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Understanding gaps in the HIV treatment cascade in eleven West African countries: Findings from a regional community treatment observatory

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Abstract

In West and Central Africa, 48% of people living with HIV are aware of their status, 40% are accessing antiretroviral therapy (ART), and 29% are virally suppressed. Progress towards universal treatment access is stymied by a range of diverse challenges, including drug stockouts, weak health systems, human rights barriers, and low quality of care. In February 2017, the International Treatment Preparedness Coalition (ITPC) established a regional community treatment observatory in West Africa to increase accountability for the UNAIDS 90-90-90 targets — ambitious global goals for the scale-up of testing, treatment and adherence.

ITPC trained and supported national networks of people living with HIV to collect facility-level data along the HIV treatment cascade from 103 health centres in 11 West African countries. The majority of facilities in the sample were large public hospitals and mid-level health centres located in capital cities. From July 2017-June 2018, the regional community treatment observatory conducted 279 interviews and 110 focus group discussions with patients and services providers. Following several refinements to the quantitative data collection tool, 538 health facility visits were conducted from January-June 2018.

In this paper, we share the first year of monitoring findings from the regional community treatment observatory, analyzed using the 'Five As' framework — availability, accessibility, acceptability, affordability and appropriateness.

Availability: ART stockouts were recorded during 23.4% of health facility visits (95% confidence interval [CI] 19.8%-27.0%), lasting an average of 40.5 days (95% CI 34.2-46.7 days). Stockouts were less common for HIV tests kits and viral load laboratory supplies (e.g. reagents). Accessibility: Long distances to health

centres was the foremost cited barrier to HIV testing and ART. Linkage to care at the monitored facilities was high overall (4,692 positive tests; 4,354 ART initiations), but was lower among key and vulnerable populations, and in countries where 'treat all' is not yet policy. Among 81,817 people on ART, 16,491 viral load tests were performed in the six months of the study. Acceptability: A third of patients rated the quality of services a 3 or less out of 5. A quarter of viral load test results were returned within two weeks, with faster turnaround time associated with improved viral suppression ($p<0.05$). Affordability: Payment for care was not cited as a major barrier to services. Appropriateness: 16% of individuals who tested HIV-positive were members of key and vulnerable populations, yet these groups made up just 7% of people on ART. Young men were less likely to access services than young women.

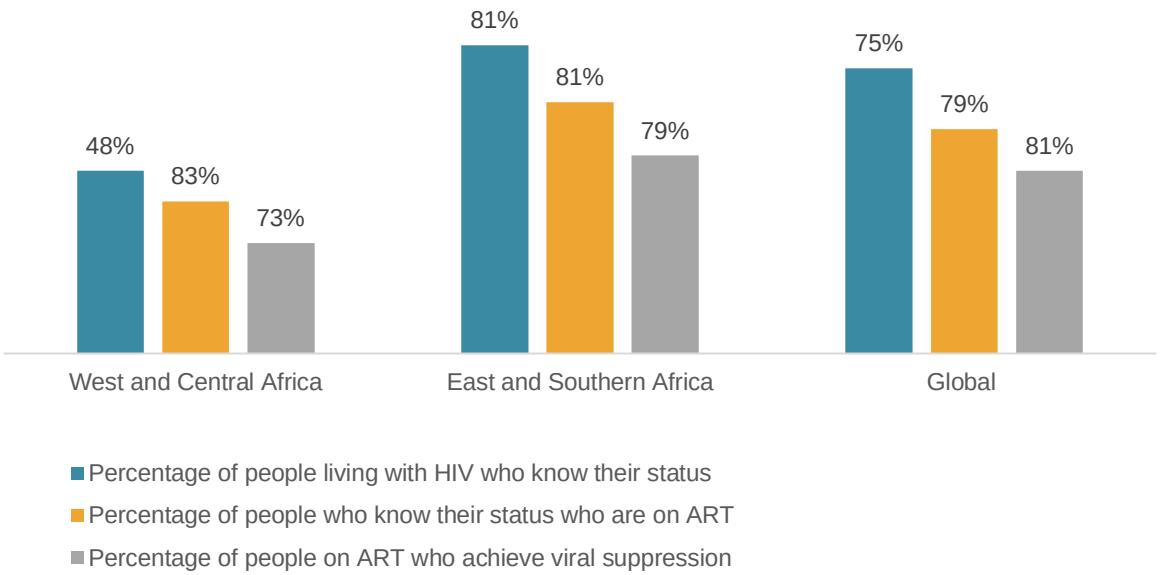
These findings highlight key gaps along the treatment cascade. Ongoing monitoring by communities of people living with HIV is critical to hold governments accountable for the 90-90-90 targets.

1. Introduction

The Joint United Nations Programme on HIV/AIDS (UNAIDS) has set ambitious HIV treatment targets for the world. UNAIDS' 90-90-90 targets require that by the year 2020, 90% of all people living with HIV know their HIV status, 90% of those receive sustained ART, and 90% of people receiving ART have viral suppression. Modelling by Stover et al. (2016) suggests that meeting these targets is a prerequisite for achieving the Sustainable Development Goal of ending AIDS by 2030.

West and Central Africa is far behind the rest of the word, and the rest of sub-Saharan Africa, in terms of UNAIDS' 90-90-90 targets (Figure 1). Of 6.1 million people living in West and Central Africa with HIV, 48% are aware of their status, 40% are on ART and 29% are virally suppressed (UNAIDS, 2017). This is commonly referred to as the HIV treatment cascade — a model that outlines the steps of care that people living with HIV go through from initial diagnosis to achieving viral suppression, showing the proportion of individuals living with HIV who are engaged at each stage.

Figure 1: Progress towards the 90-90-90 targets, by region



Source: *UNAIDS (2017) AIDSinfo: Offering information on HIV/AIDS treatment, prevention, and research.*

A confluence of different factors stymies progress towards the 90-90-90 targets in the region. These include low uptake of HIV testing services, persistent stockouts of medicines, weak health systems, human resource shortfalls, high out-of-pocket expenditure, human rights barriers to access, and low quality of care (Duvall et al., 2015; World Health Organization [WHO], 2015; Médecins Sans Frontières [MSF], 2016; Poku et al., 2017; Kruk et al., 2018; Lozano et al., 2018).

Audits of Global Fund grants in the region have documented stockouts of HIV test kits in Côte d'Ivoire, stockouts of pediatric drugs and government-financed third-line ARVs in Mali, expiry and potential expiry of ARVs in Gambia and Guinea, stockouts of reagents in Senegal, and limited use of stock cards and stock ledgers in Ghana and Togo (Office of the Inspector General of the Global Fund [OIG] 2011; 2012a; 2012b; 2015; 2016; 2017a; 2017b).

Health systems in West Africa are fragile and under-resourced, often leading to poor patient outcomes. The 2014 Ebola outbreak was both a symptom of existing health systems' weaknesses as well as a cause of enduring systems-related challenges for the HIV response (Parpia et al., 2016). A lack of public-sector resources for health means that patients must pay for basic services; out-of-pocket expenditure as a percentage of current health expenditure is greater than 50% in Guinea and Togo, and greater than 40% in Benin, Mali and Senegal (WHO, 2015). These systemic challenges have real impact on patients. Kruk et al. (2018) found

that of the 812,987 deaths in Western sub-Saharan Africa that were amenable to health care, 354,744 (43.6%) were due to poor quality of services.

Access to care has improved with the adoption of World Health Organization (WHO) guidelines to treat all people diagnosed with HIV, regardless of their CD4 count (commonly referred to as 'treat all') (WHO, 2016a: 2). To date, sixteen countries in the region have embraced this as policy (WHO, 2018b).[1] For example, the median time to treatment in Senegal decreased from 5.6 months in 1998-2003 to 0.8 months in 2014-2015 (Ngom et al., 2018). Monitoring of individuals on ART is important to ensure treatment efficacy and improved health outcomes. Although treatment monitoring remains low in much of the region, viral load suppression has steadily improved, from 28% in 2015, to 32% in 2016, to 36% in 2017 (UNAIDS, 2017). With support from external donors, the construction of 10 additional laboratories in Côte d'Ivoire has surged viral load testing coverage from 14% in 2015, to 66% in 2017, to a projected 75% by the end of 2018 (UNAIDS, 2018a).

To accelerate progress towards the 90-90-90 targets, UNAIDS' Western and Central Africa Catch-Up Plan calls for the establishment of community monitoring systems for commodity stocks, service fees, and quality of care (UNAIDS, 2018b). Community monitoring is a form of public oversight, led by populations who are most affected by its consequences (UNAIDS and Stop AIDS Alliance, 2015). Community monitoring initiatives have been shown to lead to improved health outcomes in a number of diverse settings (Björkman & Svensson, 2009; Kakade, 2012; Molyneux et al., 2012; Papp, Gogoi & Campbell, 2013; Gonçalves, 2014).

2. Methods

In February 2017, with support from the Global Fund to Fight AIDS, Tuberculosis and Malaria, the International Treatment Preparedness Coalition (ITPC) established a regional community treatment observatory in West Africa to increase accountability for the 90-90-90 targets in 11 priority countries: Benin, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Senegal, Sierra Leone and Togo. In each of these countries, the national network of people living with HIV (PLHIV) was identified as the in-country partner to lead implementation of the national community treatment observatory, by feeding information they collect from health facilities into a regional database.

[1] Benin, Burkina Faso, Burundi, Côte d'Ivoire, Cameroon, Congo, Gambia, Ghana, Guinea, Guinea-Bissau, Mauritania, Niger, Nigeria, Sao Tome and Principe, Senegal and Sierra Leone.

A series of three technical planning workshops were completed between December 2016 and February 2017 to train implementation teams from each country. The training included an overview of the data collections tools, including understanding the indicators and what they are measuring. The national community treatment observatories were trained in data management, how to check for errors, and how to clean their data for quality assurance. The training also covered qualitative methods, such as how to conduct interviews and moderate focus group discussions while managing researcher bias. Ethical considerations included topics of informed consent, confidentiality and data security.

Following the project launch, in-country partners established technical advisory boards and trained local data collectors.

Based on specific criteria (e.g. population size, location) 103 health centres were selected as designated data collection sites. Of these, 43 were large district-level or regional hospitals, 28 were mid-level health centres, 19 were non-governmental organizations, 9 were lower-level clinics and 4 were community-level health centres. ITPC signed memorandums of understanding with each facility.

ITPC submitted the project protocol to all Ministries of Health and National AIDS Programs before starting data collection. Gambia, Guinea, Mali, Senegal, Sierra Leone and Togo gave permission for the project, but Benin, Côte d'Ivoire, Ghana, Guinea-Bissau and Liberia required formal ethics approval from an Institutional Review Board. This was a long and complicated undertaking. Given that ITPC has offices in Côte d'Ivoire, ethical procedures were more straightforward there. Other countries required hosting agreements which needed to be established between ITPC, the national network of people living with HIV as their in-country partner, and the government. After a near six-month long process, ethics approval was received from *Comité National d'éthique pour la recherche en santé* in Benin, *Comité National d'éthique de la recherche* in Côte d'Ivoire, the Ghana Health Service Ethical Review Committee, *Comité Nacional de Ética na Saúde* in Guinea-Bissau, and the University of Liberia.

In July 2017, ITPC began data collection. Data were collected from the selected sites using standardized paper-based tools which were then scanned into an electronic web-based database and archiving system. One tool was used to collect quantitative data (i.e. number of HIV tests) from health facilities on a monthly basis, and a separate tool was used to collect qualitative data (i.e. reasons for not testing) from interviews and focus groups discussions on a quarterly basis (Table 1). Questions were translated and back-translated to ensure accuracy and validity

in English and French versions of the tools. Interview and focus group participants were convenience-sampled from the monitored health facilities, and were made up of a combination of service users and services providers.

Table 1. Excerpt of the Interview Schedule

Qualitative Assessment Questions – Prevention
1. What are the reasons for people not receiving an HIV test?
2. Are there any other issues or topics relating to prevention you would like to mention?
Qualitative Assessment Questions – Care and Treatment
1. How would you rate the overall quality of service at this facility? (1 out of 5, 5 being the highest). Explain in the comments section.
2. If the rating is between 1-3, explore the reasons why there is low satisfaction
3. Were you treated with respect by your health care worker today?
4. What are the reasons for people living with HIV not accessing ART? (Check all that apply and explain in the comment section)
a) The ART site is too far away
b) ART requires payment
c) ART entails considerable out of pocket expenditures
d) People living with HIV don't want to take ART because side effects make them sick
e) The ARV regimens they need are not available at closest ART site
f) The ARV regimens they need are not available in the country
g) Other (add comment)

From July 2017-June 2018, the regional community treatment observatory conducted 538 facility visits, 279 key informant interviews, and 110 focus group discussions. In this paper, qualitative data are presented from the entire year, but quantitative data are only presented from January-June 2018 (due to refinement of data collection tools during the first six months of implementation). Age disaggregation for young people was added to the tool in March 2018, and an indicator to track the proportion of HIV-positive test results was added in April 2018. The data were cleaned and validated by the community treatment observatories, with formal in-person data supervision and quality assessments conducted by ITPC project staff on a routine basis.

In this paper, we share the first year of monitoring findings from the regional community treatment observatory. Initial data analysis was conducted by ITPC's local academic partner in West Africa, *Programme Agence nationale de recherche sur le sida Coopération Côte d'Ivoire*. ITPC provided additional interpretation, followed by an external analysis by an independent consultant.

Basic descriptive statistics, frequency tests, 95% confidence intervals (CI), and bivariate logistic regressions were performed using Microsoft Excel Version

16.16.4 (181110). Two-way ANOVA tests were performed to determine statistical significance. The data and analysis were then validated by the Regional Advisory Board — a group of regional technical experts — during its third meeting in October 2018 in Abidjan, Côte d'Ivoire.

We employed a version of the "Five As" conceptual framework to assess gaps and opportunities along the HIV treatment cascade in terms of availability, accessibility, acceptability, affordability and appropriateness (Table 2).

Table 2. "The Five As" Conceptual Framework

Availability	**Accessibility**	**Acceptability**	**Affordability**	**Appropriateness**
Do the required health services, medicines, commodities and supplies exist at this facility? If so, do they exist when they are needed and in adequate supply?	Are there long travel distances or wait times? Are hours of operation convenient? Are linkage and referral processes along the cascade smooth?	Is there a high quality of care? Are services provided free of stigma and discrimination? Are the human rights of patients promoted and protected?	Do services require out-of-pocket spending by clients? Is the service delivery model(s) efficient? What is the sustainability of the response?	Are services tailored to the specific needs of key and vulnerable populations? Are age and gender considered in service packages?

The "Five As" framework was first developed by Penchansky and Thomas (1981) but has since informed a variety of studies, policies and guidance documents for human rights-based and person-centred approaches to health (Goudge, et al., 2009; Levesque, Harris & Russell, 2013; Saurman, 2016; Homer et al., 2018). The framework has been applied to the health workforce (WHO, 2018a), vaccine uptake (Thomson, Robinson & Vallée-Tourangeau, 2016), community-based long-term care (Wallace, 1990), antenatal and postnatal care (Kearns et al., 2016), universal access to HIV prevention, treatment and care (Gruskin & Tarantola, 2008), and many other areas. We present the findings of the regional community treatment observatory along these five dimensions.

3. Findings

Table 3 displays the sample characteristics for the regional community treatment observatory dataset. During the observed period, the monitored health facilities performed 161,607 HIV tests, provided 81,817 people with ART, and performed 16,491 viral load tests. As the largest treatment observatory in the sample, Côte d'Ivoire is responsible for about a third of the HIV tests and people on ART, and about half of the viral load tests.

Disaggregated data for key and vulnerable populations, including men who have sex with men, sex workers, people who inject drugs and young people age 15-24 years, were available from 38 of the 103 (37%) health facilities. Among key populations, sex workers were more likely than men who have sex with men and people who inject drugs to access HIV testing services. Men who have sex with men were more likely than sex workers and people who inject drugs to access ART. For people who inject drugs, just four community treatment observatories reported HIV testing data (Guinea, Mali, Senegal and Sierra Leone) and two reported ART and viral load testing information (Senegal and Sierra Leone). About twice as many young women were reached with services compared to young men. Access to viral load testing services was alarmingly low for key and vulnerable populations. For instance, in Togo, among 130 men who have sex with men on ART, just 11 viral load tests were performed. Among 336 young women (age 15-24 years) in Mali, just 33 viral load tests were performed.

In April 2018, the regional community treatment observatory began collecting data about the number of HIV positive test results (Table 4). At the monitored health centres, the regional community treatment observatories found alarmingly high rates of people testing HIV-positive in Liberia (26.5%) and Guinea (20.0%). At the monitored health facilities in Benin, the proportion of HIV tests which had a positive result among men who have sex with men was found to be more than twice the UNAIDS national estimate for this population (9.4% vs. 4.2%) (UNAIDS, 2017).

Table 3: Regional community treatment observatory characteristics

Indicator	Benin	Côte d'Ivoire	Gambia	Ghana	Guinea	Guinea-Bissau	Liberia	Mali	Senegal	Sierra Leone	Togo	TOTAL
	Number (%)											
Qualitative Data (Cumulative, July 2017-June 2018)												
Interviews	No data	33 (12%)	7 (3%)	18 (6%)	14 (5%)	No data	1 (0%)	127 (46%)	No data	12 (4%)	67 (24%)	**279 (100%)**
Focus group discussions	No data	27 (25%)	9 (8%)	11 (10%)	8 (7%)	No data	No data	12 (11%)	32 (29%)	8 (7%)	3 (3%)	**110 (100%)**
Quantitative Data (Cumulative, January-June 2018)												
# of health facilities monitored	3 (3%)	19 (18%)	13 (13%)	7 (7%)	13 (13%)	2 (2%)	6 (6%)	5 (5%)	16 (16%)	20 (19%)	11 (11%)	**103 (100%)**
People who received an HIV test	1,691 (1%)	48,562 (30%)	18,291 (11%)	16,527 (10%)	6,394 (4%)	918 (1%)	8,554 (5%)	9,009 (6%)	11,508 (7%)	27,681 (17%)	12,472 (8%)	**161,607 (100%)**
Men who have sex with men	173 (10%)	203 (0.4%)	No data	14 (1%)	139 (2%)	No data	12 (0.1%)	492 (5%)	99 (1%)	457 (2%)	488 (4%)	**2,077 (1%)**
Sex workers	745 (44%)	2,063 (4%)	2 (0%)	100 (2%)	336 (5%)	No data	1 (0%)	691 (8%)	18 (0%)	30 (0%)	2,505 (20%)	**6,391 (4%)**
People who inject drugs	0 (0%)	0 (0%)	No data	No data	12 (0%)	No data	No data	4 (0%)	193 (2%)	580 (2%)	No data	**789 (0%)**
Young men (15-24 years)	101 (6%)	982 (2%)	584 (3%)	0 (0%)	135 (2%)	No data	429 (5%)	96 (1%)	361 (3%)	1,157 (4%)	1,032 (8%)	**4,877 (3%)**
Young women (15-24 years)	277 (16%)	3,987 (8%)	1,844 (10%)	0 (0%)	264 (4%)	No data	388 (5%)	147 (2%)	134 (1%)	2,508 (9%)	1,016 (8%)	**10,565 (7%)**

Indicator	Benin	Côte d'Ivoire	Gambia	Ghana	Guinea	Guinea-Bissau	Liberia	Mali	Senegal	Sierra Leone	Togo	TOTAL
	Number (%)											
People living with HIV on ART (as of June 2018)	1,766 (2%)	23,098 (28%)	5,939 (7%)	2,627 (3%)	5,676 (7%)	3,226 (4%)	3,615 (4%)	7,036 (9%)	5,789 (7%)	9,510 (12%)	13,535 (17%)	**81,817 (100%)**
Men who have sex with men	21 (1%)	383 (2%)	No data	No data	0 (0%)	No data	16 (0%)	168 (2%)	190 (3%)	12 (0%)	130 (1%)	**920 (1%)**
Sex workers	82 (5%)	403 (2%)	No data	No data	0 (0%)	No data	1 (0%)	100 (1%)	3 (0%)	No data	41 (0%)	**630 (1%)**
People who inject drugs	No data	0 (0%)	No data	No data	0 (0%)	No data	No data	No data	3 (0%)	49 (1%)	No data	**52 (0.1%)**
Young men (15-24 years)	13 (1%)	315 (1%)	54 (1%)	No data	11 (0%)	No data	1 (0%)	278 (4%)	20 (0%)	499 (5%)	209 (2%)	**1,400 (2%)**
Young women (15-24 years)	10 (1%)	677 (3%)	241 (4%)	No data	61 (1%)	No data	2 (0%)	336 (5%)	0 (0%)	974 (10%)	291 (2%)	**2,592 (3%)**
People on ART who received a viral load test	144 (1%)	8,908 (54%)	554 (3%)	804 (5%)	603 (4%)	No data	83 (1%)	1,917 (12%)	923 (6%)	1,922 (12%)	633 (4%)	**16,491 (100%)**
Men who have sex with men	0 (0%)	97 (1%)	No data	No data	0 (0%)	No data	No data	58 (3%)	14 (2%)	32 (2%)	11 (2%)	**212 (1%)**
Sex workers	0 (0%)	102 (1%)	No data	No data	0 (0%)	No data	No data	70 (4%)	2 (0%)	0 (0%)	8 (1%)	**182 (1%)**
People who inject drugs	0 (0%)	0 (0%)	No data	No data	0 (0%)	No data	No data	No Data	4 (0%)	189 (0%)	0 (0%)	**193 (0%)**
Young men (15-24 years)	1 (1%)	104 (1%)	4 (1%)	6 (1%)	4 (1%)	No data	No data	49 (3%)	12 (1%)	21 (1%)	6 (1%)	**207 (1%)**
Young women (15-24 years)	4 (3%)	209 (2%)	19 (3%)	0 (0%)	4 (1%)	No data	No data	33 (2%)	0 (0%)	115 (6%)	11 (2%)	**395 (2%)**

Table 4: HIV positive test results at the monitored health facilities

Population	Benin	Côte d'Ivoire	Gambia	Ghana	Guinea	Guinea-Bissau	Liberia	Mali	Senegal	Sierra Leone	Togo
	Number (%)										
All	109 (9.3%)	997 (3.2%)	491 (5.7%)	No data	643 (20.0%)	No data	1,086 (26.5%)	250 (9.2%)	No data	905 (6.8%)	280 (4.4%)
Men who have sex with men	15 (9.4%)	23 (13.8%)	0 (0.0%)	No data	13 (20.0%)	No data	1 (9.1%)	21 (7.8%)	No data	5 (2.1%)	17 (5.6%)
Sex workers	22 (5.7%)	14 (0.7%)	0 (0.0%)	No data	10 (11.0%)	No data	0 (0.0%)	40 (10.0%)	No data	1 (25%)	11 (1.4%)
People who inject drugs	0 (0.0%)	0 (0.0%)	0 (0.0%)	No data	0 (0.0%)	No data	0 (0.0%)	0 (0.0%)	No data	9 (2.5%)	0 (0.0%)
Pregnant women	14 (3.7%)	86 (1.2%)	42 (1.1%)	No data	93 (11.5%)	No data	18 (2.1%)	14 (1.3%)	No data	129 (3.2%)	40 (2.2%)
Young men (15-24)	7 (7.0%)	9 (0.9%)	6 (1.0%)	No data	15 (11.1%)	No data	5 (1.2%)	5 (5.2%)	No data	74 (6.4%)	9 (1.0%)
Young women (15-24)	11 (4.0%)	64 (1.6%)	28 (1.5%)	No data	27 (10.2%)	No data	30 (8.7%)	14 (9.5%)	No data	226 (9.0%)	14 (1.5%)

3.1 Availability

Table 5 shows the frequency of stockouts (in the last month) of HIV tests, antiretroviral drugs, and viral load test laboratory supplies, recorded during health facility visits from January-June 2018, by country.

Table 5: Frequency of recorded stockouts at monitored health facilities

Country	Stockouts of HIV tests	Stockouts of antiretroviral drugs	Stockouts of viral load laboratory supplies
	Mean % of health facility visits (95% CI)		
All Countries	**8.8 (6.4-11.2)**	**23.4 (19.8-27.0)**	**17.2 (14.0-20.4)**
Benin	0.0 (0.0-0.0)	0.0 (0.0-0.0)	16.7 (0.0-38.7)
Côte d'Ivoire	2.9 (0.0-6.1)	13.3 (6.8-19.8)	0.0 (0.0-0.0)
Gambia	0.0 (0.0-0.0)	16.2 (7.4-24.9)	50.0 (38.0-62.0)
Ghana	2.6 (0.0-7.7)	10.3 (0.7-19.8)	0.0 (0.0-0.0)
Guinea	45.5 (32.2-58.7)	34.5 (21.9-47.2)	54.5 (41.2-67.8)
Guinea-Bissau	8.3 (0.0-24.7)	16.7 (0.0-38.7)	0.0 (0.0-0.0)
Liberia	5.3 (0.0-12.4)	47.4 (31.3-63.4)	7.9 (0.0-16.5)
Mali	16.7 (0.0-34.0)	22.2 (2.9-41.6)	5.6 (0.0-16.2)
Senegal	12.7 (3.9-21.5)	21.8 (10.9-32.8)	20.0 (9.4-30.6)
Sierra Leone	5.5 (0.8-10.2)	23.1 (14.4-31.7)	5.5 (0.8-10.2)
Togo	0.0 (0.0-0.0)	46.7 (32.0-61.4)	13.3 (3.4-23.3)

Stockouts of HIV tests were recorded during 47 out of 535 health facility visits (mean 8.8%; 95% CI 6.4%-11.2%). Of these, 27 were stockouts of rapid test kits and 20 were stockouts of blood tests. HIV test stockouts lasted an average of 29.3 days (95% CI 22.4-36.2 days).

ART stockouts were recorded during 126 out of 538 health facility visits (mean 23.4%; 95% CI 19.8%-27.0%). The most commonly out-of-stock formulations were Nevirapine, Lamivudine/Zidovudine/Nevirapine and Lopinavir/Ritonavir, together accounting for nearly half of all recorded ART stockouts. On average, ARV stockouts at the monitored health facilities lasted for 40.5 days (95% CI 34.2-46.7 days). Nineteen reported stockouts were resolved within two weeks, but 29 lasted longer than 50 days. Seven stockouts lasted longer than 100 days. In the most extreme case, one health facility in Côte d'Ivoire reported a Tenofovir and Lamivudine stockout lasting nearly 7 months (210 days). Gambia and Sierra Leone typically resolved stockouts in under a month, whereas the average time to resolve a stockout in Togo was 67 days.

Qualitative data shed light on why ART stockouts are occurring. The most common response given was that there were communication issues along the supply chain (29%; n= 85/296). This was followed by incorrect quantification and forecasting (16%; n=47/296).

Stockouts of viral load test laboratory supplies were recorded during 92 out of 536 health facility visits (mean 17.2%; 95% CI 14.0%-20.4%). 52 viral load stockouts were of reagents and chemicals, 10 were of consumables, 25 were durables and 5 were unspecified. Stockouts of viral load supplies lasted an average of 141.8 days (95% CI 109.2-174.4 days).

Case example: Togo

At the Sylvanus Olympio University Teaching Hospital in Lomé, Togo, the unit for the prevention of mother-to-child transmission of HIV uses the community treatment observatory data to cross-check data in its central reporting system. By triangulating their patient-level data with the community treatment observatory's analysis, the hospital became aware of a problem: some HIV-positive pregnant women who were on ART were, mistakenly, also being tested for HIV. Community treatment observatory data are now used by the service supervisor to avoid such mistakes. Given the limited supply of diagnostics, the community treatment observatory analysis has helped prevent wastage through errors. Togo is among three countries in the regional community treatment observatory (along with Benin and Gambia) where there have been no recorded stockouts of HIV test kits during the first year of data collection.

Case example: Benin

At the Bethesda Hospital in Cotonou, Benin, the community treatment observatory noticed that the site had not been supplied with laboratory reagents for more than 10 months. This meant that patients were not receiving critical treatment monitoring services, including viral load and CD4 count test. The community treatment observatory data on reagent stockouts were recorded in the community treatment observatory's report, for presentation at the Community Consultative Group. During this meeting, the Deputy Coordinator of the National AIDS Control Program was confronted with the community treatment observatory data on reagent stockouts. The feedback mechanism worked, and a solution was found. After the meeting, the National AIDS Control Program stocked Bethesda Hospital with reagents.

3.2 Accessibility

Qualitative data highlight accessibility to HIV testing services as a key barrier to uptake. Among 289 interviews and focus group discussions, more than a third (35%) of all respondents said that long distances to HIV testing centres is the main reason why people cannot access this service.

For those who did access HIV testing services, linkage to care and treatment initiation were high at the monitored facilities. Between April and June 2018, 4,692 people tested positive for HIV and 4,354 were initiated onto ART (93%). Treatment initiation rates were lower for men who have sex with men (89%; n=85/95), sex workers (78%; n=76/98) and young people age 15-24 years (72%; n=300/414). Linkage also varied by country. In Sierra Leone, where "treat all" only began in 2018, 905 people tested HIV-positive and 647 were initiated onto ART (71%). In Liberia, where "treat all" is not yet rolled out for all populations, 1086 people tested HIV-positive and 521 were initiated onto treatment (48%).

Once initiated onto ART, data highlight a stark gap in access to viral load testing. Among 81,817 people on ART at the monitored facilities, just 16,491 viral load tests were performed in the six-month period. Of these, less than half (48%; n=7,960) were virally suppressed (<1000 copies/ml). While the regional community treatment observatory does not have data on when specific individuals began ART, these figures make it unlikely that the World Health Organization's recommendation of one viral load test every twelve months for stable patients is being met.

Among 305 interviews and focus group discussions, the foremost reason given for not accessing a viral load test was lack of knowledge among people living with HIV (32%). Accessibility barriers may be physical (e.g. long distances) or they may be psychological (e.g. fear, lack of knowledge).

Case example: Sierra Leone

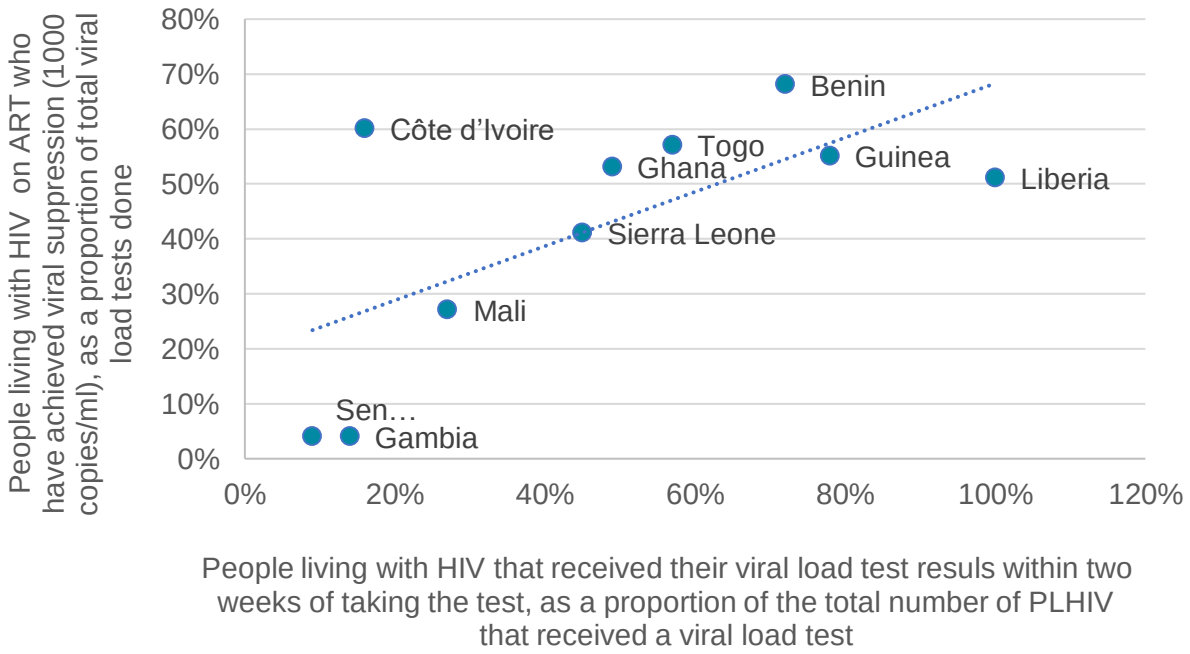
The host of the national community treatment observatory in Sierra Leone has been lobbied by the government to develop a Differentiated Service Delivery Strategy. Community treatment observatory data showed the low uptake of services for key populations. The network of people living with HIV used this data in making the case to the National AIDS Control Program of the Ministry of Health and Sanitation that such a strategy is needed in order to reduce barriers to accessing services and to achieve the 90-90-90 targets. The policy was signed by government and the National AIDS Secretariat in May 2019.

3.3 Acceptability

Thirty-seven percent (n=21/55) of key informants and focus group discussion participants rated quality of care as a 3 or less out of 5. Quality of care was rated highest in Mali (5.0/5.0) and lowest in Sierra Leone (3.4/5.0). Quality was rated lowest among men who have sex with men (3.2/5.0) and highest among sex workers and pregnant women (4.0/5.0). Young women age 15-24 years rated quality of care lower than young men age 15-24 years (3.7/5.0 vs. 3.9/5.0).

Qualitative data highlight acceptability barriers along the entire cascade. Stigma, unfriendly health workers and lack of confidentiality were cited by 23% (n=66/289) of key informants and focus group discussion participants as reasons for not accessing HIV testing services. Thirty percent (n=95/321) said that bad side effects were a reason for not accessing ART. Just 4,362 of 16,491 (26%) viral load tests had results returned to the patient within two weeks. We found a positive relationship between receiving timely viral load test results and rates of viral load suppression ($p<0.05$) (Figure 2).

Figure 2: Relationship between receiving timely viral load test results and prevalence of viral load suppression at monitored health facilities, January-June 2018 (r = 0.66, p<0.05)



Case example: Gambia

The host of the national community treatment observatory in Gambia has used its data to shine a spotlight on facility-level quality improvement needs. The community treatment observatory's most recent quarterly report, for the period January-March 2019, was shared with ART centres country-wide, the National Public Health Laboratory, the National AIDS Secretariat, the Ministry of Health, the United Nations System in Gambia and the Local Government Authorities. The community treatment observatory also presented the report to the National Assembly Health Select Committee at the National Assembly building. This high-level data-driven advocacy by the community treatment observatory has resulted in two specific commitments from the National Assembly Health Select Committee. Firstly, the Committee promised to engage the Ministry of Health and National AIDS Secretariat on performance improvement plans for health facilities. Secondly, the Committee promised to engage the Ministry of Finance on additional budgetary allocation to the HIV response.

Case example: Mali

The host of the national community treatment observatory in Mali has used its data to improve quality of care in health facilities by improving data quality and individual patient monitoring. During a recent monitoring visit to the Gabriel Touré University Teaching Hospital in Bamako, the community treatment observatory drew the attention of health facility managers to data entry issues. Viral load test results were being transferred from patient registers to the central viral load databases in groups, clustered by date. Using their data analysis, the community treatment observatory pointed out that it is better to record this data individually, by patient.

The reaction from the health facility after the community treatment observatory's advocacy was swift; without waiting for a memo from the hospital, the nurses began to systematically report the dates of the viral load results by individual patient. Based on this success story at Gabriel Touré, the community treatment observatory intends to target the Unit for AIDS Control of the Ministry of Health and Public Hygiene, and the Malian Society of Applied Sciences, to develop a memo to be sent to all sites in Mali, clarifying how viral load data should be entered and analyzed.

3.4 Affordability

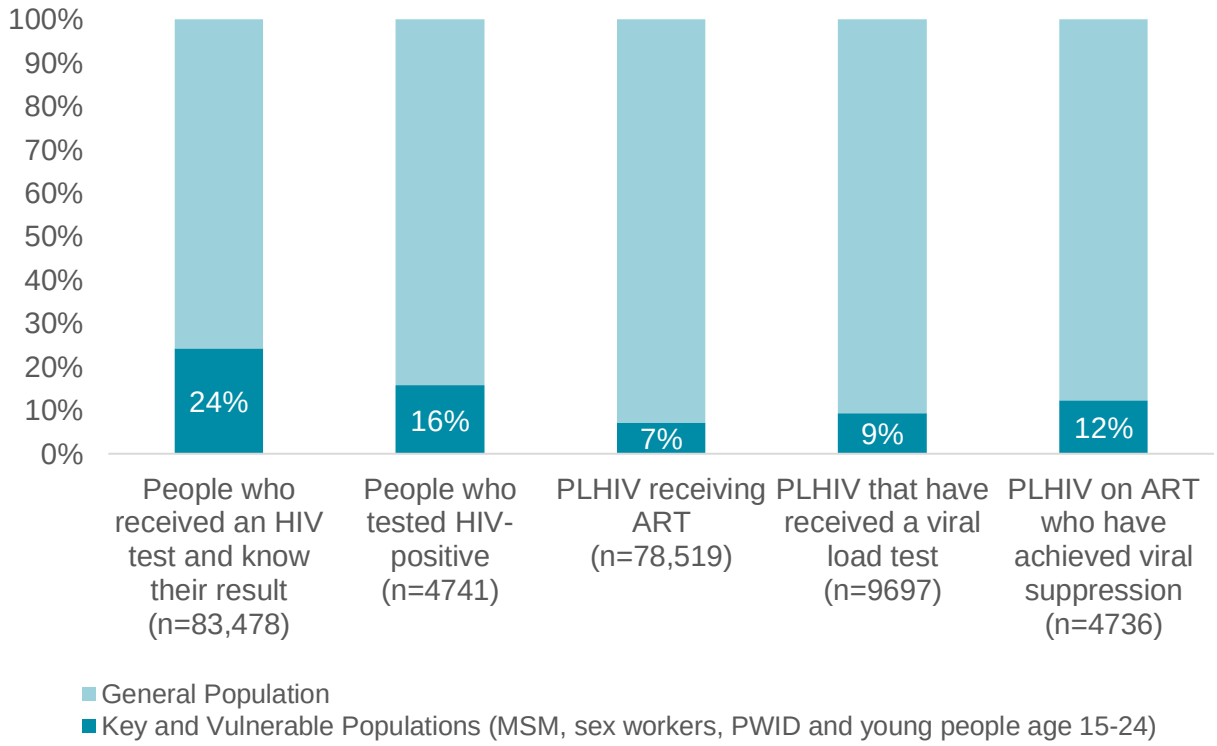
Despite high out-of-pocket expenditure on health in the West Africa region (WHO, 2015), in 334 interviews and focus group discussions, payment was not cited as a major barrier to accessing HIV testing services (2%), ART (5%) or viral load testing services (3%). This is a puzzling finding, which the regional community treatment observatory plans to explore further during focus group discussions in year two of data collection.

Just 2% (n=7/296) of participants said that reliance on donors for support was the reason for stockouts. Five out of the 103 health facilities had functional viral load testing machines, and 27% (n=82/305) of people or groups cited no or broken viral load machines as the reason they cannot access viral load testing services. Experts on the regional community treatment observatory's advisory board suggest lack of funding for viral load testing machines and laboratory reagents is a main cause of their limited number.

3.5 Appropriateness

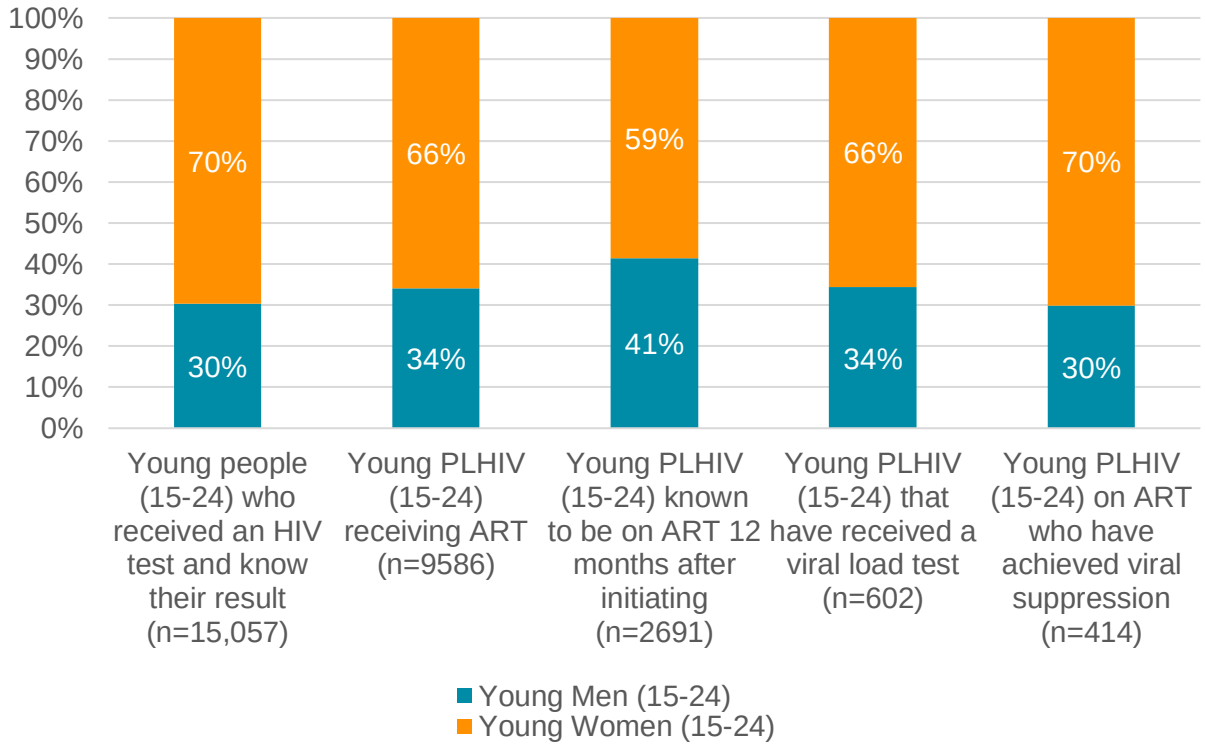
Thirty-eight out of 103 (37%) health facilities report data for at least one key population. Sixteen percent (n=746/4741) of all people who tested HIV-positive at these facilities between April and June 2018 were men who have sex with men, sex workers, people who inject drugs and young people age 15-24 years. Yet, by June 2018, these groups made up just 7% (n=5594/78519) of people living with HIV on ART at the same facilities (Figure 3). Gender disparities were also evident in the data. Young men age 15-24 years were less likely to access service along the entire cascade compared to young women (Figure 4).

Figure 3: Key and vulnerable populations reached along the cascade, as a proportion of all people reached at monitored health facilities, April-June 2018



Sub-analyses of qualitative data show that key and vulnerable populations have different reasons for not accessing ART than the general population. At 13 focus group discussions with young people, issues of confidentiality and privacy emerged as a reason for not accessing ART. At 8 focus group discussions with men who have sex with men, 7 with sex workers, and 4 with people who inject drugs, fear of stigma and discrimination were cited as key barriers to treatment access.

Figure 4: Young people age 15-24 years reached along the cascade at monitored health facilities, by sex, March-June 2018



Case example: Ghana

The host of the national community treatment observatory in Ghana, along with the members of the Community Consultative Group, have used their data and analysis to help mitigate HIV-related stigma and discrimination in the community. Using community treatment observatory reports as leverage, and using the multi-stakeholder nature of the Community Consultative Group as an entry point, the community treatment observatory and some Community Consultative Group members paid visits to Imams, women's groups and Chiefs in Tamale. During these visits, the community treatment observatory and the Community Consultative Group members presented their data and analysis around appropriateness of services. This worked to open up a dialogue with community leaders and gatekeepers around ways of reducing human rights and gender-related barriers to accessing HIV and other health services, especially for key populations and young people.

4. Discussion

Findings from the regional community treatment observatory suggest there are complex challenges with the availability, accessibility, acceptability, affordability and appropriateness of HIV services in West Africa. These challenges have grave implications for the region's ability to meet the 90-90-90 targets on time. If it fails to meet these ambitious targets, more people will become newly infected with HIV, more people will die of AIDS-related illnesses, and scarce health resources will be stretched further than they already are.

While the frequency of stockouts documented in this study is alarming, it may be an under-representation. Research in other African countries has shown that front-line healthcare workers often only report stockouts when existing informal methods of stock-sharing with other health facilities do not secure top-up supplies (Hodes et al., 2017).

The stockouts of specific drugs may affect certain populations more than others. The high frequency of stockouts of Nevirapine and other pediatric formulations are a concern for pregnant and breastfeeding women and infants. Poor retention of mother-baby pairs in prevention of mother-to-child transmission programs in West and Central Africa has been linked to stockouts of relevant medicines (UNAIDS & UNICEF, 2017). Lopinavir/Ritonavir stockouts have implications for people needing second-line treatment options. Given that patients in West Africa often interrupt treatment until stockouts end, this has grave implications given the very limited access to third-line drugs (Moriarty et al., 2018).

The low levels of access to viral load testing means there is limited effective treatment monitoring in the region. Paired with frequent treatment interruptions and regular drug stockouts, patients may risk developing ART drug resistance (Gregson et al., 2016). A recent meta-analysis estimated a pre-treatment drug resistance prevalence of 7.2% (2.9–16.5%) in people initiating or re-initiating ART in Western and Central Africa in 2016 (Gupta et al., 2018). The World Health Organization recommends standardized surveys to assess early warning indicators of HIV drug resistance, yet reporting on these indicators is not taking place in most countries. In the absence of national surveys, community monitoring findings from the regional community treatment observatory may serve as proxy early warning data.

Expanding differentiated service delivery may help to address issues along the cascade. HIV self-testing and community-based HIV testing can overcome many of the logistical, structural and social barriers to HIV testing, including travel

distance and stigma and discrimination (UNAIDS, 2018b; Indravudh, Choko & Corbett, 2018). According to the WHO guidelines, HIV self-testing is acceptable to many users across different contexts and can, therefore, increase uptake and frequency of HIV testing, particularly among populations at high ongoing risk of HIV, who may be less likely to access testing or test less frequently than recommended (WHO, 2016b: 10). In a systematic review, community HIV testing had high coverage and uptake and identified HIV-positive individuals at higher CD4 counts than facility testing (Sharma et al., 2015). Facilitated linkage (i.e. counsellor follow-up) and peer navigation may improve the gaps in ART initiation observed at the monitored facilities, especially among key and vulnerable populations (Sharma et al., 2015; Lillie et al., 2018; Cluver et al, 2019). In low-prevalence settings like West Africa, community HIV testing services should use patient indexing techniques to optimize the proportion of positive test results. Anticipated results from the ongoing HIV self-testing pilots in Côte d'Ivoire, Mali and Senegal should inform further rollout of this modality. Differentiated service delivery can also increase treatment access and adherence by providing less frequent clinical visits, longer refill periods, and community pick-up schemes for stable patients (Grimsrud et al., 2016).

Differentiated models have been shown to work in challenging operating environments, like those in West and Central Africa (Ssonko et al., 2017) and may be more effective for reaching key and vulnerable populations who face different and disproportionate barriers to accessing ART (Macdonald, Verster & Baggaley, 2017). Evidence suggests that key populations need tailored linkage support, often requiring peer-led navigation into care (Shangani et al., 2017; Lama et al., 2019). The significant leak in the cascade for key and vulnerable populations, between receiving a positive HIV test result and being initiated onto ART, suggests this needs strengthening at the monitored facilities. Lastly, in remote settings with low HIV prevalence and weak health systems, different models may be needed to scale up viral load testing access in a cost-effective and efficient manner, such as open polyvalent platforms (OPPs) and dried blood spot samples.

Improving quality of care is also critical, given low ratings at the monitored facilities and recent data showing the strong link with avoidable mortality in the region (Kruk et al., 2018). Health worker qualifications often do not correspond to clinical knowledge, and there are persistent, often sizeable, gaps between what health workers say they will do when faced with a hypothetical patient and what they actually do when they see such a patient (Das et al., 2018). In one study, providers were four times more likely to order the correct treatment in a clinical vignette that with an actual patient (Das et al., 2015). This has been called the "know-do" gap (Das et al., 2018). Enhancing supportive supervision and group

problem solving has been shown to help close the know-do gap (Rowe et al., 2005; Dieleman, Gerretsen & van der Wilt, 2009). Ensuring health facilities are friendly towards key and vulnerable populations is likely to improve quality of care and service uptake among these groups (Nyato et al, 2018; Reif et al., 2018). Feasibility for rolling-out more tolerable treatment regimens with fewer side effects, such as Dolutegravir, should be explored in the region to increase access and adherence to ART (Dorward et al., 2018). As of mid-2018, five countries in our sample are including or planning to include Dolutegravir containing regimens in their national protocols (Benin, Cote d'Ivoire, Gambia, Guinea and Mali) (WHO, 2018b).

Free care at convenient locations is a key component for expanding access to HIV treatment (Souteyrand et al., 2008). Yet, our findings do not show affordability to be a major barrier to service uptake among people living with HIV, or that reliance on donors is a reason for stockouts of drugs. Other studies have concluded differently, showing that the unpredictability of fund disbursements from donors leads to intrinsic stockout risks in Africa (Gallien et al., 2017). Expanding differentiated service delivery may help reduce other costs associated with HIV care, including travel expenses and time of doctors and nurses (Hagey et al., 2018).

Ensuring that services are appropriate for key and vulnerable populations who are most vulnerable to HIV will improve retention along the cascade. Peer-led outreach is critical, especially for reaching and retaining men who have sex with men, sex workers and people who inject drugs (Holland et al., 2015; Krishnamurthy et al., 2016; Stengel et al., 2018). Reducing gender disparities along the HIV care cascade will mean removing gender-related barriers and making services more gender-sensitive, particularly for young men who are less likely to access services. Women's contact with the health system during pregnancy and birth, and the increased efforts to test pregnant women for HIV, likely play a role in the observed difference in service uptake among young women compared to young men (Staveteig et al., 2017). Examining young people's transition out of pediatric HIV care may be important for understanding their outcomes along the cascade, including rates of viral suppression (Haghighat et al., 2019).

4.1 Study Limitations

The different national community treatment observatories have varying sizes and capacities. For example, there are 19 health facilities monitored in Côte d'Ivoire, and three in Benin. The community treatment observatory in Togo conducted 67 key informant interviews, whereas the community treatment observatory in Liberia conducted one. Comparative analyses should be seen in that light. In addition, we acknowledge several sampling biases. Because data are collected from health facilities, the regional community treatment observatory necessarily samples people who are already accessing services. This may underestimate or miss barriers to access for those who have not yet been engaged by the health system. Secondly, the regional community treatment observatory intentionally samples health facilities that serve key population groups, in order to collect this disaggregated data. This may oversample key population groups and underestimate barriers that exist in other facilities. Third, the regional community treatment observatory is currently focused on collecting data from health facilities in high-density, urban locations. Of the 103 monitored facilities, just nine are outside of capital cities. Access to, and quality of, services is likely over-estimated in the sample, compared to rural areas. The health facilities monitored by the regional community treatment observatory do not have unique patient identifiers. This means that we cannot be sure that services are performed on unique individuals. As such, the dataset can paint an overall picture of services in the region, but cannot track individual clients along the cascade.

5. Conclusion

The regional community treatment observatory highlights key access gaps along the HIV treatment cascade in West Africa. Using a person-centred conceptual framework for access, we demonstrate how issues of availability, accessibility, acceptability, affordability and appropriateness contribute to these gaps. To achieve the 90-90-90 targets, ongoing community monitoring is critical. The case examples presented throughout this paper demonstrate how the community monitoring works to increase accountability for commitments in the AIDS response. These five dimensions also help guide evidence-informed advocacy at the national and regional level. Expanding differentiated service delivery to remove barriers to access is critical. Yet, ending AIDS will take more than that. Increased treatment access must be coupled with effective prevention measures, and nobody must be left behind. Evidence increasingly suggests that the meaningful involvement of communities in the design, delivery and monitoring of interventions is key for success (UNAIDS, 2019).

References

Björkman, M. & Svensson, J. 2009. Power to the people: evidence from a randomized field experiment on community-based monitoring in Uganda. *The Quarterly Journal of Economics*, 124(2), 735-769.

Cluver, L., Toska, E., Hodes, R., Orkin, M., Gardner, F., Boyes, M., Sherr, L., Casale, M., Carty, C., Gittings, L. & Langwenya, N. 2019. *Pathways to survival: identifying psychosocial, family and service mechanisms to improve anti-retroviral adherence amongst adolescents living with HIV in Southern Africa*. Final report of a project funded by the Nuffield Foundation. University of Oxford. Available at: https://ora.ox.ac.uk/objects/uuid:c675a3d1-84d0-450a-8b2f-c1cfa7fceca9/download_file?file_format=pdf&safe_filename=Nuffield%2BPublic%2BReport_FINAL.pdf&type_of_work=Report

Das, J., Kwan, A., Daniels, B., Satyanarayana, S., Subbaraman, R., Bergkvist, S., Das, R.K., Das, V. & Pai, M. 2015. Use of standardised patients to assess quality of tuberculosis care: a pilot, cross-sectional study. *The Lancet Infectious Diseases*, 15(11), 1305-1313.

Das, J., Woskie, L., Rajbhandari, R., Abbasi, K. & Jha, A. 2018. Rethinking assumptions about delivery of healthcare: implications for universal health coverage. *BMJ*, 361, k1716.

Dieleman, M., Gerretsen, B. & van der Wilt, G.J. 2009. Human resource management interventions to improve health workers' performance in low and middle income countries: a realist review. *Health Research Policy and Systems*, 7(1), 7.

Dorward, J., Lessells, R., Drain, P.K., Naidoo, K., de Oliveira, T., Pillay, Y., Karim, S.S.A. & Garrett, N. 2018. Dolutegravir for first-line antiretroviral therapy in low-income and middle-income countries: uncertainties and opportunities for implementation and research. *Lancet HIV*, 5(7), e400-e404.

Duvall, S., Irani, L., Compaoré, C., Sanon, P., Bassonon, D., Anato, S., Agounke, J., Hodo, A., Kugbe, Y., Chaold, G. & Nigobora, B. 2015. Assessment of policy and access to HIV prevention, care, and treatment services for men who have sex with men and for sex workers in Burkina Faso and Togo. *Journal of Acquired Immune Deficiency Syndromes*, 68, S189-S197.

Gallien, J., Rashkova, I., Atun, R. & Yadav, P. 2017. National drug stockout risks and the global fund disbursement process for procurement. *Production and Operations Management*, 26(6), 997-1014.

Gonçalves, S. 2014. The effects of participatory budgeting on municipal expenditures and infant mortality in Brazil. *World Development*, 53, 94-110.

Goudge, J., Gilson, L., Russell, S., Gumede, T. & Mills, A. 2009. Affordability, availability and acceptability barriers to health care for the chronically ill: longitudinal case studies from South Africa. *BMC Health Services Research*, 9(1), 75.

Gregson, J., Tang, M., Ndembi, N., Hamers, R.L., Rhee, S.Y., Marconi, V.C., Diero, L., Brooks, K.A., Theys, K., de Wit, T.R. & Arruda, M. 2016. Global epidemiology of drug resistance after failure of WHO recommended first-line regimens for adult HIV-1 infection: a multicentre retrospective cohort study. *Lancet Infectious Diseases*, *16*(5), 565-575.

Grimsrud, A., Bygrave, H., Doherty, M., Ehrenkranz, P., Ellman, T., Ferris, R., Ford, N., Killingo, B., Mabote, L., Mansell, T. & Reinisch, A. 2016. Reimagining HIV service delivery: the role of differentiated care from prevention to suppression. *Journal of the International AIDS Society*, 19(1), 21484.

Gruskin, S. & Tarantola, D. 2008. Universal access to HIV prevention, treatment and care: assessing the inclusion of human rights in international and national strategic plans. *AIDS (London, England)*, 22(Suppl 2), S123.

Gupta, R.K., Gregson, J., Parkin, N., Haile-Selassie, H., Tanuri, A., Forero, L.A., Kaleebu, P., Watera, C., Aghokeng, A., Mutenda, N. & Dzangare, J. 2018. HIV-1 drug resistance before initiation or re-initiation of first-line antiretroviral therapy in low-income and middle-income countries: a systematic review and meta-regression analysis. *Lancet Infectious Diseases*, 18(3), 346-355.

Hagey, J.M., Li, X., Barr-Walker, J., Penner, J., Kadima, J., Oyaro, P. & Cohen, C.R. 2018. Differentiated HIV care in sub-Saharan Africa: a scoping review to inform antiretroviral therapy provision for stable HIV-infected individuals in Kenya. *AIDS Care*, 30(12), 1477-1487.

Haghighat, R., Toska, E., Cluver, L., Gulaid, L., Mark, D. & Bains, A. 2019. Transition pathways out of pediatric care and associated HIV outcomes for

adolescents living with HIV in South Africa. *Journal of Acquired Immune Deficiency Syndromes*, 82(2), 166-174.

Hodes, R., Price, I., Bungane, N., Toska, E. & Cluver, L. 2017. How front-line healthcare workers respond to stock-outs of essential medicines in the Eastern Cape Province of South Africa. *South African Medical Journal*, 107(9), 738-740.

Holland, C.E., Papworth, E., Billong, S.C., Kassegne, S., Petitbon, F., Mondoleba, V., Moukam, L.V., Macauley, I., Ntsama, S.P.E., Yomb, Y.R. & Eloundou, J. 2015. Access to HIV services at non-governmental and community-based organizations among men who have sex with men (MSM) in Cameroon: an integrated biological and behavioral surveillance analysis. *PLoS One*, 10(4), e0122881.

Homer, C.S., Lopes, S.C., Nove, A., Michel-Schuldt, M., McConville, F., Moyo, N.T., Bokosi, M. & ten Hoope-Bender, P. 2018. Barriers to and strategies for addressing the availability, accessibility, acceptability and quality of the sexual, reproductive, maternal, newborn and adolescent health workforce: addressing the post-2015 agenda. *BMC Pregnancy and Childbirth*, 18(1), 55.

Indravudh, P.P., Choko, A.T. & Corbett, E.L. 2018. Scaling up HIV self-testing in sub-Saharan Africa: a review of technology, policy and evidence. *Current Opinion in Infectious Diseases*, 31(1), 14.

Kakade, D. 2012. Community-based monitoring as an accountability tool: influence on rural health services in Maharashtra, India. In *BMC Proceedings* 6(Suppl. 1), O9. BioMed Central.

Kearns, A.D., Caglia, J.M., ten Hoope-Bender, P. & Langer, A. 2016. Antenatal and postnatal care: a review of innovative models for improving availability, accessibility, acceptability and quality of services in low-resource settings. *BJOG: An International Journal of Obstetrics & Gynaecology*, 123(4), 540-548.

Krishnamurthy, P., Hui, S.K., Shivkumar, N., Gowda, C. & Pushpalatha, R. 2016. Assessing the impact of peer educator outreach on the likelihood and acceleration of clinic utilization among sex workers. *PloS One*, 11(7), e0159656.

Kruk, M.E., Gage, A.D., Joseph, N.T., Danaei, G., García-Saisó, S. & Salomon, J.A. 2018. Mortality due to low-quality health systems in the universal health coverage era: a systematic analysis of amenable deaths in 137 countries. *Lancet*, 392(10160), 2203-2212.

Lama, J.R., Mayer, K.H., Perez-Brumer, A.G., Huerta, L., Sanchez, H., Clark, J.L., Sanchez, J. & Reisner, S.L. 2019. Integration of gender-affirming primary care and peer navigation with HIV prevention and treatment services to improve the health of transgender women: protocol for a prospective longitudinal cohort study. *JMIR Research Protocols*, 8(6), e14091.

Levesque, J.F., Harris, M.F. & Russell, G. 2013. Patient-centred access to health care: conceptualising access at the interface of health systems and populations. *International Journal for Equity in Health*, 12(1), 18.

Lillie, T.A., Baer, J., Adams, D., Zhao, J. & Wolf, R.C. 2018. Think global, act local: the experience of Global Fund and PEPFAR joint cascade assessments to harmonize and strengthen key population HIV programmes in eight countries. *Journal of the International AIDS Society*, 21, e25125.

Lozano, R., Fullman, N., Abate, D., Abay, S.M., Abbafati, C., Abbasi, N., Abbastabar, H., Abd-Allah, F., Abdela, J., Abdelalim, A. & Abdel-Rahman, O. 2018. Measuring progress from 1990 to 2017 and projecting attainment to 2030 of the health-related Sustainable Development Goals for 195 countries and territories: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet*, 392(10159), 2091-2138.

Macdonald, V., Verster, A. & Baggaley, R. 2017. A call for differentiated approaches to delivering HIV services to key populations. *Journal of the International AIDS Society*, 20, 21658.

Médecins Sans Frontières (MSF). 2016. *Out of focus: how millions of people in West and Central Africa are being left out of the global HIV response.* MSF, Brussels. Available at: https://www.msf.org.za/about-us/publications/reports/out-focus-report-hiv-west-and-central-africa

Molyneux, S., Atela, M., Angwenyi, V. & Goodman, C. 2012. Community accountability at peripheral health facilities: a review of the empirical literature and development of a conceptual framework. *Health Policy and Planning*, 27(7), 541-554.

Moriarty, K., Genberg, B., Norman, B. & Reece, R. 2018. The effect of antiretroviral stock-outs on medication adherence among patients living with HIV in Ghana: a qualitative study. *Journal of the Association of Nurses in AIDS Care*, 29(2), 231-240.

Ngom, N.F., Faye, M.A., Ndiaye, K., Thiam, A., Ndour, C.T., Etard, J.F., Sow, P.S., Seydi, M., Delaporte, E. & Cournil, A. 2018. ART initiation in an outpatient treatment center in Dakar, Senegal: a retrospective cohort analysis (1998-2015). *PloS One*, 13(9), e0202984.

Nyato, D., Kuringe, E., Drake, M., Casalini, C., Nnko, S., Shao, A., Komba, A., Baral, S.D., Wambura, M. & Changalucha, J. 2018. Participants' accrual and delivery of HIV prevention interventions among men who have sex with men in sub-Saharan Africa: a systematic review. *BMC Public Health*, 18(1), 370.

OIG (Office of the Inspector General of the Global Fund). 2011. *Audit of the Global Fund grants to Population Services International Togo* Audit Report: GF-OIG-10-021. 2011 October 31. Available at: https://www.theglobalfund.org/media/2702/oig_gfoig10021auditpsitogo_report_en.pdf

-----. 2012a. *Audit of Global Fund grants to the Republic of Senegal* Report: GF-OIG-11-007. 2012 September 7. Available at: https://www.theglobalfund.org/media/2718/oig_gfoig11007auditsenegal_report_en.pdf

-----. 2012b. *Diagnostic Review of Global Fund grants to Republic of the Gambia.* GF-OIG-11-022. 2012 August 3. Available at: https://www.theglobalfund.org/media/2749/oig_gfoig12022diagnosticreviewgambia_report_en.pdf

-----. 2015. *Audit Report Audit of Global Fund grants to the Republic of Ghana*. GF-OIG-15-018. 2015 October 27. Available at: https://www.theglobalfund.org/media/2635/oig_gf-oig-15-018_report_en.pdf

-----. 2016. *Audit Report Global Fund grants to the Republic of Côte d'Ivoire*. GF-OIG-16-025. 2016 December 14. Available at: https://www.theglobalfund.org/media/2666/oig_gf-oig-16-025_report_en.pdf

-----. 2017a. *Audit Report Global Fund grants in the Republic of Guinea*. GF-OIG-17-018. 2017 August 25. Available at: https://www.theglobalfund.org/media/6721/oig_gf-oig-17-018_report_en.pdf

OIG. 2017b. *Audit Report Global Fund grants in the Republic of Mali*. GF-OIG-17-023. 2017 November 20. Available at: https://www.theglobalfund.org/media/6961/oig_gf-oig-17-023_report_en.pdf

Papp, S.A., Gogoi, A. & Campbell, C. 2013. Improving maternal health through social accountability: a case study from Orissa, India. *Global Public Health,* 8(4), 449-464.

Parpia, A.S., Ndeffo-Mbah, M.L., Wenzel, N.S. & Galvani, A.P. 2016. Effects of response to 2014–2015 Ebola outbreak on deaths from malaria, HIV/AIDS, and tuberculosis, West Africa. *Emerging Infectious Diseases*, 22(3), 433.

Penchansky, R. & Thomas, J.W. 1981. The concept of access: definition and relationship to consumer satisfaction. *Medical Care*, 127-140.

Poku, R.A., Owusu, A.Y., Mullen, P.D., Markham, C. & McCurdy, S.A. 2017. HIV antiretroviral medication stock-outs in Ghana: contributors and consequences. *African Journal of AIDS Research,* 16(3), 231-239.

Reif, L.K., McNairy, M.L., Lamb, M.R., Fayorsey, R. & Elul, B. 2018. Youth-friendly services and differentiated models of care are needed to improve outcomes for young people living with HIV. *Current Opinion in HIV and AIDS*, 13(3), 249-256.

Rowe, A.K., De Savigny, D., Lanata, C.F. & Victora, C.G. 2005. How can we achieve and maintain high-quality performance of health workers in low-resource settings? *Lancet*, 366(9490), 1026-1035.

Saurman, E. 2016. Improving access: modifying Penchansky and Thomas's theory of access. *Journal of Health Services Research & Policy,* 21(1), 36-39.

Shangani, S., Escudero, D., Kirwa, K., Harrison, A., Marshall, B. & Operario, D. 2017. Effectiveness of peer-led interventions to increase HIV testing among men who have sex with men: a systematic review and meta-analysis. *AIDS Care*, 29(8), 1003-1013.

Sharma, M., Ying, R., Tarr, G. & Barnabas, R. 2015. Systematic review and meta-analysis of community and facility-based HIV testing to address linkage to care gaps in sub-Saharan Africa. *Nature*, 528(7580), S77.

Souteyrand, Y.P., Collard, V., Moatti, J.P., Grubb, I. & Guerma, T. 2008. Free care at the point of service delivery: a key component for reaching universal access to HIV/AIDS treatment in developing countries. *AIDS*, 22, S161-S168.

Ssonko, C., Gonzalez, L., Mesic, A., da Fonseca, M.S., Achar, J., Safar, N., Martin, B., Wong, S. & Casas, E.C. 2017. Delivering HIV care in challenging operating environments: the MSF experience towards differentiated models of care for settings with multiple basic health care needs. *Journal of the International AIDS Society*, 20, 21654.

Staveteig, S., Croft, T.N., Kampa, K.T. & Head, S.K. 2017. Reaching the 'first 90': gaps in coverage of HIV testing among people living with HIV in 16 African countries. *PloS One*, 12(10), e0186316.

Stengel, C.M., Mane, F., Guise, A., Pouye, M., Sigrist, M. & Rhodes, T. 2018. "They accept me, because I was one of them": formative qualitative research supporting the feasibility of peer-led outreach for people who use drugs in Dakar, Senegal. *Harm Reduction Journal*, 15(1), 9.

Stover, J., Bollinger, L., Izazola, J.A., Loures, L., DeLay, P., Ghys, P.D. & Fast Track modeling working group. 2016. What is required to end the AIDS epidemic as a public health threat by 2030? The cost and impact of the fast-track approach. *PloS One*, 11(5), e0154893.

Thomson, A., Robinson, K. & Vallée-Tourangeau, G. 2016. The 5As: a practical taxonomy for the determinants of vaccine uptake. *Vaccine*, 34(8), 1018-1024.

UNAIDS (Joint United Nations Programme on HIV/AIDS). 2017. *AIDSinfo.* Offering information on HIV/AIDS treatment, prevention, and research. Available at: http://aidsinfo.unaids.org/

-----. 2018a. *Knowledge is power: Know your status, know your viral load*. UNAIDS. Available at: http://www.unaids.org/sites/default/files/media_asset/jc2940_knowledge-is-power-report_en.pdf

-----. 2018b. Joint United Nations Programme on HIV/AIDS. *The Western and Central Africa catch-up plan: putting HIV Treatment on the fast-track by 2018*. Available at: http://www.unaids.org/en/resources/documents/2017/WCA-catch-up-plan

UNAIDS. 2019. *Communities at the centre: defending rights, breaking barriers, reaching people with HIV services*. Available at: https://www.unaids.org/en/20190716_GR2019_communities

UNAIDS & Stop AIDS Alliance. 2015. *Communities deliver: the critical role of communities in reaching global targets to end the AIDS epidemic*. Available at: https://www.unaids.org/en/resources/documents/2015/JC2725_communities_deliver

UNAIDS & UNICEF. 2017. *Step up the pace: towards an AIDS-free generation in West and Central Africa*. Geneva: Switzerland. Available at: https://www.unicef.org/publications/index_101480.html

Wallace, S.P. 1990. The no-care zone: availability, accessibility, and acceptability in community-based long-term care. *Gerontologist*, 30(2), 254-261.

WHO (World Health Organization). 2015. *Global health expenditure database*. Available at: http://apps.who.int/nha/database

----. 2016a. *Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection: recommendations for a public health approach*. Second Edition. Available at: https://apps.who.int/iris/bitstream/handle/10665/208825/9789241549684_eng.pdf;jsessionid=818AC0F5C47CCF40BA2152957D82EDEE?sequence=1

----. 2016b. *Guidelines on HIV self-testing and partner notification: supplement to consolidated guidelines on HIV testing services*. Geneva, Switzerland: World Health Organization. Available at: https://www.who.int/hiv/pub/vct/hiv-self-testing-guidelines/en/

-----. 2018a. *Global Health Workforce Alliance*. Available at: http://www.who.int/workforcealliance/media/qa/04/en/

-----. 2018b. *Treat all: policy adoption and implementation status in countries*. Geneva. Available at: http://apps.who.int/iris/bitstream/handle/10665/275468/WHO-CDS-HIV-18.21-eng.pdf?ua=1