, which made them wait a long time in line and return home at night. They stated that when this happens, they are afraid to go to the next appointment because they don't want to go through the same experience.

"I think so, because I missed a lot last month, since I only came back at the end of the day since morning, so when I thought about that week I preferred to go to the other hospital in Nante, there I was considered a fault, this delay problem demoralizes us much". (FGD, Female, Maganja da Costa).

In addition to the distance, poor service, and lack of respect at the HF, characterized by the fact that providers may be angry with patients when they miss an appointment, or let known patients who arrived late for the appointment to enter before those who were already at the HF, or when the health provider is talking on the cell phone. A respondent stated that there are patients who, due to bad treatment, ask someone else to go to the HF to collect the medication as they preferred not to return.

"Brother, have you heard of or followed that some patients, who have this HIV disease and started treatment are absent until some abandon the treatment, have you heard of it?
P - Yes, I have already followed up until I was one of them in 2018 I stayed at home 6 months at home.
E: So, brother, for this to happen what have been the reasons?
P - These reasons are these of bad attendance". (IDI, Male, Gilé).

"I think it contributes to the extent that poor service means that when we return to our homes we think negatively to return the next time." (FGD, Female, Alto Molócuè)

Side effects of medications have also been described (most often by women in rural areas) as barriers to treatment adherence. Some patients are afraid of taking ART because of this belief that when a person takes ART, he gets HIV.

"In my opinion, I think it is a lack of perception or they are mistaken when they are there in the community that this HIV disease person gets at the hospital through ART drugs. So when the person has a low level of education or poor mentality, they conceive this and end up not returning to the health unit". (IDI, Female, Namacurra).

Other participants reported that they have stopped going to the HF due to other occupations or trips to other places without taking a transfer guide, which makes it difficult to collect drugs in other HF outside their own.

"It happened to me, not because I gave up the treatment, but when I felt the need to go to Maputo, then I came here and asked for the transfer and went to continue at the Mavalane General Hospital. So, when I got there I was received and continued with the treatment, and when I returned from Maputo, I went to the health unit in Namacurra. And when I returned to Namacurra, I felt the need to travel again and when I returned to ask for the transfer again, I was forbidden on the grounds that I should settle and not be constantly asking

for a transfer, that's when I left because I also have responsibility and I have a family". (FGD, Male, Namacurra).

Other barriers mentioned by the respondents were: the fact that some patients do not accept or believe in their HIV positive result, weak HIV counseling, lack of bathrooms at the HF, fear of a partner knowing the serostatus, and the lack of privacy at the HF.

"There is no privacy, and this is what leads some patients to leave, not because they want to, but for lack of better patient care, it arrives at 6 am to be attended quickly and return home to do other activities. the patient only leaves the health unit at 15 or 16 hours hungry, so another consultation does not come, he prefers to die at home". (IDI, Male, Alto Molócuè).

One participant revealed that some patients take ARVs on alternate days (every other day) so that they do not have to go to the HF every month, another participant reported that the fact of not being able to read leads to not being able to read the date of the next appointment, thus missing some appointments. According to some participants, patients may miss or abandon treatment when the husband prohibits taking ART, the person is not in good health and is unable to go to the HF to pick up the drugs, and they do not have someone to take care of the children when they go to the HF.

c. Suggestions to improve patient satisfaction with services and adherence

The participants reported that for patients to improve adherence to HIV services, the waiting time at the HF should be shortened. They suggested that consultations start on time (at 7 am), health providers attend to patients quickly, respect the queue (do not attend to the acquaintances first while there are people waiting), and avoid talking on the cell phone during working hours.

"I would like that if it weren't for many people to call the nurses in this hospital here, but not all, stop answering the phones when there are many patients to attend visas, there is not much space there in that part of care for HIV-positive patients. We don't all fit on the balcony and many of us stayed outside waiting for the call. A person arrives at the hospital at 7:30 am to be attended at 12 pm, because the nurse is busy with phone calls while there are many people in the sun and in the queue waiting to be attended". (IDI, Male, Quelimane).

"Working for us all will not be possible, but we will have a fast and dignified service so that each one of us as soon as possible goes to his business or his field is already very good". (FGD, Male, Alto Molócuè).

Participants recognized that sometimes the delay is due to the fact that there are many patients and few providers to meet the demand and suggested increasing the number of nurses.

"They treat us with respect, only health professionals are few and patients are many, if there were more health professionals working, care would be quick". (IDI, Male, Quelimane).

Additionally, the respondents (mostly men from rural areas) stated that different models of care should be used to make care more flexible and to reduce waiting time at the HF with greater emphasis on the one-stop-model. According to the participants having to go through many rooms (counseling, consultation, laboratory, and pharmacy) causes them to spend a lot of time at the HF. Additionally, receiving care in a

single office would ensure patient privacy. Other models mentioned by the participants were fast-tracked and quarterly and half-yearly pick-up.

> *"What I would like, even I am not alone in all the patients, what we regret the most for a long time asking the people who care for us and the heads of this health unit is that we have a single care office. Because, there we could take more than one people already knew that when they left there, they would leave once and for all, that is: with everything done, consultation, analysis, advice and medications". (IDI, Female, Namacurra).*

> *"I ask that we be picking up medications in three months because it gives you time and quick flow care, it also allows patients to have quick care and continue with other activities". (IDI, Male, Gilé).*

To overcome the distance barrier, a large number of participants from rural areas suggested that health units be built close to the community; additionally, participants suggested community distribution of ART. A few patients suggested that the HF should provide transportation for patients who live far from the HF.

> *"If we could give a medical post in our communities, because many people end up giving up because of the distance, having a post even if someone had an impediment would create time to run to the hospital, if it is close". (FGD, Female, Maganja da Costa).*

> *"I would like the activists, during the process when they come to the community to visit, to collect our cards to collect cards (pills) and bring us here in the community, and just go to the hospital on those dates when we have an appointment." (FGD, Male, Maganja da Costa)*

Participants (mostly women from rural areas) indicated they would like to have food support. They said that everyone who is undergoing ART should receive food supplements such as soy because patients who see others receiving soy when they do not will be demoralized and may not return to consultations. For the participants who do receive and consume soy or food supplement, it helps to mitigate the side effects of ART and helps to endure the long hours of waiting at the HF.

Another factor that participants believe would improve users' satisfaction is the reinforcement of HIV counseling. Participants felt that providers should advise patients not to give up treatment; they should be aware of patients' concerns and if they have doubts, they should clarify. Patients in rural areas suggest that awareness/information sessions on HIV should be given in the community, including churches, to encourage people not to give up treatment and to explain the existing dangers if they abandon ART.

> *"Improvement for me and in my view was that our nurses respected the patients (treating them well, giving the patient a treat) explaining that they could not abandon the drugs, not forget their date of lifting the pills here at the hospital, that way we would feel satisfied. So they don't talk about it, the patient arrived or was absent they don't have that mechanism of how to talk to the patient giving him some advice on how he can't miss, ask the patient why he is missing a lot which is the reason for many absences to come up medications, show the patient the damage of not taking what consequences the person may have". (IDI, Male, Quelimane).*

In order to improve care, some respondents suggested that only nurses who are empathic and respectful should be hired. Some suggested that supervision of the nurses' work must be done because this makes them punctual and attend to patients well.

"First, to improve to a good level of contentment, I would like there to always be supervision, because without supervision, employees relax, which is not the preference of the State given that the stipulated time of entry into the State is 7 hours and they increase one more hour that they arrive 8 hours. With supervision, they will abandon this habit. Secondly, to place in those clinical sectors that want to work, that have a vocation, that respect patients above all who have feelings for human beings, and do not accumulate waiting line". (IDI, Male, Molócuè)

Some participants (mostly men from rural areas) suggested that health facilities should be improved, by increasing the number of offices since some health units are small and patients are crowded. They suggested adding benches and shade so that patients waiting to be seen have a comfortable place, potentially with television, water, and bathrooms.

6. Health Communication

The amended protocol included an evaluation of health information and communication. From August to September 2019, 266 patients responded to the survey. Among them, 149 (56%) were women, 97 (36%) resided in urban areas, and 47 (18%) had no formal education. The median age was 35 years (IQR 26-42 years). Twenty-two (8%) participants reported Portuguese as their native language, but 147 (55%) reported being fluent in comprehension of spoken Portuguese (**Table 10**). The median satisfaction score was 78 (56-84) among this group; 78 (59-88) for men and 75 (56-81) for women.

Table 10. Characteristics of participants (n=266)

		n (%)
District		
	Alto Molócuè	13 (5%)
	Quelimane	169 (64%)
	Gile	14 (5%)
	Inhassunge	14 (5%)
	Manganja da Costa	14 (5%)
	Mocubela	14 (5%)
	Namacurra	14 (5%)
	Pebane	14 (5%)
Gender		
	Female	149 (56%)
	Male	117 (44%)
Age		
	Mean	35 (sd 11)
Education		
	Never went to school	47 (18%)
	Primary	142 (53%)
	Secondary	74 (28%)
	University	2 (1%)

	Other	1 (0%)
Native language		
	Port	22 (8%)
	Other	242 (91%)
	No response	2 (1%)
Self-report of comprehension of spoken Portuguese		
	Fluent	147 (55%)
	Weak	103 (39%)
	None	16 (6%)
Reason for HF visit		
	HIV testing	2 (1%)
	ART care	1 (0%)
	Routine HIV care	258 (97%)
	Non-routine HIV care	9 (3%)
	Other non-HIV care	11 (4%)
Services received*		
	Adult ART Care	213 (80%)
	Pediatric ART Care	10 (4%)
	TB-HIV coinfection	11 (4%)
	Youth Clinic	3 (1%)
	Antenatal Care	22 (8%)
	Child at risk clinic	9 (3%)
	Lab	38 (14%)
	Pharmacy	210 (79%)
	Psychosocial Support Services	112 (42%)
	Other	18 (7%)
Attended in preferred language		
	Yes	193 (73%)
	No	73 (27%)

*All that apply.

Appendix 2 shows the details of the results as additional tables. Respondents reported to have few means of getting information at home: TV (92, 35%), radio (100, 38%), telephone with radio (37, 14%), internet (11, 4%), newspaper (3, 1%), and leaflets (20, 8%). The most frequently used are daily TV and radio: 99 (37%) reported using the TV daily at home (61% unanswered) and 104 (39%) responded that they use the radio (radio or cellphone-radio) daily at home (59% unanswered).

Regarding the means in the community to receive information, most of the interviewees answered that they did not use public or private places to watch TV (217, 81.58%), free places to watch TV (225, 84.59%), paid places to watch movies (196, 73.68%), and did not have free places to watch movies/videos (229, 86.09%).

With regard to community media from which they received health information, 86 (32%) of respondents answered that they had received it from a conversation with family members, 83 (31%) replied that they had received it on radio, and 77 (29%) on TV. Reported sources for health information in the community

were mainly conversations with peer educators (80, 30%) or family members (71, 27%), or discussion sessions (75, 28%) facilitated through lectures.

The preferred media to receive health information were conversation with health workers (109, 41%), information sessions ("*palestra*") (65, 24.44%), and conversations with peer educators (38, 14%).

Ninety (34%) respondents said they remembered 'a lot' of the content of the information received, 89 (33%) 'reasonably' remember, and 61 (23%) remember 'a little'. However, 214 (80%) considered that the information was not clear. Nevertheless, 255 (96%) considered the information to be reliable, and 257 (97%) considered the information to be useful. Many (245, 92%) shared information with someone, and the most frequently mentioned persons that they shared information with were their partner (161, 75%) and a family member (161, 61%).

With regard to information on HIV, 248 (93%) said they had heard about HIV. The most frequently mentioned sources of information were community talks (108, 41%), radio (106, 40%), and 96 (36%) through a conversation with a health care provider. Similarly, 237 (89%) of respondents have heard of tuberculosis, with source of [insert number] 35% on radio, 91 (34%) through community talks, and 84 (32%) through conversations with health care providers.

Discussion

This study in Zambézia was conducted over a period of 18 months, in 20 health facilities within 7 of the 21 districts in the province. Although not covering all districts, the study gives an important portrait of the satisfaction of health services and the association with retention in the province.

Almost two-thirds of the study population were from Quelimane district, with mainly urban/peri-urban characteristics. Three-quarters were women, and almost all came to the health facility for their routine HIV care. Half of the respondents said they were attended in the preferred language.

Overall, the participants gave high satisfaction scores for the services received at the selected public health facilities, with some variation between the districts. This is consistent with previous findings of patient satisfaction in Manica, another rural central province in Mozambique (14). A decrease in overall satisfaction score seen in our results after the first six months could be explained by the change in methodology of visits for survey facilitation, when the sites began being visited in a random manner rather than at a fixed time in the month, a slight alteration that was made to reduce any unintended influence on provider and/or patient behavior and/or interactions on survey days. At approximately the same time, FGH's support changed in February-March 2019, with more intensified support visits to the health facilities (from provincial and national level) that could have influenced satisfaction with services. During the following period (after March 2019), satisfaction scores were variable in the different districts.

A positive association was seen between level of satisfaction and retention to care at 6 and 12 months. This finding was expected; and it tracks with a recent study in Nigeria which found higher patient satisfaction was associated with increased retention in care. However, our results show the probability of being retained

at 6 or 12 months did not increase with increasing satisfaction related to specific components that contribute to the general satisfaction score. It does show the importance of receiving information about the disease or one's health and having time with the provider. The communication survey, although with a small sample, also indicates the importance of the role of health care provider and peer educators (i.e., volunteer community health workers).

When looking at the time that a person spends from arrival at the health facility until the end of the visit, an inverse correlation was seen: the longer one stayed at the health facility, the lower their probability of being retained 6 months later. The effect was stronger for one-year (12 months) retention, raising attention to the known issue of time spent at the health facility as a continued problem contributing to patient dissatisfaction, frustration, and/or care abandonment. Long wait times have consistently been reported in other studies within the region as a barrier to and/or a common complaint about care (14–16). Interestingly, the satisfaction sub-scores related to waiting time to be attended was not a factor that affected retention during the survey period. It is possible that patients do not mind waiting to be attended if they perceive the health care visit to be of good quality. A pilot on scheduled consultations in Mozambique showed in a qualitative study that this could reduce waiting time and seems to be acceptable by clients (17).

The qualitative interviews confirm that staying almost full days at the health facility, without conditions such as space to sit, shade, washing rooms/bathrooms, water or food availability, etc. influences satisfaction, aspects of which are supported by a 2014 patient satisfaction study in South Africa (15). It is also seen that over time the same reasons for liking or disliking the health facility visit were consistently mentioned.

Despite the high overall satisfaction score, there were important factors influencing patient satisfaction. Qualitative results show that respect, and receiving explanations by the health provider, especially on side effects, is important. The introduction of new treatment regimens influenced perceived satisfaction. Factors negatively influencing satisfaction were perceived disrespect (especially related to past absences/missed appointments), providers picking up/attending their phone during the consultation, and the perception that certain patients are prioritized to receive care over others. It is important to educate patients on priority populations to receive services, such as pregnant, elderly, or CAG members. These findings are consistent with other regional results highlighting that the quality of interactions with health care providers can serve as a prominent barrier to initiation and/or continuation in HIV care and other related services (15,16,18,19).

It is likely that there are distinct factors related to human resources (HR) not directly addressed within this evaluation that may be driving performance of roles/responsibilities, as well as patients' perception of worker/volunteer performance within the provincial level health system and facility-based services. Though we did not investigate in this study for associations between specific HR-related factors and patient satisfaction scores nor retention outcomes, we know that weaknesses and opportunities related to HR within the health system have been identified in other assessments. For example, the Manica study found patient satisfaction to be positively associated with increased level of training among providers (14). Future program evaluations related to patient satisfaction need to assess any potential HR effects on patient outcomes.

Additionally, the informativeness of future patient satisfaction evaluations in our supported sites may be improved by including more questions directed at perceptions about the availability of specific services and/or programs. For example, other studies have found positive patient satisfaction results related to availability of laboratory (20), family planning (18), mHealth/SMS (21), nutrition (22), and alternative hours services for patients (23), as well as patient-centered companion policies (24). Having patient feedback regarding specific available services/interventions, and assessing for potential associations with retention, could promote effective tailoring within programs.

Regarding health communication, it is interesting that although 80% of the survey respondents considered that the information they received about health was not clear, 96% considered the information to be reliable. Therefore, it can be argued that the main sources of information are considered trustworthy, so much so that 92% of participants reported they shared the information with someone. The data lead us to speculate that it may be necessary to carry out work to improve content and the way in which information should be passed on to other people. While care enrollment is a precursor for satisfaction with services, a known facilitator for initiating ART at the health system is adaptation of counseling and education to patients' specific needs, underscoring the importance of clear communication at every step in the care cascade(16).

When analyzing the preference for type of media for health information, it seems there is an opportunity for health workers, activist lecturers and peer educators to receive enhanced training for serving a more prominent role as patients' preferential sources for receiving health information. Activities to promote the improvement of interpersonal communication skills are a costlier investment. It is recommended that the investment effort to improve the clarity of health information provided should undergo research that clearly identifies why the information received by the beneficiaries may or may not be considered clear and identify improvement measures.

Additionally, in relation to the information received about HIV and TB, radio, community talks and conversations with health care provider(s) are the key sources for this information. Surprisingly, radio was not indicated as a preferred communication channel. Given that radio's potential reach is to over 18 million inhabitants nationwide, including 3.1 million inhabitants in Zambézia, and its relatively cheap cost to use (i.e., unit cost per inhabitant), it is important to investigate reasons for being a less preferred source for health communication, and address any shortcomings identified in order to improve the quality of information offered through community radio stations.

Conclusions/Recommendations

Patient satisfaction in general was relatively high, with some variation over the evaluation period. While no significant association was seen between individual satisfaction scores and retention at 6 months, interpersonal factors related to the provider-patient interaction appeared to be the main drivers of retention over the long term. Importantly, a positive health worker's attitude, provision of undivided attention towards patients, and delivery of accurate information about the patient's health increased satisfaction and retention to care. Promotion of patient-centered care, including training and mentoring resources for health

care providers related to empathy-building and positive patient-provider relations are critical elements to achieving increased patient satisfaction and keeping patients engaged in care.

Patient satisfaction was driven largely by time spent at the health facility, which was also associated with retention in care. Differentiated models of care to decongest crowded health facilities (e.g., 3-monthly or community drug dispensation, 6-monthly clinical consultations, or other models) need to be urgently taken to scale to decrease patient wait times.

As this evaluation found that higher patient satisfaction scores were associated with increased retention in HIV care and treatment, it is incumbent on us to understand and address patient-reported suggestions for clinical service delivery, particularly those factors significantly associated with being retained in care. By responding directly to patients' self-identified needs/preferences, patient satisfaction will be promoted and retention in care and treatment improved.

Dissemination Plan

Preliminary and final results have been discussed within a priority stakeholder group of investigators and collaborators. The preliminary results have been discussed with the Provincial Health Directorate in Zambézia (DPS-Z). Preliminary results related to the correlation between interpersonal patient satisfaction factors and retention in care were presented in a poster exhibition at the *AIDS 2020 Virtual Conference* in July 2020 (abstract #PED0881) and presented as a poster presentation at the *INTEREST 2020 Conference* in December 2020 (Abstract #459). Results highlighting a mediation effect of patient satisfaction scores on odds of being retained in care were presented as a mini-oral presentation at the *INTEREST 2020 Conference* in December 2020 (Abstract #12) as well. These results are also being submitted for the INS *Jornadas Nacionais 2021 Conference*, and if accepted will be presented in Maputo, Mozambique in September 2021. Additionally, a manuscript with our cumulative findings is currently being developed for submission to a peer-reviewed journal for wider public dissemination.

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Appendices

Appendix 1: Evaluation protocol

The final approved protocol (Version 5.0, December 4, 2018) is submitted along with this report, and contains all data collection instruments, informed consent forms, project timeline, evaluation project budget/ costs, and conflict of interest statements signed by co-investigators.

Appendix 2. Communication survey - Additional Tables

Sources and use of information

	n (%)		n (%)
What are the ways of getting information you have at home?		What are the ways of getting information you have at community?	
TV		Paid place to watch TV	
No	169 (64%)	do not use	217 (82%)
Yes	92 (35%)	yes, use	24 (9%)
no response	5 (2%)	no response	25 (9%)
Radio		Free place to watch TV	
No	161 (61%)	do not use	225 (85%)
Yes	100 (38%)	yes, use	11 (4%)
no response	5 (2%)	no response	30 (11%)
Cell phone - radio		Paid place to watch video/film	
No	222 (83%)	do not use	196 (74%)
Yes	37 (14%)	yes, use	44 (17%)
no response	7 (3%)	no response	26 (10%)
Internet		Free place to watch video/film	
No	247 (93%)	do not use	229 (86%)
Yes	11 (4%)	yes, use	7 (3%)
no response	8 (3%)	no response	30 (11%)
Newspaper		other places	
No	256 (96%)	do not use	207 (78%)
Yes	3 (1%)	yes, use	8 (3%)
no response	7 (3%)	no response	51 (19%)

Leaflet			
	No	237 (89%)	
	Yes	20 (8%)	
	no response	9 (3%)	
Other			
	No	236 (89%)	
	Yes	4 (2%)	
	no response	26 (10%)	
How often do you use media in the household			How often do you use media in the community
TV			Paid place to watch TV
	Daily	99 (27%)	Daily 18 (7%)
	Weekly	5 2%)	Weekly 9 (3%)
	Monthly	0 (0%)	Monthly 1 (0%)
	No response	162 (61%)	No response 238 (89%)
Radio			Free place to watch TV
	Daily	104 (39%)	Daily 3 (1%)
	Weekly	3 (1%)	Weekly 6 (2%)
	Monthly	1 (0%)	Monthly 0
	No response	158 (59%)	No response 257 (97%)
Radio through cellular phone			Paid place to watch videos or movies
	Daily	38 (14%)	Daily 19 (7%)
	Weekly	2 (1%)	Weekly 29 (11%)
	Monthly	1 (0%)	Monthly 4 (2%)
	No response	225 (85%)	No response 214 (80%)
Internet			Free place to watch videos or movies
	Daily	12 (5%)	Daily 0
	Weekly	0.0	Weekly 5 (2%)
	Monthly	0	Monthly 0
	No response	254 (95%)	No response 261 (98%)
Newspaper			Other
	Daily	0	Daily 6 (2%)
	Weekly	3 (1%)	Weekly 0
	Monthly	0	Monthly 0
	No response	263 (99%)	No response 260 (98%)
Leaflet, posters etc.			
	Daily	4 (2%)	
	Weekly	10 (4%)	
	Monthly	4 (2%)	
	No response	248 (93%)	
Other			

Daily	5 (2%)
Weekly	1 (0%)
Monthly	0
No response	260 (98%)

Receiving health information

Which means of communication through which you received health information	At home	In community	At health facility
TV	77 (29%)	5 (2%)	1 (0%)
Radio	83 (31%)	38 (14%)	0
Internet	2 (1%)	0	0
Community talk	28 (11%)	75 (28%)	143 (54%)
Conversation with health provider	29 (11%)	15 (6%)	229 (86%)
Conversation with activist or peer educator	33 (12%)	80 (30%)	130 (49%)
Conversation with friend	51 (19%)	57 (21%)	8 (3%)
Conversation with spouse	44 (17%)	28 (11%)	5 (2%)
Conversation with family member	86 (32%)	71 (27%)	8 (3%)
Conversation with healer	11 (4%)	9 (3%)	0
Brochure or poster	11 (4%)	13 (5%)	22 (8%)
Theater	7 (3%)	19 (7%)	5 (2%)
Work	1 (0%)	4 (2%)	1 (0%)
School	8 (3%)	16 (6%)	1 (0%)
Church	4 (2%)	50 (19%)	2 (1%)
Community Event (Informative movies on health with discussions)	3 (1%)	7 (3%)	2 (1%)
Ministry of Health Campaign	5 (2%)	34 (13%)	9 (3%)
Other	7 (3%)	5 (2%)	0

Preference and clearness of health information

Preferred communication mean (for health information)	
TV	21 (8%)
Radio	16 (6%)
talk/palestra	65 (24%)
conversation HCW	109 (41%)
conversation peer	38 (14%)

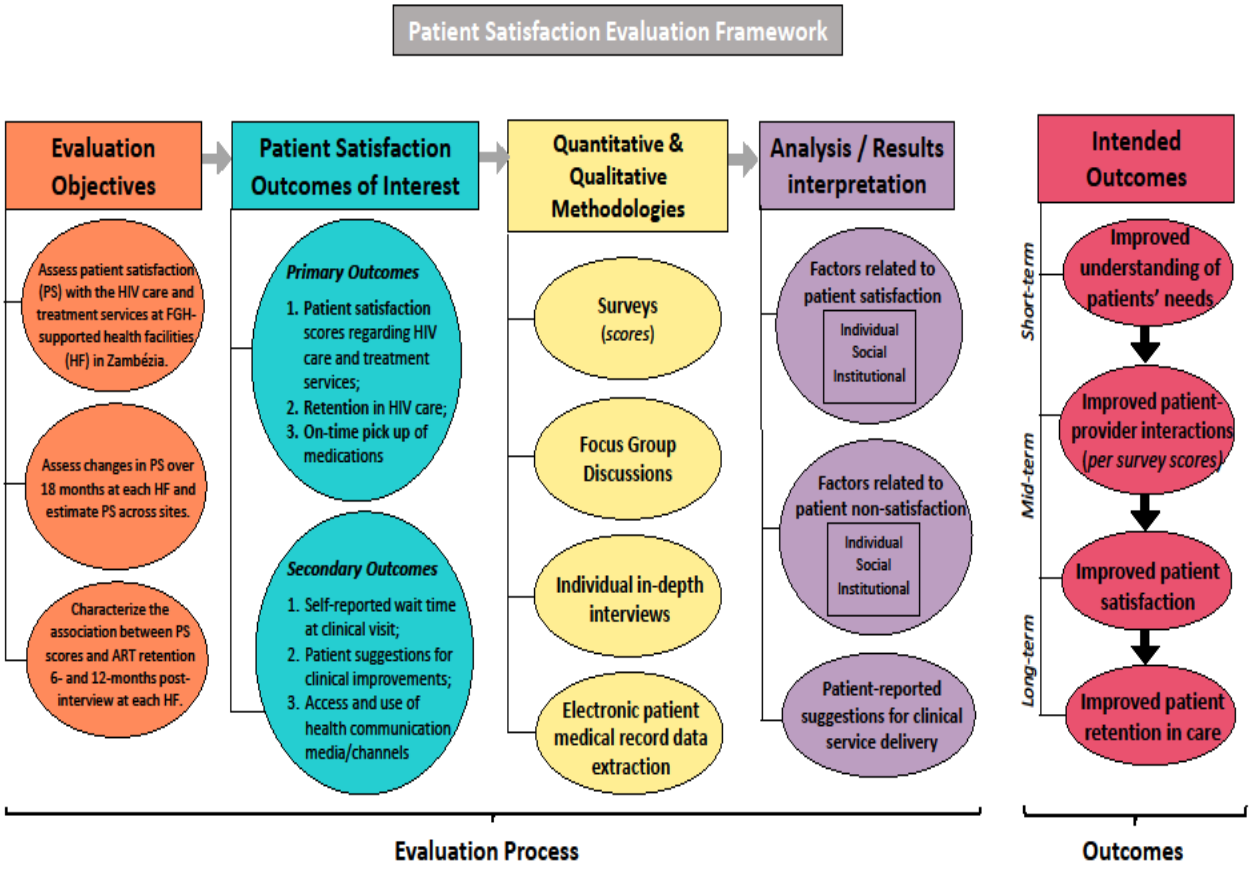
	conversation friend	2 (1%)
	conversation partner	3 (1%)
	conversation family	7 (3%)
	theatre	1 (0%)
	community event	1 (0%)
	Other	2 (1%)
	No response	1 (0%)
Do you remember the content of the health information you received?		
	No	22 (8%)
	A little bit	61 (23%)
	Somewhat	89 (33%)
	A lot	90 (34%)
	No response	4 (2%)
Was the information clear		
	No	214 (80%)
	Yes	40 (15%)
	No response	12 (5%)
Did you find the information reliable		
	No	4 (2%)
	yes	255 (96%)
	No response	7 (3%)
Was the information helpful		
	No	2 (1%)
	Yes	257 (97%)
	No response	7 (3%)
Did you share the information with anyone?		
	No	17 (6%)
	Yes	245 (92%)
	No response	3 (1%)
With whom did you share		
	Partner	199 (75%)
	Friend	80 (30%)
	Family member	161 (61%)
	Neighbor	43 (16%)
	other	5 (2%)
What did you do with the information received		
	Nothing	32 (12%)
	Talked to somebody about it	112 (42%)
	Handed leaflet to somebody to read	2 (1%)
	Talked to somebody to have more information	99 (37%)
	Other	14 (5%)

No response	7 (3%)

Information on HIV / TB

Have you heard about (not counting with the information you might have heard today)	**About HIV**	**About TB**
No	17 (6%)	22 (8%)
Yes	248 (93%)	237 (89%)
No response	1 (0%)	7 (3%)
What was the source?		
TV	89 (33%)	73 (27%)
Radio	106 (40%)	92 (35%)
Internet	6 (2%)	1 (0%)
Community talk	108 (41%)	91 (34%)
Conversation with health provider	96 (36%)	84 (32%)
Conversation with activist or peer educator	59 (22%)	51 (19%)
Conversation with friend	71 (27%)	38 (14%)
Conversation with spouse	31 (12%)	13 (5%)
Conversation with family member	71 (27%)	52 (20%)
Conversation with healer	15 (6%)	9 (3%)
Brochure or poster	17 (6%)	32 (12%)
Theater	16 (6%)	17 (6%)
Work	0	4 (1%)
School	27 (10%)	18 (7%)
Church	10 (4%)	10 (4%)
Community Event (Informative movies on health with discussions)	2 (1%)	5 (2%)
Ministry of Health Campaign	30 (11%)	26 (10%)
Other	4 (2%)	3 (1%)

Appendix 3: Evaluation framework



Appendix 4: Principal Investigator's Bio-sketches

Principal Investigator: Carolyn Audet, PhD, MSc

OMB No. 0925-0001 and 0925-0002 (Rev. 03/2020 Approved Through 02/28/2023)

BIOGRAPHICAL SKETCH

NAME: Audet, Carolyn M.

POSITION TITLE: Assistant Professor, Department of Health Policy and Vanderbilt Institute for Global Health

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Princeton University, Princeton, NJ	AB	2000	Complex Civilizations
Vanderbilt University, Nashville, TN	MA	2003	Anthropology
Vanderbilt University, Nashville, TN	PhD	2006	Anthropology
Vanderbilt University, Nashville, TN	Post-Doc	2009	Global Health
London School of Hygiene & Tropical Medicine, UK	MSc	2013	Epidemiology
Washington University in St. Louis, St. Louis, MO	Fellow	2018	Implementation Science

A. Personal Statement

I am a medical anthropologist and epidemiologist specializing in implementation and dissemination science in global health settings. I am a tenure-track assistant professor in the Department of Health Policy at Vanderbilt University Medical Center. I recently completed an Implementation Research Institute Fellowship at Washington University in St Louis where I spent two years developing and shaping implementation research skills, including the development of qualitative and quantitative metrics for implementation success. Funded by a K01 award from NIMH (2015-2020), I developed a program to integrate traditional practitioners as coaches in patient referral and continuing care for newly diagnosed HIV-infected patients. I am currently testing new strategies to encourage traditional healers to use appropriate personal protective equipment (NIAID R21 2020-2022) and provide HIV testing for those afraid of seeking services at the health facility (NIMH R34 2020-2023).

The engagement of family and the social network of patients and coaches in care delivery has been a focus of my research. I have developed a community and clinic-based system to engage male partners in ANC to increase uptake of services among pregnant woman (including HIV testing and treatment), hospital delivery, and post-natal care services in low-resource settings. To engage male partners, I have led several studies designed to encourage behavior-change through the de-stigmatizing of negative gender roles, the incorporation of traditional birth attendants into the health system, and changes in clinical flow-including the inclusion of male partners in ANC visits. I am currently the PI of a NIMH R01 award (2017-2022) Partners-based HIV Treatment for Seroconcordant Couples attending ANC testing a novel strategy to deliver HIV medications to seroconcordant HIV-infected couples in rural Mozambique.

In this proposal, I will serve as a preceptor, specifically an implementation science expert. I will contribute to the training of fellows as they learn more about research design, evaluation and analysis of evidence-based interventions on clinical and implementation outcomes, including reach, adoption, implementation fidelity, and maintenance.

B. Positions and Honors

Positions and Employment

01/06 – 12/08 Lecturer, Department of Anthropology, Vanderbilt University
09/08 – 10/09 Research Fellow, Institute for Global Health, Vanderbilt University
11/09 – 03/13 Research Assistant Professor, Department of Preventive Medicine, Vanderbilt University
04/13 - Present Positions as listed in “position title” above at Vanderbilt University

Honors and Memberships

2004 Center for the Study of Religion and Culture Summer Fellows Award, Vanderbilt University
2012- present Newman's Society, Vanderbilt University
2012- present Member, American Evaluation Association
2011- present Member, American Anthropology Association
2010- present Member, International AIDS Society
2013- present Member, American Psychological Association
2015- present Member, American Society for Tropical Medicine and Hygiene

C. Contributions to Science

1. **Engaging traditional healers as healthcare extenders:** I have developed a system to effectively engage traditional healers in the allopathic health system in rural Mozambique. In Mozambique, 60% of newly diagnosed HIV-infected patients first visited a traditional healer before seeking allopathic care. My research has focused on assessing the impact of this behavior on patient health outcomes, understanding the practices of traditional healers, and assesses their potential as allopathic health care extenders in low-resource environments.

a. **Audet CM**, Salato J, Blevins M, Silva W, Gonzalez-Calvo L, Vermund SH, Gaspar F. Occupational hazards of traditional healers: Repeated unprotected blood exposures risk infectious disease transmission. *Trop Med Int Health*. 2016 Nov;21(11):1476-80. PMCID: PMC5093076.
b. **Audet CM,** Sizzy Ngobeni, Mevian Mkansi, Floidy Wafawanaka, Muktar H. Aliyu, Sten H. Vermund, and Ryan G. Wagner. An Unrecognized Key Population? Traditional treatment practices associated with HIV risk among traditional healers in rural South Africa. *AIDS* 08 October 2020 PMID: 33048882
c. **Audet CM**, Elise M. Clemens, Sizzy Ngobeni, Mevian Mkansi, Daniel E. Sack*, Ryan G. Wagner. Throwing the bones to diagnose HIV: Views of rural South African traditional healers on undertaking HIV counselling and testing. AIDS Care. 04 August 2020.
d. **Audet CM**, Ngobeni S, Wagner RG. Traditional healer treatment of HIV persists in the era of ART: a mixed methods study from rural South Africa. *BMC Complement Altern Med*. 2017 Aug;17(1):434. PMCID: PMC5577748.

2. Improving prevention of mother-to-child transmission service delivery and uptake among HIV-infected women: My work in Nigeria and Mozambique has focused on the development of innovative service delivery improvements and the engagement of community agents to increase HIV testing and treatment uptake. In Mozambique I was the PI of a ViiV Health Care funded project designed to engage male partners in ANC services, including HIV counselling and testing. We employed a community participatory process to develop an intervention to change the behaviour of pregnant woman, their partners, and traditional birth attendants in 5 communities in rural Mozambique. That project is now being scaled up with Centers for Disease Control and Prevention funds in several provinces in Mozambique.

a. **Audet, CM**, Blevins M, Chire YM, Aliyu MH, Vaz LM, Antonio E, Alvim F; Bechtel R, Wester CW; Vermund SH. Engagement of men in antenatal care services: Increased HIV testing and treatment uptake in a community participatory action program in Mozambique. *AIDS Behav.* 2016 Sep;20(9):2090-100. PMCID: PMC4995150.
b. Sack D, Frisby M, Diemer MA, De Schacht C, Graves E, Kipp A, Emílio A, Matino A, Barreto E, Van Rompaey S, Wallston K, **Audet CM.** Empathy Scale Adaptation Among

Expectant Seroconcordant Couples with HIV in Zambézia Province, Mozambique. *BMC Psychology. 2020 Aug 28;8(1):90.*

b. Aliyu MH, Blevins M, **Audet CM**, Kalish M, Gebi UI, Onwujekwe O, Lindegren ML, Shepherd BE, Wester CW, Vermund SH. Integrated prevention of mother-to-child HIV transmission services, antiretroviral therapy initiation, and maternal and infant retention in care in rural north-central Nigeria: a cluster-randomised controlled trial. *Lancet HIV.* 2016 May;3(5):e202-11. PMCID: PMC4852280.

c. **Audet CM**, Graves E, Barreto E, De Schacht C, Gong W, Shepherd BE, Aboobacar A, Gonzalez-Calvo L, Alvim MF, Aliyu MH, Kipp AM, Jordan H, Amico KR, Diemer M, Ciaranello A, Dugdale C, Vermund SH, Van Rompaey S. Partners-based HIV treatment for seroconcordant couples attending antenatal and postnatal care in rural Mozambique: A cluster randomized trial protocol. *Contemp Clin Trials.* 2018 Aug;71:63-9. PMCID: PMC6067957.

3. Mixed Methods Research in Implementation and Dissemination Science: My implementation and dissemination science research typically focuses on triangulating findings from qualitative interviews, quantitative survey data, and clinical outcomes. I recently used the ADAPT-ITT model to localize a community health worker intervention to rural Mozambique through the development and elicitation of feedback to theater presentations detailing the intervention. Currently, we are assessing acceptability among both implementers and patients, while adapting the Implementation Measurement Based Care (iMBC) model to assess implementation readiness and success at the level of each community health worker.

a. **Audet C**, Salato K, Vermund SJ, Amico R. Adapting an Adherence Support Workers intervention: Engaging traditional healers as adherence partners for persons enrolled in HIV Care and Treatment in rural Mozambique. *Implement Sci.* 2017 Apr;12(1):50. PMCID: PMC5390357.

b. **Audet CM**, Gobbo E, Sack DE, Clemens EM, Ngobeni S, Mkansi M, Aliyu MH, and Wagner RG. Traditional Healers use of Personal Protective Equipment: a qualitative study in rural South Africa. BMC Health Systems Research. Jul 15;20(1):655. PMID: 32669101

c. **Audet CM**, Ngobeni S, Graves E, Wagner RG. Mixed methods inquiry into traditional healers' treatment of mental, neurological and substance abuse disorders in rural South Africa. *PLoS One*. 2017 Dec;12(12):e0188433. PMCID: PMC5736181.

d. **Audet CM,** Ngobeni S, Wagner RG. Traditional healer treatment of HIV persists in the era of ART: a mixed methods study from rural South Africa. *BMC Complement Altern Med*. 2017 Aug;17(1):434. PMCID: PMC5577748.

4. Identifying Mental Health Service Needs: Mental health services are under capacitated in low-income settings. I have been working to assess population level mental health service needs, including for issues related to depression and alcohol abuse.

a. Oquendo MA, Duarte C, Gouveia L, Mari JJ, Mello MF, **Audet CM**, Pinsky I, Vermund SH, Mocumbi AO, Wainberg ML. Building Capacity for Global Mental Health Research: challenges to balancing clinical and research training. *Lancet Psychiatry.* 2018 Aug;5(8):612-13. PMCID: PMC6402326.

b. **Audet CM**, Wainberg ML, Oquendo MA, Yu Q, Blevins Peratikos M, Duarte CS, Martinho S, Green AF, González-Calvo L, Moon TD. Depression among female heads-of-household in rural Mozambique: A cross-sectional population-based survey. *J Affect Disord*. 2018 Feb;227:48-55. PMCID: PMC5805617.

c. Morris M, Okoth V, Ressler DK, Mbeya J, Rogers A, Prigmore H, Vergel de Dios C, Moon TD, **Audet CM**. The prevalence and predictors of interpersonal violence (IPV) against

women in the Rongo sub-county of Migori County, Kenya. Journal of Interpersonal Violence. June 4 2020. PMID: 32627662

d. Wainberg M, Oquendo MA, Blevins Peratikos MB, Gonzalez-Calvo L, Pinsky I, Duarte CS, Yu Q, Green AF, Martinho S, Moon DT, **Audet CM**. Hazardous alcohol use among female heads-of-household in rural Mozambique. *Alcohol.* 2018 Dec;73:37-44. PMCID: PMC6173647.

5. Assessing the impact of HIV stigma and HIV knowledge on patients: My work in the US and abroad has included a focus on the development of psychometric tools to measure HIV stigma and knowledge to assess the impact of these factors on treatment adherence, service uptake, and engagement in care. I have contributed to this field by validating two HIV stigma scales in the US and developing and validating an HIV knowledge scale in Mozambique.

a. **Audet CM**, Wagner L, Wallston KA. Finding Meaning in Living with HIV While Participating in an Expressive Writing Study. *BMC Psychology*. 2015 May;3(1):15. PMCID: PMC4419455.

b. Ciampa PJ, Skinner SL, Patricio SR, Rothman RL, Vermund SH, **Audet CM**. Comprehensive knowledge of HIV among women in rural Mozambique: development and validation of the HIV Knowledge 27 Scale. *PLoS One.* 2012;7(10):e48676. PMCID: PMC3485372.

c. **Audet CM,** McGowan CC, Wallston KA, Kipp AM. The relationship between HIV stigma and self-isolation among people living with HIV in Tennessee. *PLoS ONE* 2013 Aug;8(8):e69564. PMCID: PMC3738573.

d. Kipp AM, **Audet CM**, Andemail J, Earnshaw V, McGowan CC, Wallston KA. Re-validation of the Van Rie HIV/AIDS-related Stigma Scale for use with people living with HIV in the United States. *PLoS One*. 2015 Mar;10(3):e0118836. PMCID: PMC4349586.

Complete list of Published work in My bibliography:
http://www.ncbi.nlm.nih.gov/sites/myncbi/carolyn.audet.1/bibliograpahy/48354806/public/?sort=date&direction=ascending

D. Additional Information: Research Support and/or Scholastic Performance

Ongoing Research Support

R34MH122259-01 Audet (PI)
01/01/2021- 12/31/2023

We will pilot a strategy to engage traditional healers in rural South Africa to conduct HIV testing in the community. We will specifically look at the feasibility of implementation, fidelity of healers to the counseling and testing protocol, and our ability to reach individuals who otherwise avoid or refuse to accept HIV testing at the health facility. We believe our intervention will increase testing acceptability among those who mistrust allopathic medicine and will create a bridge from traditional healers to physicians for those who need additional health care services.
Total Award: 620,020 USD
Role: **Principal Investigator**

R21AI150302-01 Audet (PI) 04/1/2020 - 03/31/2022

The Risk of HIV Acquisition among Traditional Healers in South Africa: Implementing Novel Strategies to improve protective Behaviors
Traditional healers, community-based partners with the national health system of South Africa, are exposed to patient blood an average of 1,500 times during their careers due to the practice of delivering herbal remedies via herbs rubbed into dozens of sub-cutaneous cuts. The purpose

of this proposal is to compare two implementation strategies to increase consistent use of PPE to assess their effects on exposure to patient blood. This study will allow us to test a novel implementation strategy for delivering PPE training to prevent new HIV infections among a newly identified high-risk population in a region with the world's highest HIV prevalence.

5R01MH113478-03 Audet (PI)
05/14/2017 - 05/30/2022
NIMH (Concurrent with K award)
Partners-based HIV HIV Treatment for Sero-concordant Couples Attending Antenatal Care
The primary objectives of this study are to evaluate the impact and cost-effectiveness of couples-centered services for HIV-infected seroconcordant pregnant women and their partners. Our intervention includes: (1) ANC-based couples HIV testing, ART enrollment, and care for HIV+ expectant couples; (2) Couple-based treatment in the post-partum period; (3) Couple-based education and skills building; and (4) Treatment continuity with the support of expert-patient (peer) supporters from couples who have successfully navigated EMTCT.

VUMC69285(R01AA025947) Audet (PI of sub)
09/20/2018 - 08/31/2023
NIAAA
Community I-STAR Mozambique: Community Implementation of SBIRT using Technology
Provide assistance in qualitative research with community health workers and traditional healers attempting to identify people at risk of heavy alcohol consumption.

1R01NS113171-01 Trevathan (PI)
08/01/2019 - 06/30/2024
NINDS
Bridging the Childhood Epilepsy Treatment Gap in Africa (BRIDGE)
This research will provide information to help extend epilepsy treatment to children in LMICs and worldwide who suffer from untreated seizures.
Role: Co-Investigator

1R01DK120814-01A1 Chakkalakal (PI)
09/15/2019 - 08/31/2024
NIDDK
Putting Telehealth to the Test: An Evaluation of the Use of Telehealth to Increase the Population-Level Impact of an Employer-Based Diabetes
The purpose of this program evaluation is to determine if adding a video-teleconference (VTC) participation option (as a telehealth platform) to the HP-DPP can increase the public health impact of the program by improving its reach while maintaining its effectiveness and implementation.
Role: Co-Investigator

1R21TW011327-01 Ahonkhai (PI)
09/26/2019 - 04/30/2021
FIC
PeerNaija: A Mobile Health Platform Incentivizing Medication Adherence Among Youth Living with HIV in Nigeria
In this proposal, we aim to adapt and pilot a novel behavioral intervention that uses an mHealth platform to harness both social, peer-based incentives and lottery-based financial incentives to promote medication adherence among AYA in Nigeria.
Role: Co-Investigator

Completed Research Support

1U2GGH000812-03 Wester (PI)
09/30/2012 - 09/28/2017

CDC/GAP (PEPFAR)
Avante Zambézia: Technical Assistance to the Ministry of Health (MOH) for HIV Services and Program Transition in Zambézia. This large CDC-PEPFAR-funded initiative entitled "Avante Zambézia" ("Go forward" Zambézia province) provides comprehensive HIV services (including the provision of cART including ART for PMTCT) to HIV-infected persons residing in 10 of Zambézia provinces 17 districts.
Role: Technical Advisor for Traditional Healer Engagement

5D43TW009675-05 Wainberg (PI)
06/01/2014 – 08/15/2020

NIMH
PALOP mental health implementation research training
A Mental Health Implementation Research Training Program will prepare scientists to develop effective and feasible mental health interventions that are adapted to a specific culture and context, making more efficient use of less specialized human resources available in various low-resource systems of care. In Mozambique, an expanding mental health service infrastructure will require evidence-based interventions capable of reaching those often excluded from care.
Role: Investigator

5K01MH107255-04 Audet (PI)
06/01/2015 - 11/31/2020

NIMH
Traditional Healers as Adherence Partners for PLHIV in Rural Mozambique
This K01 award will provide 4 years of protected time for research and training during Dr. Audet's time as an Assistant Professor. Her research will focus on developing a novel strategy for engaging traditional healers as treatment advocates, educators, and adherence coaches for patients newly diagnosed with HIV in Zambézia Province, Mozambique. The training component will include additional training in psychometrics and survey analysis.

***Co-Investigator**:* Caroline De Schacht**, MD, MSc, PhD**

BIOGRAPHICAL SKETCH

NAME: Caroline De Schacht

eRA COMMONS USER NAME (credential, e.g., agency login): cdeschacht

POSITION TITLE: Evaluations Director

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE ***(if applicable)***	Completion Date MM/YYYY	FIELD OF STUDY
Ghent University, Ghent, Belgium	Licentiate	07/1998	General Medicine
Ghent University, Ghent, Belgium	Specialization	07/2000	Family Medicine
Prince Leopold Institute of Tropical Medicine, Antwerp, Belgium	Diploma	02/2001	Tropical Medicine
London School of Hygiene and Tropical Medicine	MSc	07/2008	Clinical Trials
Ghent University, Ghent, Belgium	PhD	11/2015	Biomedical Science

A. Personal Statement

For over 15 years, I have been working as an HIV technical advisor and researcher in resource-poor settings, including the last 14 years in Mozambique. As technical advisor, I worked closely with the Ministry of Health and the Provincial Health authorities, and have gained valuable insight into the Mozambican Health System which I will use to help develop study protocols and design. In addition, I managed the start-up of an HIV care and treatment project in Tete and Gaza Provinces, which involved bringing together and coordinating a diverse group of stakeholders. As a researcher, I have been coordinating clinical research activities since 2008. I have been the lead investigator on several studies in Mozambique including a Gates-funded study that sought to estimate the HIV incidence in women during pregnancy and postpartum, and assess the associated risk factors to maternal HIV seroconversion – including partner HIV testing. This study included a qualitative evaluation of uptake of HIV testing among male partners of pregnant women. I was a co-Principal investigator on a study that used qualitative methods to explore facilitators and barriers to participation of HIV-infected children in care and treatment services in two regions in Mozambique, and lead investigator in another study related to mother and child health care evaluating Point-of-Care technologies for anemia and syphilis and CD4-count, and its effect on uptake of ART for HIV positive pregnant women.

Together with the National Institute of Health Mozambique, I serve as a trainer in different capacity building areas (quantitative and qualitative research methods, GCP/research ethics, protocol/abstract/manuscript writing, etc.) over more than five years. I am a certified trainer for GCP courses and work with young researches to ensure they are following appropriate protocols and procedures. I have been collaborating with the Polana Caniço Research Centre in HIV prevention research among young adults, such as HIV incidence cohort study, HIV vaccine trial (Tamovac I) and socio-behavioral studies on HIV prevention trials in Maputo city.

B. Positions and Honors

2017 - present Evaluations Director, Friends in Global Health, Mozambique

2014 - 2017 Project Coordinator/Research Advisor, Health Alliance International, Maputo, Mozambique

2008 - 2014 Public Health Evaluation Coordinator, Elizabeth Glaser Pediatric AIDS Foundation, Maputo, Mozambique

2006 - 2008 Clinical Advisor, Care and Treatment, Elizabeth Glaser Pediatric AIDS Foundation, Gaza, Mozambique

2005 - 2006 HIV Advisor/Project Manager, Pharmaccess Foundation, Maputo, Mozambique

2003 - 2004 HIV Clinical Advisor, Prince Leopold Institute of Tropical Medicine, Tete, Mozambique

2003 - 2004 HIV Clinical Advisor, Médecins sans Frontières, Ethiopia and Cambodia

2002 - 2003 HIV Clinician, Prince Leopold Institute of Tropical Medicine, Antwerp, Belgium

2001 - 2002 Project Coordinator, Médecins sans Frontières, Benin

C. Contribution to Science

Mother-to-Child Transmission of HIV

These publications are result of the contributions to research around factors influencing mother-to-child transmission of HIV in Mozambique. Retention to HIV prevention and care services for HIV infected and exposed children is a major problem in Mozambique. Dr. De Schacht was the PI of a qualitative research evaluating barriers and facilitators of access to care for HIV infected and HIV exposed children.

Jani IV, ***De Schacht C***. Innovations and challenges in early infant diagnosis of HIV. Curr Opin HIV AIDS. 2019 Jan;14(1):55-59

Audet CM, Graves E, Barreto E, ***De Schacht*** C, et al. Partners-based HIV treatment for seroconcordant couples attending antenatal and postnatal care in rural Mozambique: A cluster randomized trial protocol. Contemp Clin Trials. 2018 Jun 5;71: 63-69

Impact of a systems engineering intervention on PMTCT service delivery in Côte d'Ivoire, Kenya, Mozambique: the SAIA cluster randomized trial. Oral Abstract Presentation (TUAE0103). IAS 2016 – July 18-22, 2016, Durban, South-Africa

De Schacht C, Lucas C, Mboa C, Gill M, Macasse E, Stélio AD, Bobrow EA, Guay L. Access to HIV prevention and care for HIV-exposed and HIV-infected infants: a qualitative study in rural and urban Mozambique. BMC Public Health 2014, 14:1240

Arts M, Geelhoed D, ***De Schacht C***, Prosser W, Alons C, Pedro A. Knowledge, beliefs and practices regarding exclusive breastfeeding of infants younger than 6 months in Mozambique: a qualitative study. J Hum Lact. 2011 Feb;27(1):25-32

HIV epidemiology

Dr. De Schacht contributed to major studies in the epidemiology of HIV in Mozambique. She participated in the first cohort HIV incidence studies among vulnerable populations in Mozambique (youth, pregnant and breastfeeding women). She was PI on the HIV incidence cohort study of pregnant and breastfeeding women. Through the research work, we have been able to estimate the incidence of HIV among pregnant and breastfeeding women in a high HIV prevalence regions of Mozambique, found to be very high. Dr. De Schacht was also the PI of the qualitative study evaluating barriers to male HIV testing in Mozambique.

Viegas EO, Tembe N, Macovela E, Gonçalves E, Augusto O, Ismael N, Sitoe N, ***De Schacht C***, Bhatt N, Meggi B, Araujo C, Sandström E, Biberfeld G, Nilsson C, Andersson S, Jani I, Osman N. Incidence of HIV and the prevalence of HIV, hepatitis B and syphilis among youths in Maputo, Mozambique: a cohort study. PLoS One. 2015 Mar 23;10(3):e0121452

Caroline De Schacht, Heather J. Hoffman, Nédio Mabunda, Carlota Lucas, Catharina L. Alons, Ana Madonela, Adolfo Vubil, Orlando C. Ferreira Jr, Nurbai Calú, Iolanda S. Santos, Ilesh V. Jani, Laura Guay High HIV seroconversion in pregnant women and low reported levels of HIV testing among male partners in Southern Mozambique: results from a mixed methods study. PlosOne 9(12): e115014

De Schacht C, Mabunda N, Ferreira Jr OC, Ismael N, Calú N, Santos I, Hoffman JH, Alons C, Guay L, Jani IV. High HIV incidence in the postpartum period sustains vertical transmission in settings with generalized HIV epidemics: a cohort study in Southern Mozambique. JIAS 2014, 17:18808

Care & Treatment of HIV Opportunistic infections and antiretroviral therapy of HIV-infection

The publications are mainly a result of the work within the specialized HIV clinic, where Dr. De Schacht was part of the medical team at the outpatient STI/HIV clinic and at the inpatient ward for Tropical Diseases and HIV, from the Prince Leopold Institute of Tropical Medicine Antwerp and University of Antwerp. The institute provides HIV services and supports HIV programs in resource limited settings.

Arinze F, Gong W, Green AF, ***De Schacht C***, et al. Immunodeficiency at Antiretroviral Therapy Start: Five-Year Adult Data (2012-2017) Based on Evolving National Policies in Rural Mozambique. AIDS Res Hum Retroviruses. 2019

De Schacht C, Mutaquiha C, Faria F, Castro G, Manaca N, Manhiça I, Cowan J. Barriers to access and adherence to tuberculosis services, as perceived by patients: A qualitative study in Mozambique. PLoS One. 2019 Jul 10;14(7):e0219470

Lynen L, Zolfo M, Huyst V, Louis F, Barnardt P, Van de Velde A, ***De Schacht C***, Colebunders R. Management of Kaposi's sarcoma in resource-limited settings in the era of HAART. AIDS Rev. 2005 Jan-Mar; 7(1):13-21

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Complete List of Published Work in MyBibliography:

http://www.ncbi.nlm.nih.gov/sites/myncbi/1PGhVc58y21kk/bibliography/47217322/public/?sort=date&direction=descending

D. Additional Information: Research Support and/or Scholastic Performance

A89638 06/01/2013-12/31/2016

Title: “Global Gavi Alliance Full Country Evaluation”

This comprehensive impact evaluation of the Gavi Alliance and other related immunization support to Mozambique, includes process evaluation, resource tracking, and partnership and network analysis and vaccine efficacy sub-components. The goal of this project is to evaluate and understand the mechanisms behind changes in immunization programs and related factors along with the likely contribution of the GAVI Alliance in Mozambique. It is part of a 5-country, 4 year prospective evaluation being led by IHME.

Role: Mozambique study coordinator

OPP43975 Bill and Melinda Gates Foundation 01/2008 – 12/2012

Title: Maternal HIV seroconversion during pregnancy and postpartum period: incidence and associated risk factors

The goal of the project is to estimate the HIV incidence in women during pregnancy and postpartum period, and to assess the associated risk factors to maternal HIV seroconversion. A prospective cohort study is being implemented in 2 provinces in Mozambique (Maputo and Gaza). Two cohorts of women are followed for a period of maximum 18 months.

Role: Country Principal Investigator

U2GGH000422-01 Centers for Disease Control and Prevention
09/2011 – 08/2012

Title: Field Evaluation of Point of Care Technologies in MCH Services and in the PMTCT Program

The goal of the project is to assess the result in access to antiretroviral therapy in HIV-positive eligible women using a Point-of-Care technology for CD4-count

Role: Principal Investigator

U2GGH000422-01 Centers for Disease Control and Prevention 2011-02/2012

Title: Evaluation of Barriers and Facilitators of access to HIV care for HIV-infected and HIV-exposed infants in Mozambique

The goal of the project is to assess the barriers and facilitators of access to HIV care for HIV-infected and HIV-exposed infants

Role: Co-Principal Investigator