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ORIGINAL RESEARCH

Health System Responses to Address Treatment Gaps of Unsuppressed Adolescents on HIV Treatment in Public Primary Health Care Facilities in Windhoek, Namibia

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Background: Adolescents living with HIV (ALHIV) face unique challenges that result in persistent gaps in achieving and maintaining suppressed viral load. Although effective evidence-based interventions to address treatment gaps in adolescents are readily available, health systems in resource-constrained, high HIV prevalence settings are challenged to implement them to achieve epidemic control. Here, we describe the health system responses to address the treatment gap of unsuppressed ALHIV on antiretroviral therapy in Windhoek, Namibia.

Methods: We conducted a qualitative descriptive and exploratory study in Windhoek between June and October 2023. Nineteen purposively selected key informants, ranging from pediatric HIV program managers to healthcare providers, were interviewed. In-depth interviews were audio-recorded and transcribed verbatim. The transcripts were uploaded to ATLAS.ti and subjected to thematic analysis.

Results: The four main themes elucidated challenges related to adherence and retention as well as health system responses in the form of interventions and support programs. The predominant adherence and retention challenges faced by ALHIV were mental health issues, behavioral and medication-related challenges, and inadequate care and social support. The health system responses to the identified challenges included providing psychosocial support, peer support, optimization of treatment and care, and the utilization of effective service delivery models. Key health system support elements identified included adequately capacitated human resources, efficient medication supply chain systems, creating and maintaining an enabling environment for optimum care, and robust monitoring systems as essential to program success.

Conclusion: The health system responses to address the remaining treatment gaps of unsuppressed ALHIV in Windhoek are quite varied and, although evidence-based, appear to be siloed. We recommend harmonized, multifaceted guidance, integrating psychosocial, treatment, care, and peer-led support, and strengthening client-centred differentiated service delivery models for unsuppressed adolescents.

Keywords: viral suppression, adolescents, antiretroviral therapy, interventions, HIV, fast-track city

Introduction

Globally, it has been reported that adolescents have lower retention in care, adherence to antiretroviral therapy (ART), viral suppression, and immunological recovery rates, as well as a higher risk of virological rebound than adults.[1] Poor or nonadherence to ART is associated with virologic failure, viral rebound and drug resistance which may lead to disease progression, recurrent illnesses, and poor health outcomes.[2] The World Health Organization (WHO) recommends adolescent-friendly healthcare services that improve the accessibility, appropriateness, equity, acceptability, and effectiveness of HIV treatment for adolescents and young people living with HIV (AYPLHIV) aged 10–24 years.[3,4] It is widely reported that adolescent-friendly services mitigate known barriers to treatment success, such as fear of HIV

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disclosure, social isolation (as a result of HIV stigma), conflicts between adherence to clinic appointments and school attendance, and fractious relations with health workers through after-school clinic hours, facilitating good rapport with dedicated clinic staff, and peer support.[5]

Studies have shown that peer support can be effective in improving retention in care, treatment adherence, and viral suppression as well as the psychosocial well-being of adolescents living with HIV (ALHIV).[6,7] Peer support interventions can facilitate youth-led advocacy and mitigate the negative effects of peer pressure and self-stigmatization.[8] Poor treatment outcomes in adolescents are attributed to a myriad of factors, including poor treatment literacy and understanding of the benefits of ART adherence as well as a lack of motivation to comply with guidance on treatment regimens.[9] Other barriers for adolescents include forgetfulness, lack of social support, substance abuse, mental health issues (self-stigma, depression, anxiety), medication side effects, food insecurity, being orphaned, lack of transportation, reliance on adults, HIV status non-disclosure, health systems, and other broader structural challenges.[10]

Evidence suggests that peer support can be key to addressing behavioral issues, self-esteem, social skills, coping skills, cognitive and emotional behavioral issues, depression, anxiety symptoms, sexual and reproductive issues, substance abuse, and other psychosocial issues that may be related to the adolescent stage and living with HIV.[9,11] Examples of programs implemented in sub-Saharan African countries such as Tanzania, Mozambique, and Zimbabwe are the Resilient Empowered Adolescent and Young People Program and the Community Adolescent Treatment Supporter (CATS) programs, also known as Zvandiri, which have also been scaled up in other countries in recent years.[12]

A review of interventions for improving adherence and retention in HIV care among adolescents identified youth-friendly services, group and individual counselling, increased accessibility to clinics, and financial incentives as effective interventions.[13] An updated review identified ten studies, predominantly from sub-Saharan Africa, which outlined clinic-level, household- and community-level, and mHealth (use of mobile devices and other wireless technologies in healthcare) interventions as potential interventions for consideration.[14] The authors recommend multifaceted interventions to address socioeconomic barriers to ALHIV.[14]

However, there is an increasing interest in the observed potential of one-on-one peer-directed support to achieve viral suppression in adolescents with unsuppressed viral loads.[15] Great potential for improving treatment outcomes among adolescents has also been observed in group-based peer support interventions such as teen clubs. Two evaluation studies on teen club interventions in Malawi reported that adolescents who were not exposed to teen clubs were less likely to be retained in HIV care than those in teen clubs.[16,17] However, a recent evaluation of a teen club intervention in Windhoek found no significant differences between teen club participants and those in standard care with respect to viral suppression and overall retention.[18,19]

Although emerging evidence supports the scale-up and wider implementation of peer support interventions, the implementation of these interventions in health programs is inadequately described and their impact or effectiveness is unclear.[12] There is an urgent need for exploratory research on peer support programs to describe how they are being implemented as well as their applicability and effectiveness in addressing the unique challenges faced by adolescents. Furthermore, questions regarding how these peer support programs intersect and interact with other psychosocial interventions, treatment and care support, service delivery models, and healthcare systems remain unanswered.[3] The current paper reports on the findings from an exploratory qualitative study interrogating whether existing interventions make particular provisions for adolescents who are not suppressed from the perspective of adolescent HIV program managers and service providers in the public healthcare sector in Namibia.

Materials and Methods

Study Setting

This study was conducted in Windhoek, the capital city of Namibia, which has an estimated population of 431,000 inhabitants. Windhoek is part of the joint Fast-Track Cities Initiative, which endeavors to optimize HIV service delivery, prioritize ALHIV, and promotes lifelong engagement and retention in HIV care.[20] The Namibia Population-based HIV Impact Assessment (NAMPHIA) study of 2017 reported that Namibia had reached an estimated 86%-96%-91% of the adopted 90–90-90 UNAIDS goals for HIV epidemic control.[21] The overall HIV prevalence among the younger

population aged 15–24 years was 4.0%, whereas it was 1.7% among young adolescents aged 10–14 years.[21] However, Windhoek has the highest HIV burden in the country, and its healthcare infrastructure includes two referral hospitals, two healthcare centres, and nine primary healthcare clinics. HIV services for adolescents are provided at all facilities with only one model-specialized pediatric ART clinic at a referral hospital. A recent retrospective analysis of treatment outcomes for adolescents receiving ART at all healthcare facilities (n=13) in Windhoek found viral non-suppression at the 1000 copies/mL threshold at 12% [unsuppressed (>1000) = 12%, suppressed (40–999) = 13.6%, fully suppressed (<40) = 74.4%)] and retention in HIV care rates at 6, 12, 18, 24, and 36 months were 97.7%, 94.1%, 92.4%, 90.2%, and 84.6%, respectively.[22,23] The health system response for ALHIV caters for both adolescents born with HIV (vertical transmission) and those who acquired it through horizontal transmission.

Research Design, Sample Size and Sampling

We conducted a qualitative descriptive and exploratory research study. The participants were purposively selected from the Ministry of Health and Social Services (MHSS) management structures supporting adolescent HIV care and a key Non-Governmental Organization (NGO) supporting ALHIV, as well as health service providers and Namibia Adolescent Treatment Supporters (NATS) at public primary care facilities in Windhoek. The sample size was determined using the data saturation approach, participants were recruited into the study until no new information was being obtained. Nineteen key informants were interviewed: nine program managers (four MHSS clinical mentors (medical officers), a national pediatric HIV program officer, a regional NATS coordinator, two nurse mentors, and an NGO program director), five healthcare service providers (one pediatric HIV care medical officer, two pediatric HIV expert nurses, one pediatric ART nurse, and one lay counsellor), and five NATS.

Data Collection Procedure

In-depth interviews were conducted using interview guides specifically developed for program managers, healthcare service providers who manage ALHIV, and the NATS. Key informant interviews were conducted between June 19 and October 20, 2023. Twelve interviews were conducted in person and seven were conducted using Zoom (Zoom Video Communications, Qumu Corporation, Inc. software (version 5.16.2). Recorded interviews were transcribed verbatim in English. In line with the objectives of exploring the health system responses for unsuppressed ALHIV from the perspectives of the program managers and healthcare service providers, some of the key guiding questions included:

1. How would you describe the national strategy regarding HIV services for adolescents living with HIV?
2. From your experience, what are some of the challenges the adolescents often mention, with regard to taking their ART medication and attending their clinic appointments?
3. Could you share with me what programs or interventions the facility implements to address ART adherence and Retention in care challenges for adolescents on treatment at this facility?
4. In your opinion, what has been working well and what has not been working well regarding the implementation of these programs or interventions?
5. How can the programs/interventions be better improved? Probe: improving the specific challenges encountered.

Data Analysis

The data transcripts were uploaded to ATLAS.ti v8 software and subjected to thematic content analysis. We developed codes using an inductive approach, whereby codes and subthemes emerged from the transcribed data rather than a theoretical framework.[24] A final matrix of themes, subthemes, and codes describing adherence challenges, retention-in-care challenges, interventions, and health system issues was developed (Table 1).

Rigor and Trustworthiness

The trustworthiness and rigour of the study and its findings were ensured through several measures, including prolonged engagement with participants. We continuously engaged with program managers and observed healthcare service providers and NATS based at facilities in Windhoek during the data collection period, as well as piloting the tools with the participation

Table 1 Challenges, Interventions and Health System Responses Targeting ALHIV

Theme	Sub-themes	Code
Adherence challenges	**Mental health**	○ anxiety ○ depression ○ alcohol and drug abuse
	Behavioral	○ blame ○ adolescents do not easily open up ○ denial ○ treatment fatigue ○ forgetting to take medications ○ adolescent not coming to facility regularly ○ HIV non-disclosure to peers, boarding mates, family ○ stigma ○ unwilling to take medication ○ treatment literacy ○ partying, going out, rebellious ○ identity crisis ○ age and sex
	Medication	○ medication unpalatable ○ pill burden ○ complexity of medication dosage ○ developing resistance
	Care support	○ all key individuals not available for a sit-in ○ scheduling of visit dates ○ not involving adolescents in treatment plan ○ healthcare workers support
	Social support	○ family support ○ boarding school ○ socioeconomic issues_food insecurity, transport ○ caregiver support
	Side-effects	○ diarrhoea ○ vomiting the medication
Retention challenges	**Mental health**	○ alcohol and drug abuse ○ depression
	Behavioral	○ stigma and discrimination_retention ○ treatment fatigue
	Social support	○ attending school ○ family support ○ staying in boarding school
	Care support	○ not involving adolescents in treatment plan ○ caregiver`s home distance from facilities
Interventions	**Psychosocial**	○ caregivers club for unsuppressed adolescents ○ HIV disclosure to adolescent ○ integrating mental health and HIV services ○ enhanced adherence counseling ○ NGOs support ○ Orphans and Vulnerable children

(*Continued*)

Table 1 (Continued).

Theme	Sub-themes	Code
	Peer support	○ Namibia Adolescent Treatment Supporters (NATS) ○ treatment buddies ○ teen club
	Treatment	○ multimonth dispensing ○ directly observed treatment (DOT) ○ Dolutegravir (DTG) introduction ○ ART regimen switch ○ transition to DTG-containing regimens ○ index contact testing and linkage to care ○ managing opportunistic infections ○ pediatric HIV care strategy ○ integrating sexual and reproductive health
	Service delivery models	○ model clinics ○ differentiated service delivery models ○ case management ○ tracing and post-tracing services ○ adolescent-friendly services ○ quality improvement collaboratives
	Care support	○ treatment reminders ○ transition to adult care
Health system	**Enabling environment**	○ need for private space ○ multisectoral involvement
	Monitoring systems	○ monitoring and evaluation, intervention impact
	Medication supply	○ medicine supply chain management
	Human resources	○ staff capacity building ○ mentors ○ social workers ○ multidisciplinary team approach ○ shortage of staff

of key informants. Prolonged engagement, persistent observation, and a participatory approach enhance familiarity and understanding of different contexts for the researcher; develop a sense of ownership and involvement in the outcome of the research for the participants; add more value in terms of the credibility of the study; and ensure dependability, transferability, and confirmability.[25] The piloting of tools also helped refine the quality of the questions in the interview guide and subsequently the information produced. We also conducted a review of program documents and a systematic review that familiarized us with the key concepts that allowed us to conduct iterative questioning during the interviews. Triangulation is another measure that we utilized, analyzing responses from program managers, healthcare service providers, and the NATS, to compare responses to reach a rich picture of the dynamics as much as possible and to increase credibility.

Ethical Approval and Informed Consent

Ethical clearance was obtained from the University of the Western Cape Biomedical Research Ethics Committee (Ref. no. BM21/5/7), and Namibia Ministry of Health and Social Services (MHSS) Research Management Committee (ref. no. 17/3/3/FKM). This study was conducted in compliance with the 1964 Declaration of Helsinki guidelines and its subsequent amendments. Written consent was obtained from all the participants for their participation in the interviews and for the interviews to be recorded. In addition, the participants consented to the anonymous publishing of their responses, and pseudonyms were used to identify all study participants. No personal identifying information, such as

names, surnames, or identity numbers, was used during or after the interviews to ensure respect for the privacy and dignity of the participants and confidentiality of participants' information.

Results

We classified the findings of our study into four main themes: adherence challenges, retention challenges, Interventions and Health system issues. Table 1 outlines the main themes, their corresponding subthemes, and codes. Five domains emerged from the interventions, while four health system components were identified as key elements in the programmatic response to address the challenges for ALHIV to adhere to their treatment, stay engaged in HIV care, and achieve and sustain viral suppression (Table 2).

Table 2 Programmatic Response to Challenges Faced by ALHIV

Intervention domain	Strategy/Activities	Targeted challenges
Psychosocial	Caregivers` club for unsuppressed adolescents	Treatment literacy; All key individuals are not available for a sit-in; Family support; Caregiver support
	HIV disclosure to adolescent	Unwilling to take medication; Treatment literacy; Age (not mature/ready for full disclosure)
	Integrating mental health and HIV services	Anxiety; Depression; Alcohol and drug abuse
	Enhanced Adherence Counseling	Mental health issues; Behavioural issues; Medication-related problems; Care support; Social support; Side effects
	NGOs support	Socio-economic issues, food insecurity, transport; Age group-specific issues; Gender-specific (eg, SRH); Family support; Boarding school
	Orphans and Vulnerable children	Socio-economic issues, food insecurity, transport; Age group-specific issues; Gender-specific (eg, SRH); Family support; Boarding school
Peer support	Namibia Adolescent Treatment Supporters	Blame; Adolescents do not easily open up; Denial; Treatment fatigue; Forgetting to take medication; Stigma; Treatment literacy; Partying, going out, rebelliousness; Identity crisis; Age group-specific issues; Healthcare worker support; Family support; Caregiver support, Caregiver`s home distance from facilities; Staying in boarding school
	Treatment buddies	Forgetting to take medication, Adolescents not coming to the facility regularly; Unwilling to take medication; Treatment fatigue; Treatment literacy
	Teen clubs	Alcohol and drug abuse; HIV non-disclosure to peers, family; Identity crisis; Blame; Adolescents do not easily open up; Denial; Treatment fatigue; Stigma and discrimination; Treatment literacy; Partying, going out, rebelliousness; Identity crisis; Age group-specific issues; Healthcare worker support; Family support; Caregiver support; Staying in boarding school; Gender-specific issues; Sexual and reproductive health
Treatment	Multimonth dispensing	Caregiver`s home distance from facilities; Scheduling of visit dates; Adolescents not coming to the facility regularly; Socioeconomic issues, transport; Staying in boarding school
	Directly observed treatment (DOT)	Treatment fatigue; Forgetting to take medication; Unwilling to take medication; Treatment literacy; Medication unpalatable; Pill burden; Complexity of medication dosage; Developing resistance; Healthcare worker support
	DTG introduction	Pill burden; Complexity of medication dosage; Developing resistance
	ART regimen switch	Developing resistance; Pill burden
	Transition to DTG-containing regimens	Pill burden; Complexity of medication dosage; Developing resistance
	Index contact testing and linkage to care	HIV non-disclosure to peers, boarding mates, family; Forgetting to take medication; Family support
	Managing opportunistic infections	Unwilling to take medication; Healthcare workers' support; Diarrhoea; vomiting the medication
	Pediatric HIV care strategy	Pill burden; Complexity of medication dosage; Developing resistance; Managing side effects
	Integrating sexual and reproductive health	HIV non-disclosure to peers, family; Stigma and discrimination; Age group-specific issues; Gender-specific issues; Family support

(*Continued*)

Table 2 (Continued).

Intervention domain	Strategy/Activities	Targeted challenges
Service delivery models	Model clinics	Mental health issues; Behavioural issues; Medication-related problems; Care support; Social support; Side effects
	Differentiated service delivery models	Adolescents not coming to the facilities regularly; Stigma and discrimination; Scheduling of visit dates; Not involving adolescents in treatment plan; Healthcare workers support; Boarding school; Attending school; Caregiver`s home distance from facilities
	Case management	Mental health issues; Behavioural issues; Medication-related problems; Care support; Social support; Side effects
	Tracing and post-tracing services	Adolescents not coming to the facility regularly; Healthcare workers' support; Not involving adolescents in treatment plan; Caregiver`s home distance from facilities
	Adolescent-friendly services	Adolescents do not easily open up; Adolescents not coming to facility regularly; Scheduling of visit dates; Healthcare workers' support; Attending school; Staying in boarding school
	Quality improvement collaboratives	Mental health issues; Behavioural issues; Medication-related problems; Care support; Social support
Care support	Treatment reminders	Forgetting to take medications; Treatment fatigue; Alcohol and drug abuse; Partying, going out, rebelliousness; Attending school; Staying in boarding school
	Transition to adult care	Treatment literacy; Identity crisis; Healthcare worker support

Psychosocial Support

Psychosocial support has emerged as one of the main interventions implemented to address the challenges faced by the ALHIV. A *caregivers' club for parents, caregivers and guardians of unsuppressed adolescents* was introduced to improve treatment literacy among caregivers, family support, caregiver support, as well as encouraging key individuals (caregivers) in the lives of adolescents with poor treatment outcomes to be available for "sit-in sessions" with the healthcare providers and the affected adolescents. Sit-in sessions are essential for facilitating a holistic understanding of adherence challenges and for coming up with solutions together with adolescents and caregivers.

> Especially those [adolescents] who are struggling, we target those children who are having issues under the care of caregivers, their caregivers form a club to learn from each other, share challenges and best practices. The curriculum or guide from the ministry is being developed – Medical Officer (MO), HIV program director.

HIV disclosure addresses treatment literacy among ALHIV and their unwillingness to take medication in relation to their age, maturity, and readiness for full disclosure. Disclosure support should be provided to both caregivers and adolescents.

> For a lot of parents, reality sets in when the child is becoming older, fear sets in like oh now they [adolescent] are going to understand where they got the HIV from and that leaves me exposed and now I have to answer questions that I don't feel appropriate for a parent to speak to a child on – Health Assistant (HA), Pediatric ART clinic

The program *integrates mental health and HIV services* to address anxiety, depression, and alcohol and drug abuse among adolescents on ART. In addition, *enhanced adherence counseling (EAC)* is implemented to address mental health issues as well as behavioral, care, and social support challenges, medication-related problems, and any side effects that adolescents may experience.

> Some interventions do not require a lot of resources, for example, enhanced adherence counseling, we managed to suppress clients just by talking to them, almost 50% of them just by enhanced adherence counseling. Initially a root cause analysis of why the adolescent was failing was not being done, but we have changed that and actually use a high viral load register to keep track of the issues – Pediatric HIV Expert Nurse (PHEN)

Specific programs for *Orphans and Vulnerable Children (OVCs)* and *Non-Governmental Organizations (NGOs)* complement government health service efforts by addressing socio-economic challenges such as food insecurity, transport to

clinic appointments, age-appropriate and gender-sensitive issues at the community level, as well as boarding school programs and family support.

> It's not a separate intervention for caregivers, adolescents and their caregivers come from their homes and join the meetings together. You have some children who joined these meetings, you know, not speaking, not being open, but in the end, you really see that both are now starting to engage, the parent and the child relationship is developing, so that's working well – non-Governmental Organization (NGO) program director.

Peer Support

The *Namibia Adolescent Treatment Supporters (NATS)* program is a rapidly scaling up intervention. The NATS are at the forefront of the *teen clubs* as well as the setting up *treatment buddy pairs* in which an unsuppressed adolescent is paired with an adolescent who is doing well and virally suppressed. Among the main challenges the NATS helps to unlock are issues of stigma (especially self-stigma), denial, blame (self or blaming parents), treatment fatigue, getting adolescents open up, rebelliousness, and other teenage behavioral issues, dealing with identity crises, encouraging healthcare worker support, and caregiver and family support.

> They [NATS] have created with their peers, adolescents, to accept their treatment, they share a lot of issues, even some things as healthcare workers we don't happen to hear, we hear them from the NATS and it has positively impacted retention and adherence, we have seen a number of clients enrolled in enhanced care suppressing – PHEN

> Thanks to the NATS program, I call it, the NATS, our liaison officers, because the adolescents are closed off, they don't like to talk. They will never tell you what's wrong, but if you sit with the NATS, they get to open up – MO, Pediatric HIV clinic

The NATS also assist adolescents staying far from facilities with medication deliveries when needed and assist those staying in boarding schools, in line with the client-centred care approach. Through the treatment buddies and teen clubs, the NATS also support those who are unwilling to take their medication, forgetting to take their medication, non-disclosure to peers, family or relatives they live with, alcohol and drug abuse, and discussing gender sensitive issues such as sexual and reproductive health topics especially within the teen clubs.

> Our work is really making them [adolescents] understand, it`s empowering the adolescents. We are also bringing them to the teen clubs and we have this group called HOPE where the one struggling with high viral load we mix them with another adolescent who is having a low viral load or TND [target not detected], we have to give them a friend, they become treatment buddies. Sometimes I take medication to their houses or talk to their families if there are problems – NATS, Primary Healthcare (PHC) clinic

Treatment

Multi-month dispensing (MMD) is one of the strategies implemented to address the challenges of retention and access to health facilities. Adolescents with scheduling difficulties, staying far from the clinic, staying in boarding schools, and socioeconomic challenges (lack of transport money) can benefit from MMD. Adolescents who often forget or are unwilling to take medication, experience Treatment fatigue, or struggle with the pill burden or unpalatability of medication can be assigned to *direct observed treatment (DOT)*.

> She [adolescent] struggled to take medication at the school, one matron knows and was helping her to come to the clinic, but now it was agreed to call her [adolescent] to the teacher`s room every day when they go to class, the teacher will give her the medication, then she will drink her medication, she doesn't have a problem with it so far – NATS, Health Center.

Challenges with inadequate support from healthcare workers and complex medication dosages have also been addressed with DOT. The *Introduction of Dolutegravir (DTG), transitioning of patients to DGT-containing regimens* and appropriate *ART regimen switches* also address pill burden, complexity of medication dosages, and risk of developing resistance. The *pediatric HIV care strategy* provides guidance on the treatment challenges outlined above as well as *management of opportunistic infections* and medication side effects.

> The introduction of pediatric DTG, fixed dose combination which is very strong and can reduce the virus in a very short period of time, we can see rapid and remarkable improvements among adolescents. DTG has a very high genetic barrier, it's a bit forgiving, even if someone is not taking it 100%, which really suits adolescents – Clinical Mentor, Khomas region

To address HIV non-disclosure to peers and family, and to enhance family and partner support, the program offers *index partner testing and linkage to appropriate services*. Partner testing and linkage to appropriate services are entry points for treatment support, especially for older adolescents.

> Do you know, that up to now we do not have a straightforward guidance on how to go about disclosing HIV status to a partner of these adolescents. That they are really finding it challenging - a lot. So you`d find out that older adolescents give up completely on their medication because they do not want others to see it, but we cannot assist them – Registered Nurse (RN), Pediatric HIV care

> Like I remember one of my patients, she is breastfeeding, she came with her boyfriend, and then she didn't disclose that she is drinking medication, she just drinks the medication when the boyfriend has gone out of the house, she would not drink while the boyfriend is in the house. She has refused to disclose, but agreed to bring the boyfriend for testing but they haven't come yet – NATS, Health Center

Service Delivery Models

The program introduced *model clinics* for pediatric HIV care to provide specialized services, *individual case management*, and *quality improvement collaboratives* to address adolescent behavioral issues, mental health issues, pediatric medication-related problems, side effects, and overall adolescent care and social support needs.

> We just have too many adolescents failing treatment. By having model clinics, centers of excellence, we build some expertise, and these clinics are empowered to address adolescent issues and do better in terms of viral load suppression among adolescents - MO, HIV program director.

> Case-by-case management, I think that's why support needs to be tailor-made according to how the emotional development of the child the parent is raising needs and identifying or anticipating potential challenges, sometimes it is how the disclosure was done, accidental disclosure, or late disclosure, there is need for case-by-case management – RN, District Quality Manager (DQM)

Differentiated service delivery models and *adolescent-friendly services* have been introduced in most facilities to address adolescent-specific health needs, considering challenges in accessing health facilities due to school schedules, home distance from facilities, stigma and discrimination, inadequate healthcare worker support, adolescents not easily opening up, and lack of involvement of adolescents in developing a treatment plan that works for them.

> So, I found that if the mother or father are part of the CARGs for example, the adolescent can also be part of it which means one person can bring all the cards and collect medication for all of them and meet in the community. Community Health Workers can also be attached to a certain adolescent who we may have identified with adherence issues and support home delivery of medication in the community for those who cannot come to the facility – RN, DQM

> We have adolescent-friendly corners, and pediatric-only day each week, for example, each Friday healthcare workers focus on adolescents' viral load monitoring, give them more attention. Because sometimes it is just "Are you fine? Any complaints? Ok next one… – Regional NATS coordinator

> We make sure adolescents do not sit in the queue, sometimes they send their cards in advance or call that they are coming to the clinic, and we fast track them to see the nurse or doctor or get medication at pharmacy, they just wait to get their bloods taken, we make it smooth, we don't want them to stay longer. At pharmacy, that's why we came up with delivering medication at home, they don't like sitting there – NATS, Health Center

Challenges with coming to health facilities are also addressed through the implementation of tracing and post-tracing services that address the reasons for interrupting treatment among adolescents. The MHSS developed an SOP and curriculum to ensure the implementation of these activities by healthcare providers.

Care Support

The program has also introduced treatment reminders to deal with forgetfulness, effects of treatment fatigue, managing medication schedules while attending school and boarding school environments, typical adolescent outgoing behavior, rebelliousness, alcohol and drug abuse, and other behaviors that may distract adolescents from taking their medication. Older adolescents may need enhanced support during the transition period to adult care as they may be resistant to moving from pediatric care due to uncertainty about the level of healthcare worker support in adult care, inadequate treatment literacy to independently manage their own treatment and care, and experience some form of identity crisis.

> Most of the people that are in school don't have watches to check to remind them that it's time to take their medicine. Some are still struggling because they are used to the caregiver reminding them. So, there is an initiative to provide them with wristwatches, pill boxes or to put alarms on their mobile phones – RN, DQM

> The only struggle I have seen is once these teenagers move over to the adults, that's where they struggle the most. If we can have another way of just trying to keep them on track because you`ll find that some would rather stay under pediatric ART instead of going on the adults side because they feel neglected at some point – RN, Pediatric ART clinic

Health System Essentials

The interventions described above require essential elements of a health system, as outlined in Table 3, to facilitate their effective implementation. An enabling environment with adequate privacy and space to engage with adolescents has emerged as one of the key elements to tackle the challenges of adolescents not opening up or not coming to facilities regularly. Privacy and space issues were also identified as contributing to HIV non-disclosure, especially in community and home settings when an adolescent may be living with relatives or visitors in the home.

To address HIV non-disclosure to peers, boarding school mates, and stigma and discrimination, a multisectoral approach is implemented involving community leaders, other line ministries (education, gender equality, poverty eradication and social welfare), NGOs and other stakeholders. Multisectoral involvement also addresses socioeconomic issues, such as transport and food insecurity in the home, family support, and alcohol and drug abuse.

Table 3 Health System Essentials Supporting the Programmatic Responses to Challenges Faced by ALHIV

Health system	Health system elements	Challenges addressed
Enabling environment	Privacy and space	Adolescents do not easily open up; Adolescents not coming to facility regularly; HIV non-disclosure to peers, boarding mates, family
	Multisectoral involvement	HIV non-disclosure to peers, boarding mates; Stigma and discrimination; Staying in boarding school; Socioeconomic issues, food insecurity, transport; Family support; Alcohol and drug abuse
Monitoring systems	Monitoring and Evaluation	Intervention impact evaluations; Monitoring Quality Improvement collaboratives
Medication supply	Medication supply chain management	Availability of medication for treatment interventions (DTG-containing regimens, Multimonth dispensing, ART regimen switch, DOT, managing Opportunistic Infections)
Human resources	Staff capacity building	Staff capacity (knowledge and skills) to implement the outlined strategies and address identified challenges for ALHIV
	Mentors	Expert support through mentorship and coaching of staff managing ALHIV; Participating in Multidisciplinary team interventions for difficult cases
	Social workers	Providing psychosocial support; Participating in Multidisciplinary team interventions for difficult cases; Appropriate referrals to psychologists, psychiatrist
	Multidisciplinary team approach	Managing difficult cases, persistent high viral load
	Staffing (shortages)	Managing workload in integrated clinics; Shortage of staff equipped with skills to manage ALHIV; Shortage of social workers, psychologists, psychiatrists

To evaluate the impact of different interventions and monitor the performance of quality improvement initiatives, the HIV program has developed monitoring and evaluation systems. The systems also monitor medication supply chain management to ensure the availability of medication for treatment interventions, such as DTG-containing regimens, adequate stocks for MMD, the needed ARVs for appropriate regimen switches, for DOTS, and for managing opportunistic infections.

Human resources that support adolescent care and treatment programs have emerged as a major challenge. There are social workers in the ministries of health and gender who are stationed at the main hospitals and visit smaller facilities, although their schedules and frequencies are uncertain because of their limited number and reported overwhelming workload. Access to these social workers is limited, hampering their participation in multidisciplinary team interventions for difficult cases, provision of psychosocial support, and a clear referral path to psychologists or psychiatrists, who are also available only at the main referral hospital.

Discussion

This study explored the implementation of interventions aimed at addressing the challenges faced by unsuppressed adolescents in HIV care in Windhoek, Namibia. The programmatic response to managing ALHIV in Namibia includes psychosocial support, peer support, treatment, different service delivery models, and care support. In addition, four health system components–human resources, medication supply, monitoring systems, and creating and maintaining an enabling environment for adequate care, emerged as the key essential elements for treatment success. The programmatic response addresses some of the main treatment gaps in unsuppressed ALHIV to a certain extent, although challenges remain in optimizing their accessibility, appropriateness, equity, acceptability, and effectiveness, as described by the WHO.[3]

There is growing recognition of mental health as a facilitator or barrier to retention in HIV care, ART adherence, and viral suppression in PLWHIV, and adolescents are no exception. Evidence from other studies suggests that improved mental health leads to improved adherence and a focus on mental health supports higher rates of viral suppression.[26–28] Accordingly, the Namibia HIV program is strengthening the integration of mental health and HIV services, with the training of healthcare providers in mental health services.[29] However, it is apparent that there is a scarcity of social workers, psychologists, and psychiatrists, and referrals to the limited number of these cadres are often unsuccessful. The availability of these cadres and the strengthening of the knowledge and skills of other healthcare workers, such as nurses, counsellors, and doctors, in mental health services would go a long way toward addressing depression, anxiety, alcohol and drug abuse, and other mental health issues.[30,31] Enhanced adherence counselling appears to be a successful intervention in addressing mental health issues, utilizing a multidisciplinary team approach with the involvement of social workers. EAC has also been successful in addressing behavioural issues, care and social support, medication-related issues, and side effects. Evidence from other studies corroborates that EAC has great potential to improve viral suppression with adequate ART support.[32,33] In Namibia, adolescents with high viral loads above 1000 copies/mL, are enrolled in EAC and tracked using a somewhat case management approach through a high viral load register, which documents root causes, interventions, and progress at each clinic encounter and the outcomes of the interventions.

The Namibia program also recognizes the key role of HIV disclosure to adolescents and challenges with non-disclosure to family, peers, and other key individuals, such as in boarding schools. Although the evidence from elsewhere is inconclusive, knowing one's HIV status and disclosure to others may improve adherence to ART.[34] Full disclosure is offered at the appropriate age when the child has adequate maturity and is ready to fully understand the HIV status.[35] Treatment literacy is a key concept to promote compliance in adolescents who are unwilling to take medication. Caregivers of adolescents with unsuppressed viral loads, in particular, are encouraged to be part of caregiver clubs aimed at improving their treatment literacy, improving caregivers and family support. Caregivers are also encouraged to attend sit-in sessions together with the child facing adherence challenges. Other studies posit that caregivers of unsuppressed adolescents experience first-hand challenges that directly affect adolescents under their care, and need both facility and community-based support.[36,37] Beyond the clinic setting, NGOs and OVC programs support structural and socioeconomic challenges, such as transport for clinic visits, food insecurity, and other family economic empowerment initiatives. A previous study in Uganda argued that multi-sectoral engagement and involvement need to be

strengthened to address challenges that facilitate viral non-suppression in community environments, such as schools and boarding schools.[38]

Evidence suggests that peer support is the cornerstone of sustained engagement of adolescents in treatment programs. Adolescence is a critical developmental phase, in which positive peer support and influence are essential components of coping and overall growth.[39] Peer support programs enable healthcare workers, adolescent programs, and healthcare services to be more acceptable, responsive, relevant, and sustainable, thereby promoting better retention in care among AYPLHIV.[40] Correspondingly, the expansion of teen clubs, rollout of the NATS, and treatment buddies seem to be key interventions that are strongly appreciated and promoted by healthcare providers and program managers. NATS play a pivotal role in identifying adolescents with unsuppressed viral loads and enrolling them in standard or enhanced support.[41] They also facilitate teen clubs and the pairing of unsuppressed and suppressed adolescents using the treatment buddy approach, which is reportedly yielding positive Results. The appraisal of the NATS by healthcare workers as the "liaison officers" or "champions" is a testament to their impact.

Peer support ranges from peer-to-peer counselling support and peer support groups to treatment buddy programs, whereby AYPLHIV are engaged formally or informally to provide care support to improve treatment outcomes in their peers.[4] The NATS complements support from healthcare workers, caregivers, and family, addressing issues of denial, blame, stigma and discrimination, identity crises, rebelliousness, and other adolescent behavioral issues.[42] In addition, through treatment buddies, difficulties with opening up, forgetfulness, treatment fatigue, school schedule, taking medication, alcohol and drug abuse, and relationship matters are shared and addressed. However, these interventions need adequate resources for the NATS to be able to conduct home visits as needed, for telephonic support, smooth uninterrupted running of the teen clubs, ensure the well-being of the peer supporters, and ensure the sustainability of these programs.[43]

Optimizing treatment has evidently seen the achievement of higher viral suppression rates. The introduction of DTG and the transitioning of adolescents to DTG-containing regimens is one of the main thrusts of the program. Evidence from recent studies shows that the regimens are more simplified and there is a reduced pill burden and lower risk of developing resistance.[44] Adolescents who may be unwilling to take medication, forget, or experience treatment fatigue may be included in the DOT strategy. Anecdotally, the use of treatment reminders, such as wristwatches and pill boxes, appears to be helpful but still needs to be empirically tested. The pediatric HIV care strategy provides guidance on appropriate HIV treatment, management of opportunistic infections, integration of sexual and reproductive health, engagement of partners of HIV-positive adolescents in relationships, and the smooth transition of adolescents to adult care.[45]

The model clinics introduced by the program are essential learning centres of excellence for service providers and provide the highest standard of care for adolescents. Most facilities are also implementing adolescent-friendly services, as recommended by the WHO, including the introduction of high-viral-load days for adolescents in some clinics.[3] However, the availability of space for adequate privacy to engage adolescents remains a challenge in many clinics. Differentiated service delivery models are also key to delivering HIV services according to the needs of adolescents, especially for those struggling to achieve and maintain viral suppression.[46] The program introduced tracing and post-tracing services to find those adolescents who would have fallen out of care and are likely to have high viral loads. Post-tracing services address the causes and risks of individuals disengaging from care. Finally, quality improvement collaboratives focusing on viral load suppression among adolescents track unsuppressed adolescents and use PDSA cycles to test change ideas for improvement in viral suppression, and the adoption of sustainable and effective interventions.

Limitations of the Study

Despite our intention and efforts to interview social workers from the ministries of health and gender, and life skills teachers in the education sector, our final sample did not include these cadres. We could not obtain individuals who specifically support ALHIV programs from these sectors; therefore, the voices of social workers and life skills teachers are missing. We suggest that future research should include broader multisector stakeholders that support the ALHIV program response. We also did not include the interviews with unsuppressed ALHIV and their caregivers in this analysis, which could have added the voice of the beneficiaries of the programs. The results presented in this study does not include weights of the themes and theme networks and linkages.

Conclusion

The health system responses to address the remaining treatment gaps of unsuppressed ALHIV in public primary healthcare facilities in Windhoek are quite varied and strongly link facility and community-based interventions. From our observations, although the interventions are comprehensive, they appear to be implemented in silos, and how they synergize in addressing unsuppressed adolescents holistically remains unclear. We recommend the provision of specific guidance on managing unsuppressed adolescents, which considers integrating psychosocial, treatment, care, and peer-led support, and strengthening client-centred differentiated service delivery models for unsuppressed adolescents.

Abbreviations

ALHIV, Adolescents Living with HIV; ART, Antiretroviral therapy; ARV, Antiretroviral; AYPLHIV, adolescents and young people living with HIV; CALHIV, Children and Adolescents Living with HIV; CARG, Community ART Refill Groups; CATS, Community Adolescents Treatment Supporter; DOT, Directly Observed Treatment; DQM, District Quality Manager; DTG, Dolutegravir; EAC, Enhanced Adherence Counselling; HA, Health Assistant; HIV, Human Immunodeficiency Virus; MHSS, Ministry of Health and Social Services; MMD, Multi-month; MO, Medical Officer; NAMPHIA, Namibia Population-based HIV Impact Assessment; NATS, Namibia Adolescents Treatment Supporter; NGO, Non-Governmental Organization; OVC, Orphans and Vulnerable Children; PDSA, Plan-Do-Study-Act; PHC, Primary healthcare clinic; PHEN, Paediatric HIV Expert Nurse; PLWHIV, People Living with HIV; RN, Registered Nurse; SOP, Standard Operating Procedure; SRH, Sexual and Reproductive Health; UNAIDS, The Joint United Nations Programme on HIV/AIDS; WHO, World Health Organization.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in this work.

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