Understanding the effects of the COVID-19 pandemic on HIV care among adolescents and young adults living with HIV in Kenya

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Abstract

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Background: The COVID-19 pandemic posed a considerable risk of disruption of clinical services, including HIV services. Mitigation measures mandated by governments limited movement and access to HIV clinics, which could impact clinical care. The impact of these measures among youth (10- 24) living with HIV (YLH) who were already a vulnerable group could result in exacerbation of poor outcomes. Using a mixed-methods design, we explored the effects of COVID-19 on HIV care among YLH in Kenya.

Methods: We conducted a cross-sectional analysis of COVID-19 survey data collected in an ongoing clinical trial evaluating the impact of an Adolescent Transition Package (ATP) on readiness to transition to adult care. We used logistic regression models to estimate odds ratios and 95% confidence intervals for correlates of medication adherence, access to ART and clinical services, and mental health during the COVI9-19 pandemic period. Relevant correlates included age, gender, entry point to HIV services, and type of support person. Qualitative data from interviews with a subset of YLH was analyzed using a thematic analysis approach. Qualitative

and quantitative results were triangulated to explore the effects of COVID-19 on HIV care among YLH.

Results: A total of 1066 YLH, median age 20 years (17, 23), responded to the COVID-19 survey conducted June-October 2020. Most participants were female (n=770 [72%]) and were enrolled at Comprehensive Care Clinics (CCCs) (n= 711 [67%]). Of the 71 YLH who participated in the interviews, median age was 20 (18, 22) and 56% (n=37) were female. Overall self-reported medication adherence was high, with only 3% (n=29) of respondents reporting that they had missed ART doses for 2 or more days in the past week. Over a quarter (26% [n = 251]) of survey participants reported experiencing challenges accessing ART from clinics. Interview participants shared concerns about nationwide ART stockouts, noting challenges getting >1 month of medication at a time, and feared that stockouts would negatively impact adherence. Older YLH (20-25), and clients enrolled at CCC (vs. PMTCT) had higher odds of experiencing difficulties accessing ART (OR = 1.72, 95% CI: 1.21-2.44, p = 0.003; OR 1.67; 95% CI: 1.13-2.50; p= 0.011, respectively). Compared to male participants, female participants were more likely to face challenges accessing HIV clinical services (OR = 2.04; 95% CI: 1.13-3.86; p = 0.023). Participants who reported feeling loneliness were more likely to report challenges with adherence (OR= 0.19; 95% CI: 0.07-0.52; p = 0.001). Interviews revealed that COVID-19 disrupted social support networks for YLH and negatively impacted overall mental well-being.

Conclusions: Self-reported adherence among YLH during COVID-19 was high, despite challenges accessing care. Fear of ART stockouts, disruption in social support and mental health well-being were important impacts of COVID-19. Efforts to optimize HIV care for YLH should consider strategies to strengthen the ART supply chain and integrate mental health services into the HIV care system

INTRODUCTION

Kenya has approximately 1.5 million people living with HIV (PLH), including an estimated 190,000 adolescents and young adults (ages 10-24).[1] Of all PLHIV, 75% of adults and 63% of children are on treatment.[2] Antiretroviral therapy (ART) effectively suppresses HIV, increasing life expectancy and reducing morbidity. Uninterrupted treatment is crucial for PLH to achieve maximal treatment benefits. ART adherence is key to viral suppression; however, only 67% of patients with HIV globally are adherent to ART.[3] Among PLH, youth (ages 10-24) living with HIV (YLH) are recognized as a vulnerable group, as they have poor clinical outcomes compared to other populations. Among YLH globally, only 64% are suppressed after one year on ART,[3] and over 50% are lost to follow-up 2 years after ART initiation.[3] In Kenya only 73% of YLH on ART are virally suppressed.[4]

The COVID-19 pandemic posed concern and a possible threat for engagement in HIV care among YLH. During the early pandemic days (March 2020 – June 2020), governments followed the World Health Organization (WHO) and Centers for Disease Control and Prevention (CDC) recommendations for physical distancing. Aligned with these guidelines, the Kenyan government promoted physical distancing and instituted a range of public health prevention measures, including curfews, school closure, and halted provision of non-essential health services.[1] These measures decreased access to clinical services for those with chronic care needs, restricted movement, and resulted in medication supply-chain challenges.[6] COVID-19-related disruptions in access to health services had the potential to exacerbate existing poor outcomes among YLH.

Within the HIV care realm, Kenya is regarded as one of the most successful countries in SSA, with well-functioning HIV prevention and treatment programs.[2] Despite having a robust HIV care system in place, disruptions in clinical services are possible during public health crises. To attempt to mitigate possible interruptions to service delivery, the Kenyan Ministry of Health (MOH) issued

adapted HIV care guidelines that included the provision of up to 3 months of ART for PLH (vs. standard 1-month supply) and flexible service delivery such as telehealth and community-based ART groups.[1]

To better characterize the impact of these measures, we conducted analysis of data collected from the Adolescent Transition to Adult Care for HIV- infected Adolescents in Kenya (ATTACH), a cluster randomized trial evaluating the impact of an Adolescent Transition Package (ATP) on readiness to transition to adult care that had enrolled 1066 YLH.[5] Understanding the effects of COVID-19 on health access and outcomes among this cohort of YLH can inform development of recommendations and interventions that optimize HIV services and clinical outcomes for YLH during future public health crises.

METHODS

Ethical Approval

The use of human subjects for this study was approved by the Kenyatta National Hospital/ University of Nairobi Ethical Review Committee and the University of Washington Human Subjects Institutional Review Board (UWHSD). Written consent was obtained from all participants, and consent forms were provided in three languages (English, Swahili, and Luo). A waiver of parental consent was obtained for adolescents aged 15 and over for participation in the survey, as they frequently attend visits unaccompanied. Participants under 15, and all interview participants under 18, required caregiver's written informed consent, and participants provided written assent.

Study Design, Population, and Setting

The ATTACH study, conducted between 2019 and 2021, was a hybrid type 1 effectiveness-implementation cluster randomized controlled trial (RCT) to assess the effectiveness of the ATP on clinical outcomes. ATTACH was conducted at 20 randomly selected HIV clinics across four counties with the highest number of YLH during a pretrial survey (Homa Bay, Nakuru, Nairobi, and Kajiado). YLH were assessed for eligibility and recruited by clinic staff during their scheduled clinic visits. All YLH enrolled in the ATTACH study were between 10-24 years of age and attended at least one clinic visit at participating facilities. At the start of the COVID-19 pandemic, the study team obtained ethical approval to modify the protocol and include questions on impact of COVID-19 on services for enrolled participants.

For this analysis, we utilized a mixed methods design, triangulating data from a cross-sectional survey on the impact of COVID-19 on health services and outcomes, and interviews with a subset of ATTACH participants.

Data Collection

Quantitative data: Between June and October 2020, study staff contacted enrolled participants by phone and conducted a survey to assess the impact of COVID-19 on YLH. Survey questions assessed COVID-19 knowledge and beliefs, and the impact of COVID-19 on their overall well-being and ability to access HIV services. Responses were entered into a secure Redcap electronic database.

Qualitative data: Between April and May of 2021, a convenience sample of enrolled YLH, were identified by routine HCWs at ATTACH intervention facilities and referred to study staff for individual interviews. Interviews were conducted by five trained female Kenyan social scientists, with considerable experience interviewing adolescents about health experiences. Interviewers

used a semi-structured interview guide following the same topics as the survey but using open-ended and exploratory language to add depth and explanation to YLH experiences during COVID-19. Interviews were conducted in the interviewee's language of choice (English/Swahili/Luo), were audio recorded, transcribed, and translated to English for analysis.

Data Analysis

Quantitative and qualitative data analysis was conducted sequentially with data triangulation occurring during the interpretation of the results. Three outcomes were assessed quantitatively: 1) adherence, defined as taking all seven days of antiretroviral therapy (ART) in the past week, 2) challenges accessing ART and clinical services determined by participants report on a yes/no question, and 3) a self-report of feeling depressed for two days or more in a week. Descriptive statistics were used to summarize demographic characteristics. Multivariate logistic regression examined the association between outcomes and correlates of interest, including gender, age (classified as 15-19 years or 20-25 years), entry point (Comprehensive Care Clinics (CCC) or Prevention Mother to Child Transmission (PMTCT) clinics), and support person. Statistical analysis was performed using R.Studio Version 4.1.3 (2022.03.10), and statistical significance was defined as a p-value <0.05.

Qualitative data was analyzed using a thematic analysis approach, and a combination of inductively and deductively derived codes. Deductive codes and corresponding code categories were designed around interview guide questions. Open coding of a subset of transcripts was used to develop additional codes to capture specific elements of experiences in more detail. The initial codebook was further refined through coding an additional subset of transcripts and discussion between two members of the coding team. Transcript review and codebook revisions continued until code saturation and consensus in code application was achieved. All transcripts were then

divided between coders and independently coded. Code application was reviewed by another member of the team for consistency, discrepancies noted, and resolved through discussion. Queries of codes capturing key influences on quantitatively assessed outcomes were generated to evaluate explanatory narratives and experiences to further explore quantitative results. Analysis was conducted in Atlas.ti (v 22.1, GambH, Germany).

RESULTS

A total of 1066 YLH were included in the quantitative analysis. The median age of participants at enrollment was 20 years (IQR 17,23), and the majority were female (n= 770, [78%]). At the time of enrollment to the primary study, participants had knowledge of their HIV status for a median of 50 months (IQR 19,69). Nearly two-thirds (67%) of participants were enrolled at CCC, while 31% were from PMTCT clinics. Approximately half (n=468, [44%]) listed a parent as their primary support person, while 29% (n=305) were supported by a spouse, 7% (n = 77) by a sibling, and 7% (n=74) by a grandparent (Table 2).

A total of 71 YLH participated in qualitative interviews. Fifty-six percent (n=37) of YLH reported being female, 41% (n=27) reported male, and three percent (n=2) reported other. The median age of participants at the time of interview was 20 years (IQR 18, 22). Nearly half (n = 32, [48%]) were secondary school students, 26% (n=17) were not enrolled in school, 15% (n=10) were university students, and 11% (n=7) were primary students. Sixty-five percent (n=43) of interviewees were unemployed (Table 3).

Almost all participants (n=993, [99%]) reported having heard of COVID-19. The frequently cited ways of reducing COVID-19 were social distancing (81%), washing hands with soap and water frequently (80%), and wearing a face mask when in public (80%). In the following section, we

report triangulated YLH findings regarding the effects of COVID-19 on (1) medication adherence and access to ART, (2) access to clinical services, and (3) mental health.

Medication adherence and ART Access

Overall, self-reported medication adherence was high (97%) among YLH. However, a few YLH (n= 29, [3%]) reported missing at least 2 doses in the past week. YLH aged 15-19 years had lower odds of being adherent to medication compared to those aged 20-25 years, although this was not statistically significant (OR = 0.51; 95% CI: 0.22-1.18; p = 0.12). At the time of the survey, the majority of YLH (n=855, [89%]) reported having enough ART to last one month. Age and entry point were associated with access to HIV medication. YLH aged between 20-25 had higher odds of experiencing challenges accessing ART (OR = 1.72, 95% CI: 1.21-2.44, p = 0.003), as did YLH who were enrolled at CCC clinics (OR 1.67; 95% CI: 1.13-2.50; p= 0.011). Gender and primary caregiver type were not significantly associated with access to ART (Table 5).

Despite reporting continued access, YLH who participated in interviews expressed fears around inability to access ART and noted that COVID-19 was negatively impacting the ART supply chain. Those who had maintained adherence felt they had done so despite logistical challenges experienced in response to social distancing guidelines, such as unemployment, and lack of funds for and availability of transportation. Participants described how lack of access to transportation or moving locations to be near extended family during the pandemic limited ability to access regular clinics for refills. YLH sought medications at alternative local facilities. However, shortages in medication supplies meant that even if they did manage to find transportation to a local facility, access to medication was not guaranteed.

"...Someone has traveled home, and her appointment is tomorrow; she cannot travel and come all the way to the clinic because roads are closed… and even if she goes to the clinic [at her house] with the current shortage of drugs at some facilities, they may fail to give her the services because the drugs are scarce." - 24-year-old male

Overall, there were concerns about long-term stockouts and how this might more permanently impact their adherence and overall health outcomes.

"Then the shortage of ARVs being experienced currently can be a problem if the shortage continues." – 21-year-old female

COVID-19 and access to clinical services

Most participants (n=895, [93%]) reported that COVID-19 had not caused any trouble in accessing clinical services. However, a few YLH (n= 67 [7%]) reported experiencing challenges accessing clinic services. Female YLH were at higher odds of experiencing these challenges compared to male YLH (OR = 2.04; 95% CI: 1.13-3.86; p = 0.023). Though not statistically significant, YLH enrolled in CCC had higher odds of experiencing challenges accessing clinical services when compared to those attending PMTCT (OR = 0.91, 95% CI: 0.91-4.25; p = 0.10) (Table 6).

Interviews revealed that challenges in accessing clinical services were related to how services had been modified to account for new public health prevention measures. To ensure social distancing guidelines were being followed, clinics reduced the number of appointments per day to reduce the traffic in clinics.

"… before the Covid outbreak, we were coming very many of us to the clinic, but right now they have kind of reduced the numbers that are coming. You might find that on

adolescents' clinic days, there are only 20 adolescents coming. But the last time we were even over 60, we would be so many there. And even our seating arrangement has been changed. You will find that on a bench, you only sit 5, and before the Covid outbreak, we used to sit like nine on a bench; you would squeeze to fit."- 21-year-old female

COVID-19 and mental health

Regarding mental and emotional health among YLH, 34% (n=262) reported feeling nervous, 37% reported feeling depressed at least 2 days of the week (n= 352), 27% (n=257) reported feeling lonely, and 15% (n= 145) reported having physical reactions (such as sweating, trouble breathing, nausea, pounding heart). The majority (76%) reported thinking about their COVID experiences at least one day or more per week. Twenty percent (n=195) of YLH reported not feeling hopeful about the future in the past week.

Older ALH age 20-25 higher odds of reporting feeling depressed for at least 2 days (odds ratio of 1.44, 95% CI: 1.04-1.98; p = 0.0026). Loneliness was the only symptom with a statistically significant association with medication adherence. The odds of being adherent for YLH who reported being lonely was significantly lower than YLH who reported not being lonely (OR= 0.19; 95% CI: 0.07-0.52; p = 0.001) (Table 8). Contributing to feelings of loneliness, YLH expressed how they could no longer share some of their burdens and issues with peers.

"Now I don't even meet with my friends, so I don't have people to share with what I'm feeling, what I am going through because when you come you find yourself all alone.... you give the card, they measure your weight, pressure, I go to the doc I explain myself, and I leave. I have never met any teenager whom I talk to or just ask, "how is COVID taking you?" like that." – 21-year-old female.

Limiting their ability to share with peers, YLH reported their support and counseling groups had been halted during COVID-19, and interactions during clinic visits had been reduced to just healthcare workers.

> *"That was bad because we were not even getting the chance to talk to other adolescents the way we used to before. Again, we were only talking with the doctor, and we were not seeing the counselor…We did not have support groups. It was bad because now we were not having our regular meetings, and we were not able to share any of our health-related issues. We were not talking to each other." – 16-year-old female.*

These feelings of loneliness and removal of support services negatively influenced motivation to take ART, with some YLH describing completely stopping their medication and failing to attend clinic.

> *"I was not taking drugs totally, I just didn't feel like taking drugs, and then I stayed for three months without coming to the clinic." - 21-year-old female*

DISCUSSION

In this mixed methods study we found that ART adherence among YLH remained relatively high despite challenges accessing clinical services and reported disruption to the ART supply chain. Young adults (20-24 years) experienced more difficulty accessing services and ART but were also more likely to self-report being adherent compared to adolescents (15-19 years). Young adults were more likely to report feeling depressed than adolescents, and reported loneliness was associated with low ART adherence.

YLH in our study reported frequent concerns about stockouts of ART due to supply chain issues. COVID-19 abruptly ceased production and distribution of ART from ART-producing nations to nations that do not produce ART, like Kenya, putting many YLH at risk of compromising adherence.[6] ART stockouts where not isolated to Kenya; according to WHO during the early stages of the pandemic, 24 countries reported critically low stock (defined as stock of three months or less) of first-line ARVs.[7] Additionally, 27 countries including SSA countries such as Kenya, Botswana, Zambia and Zimbabwe faced possible second-line ART stock outs.[7] To mitigate the situation, WHO recommended the adaptation and upscale of the policy on multi-month dispensing (MMD) for all stable patients, including YLH. Through MMD model patients are provided with either 3 or 6 months of medication which eliminates the need for monthly clinic visits. [8] By November 2020, 129 countries had adopted the MMD policy, including Kenya, which prior to the pandemic did not recommend differentiated delivery for YLH under the age of 20 years.[1,7] Despite this adaptation, from the low supply and stockouts discussed by YLH, it is evident that additional mechanisms are needed to mitigate supply chain issues and ensure full stock of ART to meet the increased needs from MMD during emergency periods.[6]

Our study found that young adults (20-24 years) were more likely to be adherent than adolescents (15-19 years). Developmental differences, including perceived ART benefits, more recognition of body autonomy and self-efficacy in health behaviors, may have provided the additional motivation needed for young adults to remain adherent during this more challenging period.[8] While working to ensure access when physical access to clinics was limited, providing longer refills and fewer touch points may have removed needed support for younger adolescents, who are still developing intrinsic motivation. YLH need healthcare providers to provide continuous counselling and guidance on issues related to medication adherence, transmission prevention and self-disclosure.[8] YLH have highlighted that such discussions with healthcare providers are

empowering and necessary in resolving challenges with nonadherence.[9] Additionally, these sessions work well for accountability and can increase responsibility for HIV self-management.[9] Therefore, providing additional reminders and support (from both healthcare providers and caregivers) for YLH may improve their adherence in future times of limited clinical access.

Although they remained more adherent, young adults were more likely to report challenges accessing ART than adolescents. Challenges to accessing HIV medication are associated with social determinants of health including employment, and income and any economic downturns that YLH experience complicate HIV managament.[10,11] While adolescents often still rely on parents or caregivers for financial support, young adults are more likely to be economically independent. In addition, jobs for young adults may be more likely to provide lower wages and be less resistant to economic impacts of COVID-19. Several YLH in our study reported losing their jobs and experiencing economic challenges, which negatively affected ART access. Economic pressures during the pandemic magnified social determinants that play a huge role in HIV management and are usually overshadowed during normal conditions.[10] COVID-19 heavily disrupted youth livelihoods and exacerbated disparities that negatively affect HIV management.[10] Therefore, there is a need for the government to develop mechanisms to cushion economic security amid adverse economic situations for youth managing chronic illness such as HIV.[12]

Few YLH reported challenges accessing clinical services. This may be attributed to the success of clinics adopting the guidelines for differentiated service delivery. Clinics were still able to provide services, but with longer duration between in-person visits, by expanding to offer telehealth.[6] There was significant association between gender and access to clinical services, as women were more likely to experience challenges accessing services. Prior research has shown

that traditional gender norms influence women's access to resources that could result in barriers such as cost of transportation and laboratory tests, and lack of time.[13] With lockdowns, these barriers were exacerbated and ultimately women were at a greater disadvantage than their male counterparts. Women are already disproportionately at higher risk of HIV infection than men, with women accounting for 910,000 (57%) of the 1.6 million PLHIV in Kenya; therefore, it is important to ensure continuous access to clinical services for this population.[2] Additionally women may require different types of interventions, as they have unique needs and experience unique challenges in managing their HIV infections.[10] Findings from this study unveiled the need to accelerate adaptation and scale-up of differentiated service delivery to minimize gender disparity in accessing HIV services. Differentiated service delivery models, including multi-month dispensing of ART, community-based ART and self-testing services are potentially more impactful for young women who may experience more challenges accessing in-person clinics.[14]

Our study highlights the role of mental health in medication adherence among YLH. YLH who experienced depressive symptoms such as loneliness were less likely to be adherent. From qualitative data, we found that support groups and counseling sessions were disrupted. Support groups are critical for youth support and are associated with self-acceptance, independence, motivation, and consequently increased engagement with HIV care and adherence to ART.[15] Consequently, YLH no longer had sufficient mental and emotional support during COVID-19, which could impact adherence to ART by decreasing motivation to engage in care. Prior research has shown that depressive and anxiety symptoms are associated with suboptimal adherence to ART.[16] Given the observed association between mental health and adherence to ART, interventions should focus on integrating mental health care into HIV care, and incorporation of telehealth or m-Health interventions to reach hard to reach YLH or use during emergency situations.

LIMITATIONS

Our study had some limitations. The COVID-19 survey was given at a single point in time, which coincided with the height of the pandemic, while qualitative data was collected almost a year later, when vaccines were available and initial restrictions had been relaxed. This could result in a dampening of the impact of COVID-19 on care. Additionally, the survey utilized self-reporting of the impact of COVID-19 on health outcomes, rather than abstracted medical record data or more objective adherence and validated mental health measures, subjecting results to reporting bias and affecting the generalizability of findings. Use of validated measures of mental health may have provided additional insight into the role of COVID-19 on mental health and depression in this population.

CONCLUSION

This mixed-methods study explored the effects of COVID-19 on HIV care among YLH in Kenya. Overall, adherence to ART remained high despite disruptions and alterations to HIV services. This study highlights the need for a diversified ART procurement process and integration of mental health services into HIV care for sustained robust HIV care.

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APPENDIX I: Tables of Results

Table 1: Demographic and HIV characteristics among survey participants (N = 1,066)

Characteristics	Median (IQR) / N (%)
Gender	
Female	770 (72%)
Male	296 (28%)
Mean age in years	20 (17, 23)
HIV care characteristics	
Months of fully disclosed HIV status	50 (19, 69)
Entry Point	
PMTCT	330 (31%)
CCC	711 (67%)
Other	24 (2%)
Support Person	
Parent	468 (44%)
Sibling	77 (7%)
Grandparent	74 (7%)
Spouse	305 (29%)
Other	142 (13%)

IQR, interquartile range, Participants with missing information removed

Table 2: Descriptive statistics of quantitative COVID-19 survey responses

	Overall N= 1066
1. Impact of lockdown on access to clinical services	
Had trouble getting access to clinical services	
Yes	67 (7%)
No	895 (93%)
Had problems accessing HIV medication	
Yes	251 (26%)
No	709 (74%)
2. COVID effects on ART adherence	
ART use in the past week	
Missed 1 or more days	29 (3%)
Did not miss any days	932 (97%)
Had sufficient ART supply for a month	
Somewhat to very likely	855 (89%)
Somewhat to unlikely	96 (10%)
Not enough to last a month	11 (1%)
3. Mental effects of COVID-19 pandemic	
Felt nervous (past week)	
1-2 days	200 (21%)
3-4 days	75 (7.8%)
5-7 days	54 (5.6%)
Not at all or less than 1 day	631 (66%)
Felt depressed (past week)	
1-2 days	193 (20%)
3-4 days	83 (9%)
5-7 days	76 (8%)
Not at all or less than 1 day	608 (63%)
Felt lonely (past week)	
1-2 days	154 (16%)
3-4 days	57 (6%)
5-7 days	46 (5%)
Not at all or less than 1 day	698 (73%)
Felt hopeful about the future (past week)	
1-2 days	87 (9%)
3-4 days	162 (17%)
5-7 days	426 (44%)
Not at all or less than 1 day	195 (20%)
Had physical reactions thinking about COVID experiences	
1-2 days	94 (10%)
3-4 days	20 (2%)
5-7 days	31 (3%)
Not at all or less than 1 day	811 (84%)
4. Knowledge and strategies to reduce the risk of COVID	
Has heard about COVID	
Yes	993 (99%)
No	9 (0.9%)

Thoughts on what protects people from getting coronavirus	
Staying away from others or practicing social distancing	863 (81%)
Taking HIV medications	31 (3%)
Herbal remedies	6 (0.6%)
Younger age	6 (0.6%)
Washing hands with soap and water more frequently	858 (81%)
Using hand sanitizer	445 (42%)
Wearing a face mask when I go out	851 (80%)
None of the above	3 (0.3%)

* Unknown and missing values removed. No responses totals not shown.

Table 3: Demographic characteristics among interview participants (N = 66)

Characteristics	Median (IQR) / N (%)
Gender	
Female	37 (56%)
Male	27 (41%)
Other	2 (3%)
Mean age in years	20 (18, 22)
Clinical Services	
Adolescent	57(86%)
Adult	9(14%)
Academic Level	
Primary	7(11%)
Secondary	32 (48%)
University/ College	10 (15%)
Not currently enrolled in school	17 (26%)
Employment Status	
Regular hourly work	5 (7.6%)
Irregular hourly work	8(12%)
Salaried	3 (3%)
Unemployed	43 (65%)
Other	8 (12%)

IQR, interquartile range, Participants with missing information removed

Table 4: Association between demographic characteristics and reported medication adherence during the COVID-19 pandemic

Characteristic	ALL N* (%)	Adherent n (%)	Non adherent n (%)	OR[1]	95 % CI[1]	p-value
Age						
15-19	437 (46)	425 (44)	12 (1.4)	-	-	
20-25	521 (55)	505 (53)	16 (1.7)	0.51	0.22, 1.18	0.12
Gender						
Male	275 (29)	262 (27)	13 (1.3)	-	-	
Female	683 (71)	668 (70)	15 (1.6)	1.59	0.70, 3.65	0.3
Entry Point						
PMTCT	289 (30)	286 (30)	3 (0.3)	-	-	
CCC	647 (66)	622 (65)	25 (2.6)	0.38	0.08,1.32	0.2
Other	22 (2.3)	22 (2.3)	0 (0)	0.00	0.00, ∞	> 0.9
Primary care Giver						
Parent	430 (45)	415 (43)	15 (1.6)	-	-	
Sibling	67 (7.0)	65 (6.8)	2 (0.2)	1.40	0.37, 9.12	0.7
Grandparent	65 (6.8)	64 (6.7)	1 (0.1)	2.26	0.44, 41.4	0.4
Partner	269 (28)	266 (28)	3 (0.3)	2.55	0.69, 12.4	0.2
Other	127 (13)	120 (13)	7 (0.7)	0.69	0.27, 1.88	0.4

[1] OR = Odds Ratio, CI = Confidence Interval

* N = 1066, Unknown and missing values removed

Table 5: Association between demographic characteristics and reported access to ART during the COVID-19 pandemic

Characteristic	N* (%)	No challenges accessing ART n(%)	Challenges accessing ART n(%)	OR[1]	95 % CI[1]	p-value
Age						
15-19	437 (46)	348 (36)	89 (9.3)	-	-	
20-25	521 (55)	360 (38)	161 (17)	1.72	1.21, 2.44	**0.003**
Gender						
Male	275 (29)	207 (22)	68 (7.1)	-	-	
Female	683 (71)	501 (52)	182 (19)	1.01	0.70, 1.45	>0.9
Entry Point						
PMTCT	289 (30)	217 (23)	72 (8)	-	-	
CCC	647 (66)	472 (49)	175 (18)	1.67	1.13, 2.50	**0.011**
Other	22 (2.3)	19 (2)	3 (0.3)	0.86	0.19, 2.75	0.8
Primary care Giver						
Parent	430 (45)	331 (35)	99 (10)	-	-	
Sibling	67 (7)	50 (5)	17 (2)	1.02	0.54, 1.84	>0.9
Grandparent	65 (7)	54 (6)	11 (1)	0.67	0.32, 1.30	0.3
Partner	269 (28)	184 (19)	85 (9)	1.46	0.95, 2.24	0.087
Other	127 (13)	89 (9)	38 (4)	1.29	0.81, 2.01	0.3

[1] OR= Odds Ratio, CI = Confidence Interval

* N = 1066, Unknown and missing values removed

Table 6: Association between demographic characteristics and reported access to clinic access during the COVID-19 pandemic

Characteristic	N* (%)	No challenges clinical services n(%)	Challenges accessing clinical services n(%)	OR[1]	95 % CI[1]	p-value
Age						
15-19	435 (45)	394 (41)	41 (4.3)	-	-	
20-25	520 (55)	495 (52)	25 (2.6)	0.64	0.34, 1.14	0.14
Gender						
Male	274 (29)	258 (27)	16 (1.7)	-	-	
Female	681 (71)	631 (66)	50 (5.2)	2.04	1.13, 3.86	**0.023**
Entry Point						
PMTCT	287 (30)	276 (29)	11 (1.2)	-	-	
CCC	646 (67)	593 (62)	53 (5.5)	1.90	0.91, 4.25	0.10
Other	22 (2.3)	20 (2.1)	2 (0.2)	2.08	0.29, 9.36	0.4
Primary care Giver						
Parent	429 (45)	390 (41)	39 (4.1)	-	-	
Sibling	66 (7)	61 (6.4)	5 (0.5)	0.88	0.29, 2.16	0.8
Grandparent	65 (7)	61 (6.4)	4 (0.4)	0.63	0.18, 1.64	0.4
Partner	269 (28)	259 (27)	10 (1.0)	0.56	0.23, 1.28	0.2
Other	126 (13)	118 (12)	8 (0.8)	0.69	0.29, 1.47	0.4

[1] OR= Odds Ratio, CI = Confidence Interval

* N = 1066, Unknown and missing values removed

Table 7: Association between demographic characteristics and reported feeling depressed for at least 2 days during the COVID-19 pandemic

Characteristic	N* (%)	Not Depressed n (%)	Depressed n (%)	OR[1]	95 % CI[1]	p-value
Age						
15-19	435 (46)	300 (31)	135 (43)	-	-	
20-25	520 (55)	304 (6)	216 (49)	1.44	1.04, 1.98	**0.0026**
Gender						
Male	275 (29)	189 (20)	85 (9)	-	-	
Female	683 (71)	415 (43)	266 (28)	1.20	0.86, 1.68	0.3
Entry Point						
PMTCT	289 (30)	167 (17)	120 (13)	-	-	
CCC	647 (66)	425 (45)	221 (23)	1.01	0.71, 1.44	>0.9
Other	22 (2.3)	12 (1.2)	10 (1.0)	1.78	0.69, 4.49	0.2
Primary care Giver						
Parent	430 (45)	288 (30)	141 (15)	-	-	
Sibling	67 (7.0)	46 (6)	20 (2.1)	0.81	0.45, 1.42	0.5
Grandparent	65 (6.8)	37 (0.2)	28 (7)	1.49	0.87, 2.54	0.14
Partner	269 (28)	150 (16)	119 (12)	1.25	0.85, 1.85	0.3
Other	127 (13)	83 (9)	43 (5)	0.95	0.62, 1.46	0.8

[1] OR= Odds Ratio, CI = Confidence Interval
* Overall N = 1066, Unknown and missing values removed

Table 8: Association between medication adherence and reported depressive symptoms experienced during the COVID-19 pandemic

Symptom	N* (%)	OR[1]	95 % CI[1]	p-value
Nervous				
Nervous	329 (34)	-	-	
Not Nervous	626 (66)	1.84	0.67, 5.02	0.2
Depression				
Depressed	351 (37)	-	-	
Not depressed	604 (63)	0.97	0.36, 2.58	>0.9
Lonely				
Lonely	259 (27)	-	-	
Not Lonely	696 (73)	0.19	0.07, 0.52	**0.001**
Physical Reactions				
Reactions	807 (85)	-	-	
No reactions	148 (15)	1.02	0.33, 2.63	>0.9
Hopeful				
Hopeful	763 (80)	-	-	
Not hopeful	192 (20)	0.55	0.13, 1.61	0.3

[1] OR= Odds Ratio, CI = Confidence Interval
* Overall N = 1066, Unknown and missing values removed

APPENDIX II: Supplemental Table

Table 9: Descriptive statistics of quantitative COVID-19 survey responses by age group

	15-19 N= 483	**20-25 N= 583**	**Overall N= 1066**	**p-value**
1. Impact of lockdown on access to clinical services				
Had trouble getting access to clinical services				
Yes	42	25	67	**0.00015**
No	399	496	895	
Had problems accessing HIV medication				
Yes	90	161	251	**0.00012**
No	349	360	709	
2. COVID effects on ART adherence				
Had changes in medication regimen				
Yes	15	17	32	0.99
No	426	504	930	
ART use in the past week				
Missed 1 or more days	13	16	29	0.99
Did not miss any days	427	505	932	
Had sufficient ART supply for a month				
Somewhat to very likely	402	453	855	
Somewhat to very unlikely	38	56	96	
Not enough to last a month	1	10	11	0.092
3. Mental effects of COVID-19 pandemic				
Felt nervous (past week)				
1-2 days	85	115	200	
3-4 days	30	45	75	0.049
5-7 days	13	41	54	
Not at all or less than 1 day	312	319	631	
Felt depressed (past week)				
1-2 days	88	105	193	
3-4 days	27	56	83	**0.015**
5-7 days	23	53	76	
Not at all or less than 1 day	303	305	608	
Felt lonely (past week)				
1-2 days	69	85	154	
3-4 days	20	37	57	0.26
5-7 days	13	33	46	
Not at all or less than 1 day	334	364	698	
Felt hopeful about the future (past week)				
1-2 days	48	39	87	
3-4 days	72	90	162	0.76
5-7 days	199	227	389	
Not at all or less than 1 day	86	109	195	
Had physical reactions thinking about COVID experiences				

1-2 days	47	47	94	0.88
3-4 days	7	13	20	
5-7 days	15	16	31	
Not at all or less than 1 day	371	440	811	
4. Strategies to reduce risk of COVID				
Thoughts on what protects people from getting coronavirus				
Staying away from others or practicing social distancing	383	480	863	0.27
Taking HIV medications	20	11	31	0.10
Herbal remedies	5	1	6	0.18
Younger age	3	3	6	0.98
Washing hands with soap and water more frequently	378	480	858	0.13
Using hand sanitizer	178	267	445	0.01
Wearing a face mask when I go out	382	469	851	0.67
None of the above	1	2	3	0.91
* Unknown and missing values removed				