

The Comprehensive Review of Antiretroviral Therapy: A Paradigm Shift

By

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A thesis submitted to the School of Pharmacy in partial fulfillment of the requirements
for the degree of
Bachelor of Pharmacy (Hons.)

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Declaration

It is hereby declared that

1. The thesis submitted is my own original work while completing degree at Brac University.
2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The thesis does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. I have acknowledged all main sources of help.

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Ethics Statement

This study does not involve any human or animal trial.

Dedication

Dedicated to my parents

Acknowledgement

I would want to begin by expressing my gratitude to the Almighty for His unending gifts, mercy, and kindness, which have enabled me to get thus far and complete my studies with entire dedication. It is a pleasure to express my deep sense of thanks and gratitude to my supervisor, Sania Ashrafi (Lecturer, School of Pharmacy, Brac University), for allowing me to work on this project. It would be impossible for me to cope with several critical challenges if she didn't supervise me. My project work was made more efficient due to her ongoing supervision and assistance, which allowed me to work more efficiently. My heartfelt thanks go out to our School of Pharmacy Chairperson, Professor Dr. Eva Rahman Kabir and Academic Coordinator Professor Dr. Hasina Yasmin of Brac University, for creating a competitive academic environment that allows us to achieve our full potential and be an inspiration and support to all of us. Also, I'd like to use this time to convey my appreciation to all of the faculty members and the lab officer for their assistance and support throughout the years.

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List of Acronyms

ART	Antiretroviral Therapy
PLWHIV	People Living with HIV
HIV	Human Immunodeficiency Virus
AIDS	Acquired Immunodeficiency Syndrome
WHO	World Health Organization
UNAIDS	United Nations Joint Programme. on HIV/AIDS

Abstract Summary

Human immunodeficiency virus type 1 (HIV-1) infection has reached pandemic proportions since the first instances of AIDS surfaced in 1981. By far, more than 30 antiretroviral therapies (ART) have been approved while combination therapy has made HIV-1 infection a chronic but manageable disease. After 40 years of research, antiretroviral therapy has become an affordable, accessible and safer choice. Unfortunately, a decent number of countries still fall behind in achieving the 90-90-90 UNAIDS goals to deal with HIV. In this comprehensive review, we tried to deliver a complete status of HIV and ART all over the world. We also have discussed the root causes of many countries lagging behind the target and accomplishments of others. As well as, the reasonable solutions that may open a new gateway to deciphering this multilateral issue to accomplish the 95-95-95 UNAIDS goals for a better planet with good health.

Keywords: ART Therapy, PLWHIV, UNAIDS, AIDS, 90-90-90 goal.

Chapter 1

Introduction

1.1 Background

Since the dawn of time, mankind has been plagued by various diseases. Some of these diseases have been cured, while others have not yet been fixed. Researchers worldwide are still trying to find a panacea for diseases that now have no known cure. Human Immunodeficiency Virus (HIV) is one of the diseases particularly have yet to be fully treated. The American data visualization expert Janet Iwasa recently stated on TED that something remarkable occurred in 2008: an HIV-positive man was rehabilitated. That was the first and, so far, the last time in over 70 million HIV cases. It's still difficult to ascertain how he was treated, and no one knows for sure. Why can't HIV be cured the same way as other diseases, such as malaria and hepatitis C, have been fixed? Let's start by gaining knowledge about HIV and looking at how it infects people and proceeds to AIDS in the first place.

1.2 HIV and Current Status

The HIV virus is a virus that targets a person's immune system and causes them to become ill. If HIV infection is not treated, the most critical phase, which is the Acquired immunodeficiency syndrome (AIDS), which can take several years to emerge if not properly treated (CDC 2021a). Depending on the person, the development process can take several months or years (Avert 2020). When certain cancers or infections develop or when other serious long-term clinical signs appear, it is thought to be an indication that the patient has HIV (WHO Fact Sheet 2021). There are approximately 37 million individuals living with AIDS in the world at any given time, making it one of the most devastating pandemics in contemporary history (Fajardo-Ortiz et al. 2017a)(WHO Fact Sheet 2021). AIDS, is a disease in which the immune system of the human body is severely compromised (NHS 2021).

With more than 260,000 publications enumerated in GOPubMed (Doms and Schroeder 2005) and more than 42,000 papers (with HIV/AIDS in the title) (Falagas et al. 2008) included in the Web of Science, infection diseases such as HIV/AIDS are among those that have received the most comprehensive scientific investigation (Falagas et al. 2008). These publications span more than three decades of scientific investigation. HIV/AIDS is being investigated by various biological disciplines, including epidemiology (Wilson 2006), immunology (Medzhitov and Littman 2008), drug development (Flexner 2007), and non-biomedical domains, such as the humanities, to better understand it (Mann, Jnathan M; Tarantola 1996)(Fajardo-Ortiz et al. 2017b)

In a new study, researchers speculate that HIV may have been transmitted from chimpanzees to humans as early as the late 1800s (Sharp and Hahn 2011)(Britannica 2021.)(CDC 2021b). A virus that originated on the African continent made its way around the globe over several decades to other parts of the world. When it comes to HIV infection, the signs and symptoms

vary depending on the stage of the disease. The progression of HIV infection in a person occurs in three stages (Avert 2020.). When it comes to the form and intensity of HIV infection, the signs and symptoms can vary from person to person, and some people may not show any signs or symptoms for many years. People who have HIV are most contagious in the first few months after contracting the virus, but most of those who do not know they have the virus do not find out until much later (World Health Organization 2021). While it is possible to suffer flu-like symptoms in the first stage following initial infection, this is not something that everyone will encounter.

Several reports have been reported that people feel better throughout Stage 2, which can last for up to 10 years or longer. There is a chance that a person will not have any symptoms throughout this period. When an individual's immune system has suffered severe damage and is no longer capable of fighting off deadly diseases and illnesses, they are said to be at Stage 3. (Avert 2020)

1.3 How It Infected People

We now have a comprehensive knowledge of HIV. The simplest explanation of HIV is an infection caused by a virus that targets the immune system. If it remains untreated, HIV will cause immune failure in a person, also known as immune deficiency, and this state of immune deficiency is referred to by the name "AIDS" (CDC 2021c)(Waymack and Sundareshan 2021). Finally, we'd want to explore how HIV is transmitted, as well as the many ways in which we might acquire HIV and, so, become infected with HIV. Blood, sperm, pre-seminal fluid (commonly known as "pre-cum"), rectal fluid and anal mucous, vaginal fluids, and breastfeeding are all examples of bodily fluids in which the virus can be found in an HIV-positive person's body (NHS inform 2021).



Figure 1 People get AIDS via (Avert 2021b)

It is necessary for these bodily fluids to enter someone's circulation through a mucous membrane, such as the lining of the vaginal or rectum, shared injecting equipment, or a rupture in the skin for them to get HIV (such as cuts or sores in the mouth or tears around the anus) (Avert 2021). Unlike saliva, sweat, and urine, HIV does not appear to be present in significant amounts in other bodily fluids to allow transmission from one person to another. Aside from that, HIV can be transmitted from a mother to her unborn child during pregnancy (Volmink and Marais 2008)(Cervený, Murthi, and Staud 2021). There is a slew of HIV myths that need to be dispelled. Some people believe that HIV can be transmitted through the air, which is incorrect (even though HIV cannot survive in the air). Individuals are not exposed to the virus through regular daily interaction like sharing personal possessions, hugging, shaking hand.



Figure 2 People can't get AIDS via (Avert 2021c)

1.4 Threat Impose by Diagnosed vs Undiagnosed Patient

SARS-Cove 2 virus, one of the world's most lethal viruses, has spread across the globe and has killed thousands of people. According to official estimates, 351 million people have been infected with the virus thus far (World Health Organization 2022). People infected with COVID 19 are often unaware of their condition because the virus' symptoms tend to be silent. They pose a more significant threat because they aren't aware of COVID-19 positive. As a result, they are not isolated, and they even talk and contact other individuals, causing the virus to spread even further. HIV, on the other hand, is spreads in a same way. According to Unaid, around 6.1 million people have no idea they are infected with HIV (UNAIDS- Fact Sheet 2021). It is stated in the article by Alain et al. that undiagnosed HIV infections have the potential to jeopardize efforts to reverse the global AIDS epidemic by 2030 (Vandormael et al. 2018). So, given that HIV is not infectious in the same way as COVID-19 is, why are undiagnosed people are more threatening? This question is addressed in the infographic that

follows.

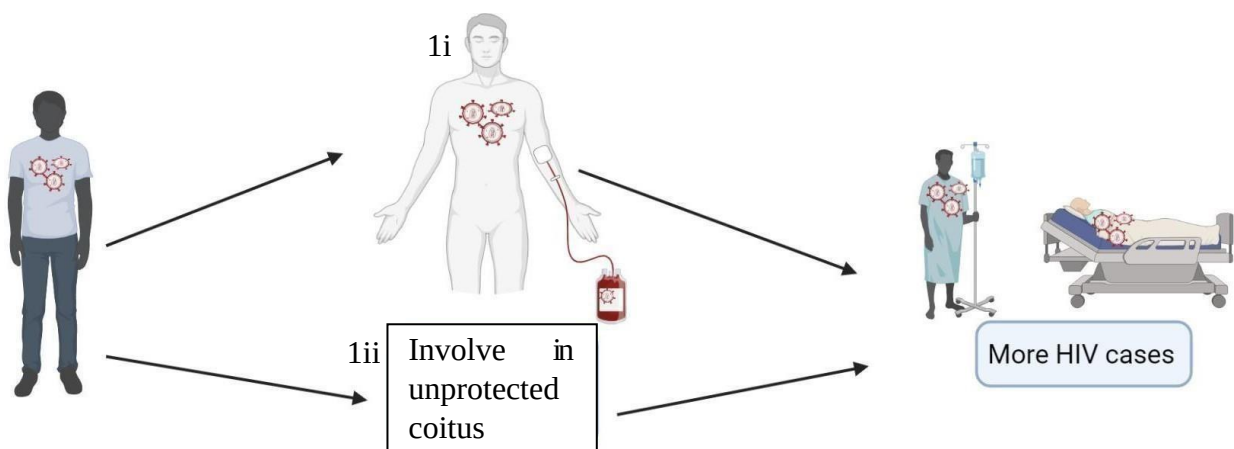


Figure 3 Info-Graphic A depicts an HIV-infected person who has not been diagnosed and is unaware that they have the virus. Due to his lack of knowledge, 1i donates blood to expand the number of persons infected with HIV daily. By coming into contact with healthy individuals, 1ii implies that the number of diseases cases will go up over time

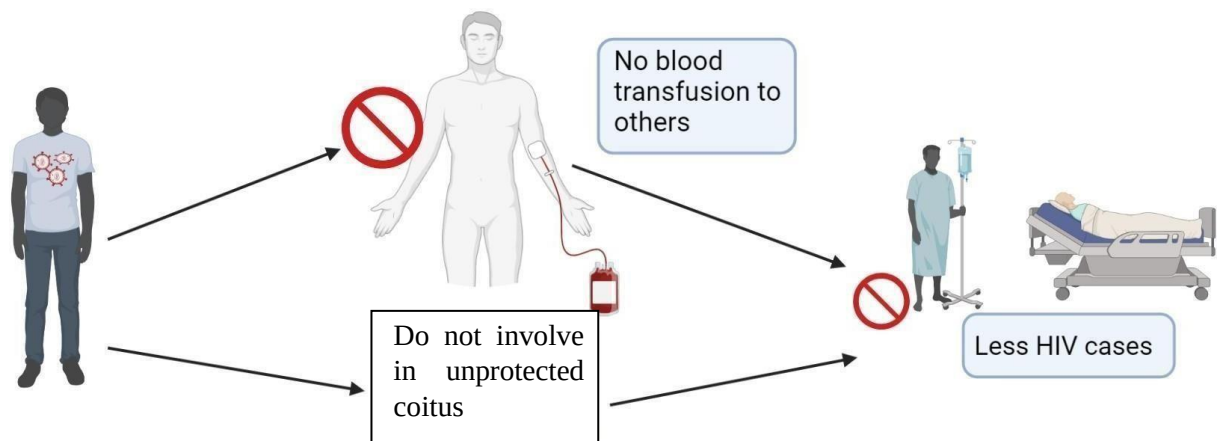


Figure 4 Info-graphic B represents an HIV-infected person who has been diagnosed and is aware that they have HIV. Being aware that they are HIV-positive has resulted in refusing to donate blood and refraining from having sexual relations with uninfected individuals. For this reason, the number of HIV-positive individuals is deteriorating day by day

This scenario is problematic for public health because undiagnosed and untreated persons will remain susceptible to the disease for long periods and have the higher threat of transmitting AIDS to their healthy partners. If the global AIDS epidemic is to be brought to a close by 2030, a high level of HIV testing will be anticipated in order to reduce the time between diagnosis and treatment as well as the number of undiagnosed cases (Vandormael et al. 2018).

1.5 Antiretroviral Therapy

At this time, there is no effective treatment available for this condition. Once someone catches HIV, they are doomed to live with the virus for the rest of his or her life.

HIV, on the other hand, can be controlled with the help of proper medical attention (Avert 2021d). In addition to being able to live long and healthy lives, people living with HIV who receive appropriate HIV therapy can also protect their partners from contracting the virus (WHO 2012). It is possible to control the amount of virus in our blood within a reasonable limit with the help of anti-HIV drugs (Avert 2020g)(Barry, Mulcahy, and Back 1998). Virus suppression is the phrase used to explain what is taking place here. When our viral load is undetectable, it is easy to maintain good health and nearly completely remove the virus's risk to individuals around us.

Antiretroviral therapies are medications used to treat HIV infection in people who have already contracted the virus. ART (antiretroviral therapy) is a treatment that consists of taking a combination of HIV drugs (HIVinfo.NIH.gov 2021). Antiretroviral therapy (ART) is recommended for everyone who has been diagnosed with HIV (CDC 2021d). Because antiretroviral therapy (ART) cannot cure HIV, there is a remaining question how does it function?

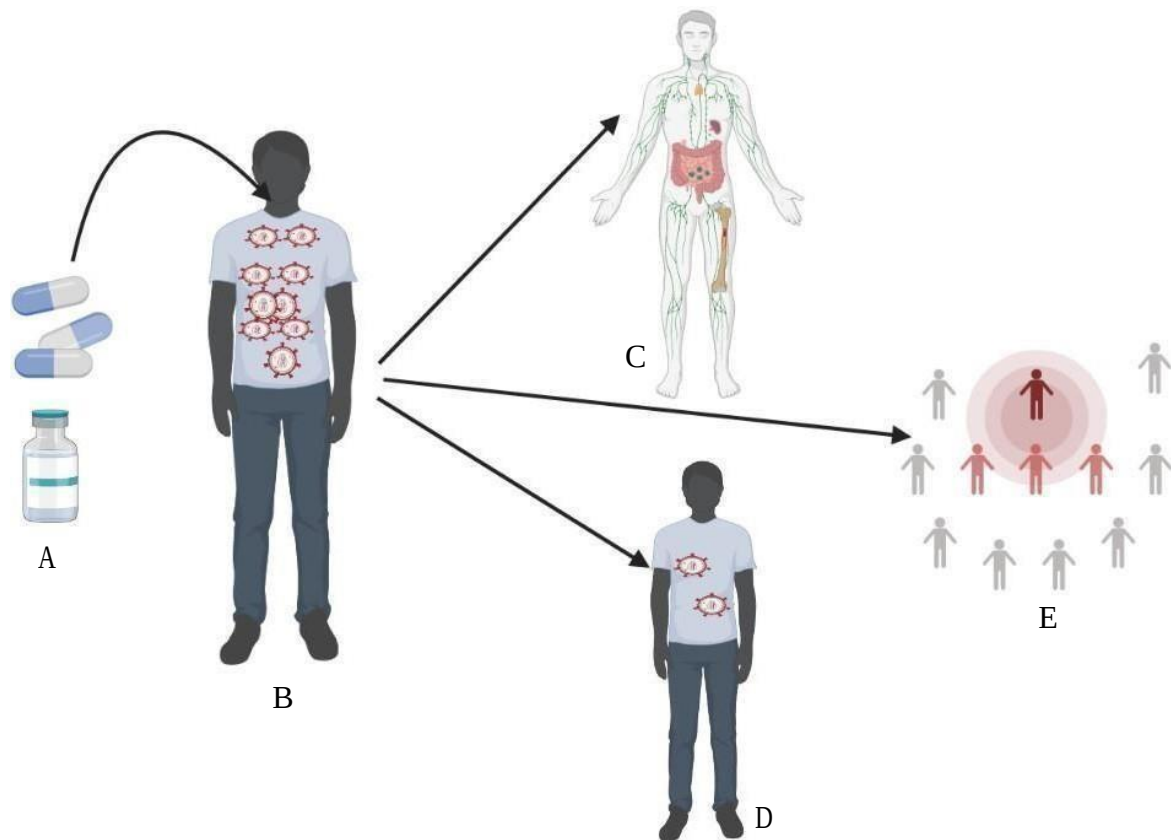


Figure 5 A represents antiretroviral medications in this graph. Patients (B) who receive it in conjunction with HIV treatment have a more robust immune system (C), a substantially reduced risk of infection (D) and less HIV in their bloodstream (E) than those who do not receive it

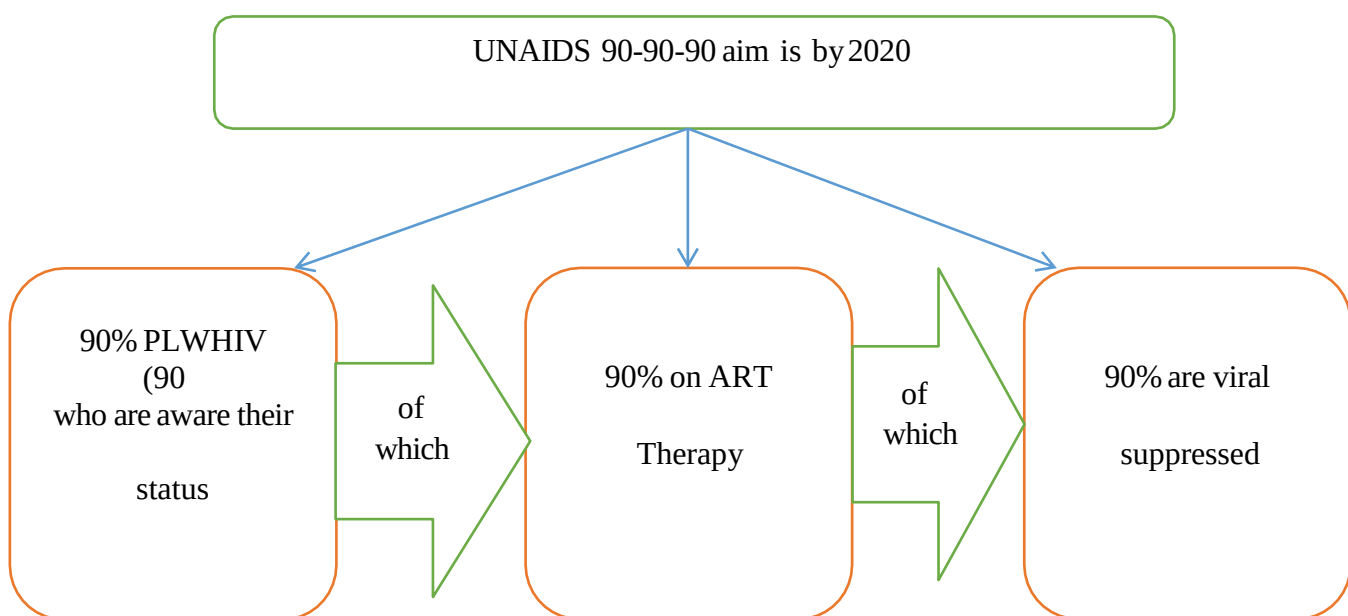
HIV cannot be cured with antiretroviral therapy (ART), but it can be managed better with it.

Over the last two decennaries, the care rate for patients living with HIV/AIDS has improved dramatically (National and Pillars 2006). Combination ART contains the excellence treatment for HIV-1 condition in Europe and North America for over two decades (Trickey et al. 2017). In comparison to today's antiretroviral therapy regimens, which have greater genetic obstacles to resistance, as well as a lower pill burden, better suppress HIV replication, slightly toxic and rarer side-effects than previous regimens (Pau and George 2014). The three-year overall survival rate for HIV patients who began ART between 1996 and 2013 grew dramatically (Trickey et al. 2017). Individuals who began therapy between 1996 and 2007 saw similar mortality rates throughout the first year of ART, while those who began treatment between 2008 and 2010 experienced decreased mortality rates (Trickey et al. 2017).

It is possible that those who commenced antiretroviral medication (ART) more recently than those who started treatment earlier in the ART period will have a greater chance of living as a result of this finding.

1.6 UNAIDS 90-90-90 GOAL

The goal of the UNAIDS is to eliminate the AIDS pandemic by the year 2020(1). The term was coined by the UNAIDS in 2014 (2).



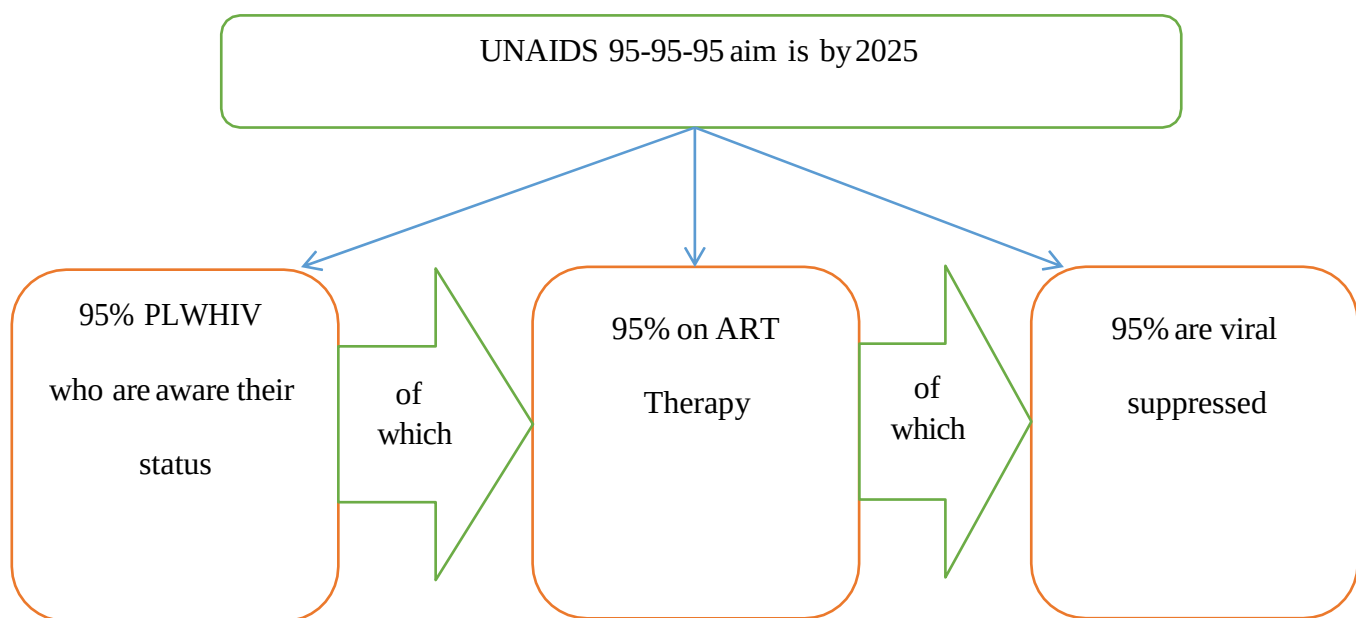
HIV treatment works by lowering the amount of HIV in the body (viral load) to a shallow level. These allow the immune system to work and keep people from getting sick, even with HIV, which is virus suppression (3). Viral suppression can assist HIV-positive individuals to live healthier and longer lives while also reducing the possible dangers of spreading the virus from one individual to another (4). Achieving these goals by 2020 will reduce HIV to an endemic disease in 2030 and reduce mortality significantly (2).

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It has already been attained by six countries (Botswana, Cambodia; Denmark; Eswatini; Namibia; and the Netherlands) who achieved the UNAIDS goals, and seven more countries are on their way (5).

1.7 UNAIDS 95-95-95 GOAL

The 95-95-95 method is similar to the 90-90-90 strategy in that it consists of three steps. The goal was



90-90-90 was an intermediate goal established for 2020, with the final aim of 95-95-95 being achieved.

1.8 AIMS

The study aims to focus on the status of Antiretroviral Therapy worldwide before and on the time of pandemic. We also tried to find out the proper justification why many countries fall behind to improve UNAIDS strategy compared to other countries. Does the pandemic itself downtown progress or any other factor? What lessons can be taken to fulfill 95-95-95 goals.

Chapter 2

Epidemiology of HIV and Antiretroviral Therapy

2.1 East and Southern Africa (ESA)

Despite the fact that there is still no effective vaccine or cure for HIV after more than three decades, there have been significant advances in treatment, AIDS-related deaths and new HIV infections have decreased significantly worldwide since ART became widely accessible and promptly scaled up, turning what was a terminal illness into a chronic, manageable condition. (Kharsany and Karim 2016).

The territory hardest tormented by HIV in ESA. It is estimated that 54% of the world's HIV-positive population resides within its geographical boundaries (20.6 million people). Fewer than two out of every ten people with HIV are unaware of their illness because of more widespread HIV testing.

This province has a high rate of HIV infection but transgender individuals, sex workers, young women, men who have physical relationship with males, those who injecting dopes are particularly vulnerable. Women who are pregnant or breastfeeding and their newborns are a particularly vulnerable demographic that is often overlooked or ignored (Parker et al. 2021)

About 15 percent of the world's HIV-positive women are between 15 and 24, and 80 percent live in sub-Saharan Africa. In this region, young women bear an excessive allocation of the burden of HIV infection, with somewhat more than 70% of all recent HIV diseases. In addition, this age group (15-24) of young women is at greater risk of contracting HIV than the 15-24 years group of men. Overall in ESA, HIV prevalence is generally greater among young women than young males. Kharsany et al show a graph where we also see that only 10% of men (15-24) are infected with HIV whereas 32% of women are infected with HIV which is 22 times more (Kharsany and Karim 2016)



Figure 6 Percentages of PLWHIV who are comprehend of their situation in ESA

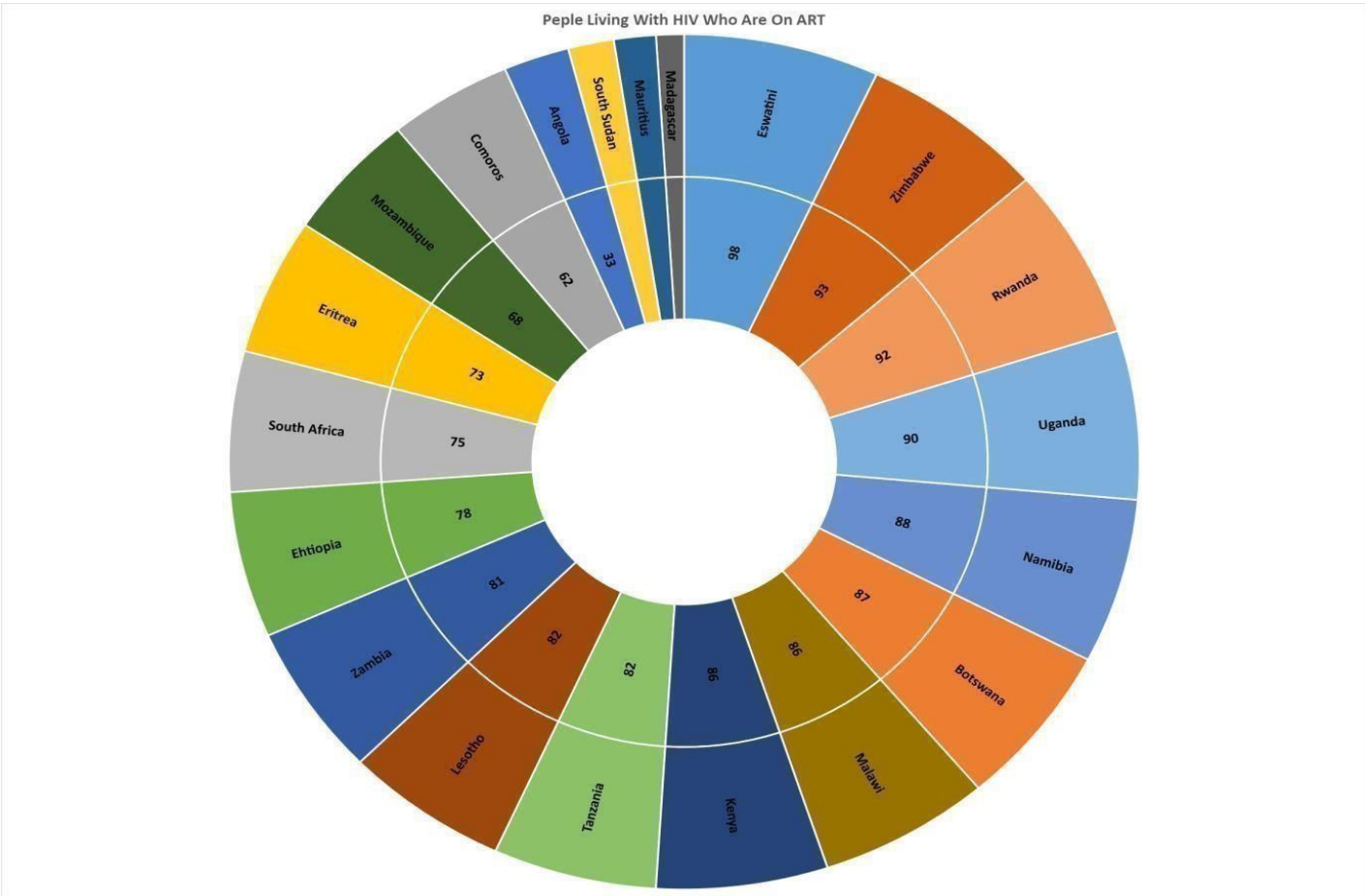


Figure 7 Percentages of PLWHIV who are on ART in ESA



Figure 8 Percentages of PLWHIV whose viral load has been suppressed in ESA

To summarize, these three charts show the percentage of PLHIV in ESA who are on antiretroviral therapy (ART), the percentage of PLWHIV are aware of their condition, and the percentage of PLWHIV whose viral load has been suppressed. According to UNAIDS, Eswatini has the highest percentage PLWHIV who are aware of their condition, ART status along with suppressed viral loads which is respectively 98%, 98% and 97% while South Sudan has the lowest percentage of PLWHIV who knows their status which is 23%. On the other hand, Madagascar has low percentages of ART status which is 14% and Mauritius suppressed viral loads which is 15%.

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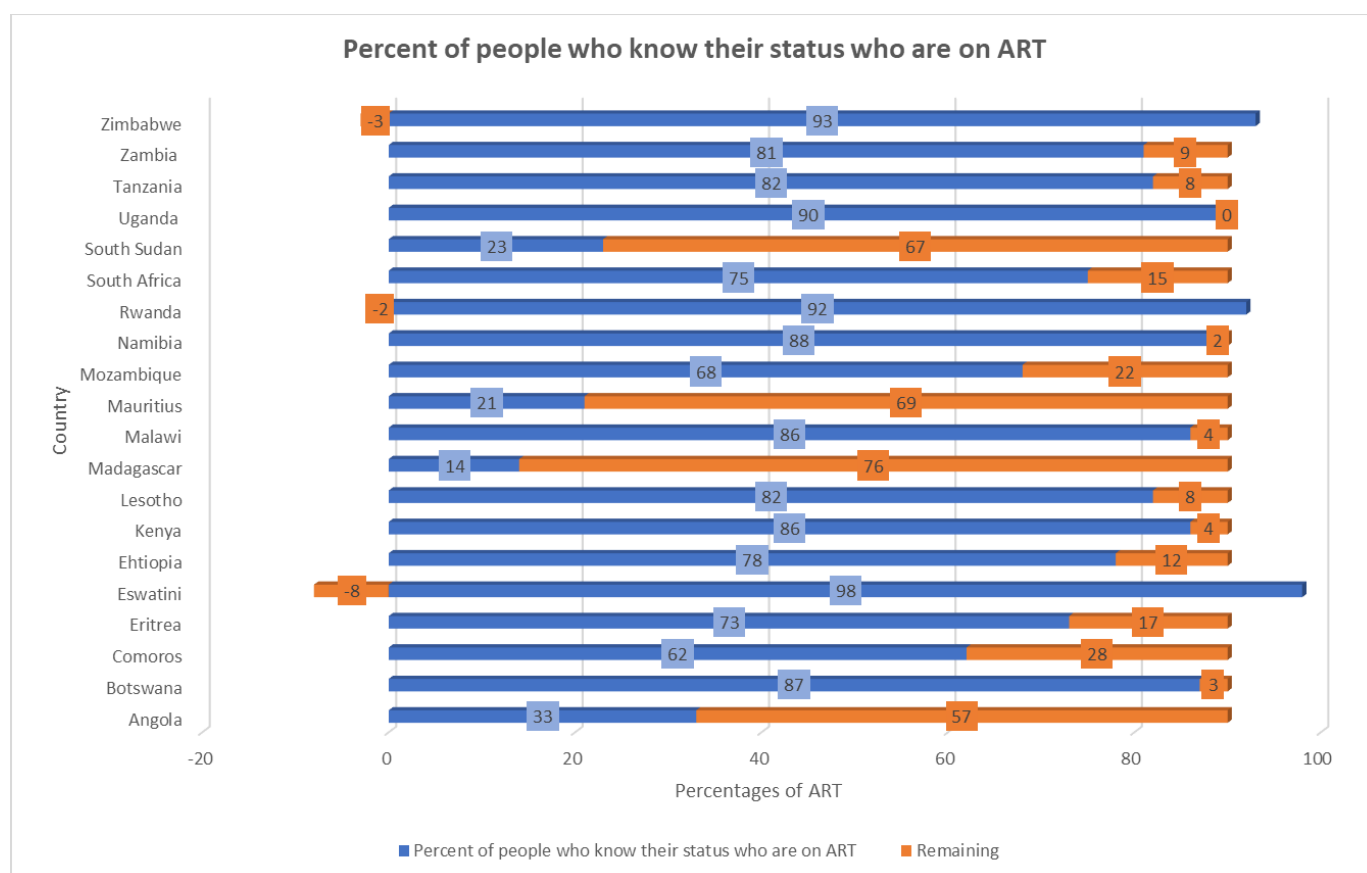


Figure 9 Remaining percentages of PLWHIV who are on ART in ESA

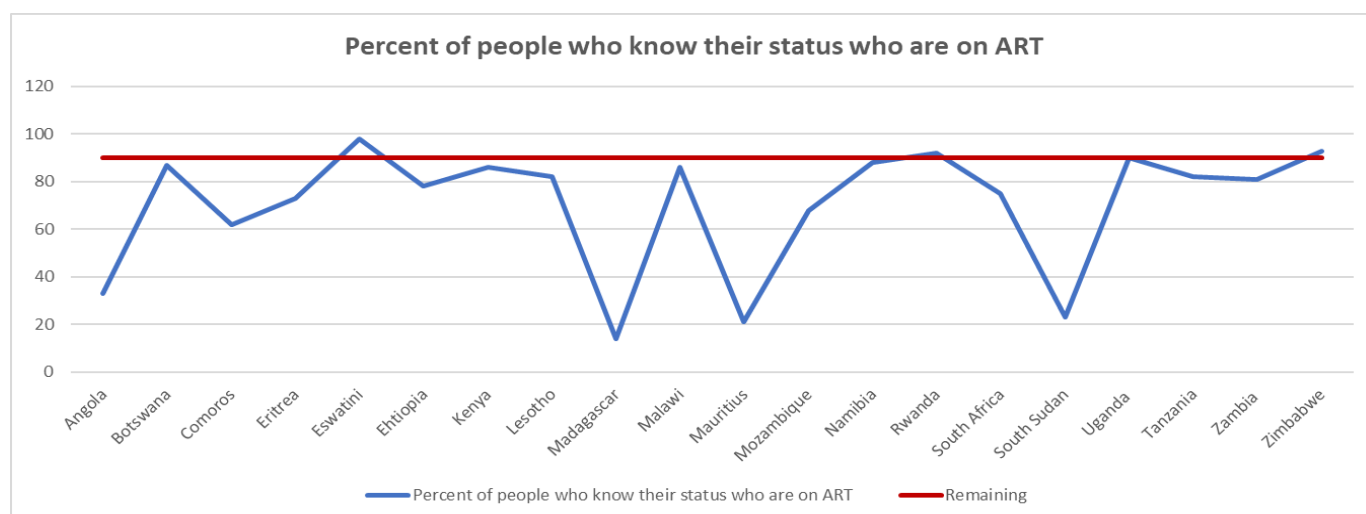


Figure 10 Countries that have crossed 90 percentages goal of ART in ESA

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The two graphs depict the current state of ART, the percentage of countries still in need of treatment, and the countries that have reached or above the 90 percent target. That is why some countries like Eswatini and Rwanda have leftover values that are negative in the first graph (-8 and -2). Consequently, the question of what the negative sign signifies may now be brought to view. The term "negative" refers to countries that have achieved more than 90 percent of the ART objective and have a percentage of more than 90 percent of the target.

Consequently, we have the lowest percentage of ART situations in Madagascar, 14 percent, with the remaining 76 percent needed to fulfill the 90 percent target, which is a very high percentage. The ART rate in Eswatini, on the other hand, is seven times greater than the rate in Madagascar, which is 98 percent. There is a chasm of insurmountable proportions between these two countries.

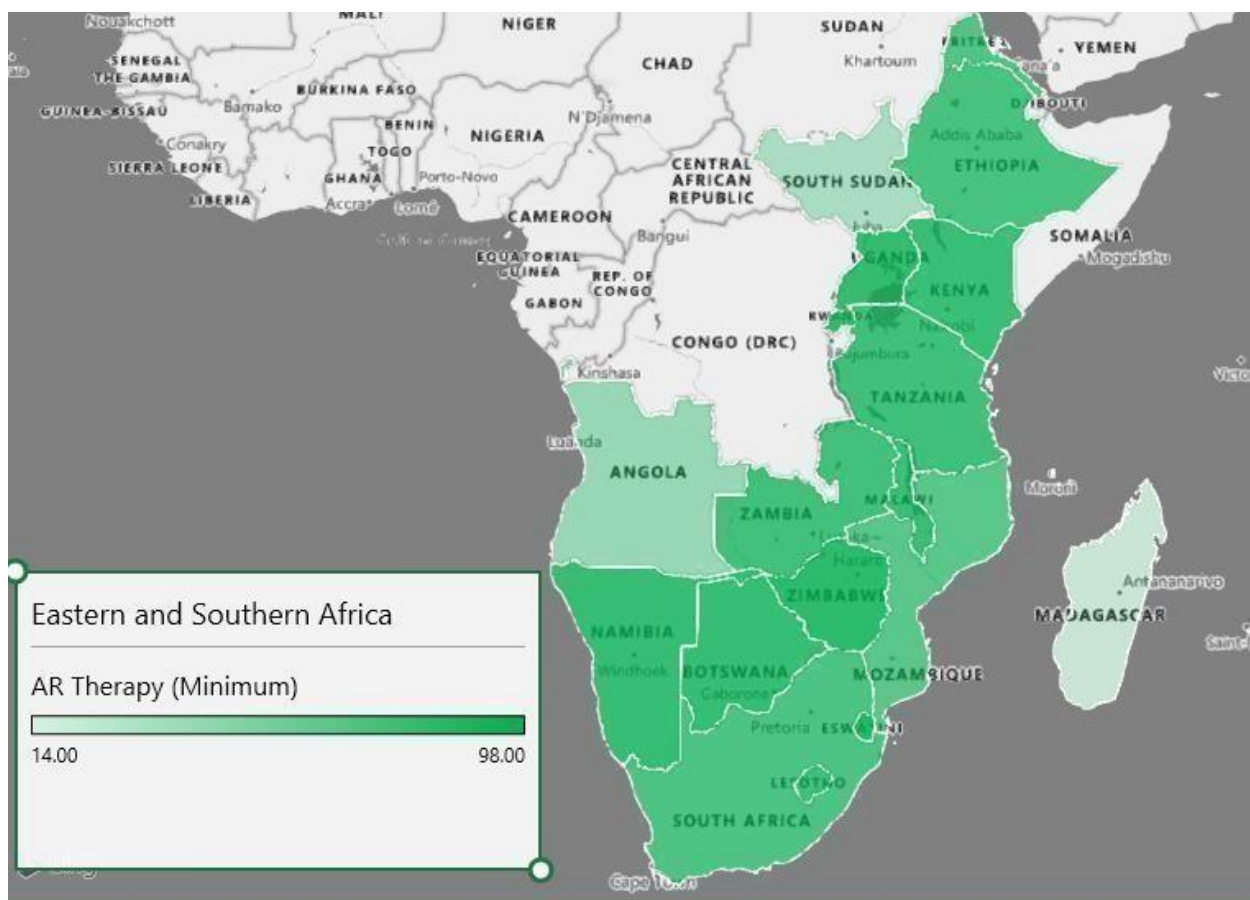


Figure 11 Choropleth map showing ART status across the ESA

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To a large extent, this map depicts the current state of antiretroviral therapy in the countries of Southern Africa. As you can see, the color gradient from light to dark green denotes a low to high ART status %. Because the percentage of ART coverage is inadequate around these countries, the 95 objectives will not be attained, as indicated by the light green. The darker color represent the higher percentage of ART status and the greater the likelihood that the UNAIDS 95 targets will be met.

It's no surprise that Madagascar's color on the graph is light green because of its lower ART status and a lower likelihood of achieving 95 goals. Eswatini, on the other hand, has a more significant number of ARTs and a greater possibility of attaining 95 goals, so its coloration is darker.

From this data we make a hypothetical chart which is given below:.

UNAIDS 90% Goals on ART Status

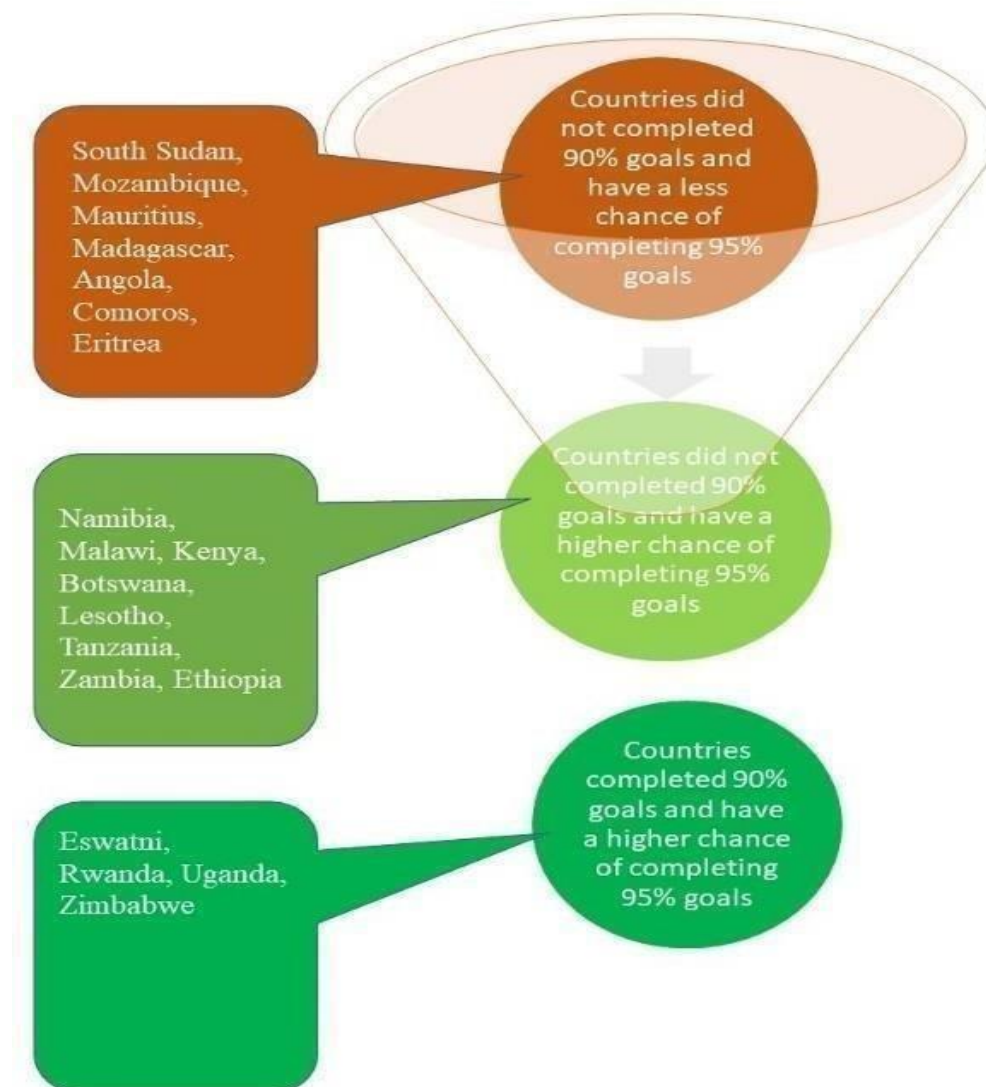


Figure 12 A graphical representation of Eastern Southern African countries that poses higher, moderate and poor chance to accomplish the UNAIDS 90% goal regarding ART

2.2 Western and Central Africa (WCA)

WCA is a big continent with many religions, cultures and ways of life. According to current estimates, transmissible infections eventually account for over a quarter of all worldwide mortality and kill at least 10 million people per year, most of them in tropical countries. (Fenollar & Mediannikov 2018). Arising infectious diseases have a significant influence on public health and economizing (Jones et al. 2008). Socioeconomic and environmental factors are often at play in developing these phenomena (Jones et al. 2008). Only 40 percent of Africa's anticipated potential has been realized due to persistent inequities in education and health, as well as skills.

Furthermore, battles, food shortages, inhabitants increase, and in the face of climate change's disruptive consequences, previous decades of development are at risk of being reversed. The current COVID-19 epidemic has brought to light the perils of underfunded health systems and lax oversight of outbreaks and transmissions. A large number of countries in the area are implementing lessons acknowledged from the West African Ebola outbreak which is occur in 2014 and all available tools and experience to combat the pandemic, putting the poorest and most vulnerable people first. The urban population, economic activity, and connection in West and Central Africa are all rapidly increasing. The recent Ebola virus outbreak in West Africa highlighted the susceptibility of local healthcare systems to emerging infectious illnesses. Large urban populations, which overloaded these resource-poor countries' public health systems, and the population's broad spatial and technological connection were two critical factors contributing to the epidemic's unprecedented scale. These variables point to a higher risk of developing infectious illnesses in Central Africa, caused by both known and undiscovered microorganisms (Munster et al. 2018)

One million people are projected to be living with HIV in eight nations of the ESA. HIV prevalence in the general population in West Africa remains low, except for some

countries where adult prevalence is assessed at 3.4 and 3.5 percent, respectively (Djomand, Quaye, and Sullivan 2014). Despite the low prevalence of HIV in WCA, solely about 65% of HIV-positive people in the region are conscious of their situation, which also indicates that half of all HIV-positive individuals are not receiving therapy (Lillie et al., 2019)

Because of a lack of antiretroviral treatment, West and Central Africa account for one-fifth of all AIDS-related fatalities worldwide each year. AIDS-related mortality is also common among children (ages 0-14), with four out of every ten youngsters dying in the region from AIDS-related infections. Since the AIDS epidemic began, an estimated 3.4 million children aged 0 to 17 have been orphaned in WCA (Lillie et al., 2019). According to UNAIDS figures from 2017, young girl accounted for around 3 out of every 5 HIV patients in the 15 to 24 year age group and 58 percent of AIDS-related fatalities in the 20 to 24 year age group. The United Nations has classified, when compared to males, adolescent girls and youthful women in the province are more endangered due to gender-based norms and prejudice, as evidenced by less access to education and HIV-related knowledge (Bommer, Vollmer, and Zagre 2021).

In recent years, HIV testing and antiretroviral drug coverage have increased faster, with over three-quarters of PLWHIV (73 percent) receiving antiretroviral therapy in 2020 and 59 percent suppressed virally (Update 2021).

Person is living with HIV who know their Status



Figure 13 Percentages of PLWHIV who are comprehend of their situation in WCA

People living with HIV who are on ART



Figure 14 Percentages of PLWHIV who are on ART in WCA

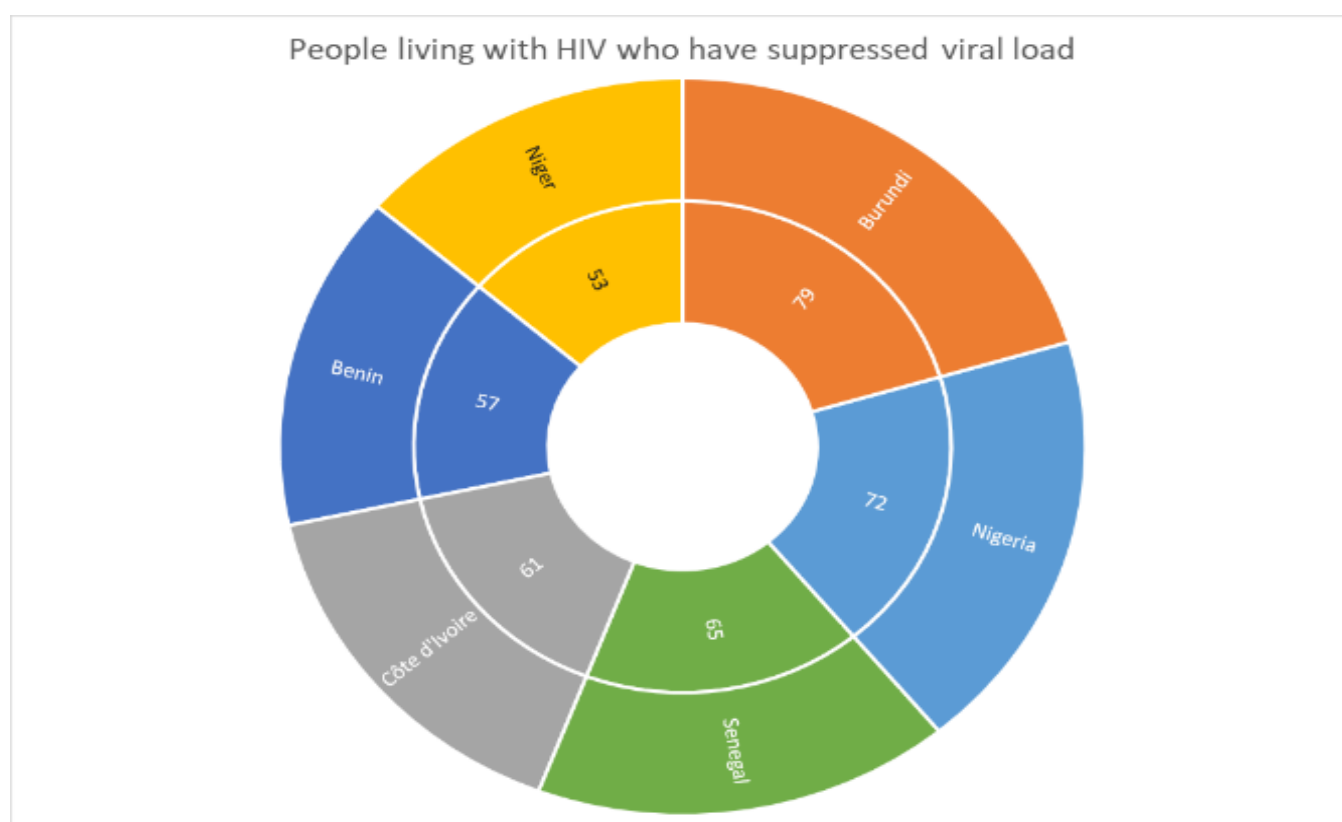


Figure 15 Percentages of PLWHIV whose viral load has been suppressed in WCA

To recapitulate, these three figures illustrate the percentage of PLWHIV in WCA who are on antiretroviral therapy, the percentage of PLWHIV who are comprehend of their situation, and the percentage of PLWHIV whose viral load has been suppressed. According to UNAIDS, Cape Verde has the highest percentage of PLWHIV who are comprehend of their situation and the status of ART which are respectively 98 percent and 97 percent. Similarly, Burundi has the highest suppressed viral loads, 79 percent. On the other hand, Congo has the lowest percentage of PLWHIV who know their status, which is 36 percent, and has low percentages of ART status, which is 27 percent. In the case of viral suppressed loads, Niger has low percentages, 53 percent.

The Comprehensive Review of Antiretroviral Therapy: A Paradigm Shift

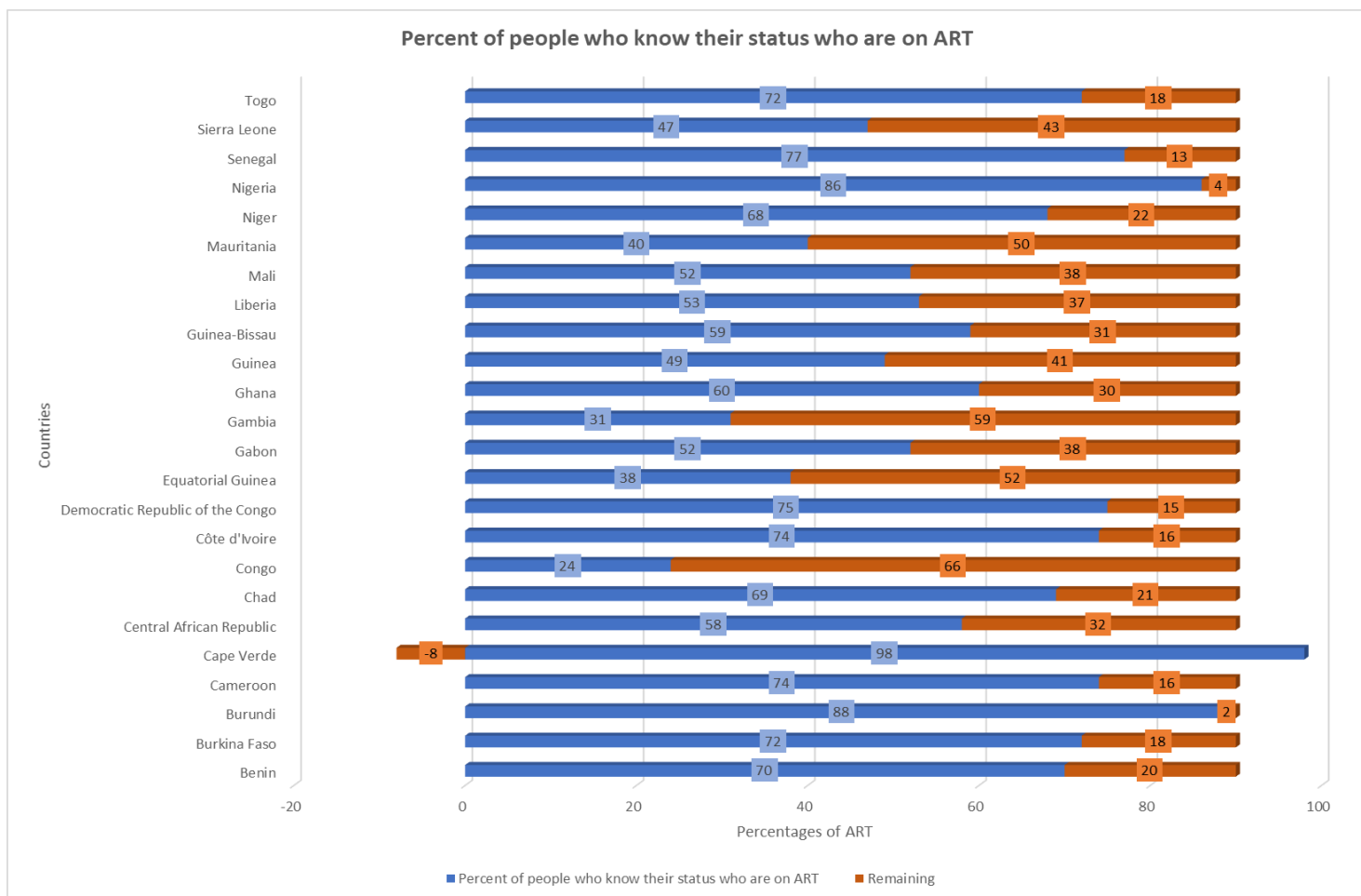


Figure 16 Remaining percentages of PLWHIV who are one ART in WCA

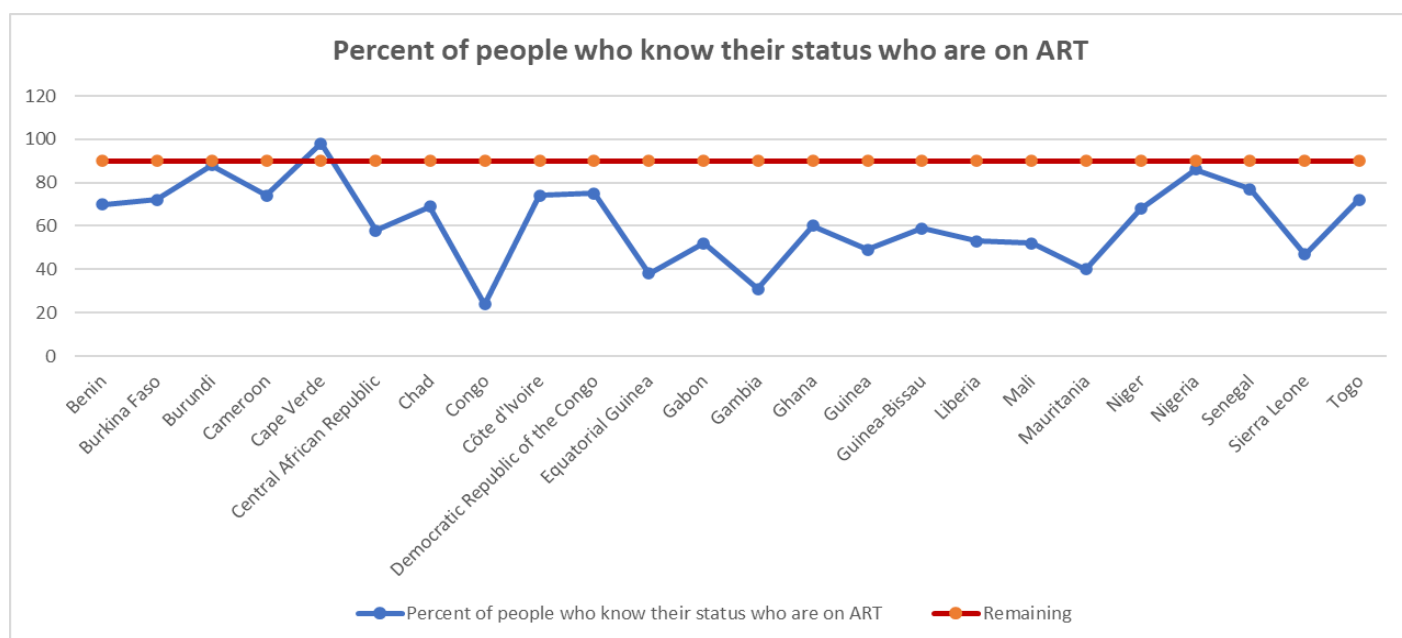


Figure 17 Countries that have crossed 90 percentages goal of ART in WCA

The Comprehensive Review of Antiretroviral Therapy: A Paradigm Shift

It is depicted in two graphs: the percentage of countries still needing treatment and those that have reached or surpassed the 90% mark. As a result, Cape Verde residual values in the first graph are negative (-8)

As we know earlier, the term "negative" describes countries that have met or exceeded 90% of their ART target. Consequently, the lowest percentage of ART situations in Congo is 24 percent, with the remaining 66 percent is needed to fulfill the 90 percent target, which is a staggeringly high rate. When it comes to Cape Verde, it has a percentage four times higher than Congo, which is 98 percent.

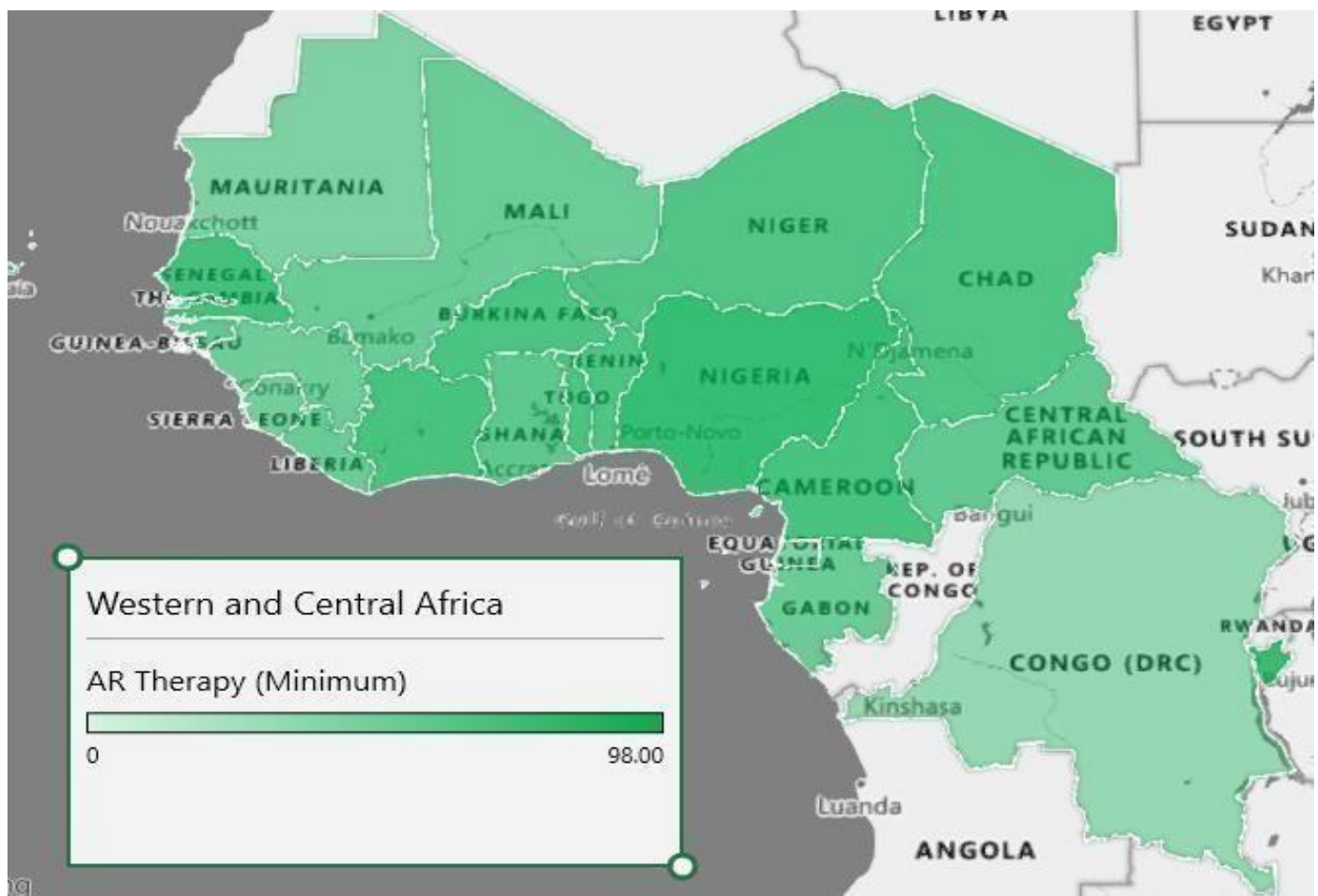


Figure 18 Choropleth map showing ART status across the WCA

This map can depict an antiretroviral therapy situation in Western and Central Africa. Congo has a light green tint on the graph isn't a surprise due to its low ART status and a slight possibility of fulfilling 95 targets. As a result of Cape Verde, Nigeria has a higher ART count and a higher likelihood of achieving its 95 goals; its color tone is more profound.

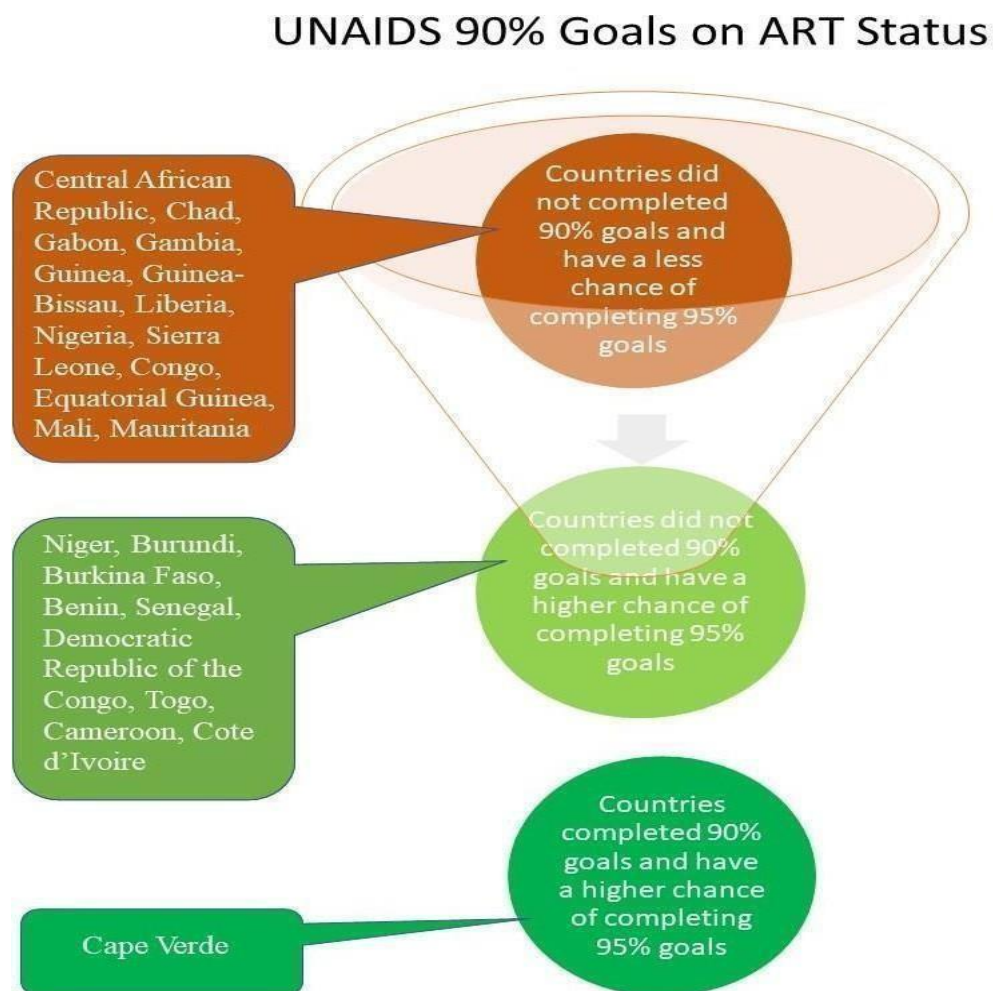


Figure 19 A graphical representation of Western and Central African countries that poses higher, moderate and poor chance to accomplish the UNAIDS 90% goal regarding ART.

2.3 Asia-Pacific Region (APAC)

Asia-Pacific (APAC) refers to the world's region located in or around the Western Pacific Ocean (World population Review n.d.). It contains the world's most populous country, yet several Pacific Island states are among the world's most miniature (The World Bank 2021). As a more significant part of the population proceeds through the economic transition, the components of the illness burden in the Asia-Pacific area are fast changing. A variety of significant global diseases, like influenza, dengue fever, TB, pneumonia, and the newly emerged Hendra and Nipah viruses, are endemic to the region (Infections, Davis, and Lederberg 2001). Although the rising infectious disease concerns in the Asia-Pacific area are as severe as those in other parts of the world, the region's potential for disease outbreak prevention and mitigation is significant, as proven by multiple recent epidemic threats.

HIV/AIDS epidemic now become a significant health and developmental issue in many Asia Pacific countries. Given the presence of risk behaviours and a population that accounts for 60% of the world's population, the threat of epidemic spread is quite significant (World Health Organization. Regional Office for South-East Asia. and World Health Organization. Regional Office for the Western Pacific. 2004). Intervention actions can successfully reduce HIV prevalence when accompanied by high-level political commitment and leadership, as evidenced by regional experiences. The objective is to deliver HIV interventions in populations who have high risk for example sex workers and their clients, injectable drug users, and migrant workers. In the Asia Pacific area, the HIV epidemic is concentrated among critical demographics, such as males who have physical intimacy with men, transgender individuals, drug users, and sex workers (Vu et al. 2018)(AVERT 2020). Despite the region's diversity, new infections in the region are caused by 78% of its population and sexual partners (AVERT 2020). Man who has physical relations with men have the highest rate of

new conditions, Persons who inject drugs account for 13% of the total, sex workers account for 8%, and transgender individuals (3.1 percent) (Avert 2020b).

In 2019, the APAC area was home to an estimated 5.8 million HIV-positive persons (AVERT 2020). India, Indonesia, China more than seventy-five percent of the region's AIDS positive people. Since 2010, prevention programs have reduced new infections by 9%, but late detection remains a significant source of worry (AVERT 2020). Since 2010, sustained and targeted efforts to reach significant populations have resulted in substantial decreases in HIV infections in the country of Cambodia, India, Myanmar, Thailand, and Vietnam. The country like: Bangladesh, Pakistan, the Philippines, and Papua New Guinea, however, new infections are on the rise, while AIDS-related mortality is rising in Bangladesh, Pakistan, the Philippines, and Afghanistan. In terms of HIV response, it is evolving increasingly apparent that the APAC is languishing behind African regions (AVERT 2020). In the year of 2019, 75% of PLWHIV in this region who are comprehend of their situation. 80% of individuals who were informed were receiving treatment, with 91 percent whose viral load has been suppressed (Avert 2020a)(United Nations Programme on HIV/aids. UNAIDS 2021).

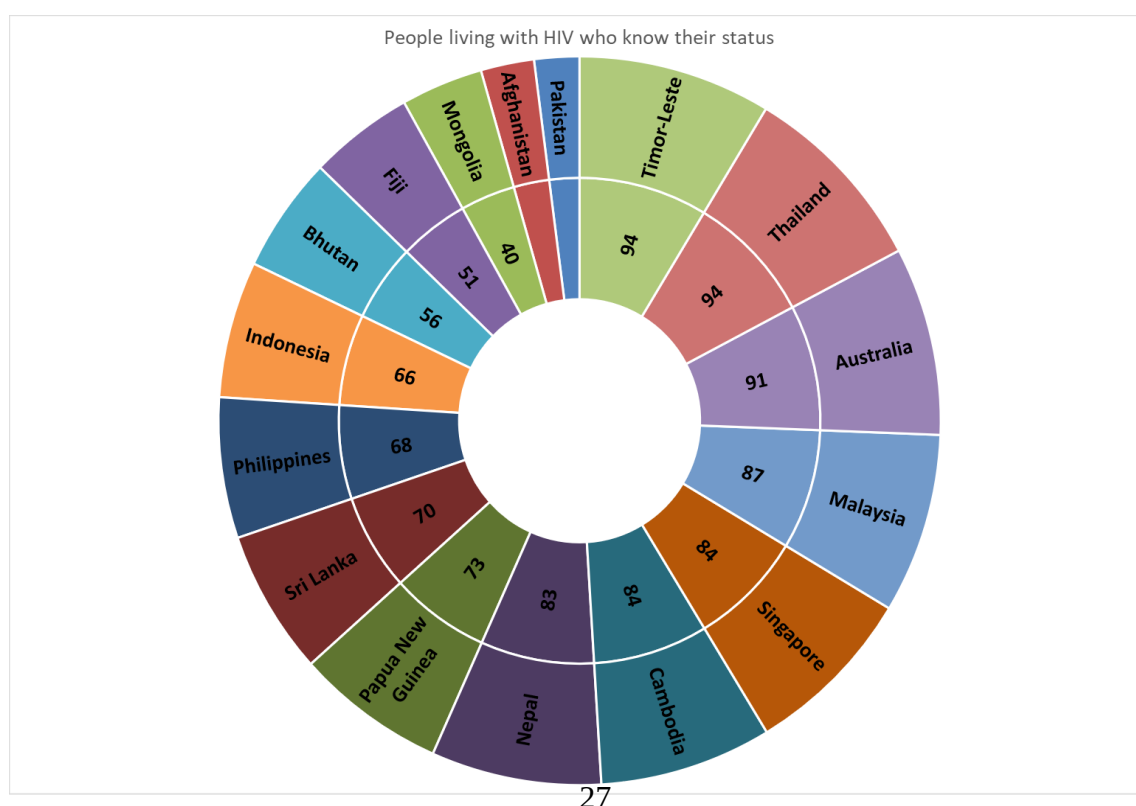


Figure 20 Percentages of PLWHIV who are comprehend of their situation in APAC

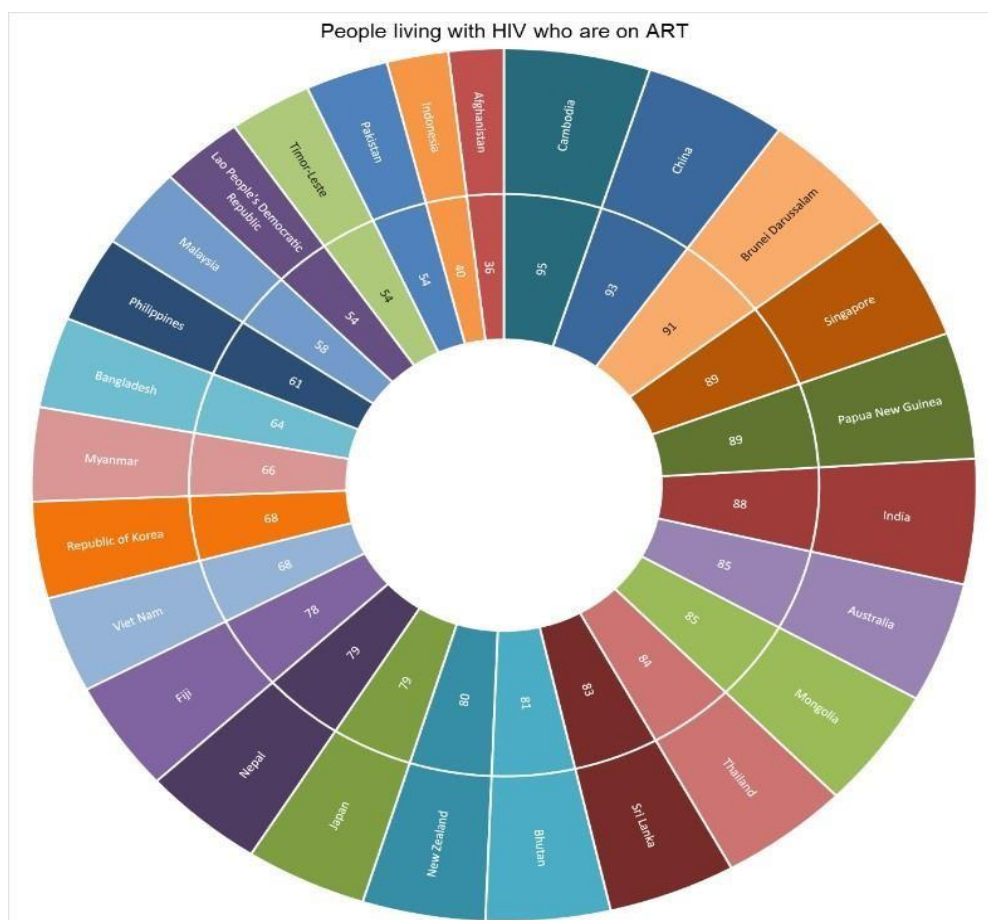


Figure 21 Percentages of PLWHIV who are on ART in APAC

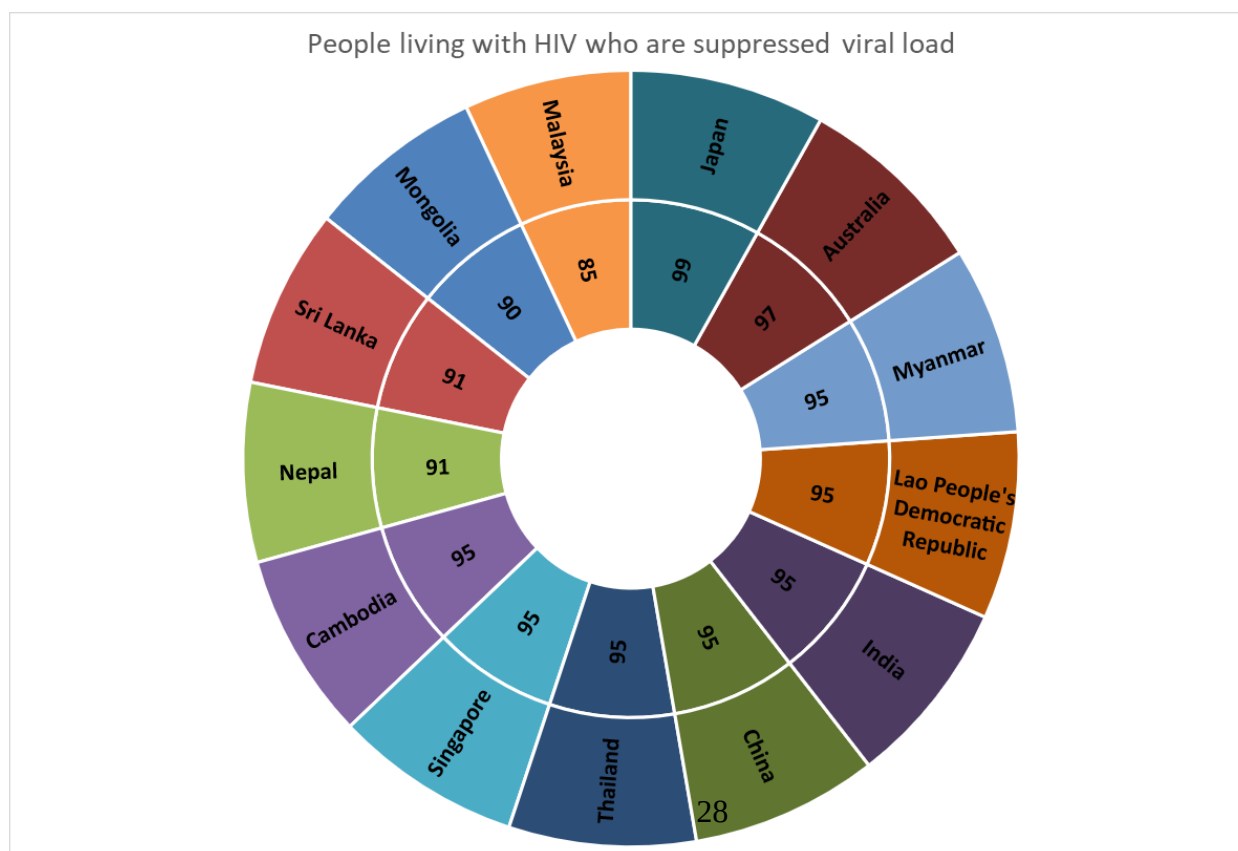


Figure 22 Percentages of PLWHIV whose viral load has been suppressed in APAC

The Comprehensive Review of Antiretroviral Therapy: A Paradigm Shift

From those three graphs, according to UNAIDS, Timor-Leste and Thailand has the greatest percentage of PLWHIV who are comprehend of their situation which is 98 percent. But from this region, Cambodia has the highest percentages in the case of ART status which is 95 percent. Afghanistan, on the other hand, has the lowest percentage of PLWHIV who are comprehend of their situation (36%) and the also has lowest percentages of ART status (27%).

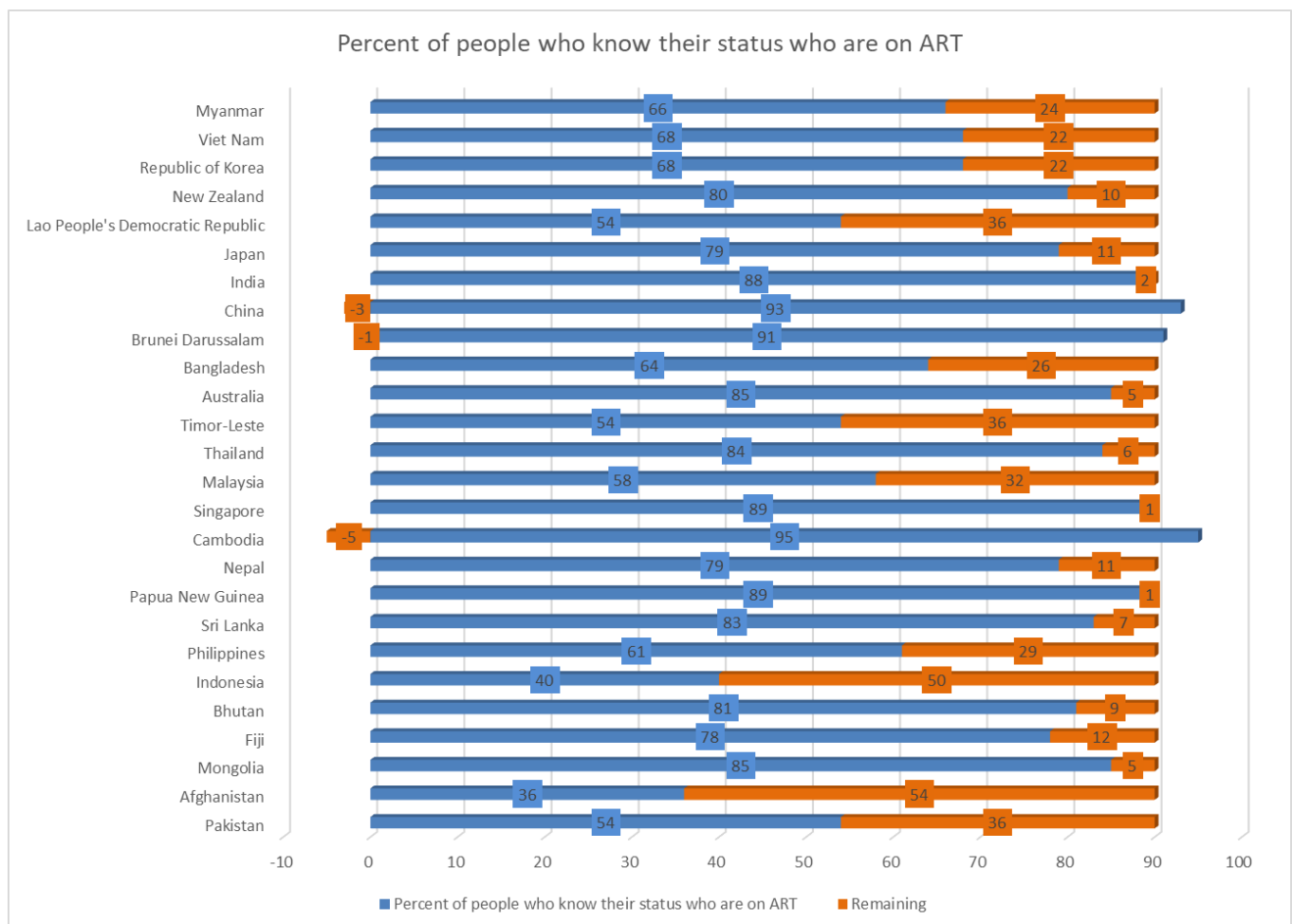


Figure 23 Remaining percentages of PLWHIV who are one ART in APAC

The Comprehensive Review of Antiretroviral Therapy: A Paradigm Shift

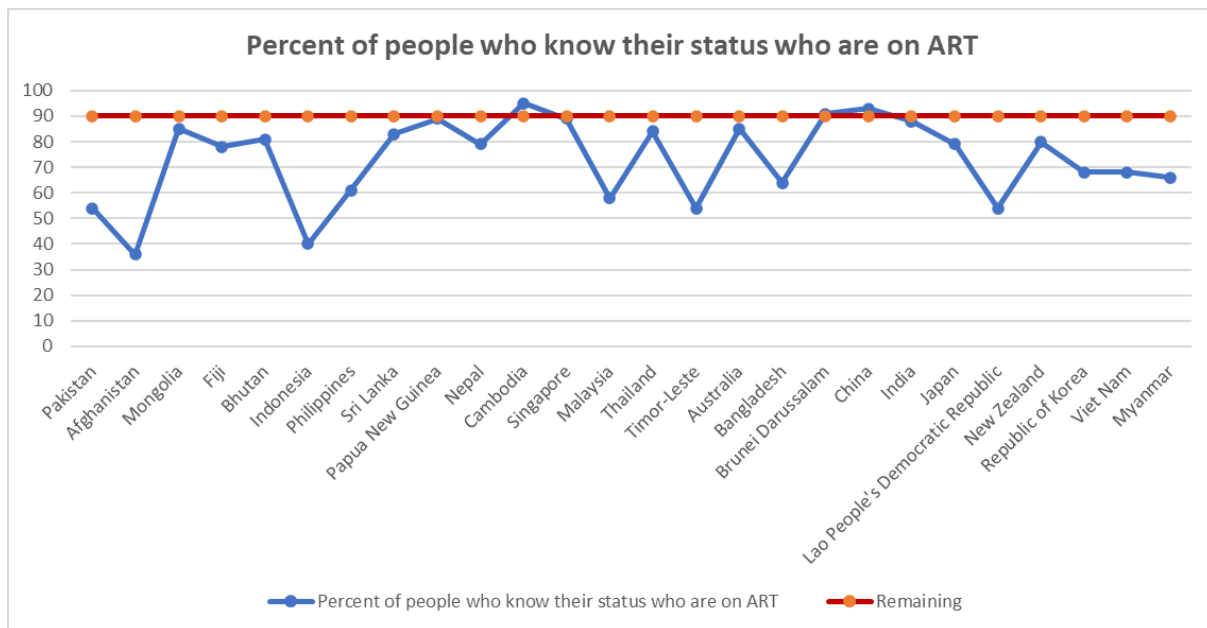


Figure 24 Countries that have crossed 90 percentages goal of ART in APAC

From the first graph we found that, Cambodia, China and Brunei Darussalam residual values in the first graph are negative so that's means those countries have met or exceeded 90% of their ART target. Consequently, the lowest percentage of ART situations in Afghanistan, 36 percent, with the remaining 54 percent needed to fulfill the 90 percent target. When it comes to the Cambodia it has a percentage that is 2.5 times higher than Congo, which is 95 percent.

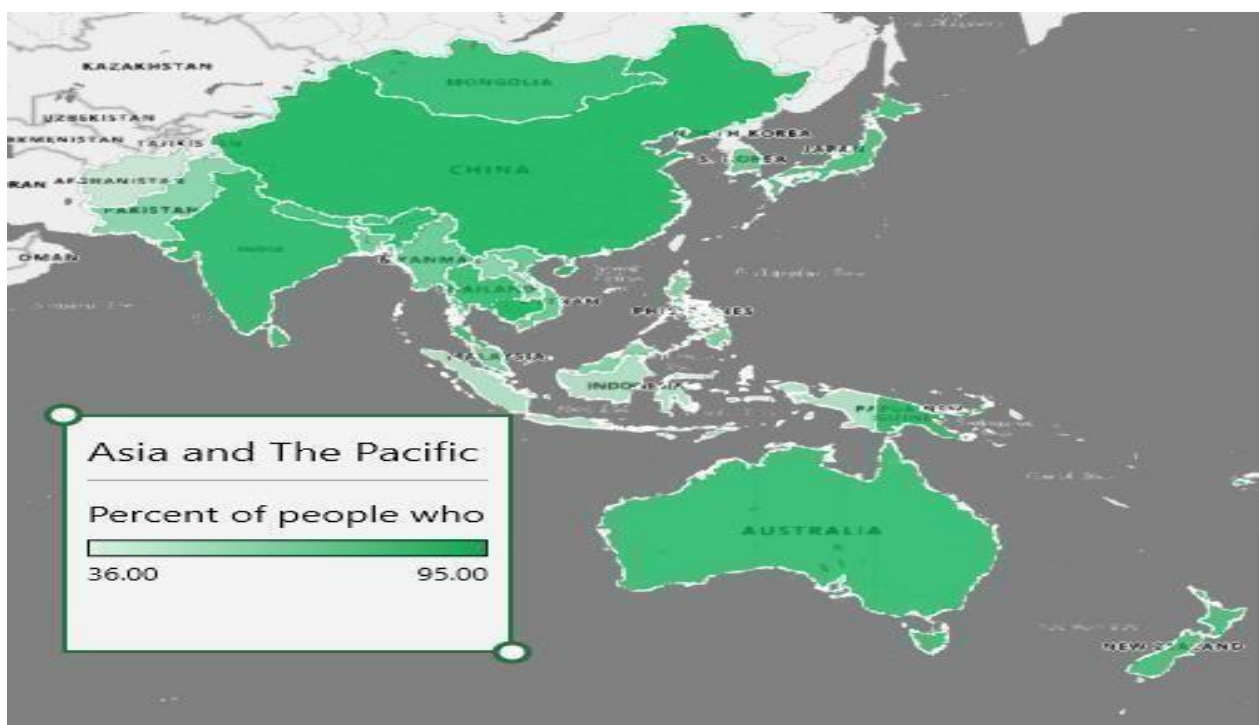


Figure 25 Choropleth map showing ART status across the APAC

The Comprehensive Review of Antiretroviral Therapy: A Paradigm Shift

An antiretroviral therapy situation in Asia and The Pacific can be depicted by this map. Afghanistan, Pakistan has light green tint on the graph isn't a surprise due of its low ART status and little possibility of fulfilling 95 targets. As a result of Cambodia, China, Australia has a higher ART count and higher likelihood of achieving its 95 goals, the country's color tone is more deeper.

UNAIDS 90% Goals on ART Status

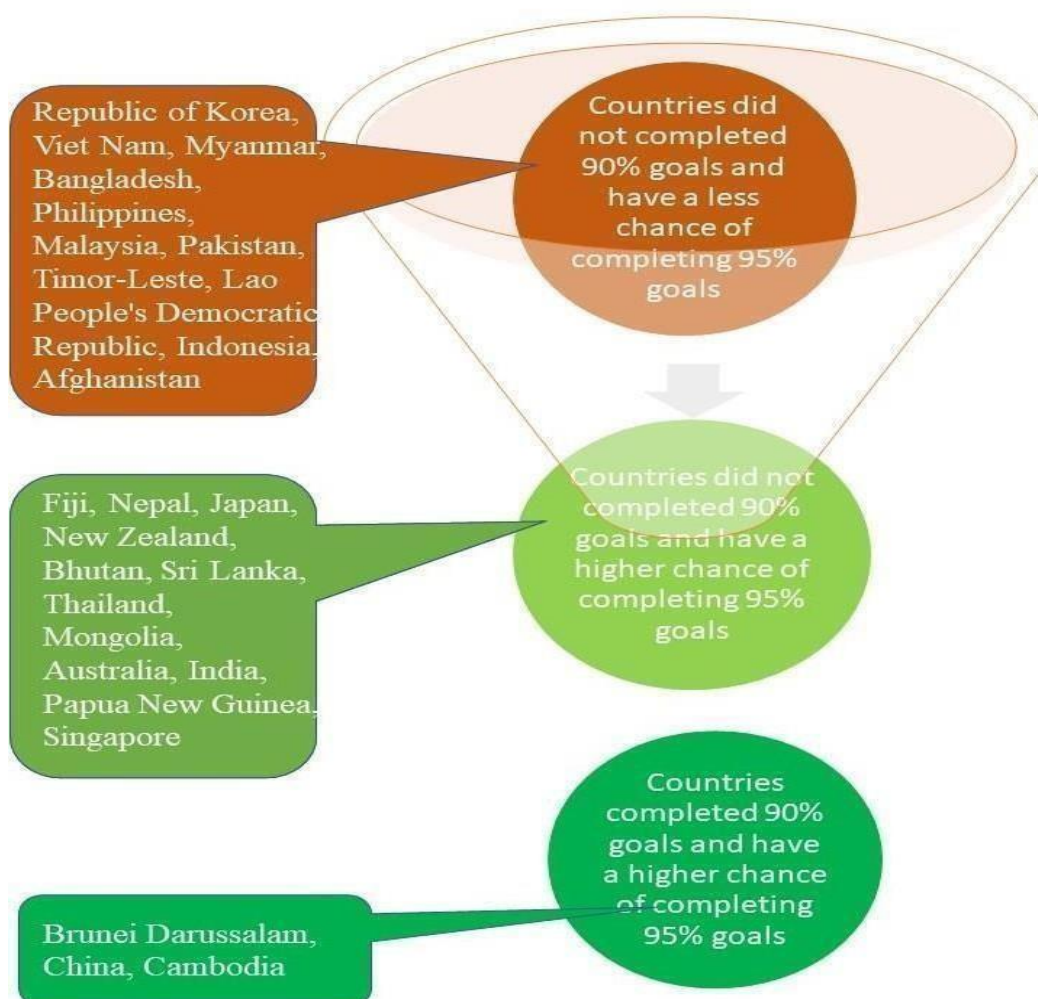


Figure 26 A graphical representation of Asia and the Pacific countries that poses higher, moderate and poor chance to accomplish the UNAIDS 90% goal regarding ART.

2.4 Latin America and The Caribbean (LATC)

A Romance language-speaking region, Latin America, comprises the whole continent of South and Central America (SCA), including the Caribbean islands occupied by people who communicate a Romance language (Posner 2021). Economic globalization, demographic change, and fast-rising healthcare expenses are all converging factors that cut across national boundaries 1. Economic globalization in Latin America has resulted in increasing mobility of people and goods and changes in environmental and occupational health hazards, which frequently occur in political instability (Sultan 2019). It has also resulted in the transmission of health concerns. As a result of climate change, long-term droughts with intermittent and drastic flooding are among the problems Latin America is dealing with (reliefweb 2021). Other issues include drug-related violence and political instability resulting from agrarian downfalls and the marginalization of indigenous individuals in large numbers in some cases. Global burden disease studies have demonstrated a decrease in death rates, as well as an increase in life expectancy and dynamic temporal patterns, over the last few decades. As a result, Latin America has been undergoing an epidemiological transition, marked by a lower prevalence of some infectious and contagious diseases, improved maternal and infant survival rates, and an increase in the frequency of chronic degenerative disorders (Gage 2005). Dengue fever is one of these "neglected infectious diseases" that has caused a significant disease burden in Latin America in the previous decade (Pelayo, García, and Santos-Argumedo 2020).

On the report of UNAIDS, 1,900,000 adults and children throughout LATC lived with HIV in 2018 (Ianniello 1995)(Crabtree-Ramírez et al. 2020), with an overall prevalence of 0.5 percent (Crabtree-Ramírez et al. 2020). The HIV epidemic in Latin America is concentrated among male who have physical relations with other male, transgender, sex workers along with drug users. Since most countries in region had no prior infrastructure for HIV care and

little foreign financial backing, programs for universal access to antiretroviral therapy (ART) were implemented in a short amount of time and with tremendous effort. For many years, Latin America has had a high rate of antiretroviral treatment (ART) coverage and a low rate of AIDS-related mortality. Despite this, the rate of new infections has only decreased by 1% between 2007 and 2017, and new infections among young people in essential populations are on the rise, despite recent success. However, AIDS-related mortality has fallen by 12 percent over the same time span (Avila-Rios et al. 2016)(Avert 2020d).

In LATC, 77 percent of PLWHIV who are comprehend of their situation in 2019, 78% of those in the know had access to ART, 88% of individuals whose viral load has been suppressed (Avert 2020d)



Figure 27 Percentages of PLWHIV who are comprehend of their situation in LATC

The Comprehensive Review of Antiretroviral Therapy: A Paradigm Shift

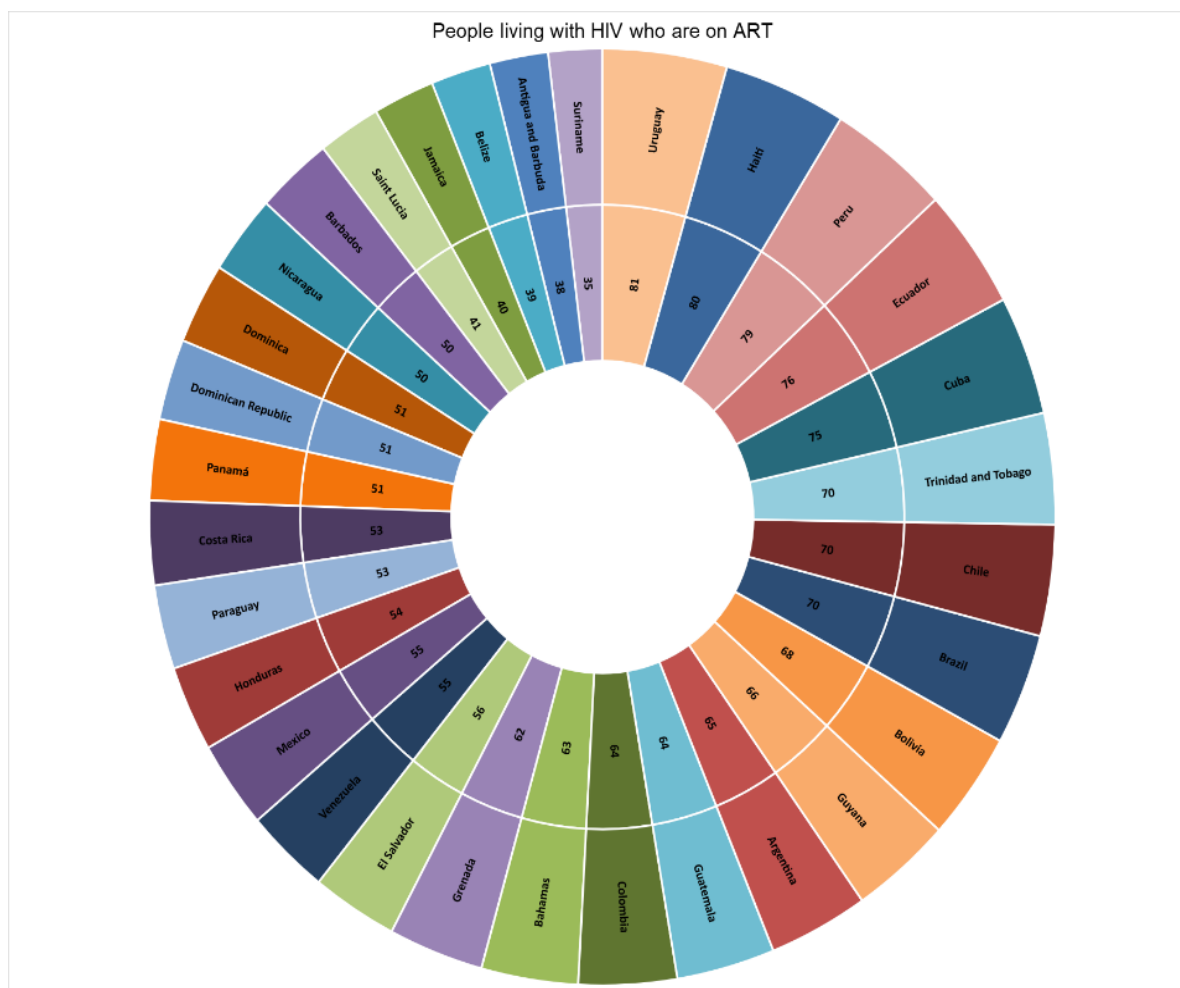


Figure 28 Percentages of PLWHIV who are on ART in LATC

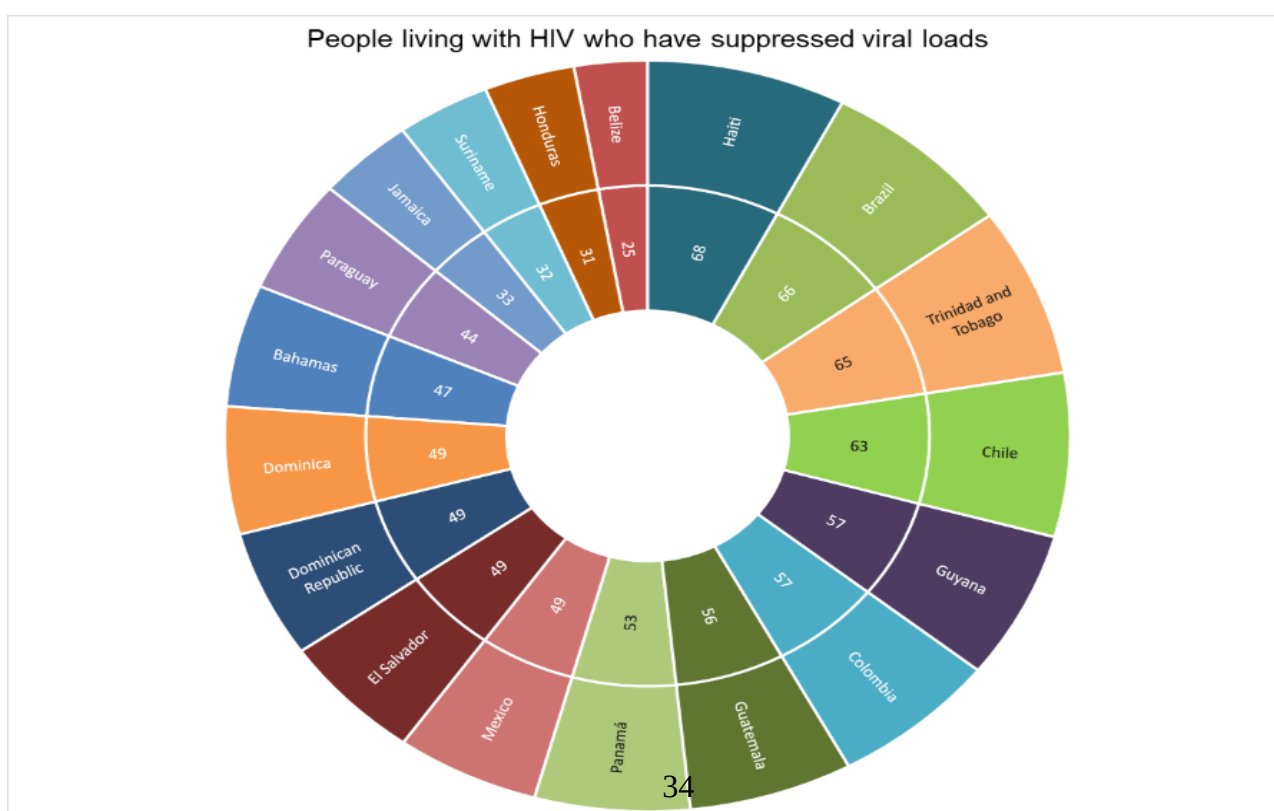


Figure 29 Percentages of PLWHIV whose viral load has been suppressed in LATC

The Comprehensive Review of Antiretroviral Therapy: A Paradigm Shift

From these three graphs, According to UNAIDS, Peru has the most significant percentage of people living with HIV who know their status, which is 98 percent. But in this region, Uruguay has the highest percentages in the case of ART status, which is 81 percent. On the other hand, Suriname has the lowest percentage of PLWHIV who know their status (50%), and Antigua and Barbuda have the most subordinate ART status (38%).

Percent of people who know their status who are on ART

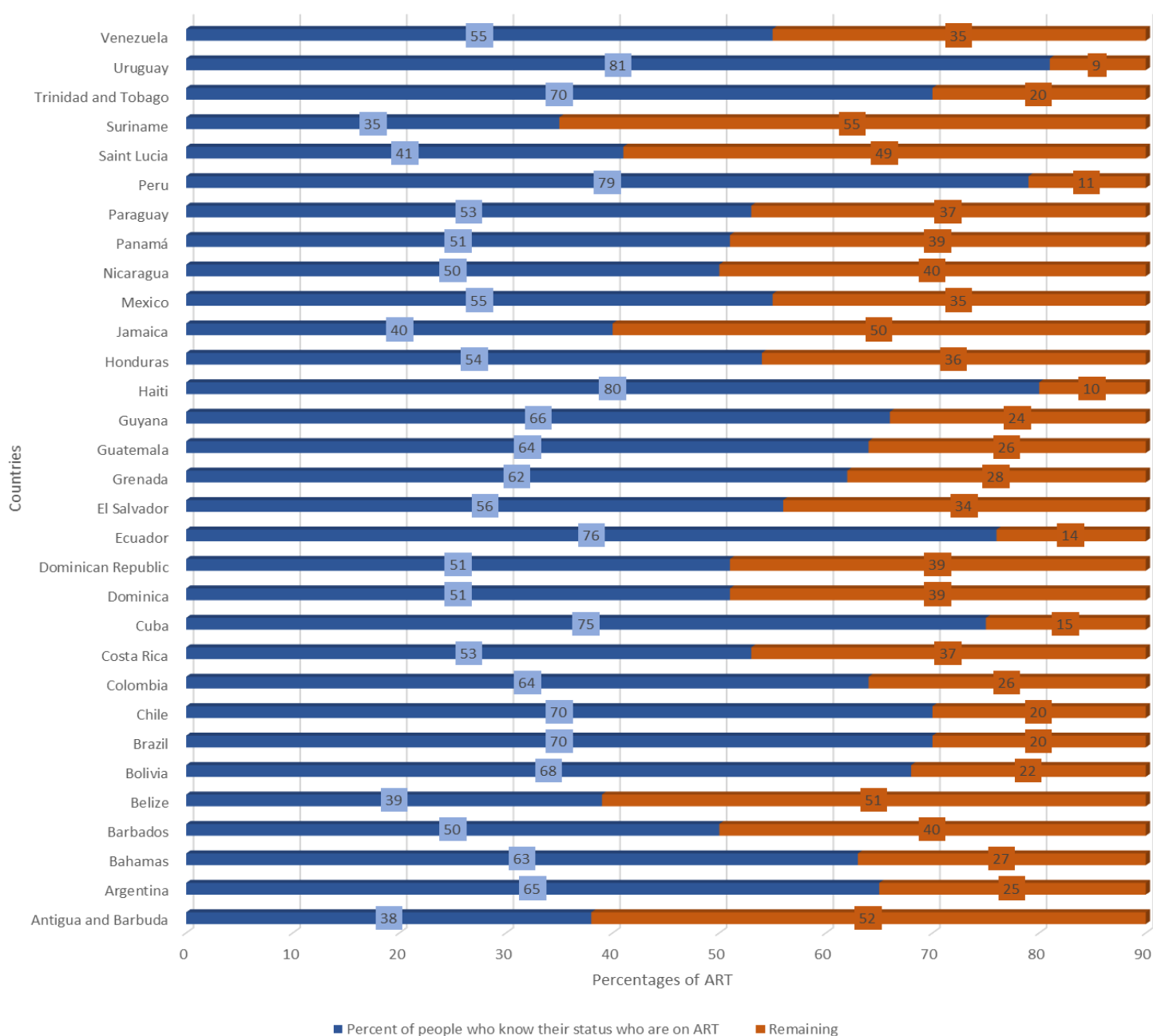


Figure 30 Remaining percentages of PLWHIV who are one ART in LATC

The Comprehensive Review of Antiretroviral Therapy: A Paradigm Shift

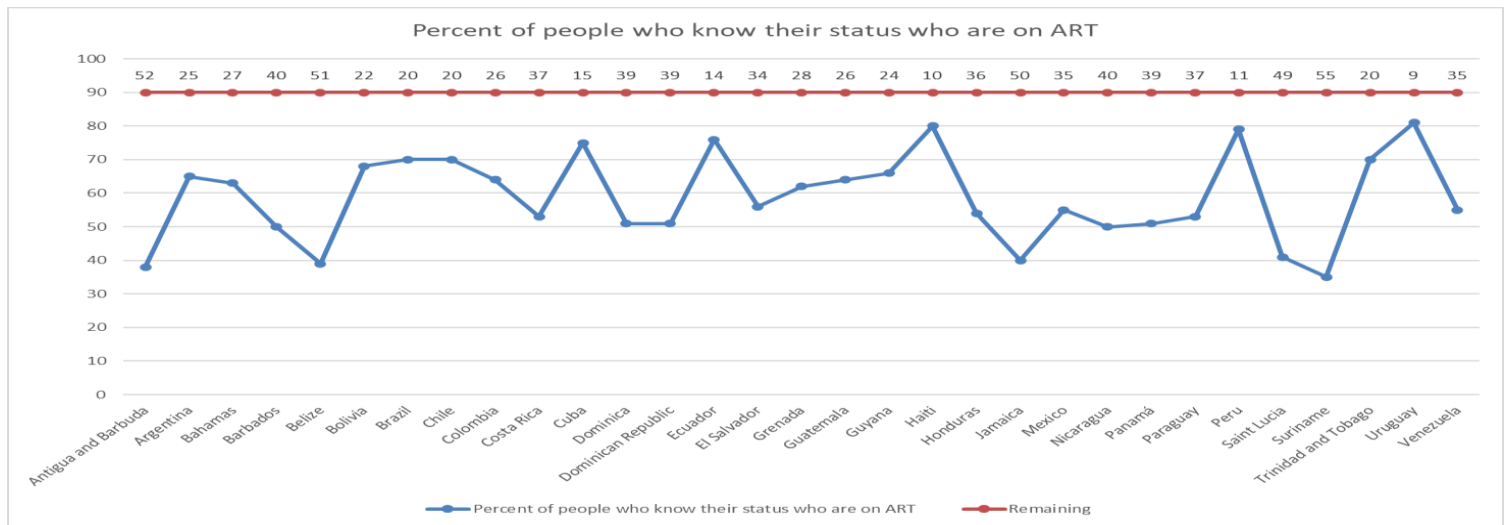


Figure 31 Countries that have crossed 90 percentages goal of ART in LATC

The ART condition in this region is relatively poor. The fact that no country can pass the 90-point line has already been demonstrated in Graph 2. Uruguay has the most significant percentage of this region, with only 81 percent. Suriname has the lowest percentage of people



Figure 32 Choropleth map showing ART status across the LATC

living with ART in this region, which is twice as low as Uruguay (35%).

ART status in LATC is shown on this map. Due to Paraguay and Suriname poor ART status and low chances of attaining 95 goals, it represents in the graph with a light green color. It is more likely to achieve its 95 objectives in Uruguay ART's increased prominence, and for this reason, it has a resounding color theme.

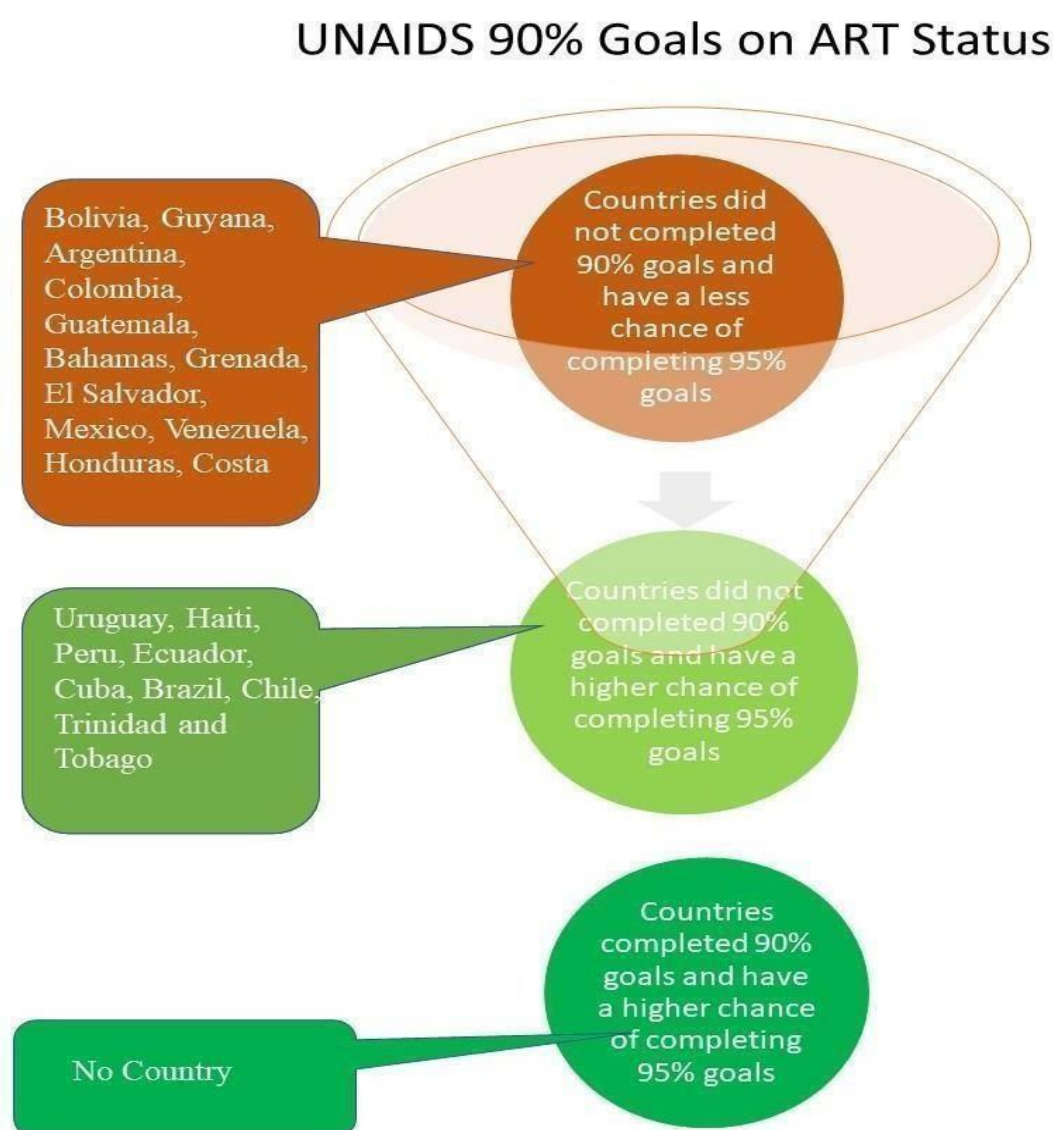


Figure 33 A graphical representation of Latin America and the Caribbean countries that poses higher, moderate and poor chance to accomplish the UNAIDS 90% goal regarding ART.

2.5 The Middle East and North Africa (MENA)

The Middle East is comprised of the territories surrounding the Mediterranean Ocean southern and eastern borders, including at the very least the Arabian Peninsula or, by specific estimates, Iran, North Africa, and occasionally further afield, and it includes the countries of the Arab world (T. E. of E. Britannica 2021.). The region usually consists of roughly 19 countries, but it can be expanded to include up to 24 (Chen 2021). On the report of WorldAtlas, the MENA is place of about 6% of the global citizen (World Atlas 2019). A diverse range of civilizations, histories, and socioeconomic circumstances may be found throughout the Middle East and North Africa. As a result, their health condition, administration, and access to proper health care vary. No communicable diseases are the leading cause of death worldwide, with non-communicable diseases accounting for 74% of all fatalities in the Middle East and North Africa (Kaneda and El-Saharty 2017). The probability of dying prematurely from four major noncommunicable illnesses is 19% in the MENA, compared to 12 percent in higher-income countries worldwide (Kaneda and El-Saharty 2017). These deaths occur at the pinnacle of an individual's economic production, putting a strain on families and health systems and threatening economic growth and progress. Women in the MENA have the most significant percentage of metabolic disorders worldwide, although men in the MENA come second across all men (Azizi et al. 2019). More than 300 mortality per 100,000 persons in this region are caused by metabolic risk factors, as opposed to the worldwide average of less than 250 (Azizi et al. 2019). Biological inertness, particularly among female, along with poor nutriment are notable. In several countries, the programs of deterrence have not been adequately implemented, bleak outlook. Monitoring and surveillance of multisectoral approaches that support primary and prior deterrence and continuing schooling for healthcare providers are urgently needed to enhance the healthiness rate of citizens in the MENA.

The Comprehensive Review of Antiretroviral Therapy: A Paradigm Shift

Over the last decade, the 2020 info has highlighted the globe's comprehensive improvement in facilitating new HIV infections. However, this success is not shared by everybody. In 2019, 20,000 new cases were reported in the MENA, minuscule number compared to other regions but a 22 percent increase since 2010 (Al-Ghazawy 2020). In this region, the most common transmission routes differ from country to country. HIV transmission is substantially more common among persons who inject drugs. In some nations, like Djibouti and portions of Somalia, sex work is the primary source of HIV infection. With 240,000 persons living with HIV in 2019, the MENA area has the world's most subordinate HIV prevalence (smaller than 0.1 percent) (Avert 2020e).

Contrary to popular belief, the prevalence of AIDS in Sub-Saharan Africa is the most elevated of any region (6.8 percent) (Avert 2020e)(UNAIDS 2021). Notwithstanding its low incidence, the MENA region is becoming a burgeoning source of worry. In 2019, over 8,000 individuals perished as a result of an AIDS related illness (UNAIDS 2018). This is due to limited availability to antiretroviral therapy (ART), with only 38% of individuals who require it having it — significantly below the global average of 59 percent (UNAIDS 2018). Overall, the region is falling short of the 2020 Fast-Track Goals:

- In 2020, only 52% PLWHIV was conscious of their HIV status.
- 73% were on therapy.
- 83% of those living with HIV were virally suppressed.

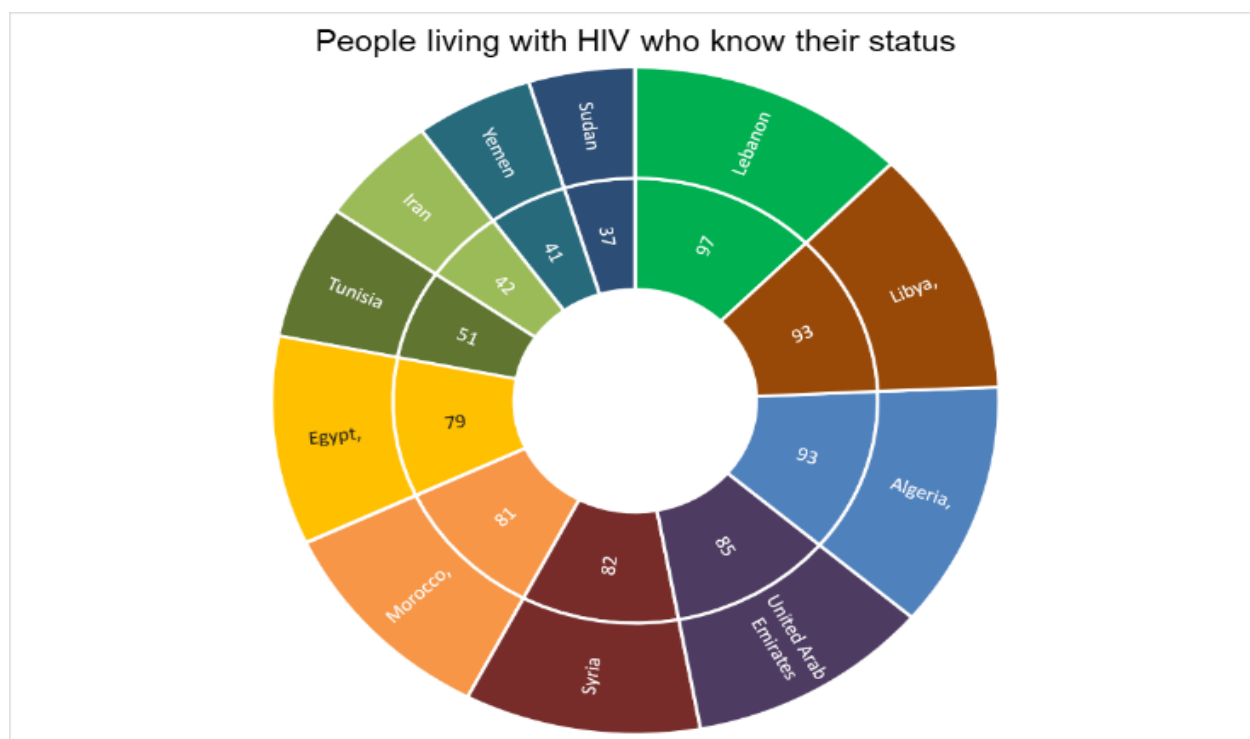


Figure 34 Percentages of PLWHIV who are comprehend of their situation in MENA

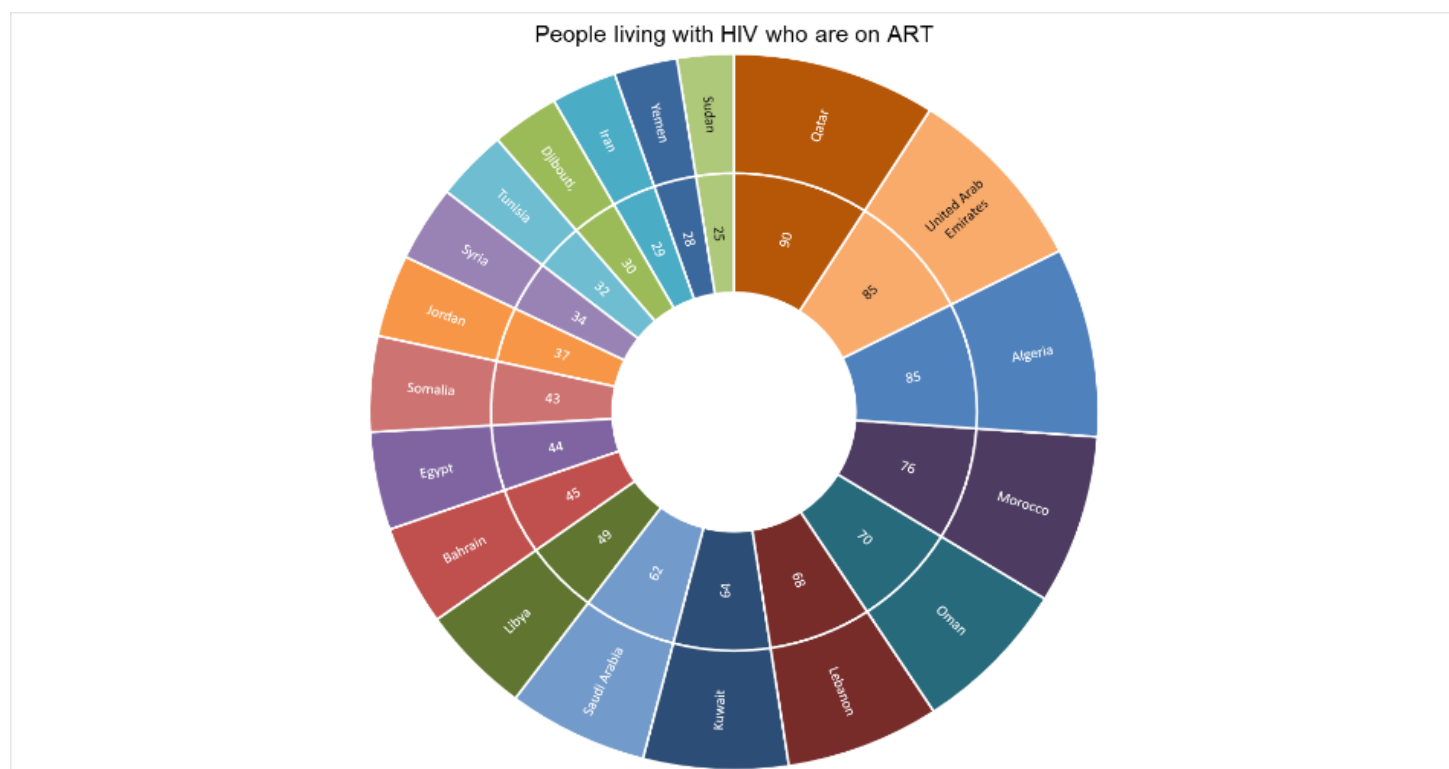


Figure 35 Percentages of PLWHIV who are on ART in MENA

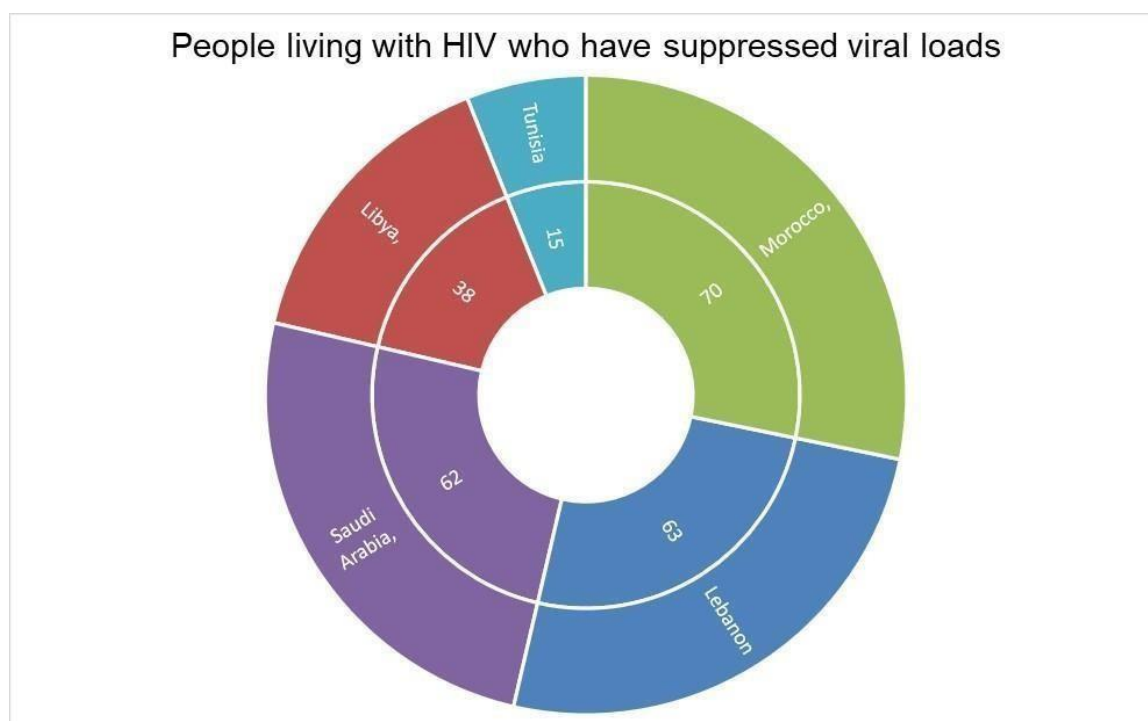


Figure 36 Percentages of PLWHIV whose viral load has been suppressed in MENA

According to the United Nations, from these three figures, Lebanon has the most elevated number of PLWHIV who are knowing status 98%). Nonetheless Qatar have the most significant percentage of people taking antiretroviral therapy in this region (90%). Contrary to these findings, Sudan has the lowest percentage of PLWHIV who are conscious of their condition (37%) as well as have the most subservient ART status (25%).

The most significant percentages of suppressed viral loads are seen in Morocco (70%), whereas the lowest percentages are found in Tunisia (15%)

The Comprehensive Review of Antiretroviral Therapy: A Paradigm

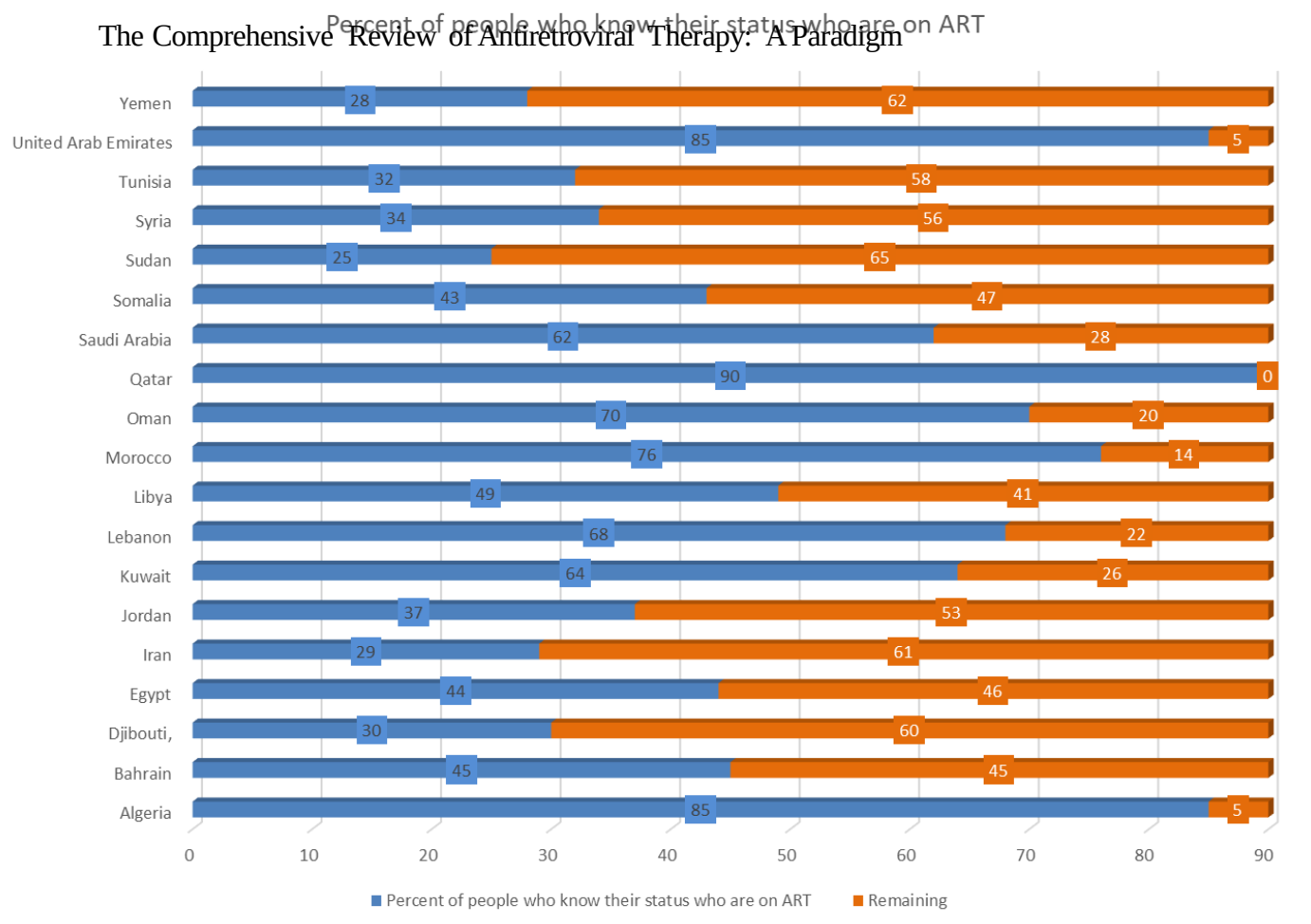


Figure 37 Remaining percentages of PLWHIV who are one ART in MENA

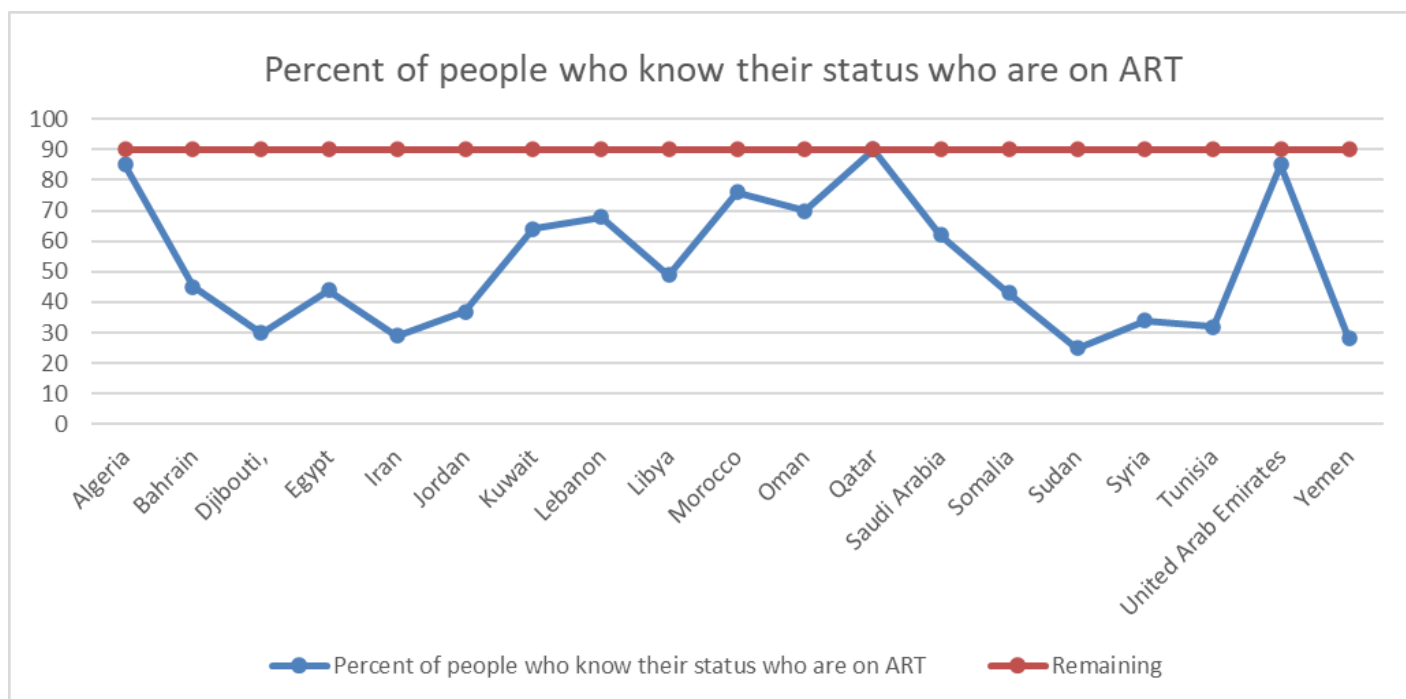


Figure 38 Countries that have crossed 90 percentages goal of ART in MENA

The Comprehensive Review of Antiretroviral Therapy: A Paradigm Shift

Only Qatar has achieved 90 percent of the ART status, as seen by the two graphs. Contrastingly Sudan has the lowest percentage of ART status, 25 percent, with the remaining 65 percent needed to meet the 90 percent target.

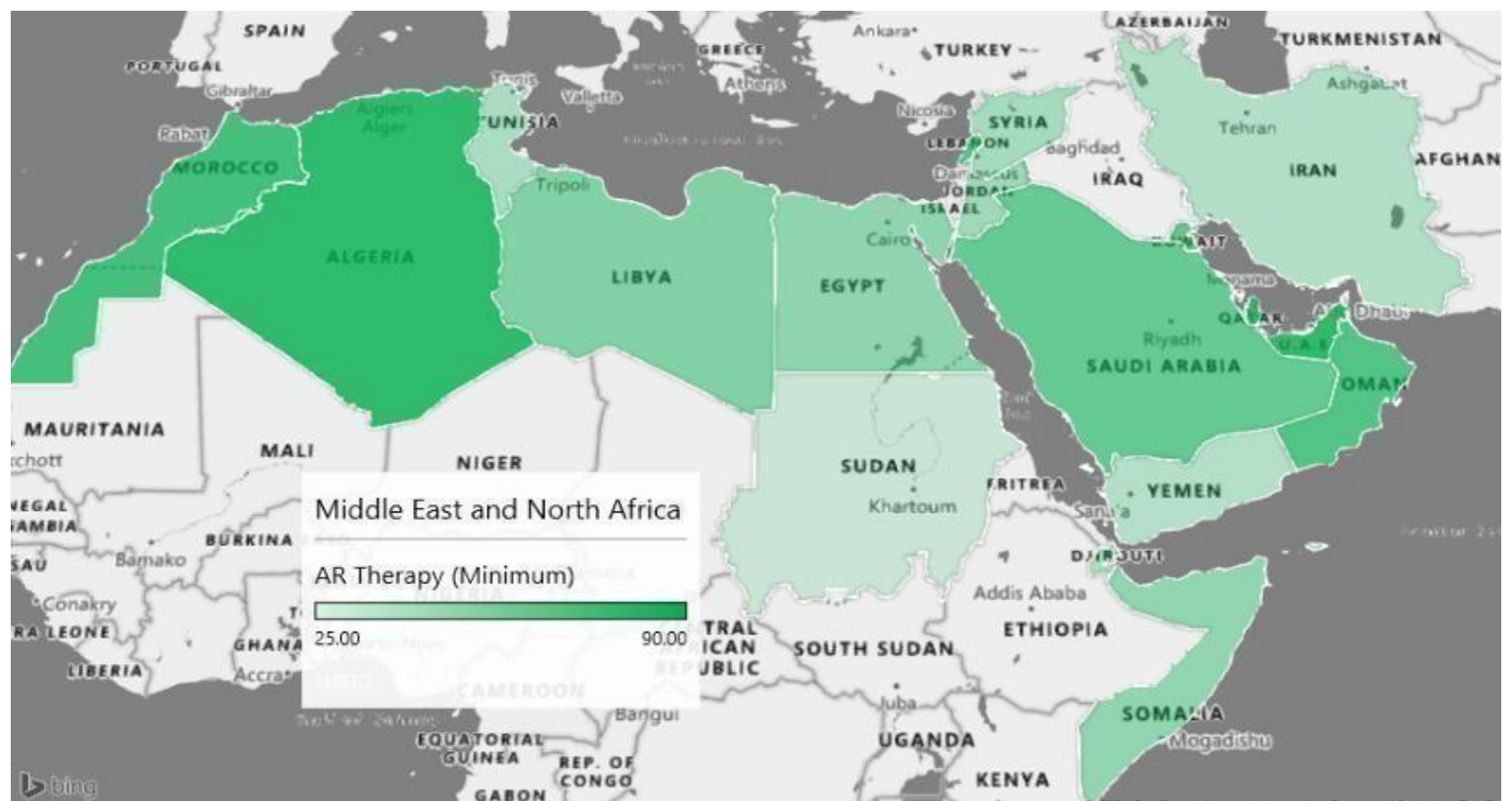


Figure 39 Choropleth map showing ART status across the MENA

This map depicts the status in Middle East and North Africa concerning antiretroviral therapy. As expected, the graph shows Sudan and Iran with a slight green tinge due to their poor ART status and minimal chance of achieving 95 goals. In light of Qatar, UAE, Algeria ART count is more prominent, and its color tone is deeper, increasing its likelihood of accomplishing its 95 goals.

UNAIDS 90% Goals on ART Status

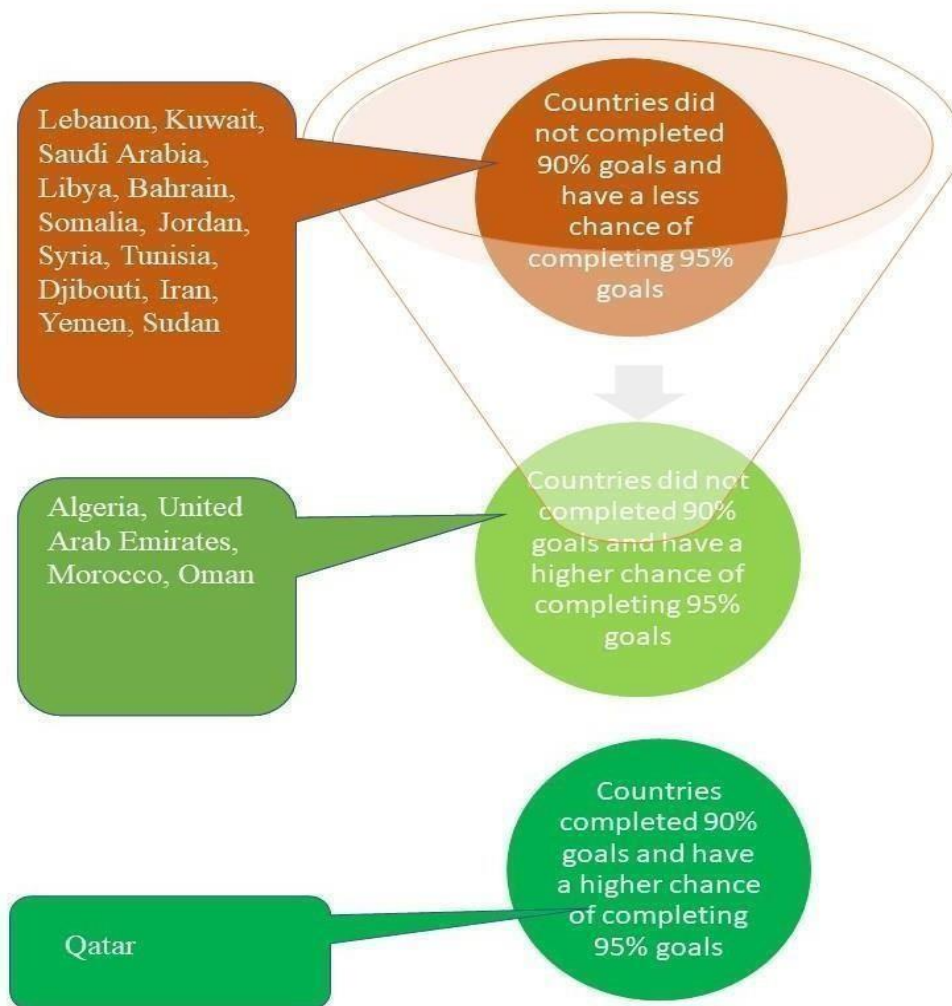


Figure 40 A graphical representation of Middle East and North Africa countries that poses higher, moderate and poor chance to accomplish the UNAIDS 90% goal regarding ART.

2.6 Eastern Europe and Central Asia (EECA)

IUCN Statutory Region of EECA contains 18 nations. EECA region's entire landmass accounts for nearly 15% of the world's surface, and its population is estimated to be 303 million people or 4.17 percent of the worldwide population (Ecaro n.d.). Since 2010, the HIV epidemic in EECA has increased by 30%, owing to a lack of political will and domestic investment in national AIDS programs in much of the region (Aidspace 2018). Developments heavily influence regional trends in the Russian Federation, residence to 70% of the region's AIDS positive persons (Avert 2020c). The rate of new HIV infections is steady outside of the Russian Federation. In the Russian Federation, efforts to prevent HIV infections among those who inject drugs are stymied by a lack of sterile injecting equipment and opioid replacement therapy.

There is mounting evidence that HIV infection is declining in general populations around the world. Furthermore, whereas death rates in other countries have decreased, death rates in Eastern Europe and Central Asia have increased 2.5 times between 2001 and 2012. This region is among the few areas in the world where the rate of HIV infection is continuing to rise. From 2004 to 2011, the rate of HIV infection per 100,000 people in Eastern Europe has climbed from 11.7 to 22.5 (DeHovitz, Uuskula, and El-Bassel 2014). Heterosexual transmission, which was sparked by injectable drugs, has become a significant source of new infections in the region.

Nonetheless, substance abuse is a significant factor, with scaling up harm reduction programs posing a barrier. Even though most countries have developed opioid replacement therapy programs, their scope is still quite limited. Similarly, needle syringe program coverage varies across the region. The HIV epidemic has disproportionately affected people who inject drugs. Harm reduction service coverage continues to be limited, and where it does exist, the services provided are frequently insufficient. AIDS correlated mortality increased by 32% between

2010 to 2020. In total, 70% of PLWHIV are comprehend of their situation, 63% were on ARV medication, and 93% whose viral load has been suppressed (Avert 2020c). At 63%, antiretroviral therapy coverage is still significantly below the global norm. The number of new infections continues to outnumber the number of people who are enrolled in ART. The main gaps in the region's treatment efforts are diagnosing PLWHIV and connecting them to medication including supervision (DeHovitz et al. 2014).



Figure 41 Percentages of PLWHIV who are comprehend of their situation in EECA

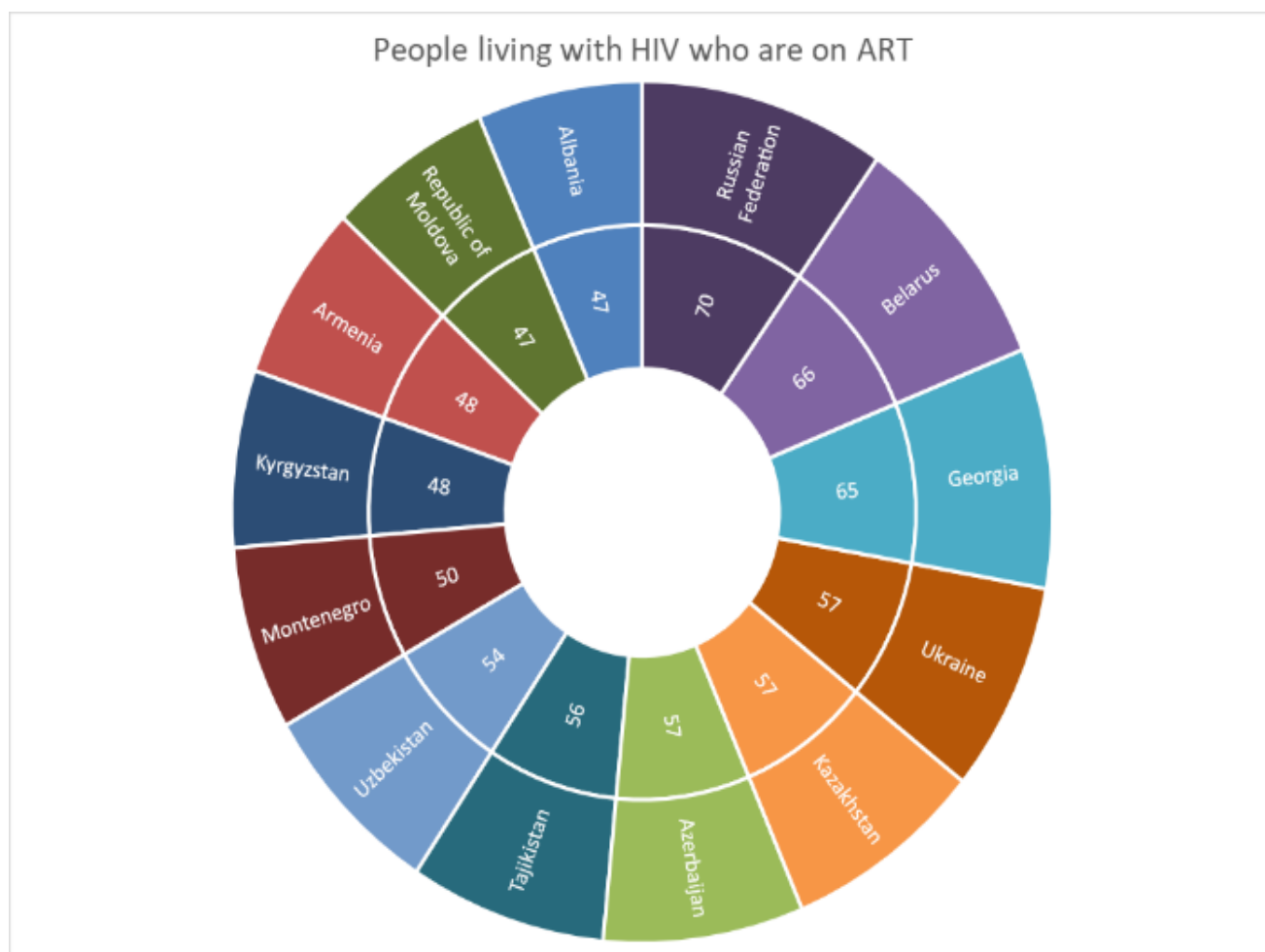


Figure 42 Percentages of PLWHIV who are on ART in EECA

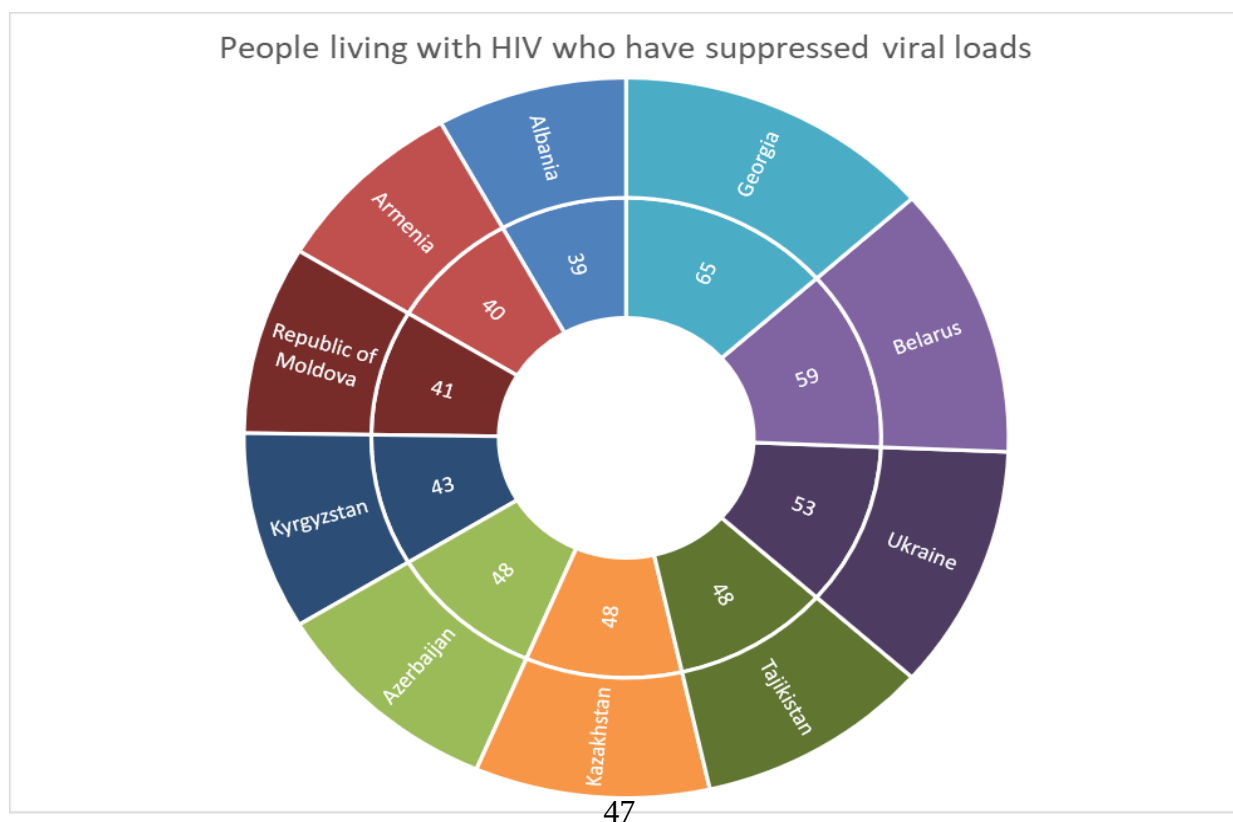


Figure 43 Percentages of PLWHIV whose viral load has been suppressed in EECA

The Comprehensive Review of Antiretroviral Therapy: A Paradigm Shift

According to the United Nations, these three data indicate that Belarus has the highest percentages of PLWHIV comprehend of their situation (81%). Despite this, the most significant percentage of individuals in EECA are receiving ARV medication in Russian Federation (70%). On the other hand, Tajikistan has the lowest percentage of PLWHIV (66%) comprehend of their situation. In contrast, Albania along with Moldova have the lowest adherence level to ART of any country (47%).

The highest percentages of suppressed viral loads are seen in Georgia (65%), while the lowest percentages are found in Albania (39%)

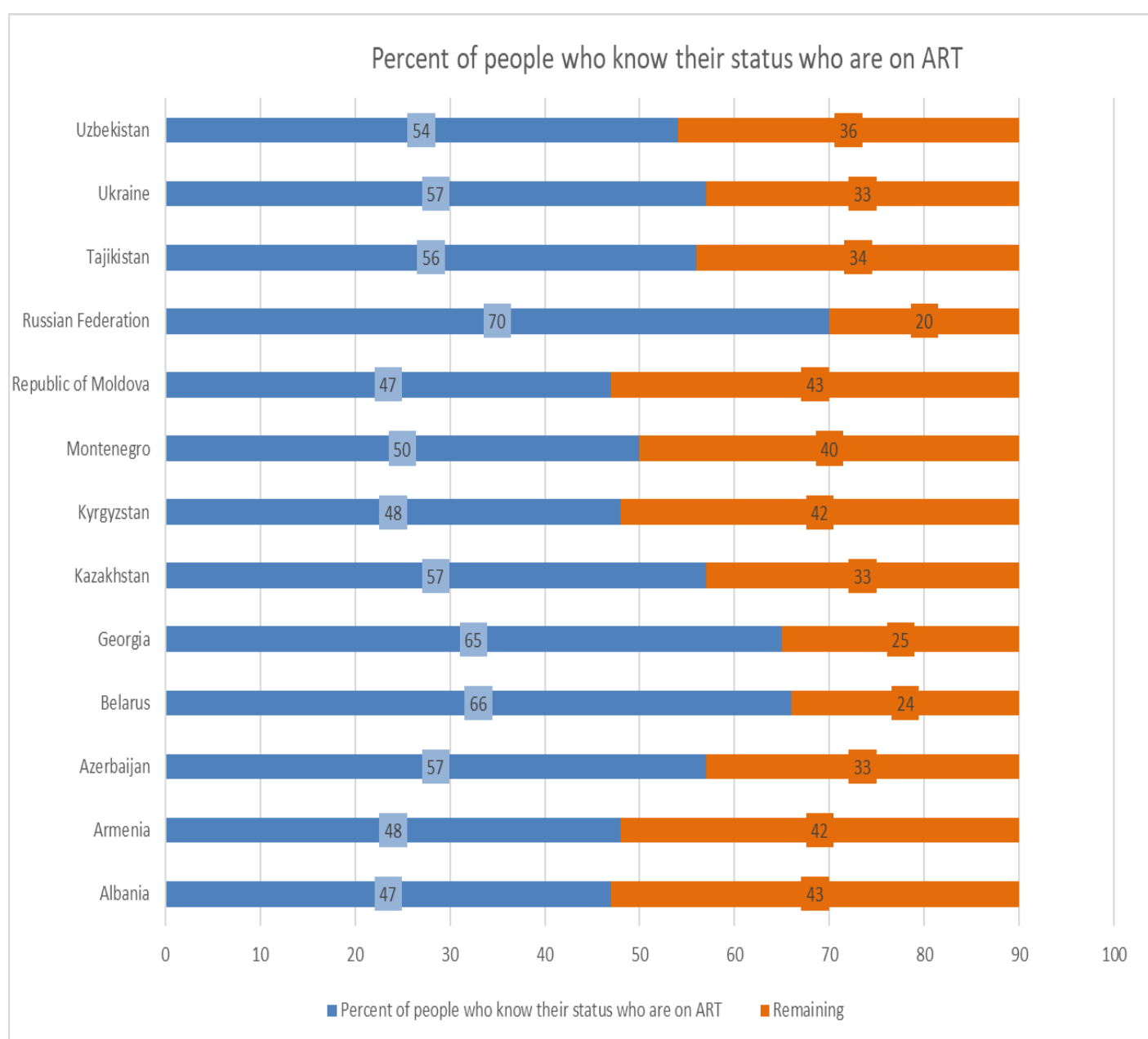


Figure 44 Remaining percentages of PLWHIV who are on ART in EECA

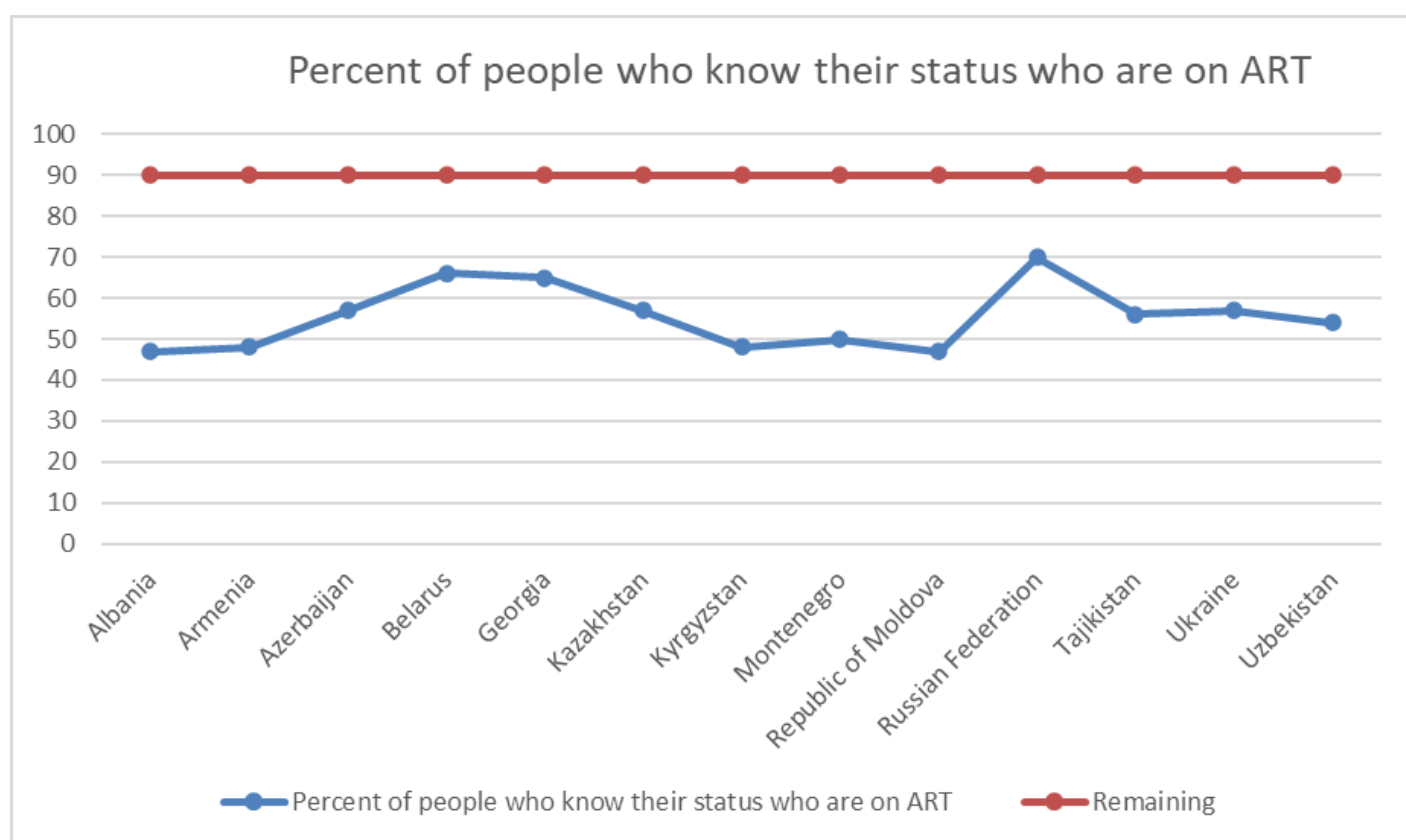


Figure 45 Countries that have crossed 90 percentages goal of ART in EECA

Since no country in this region has passed the 90-point line, the ART condition in this region is the same as the Latin and Caribbean region, which has already been demonstrated in Graph 2. Surprisingly only 70 percent of this region's people are on ART in Russian Federation, ART use in Moldova and Albania is the lowest in this region (47%)



Figure 46 Choropleth map showing ART status across the EECA

This map depicts the distribution of antiretroviral therapy in EECA. The country (Moldova along with Albania) is shown in light green on the graph because they have poor ART status and low probability of achieving the 95 targets. However, Russian Federation ART's increased prominence has made it more likely to meet its 95 goals, thus it has a strong color motif.

UNAIDS 90% Goals on ART Status

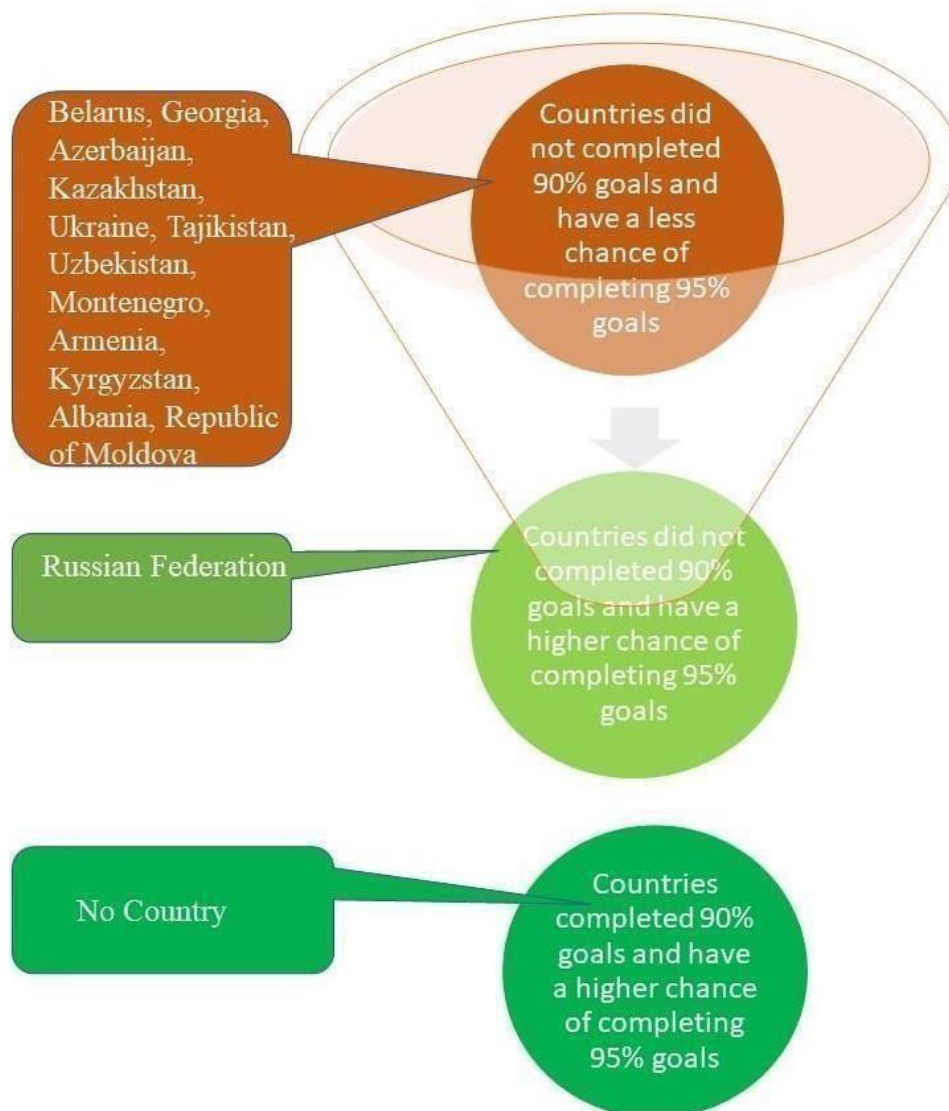


Figure 47 A graphical representation of Eastern Europe and Central Asia countries that poses higher, moderate and poor chance to accomplish the UNAIDS 90% goal regarding ART

2.7 Western and Central Europe and North America (WCENA)

Concerning geographical location, Western Europe refers to that region of Europe that is the furthest away from Asia, with the countries and territories included differing depending on the context (East 2022)

This region met the UNAIDS objectives and sustained falls in annual HIV infections and deaths signal that most of the region's epidemics are under control (UNAIDS 2021). These regional averages, on the other hand, hide disparities between and within countries. For example, 34.5 percent of people living with HIV infection (aged 13 and up) were not virally suppressed in the USA (UNAIDS 2021). In this region, an estimated 2.2 million people were predicted to be living with HIV in 2020 (Avert 2020f). Annual new HIV infections reached a record of 82,000 in 2008, but have decreased by 12 percent to 2018 from the beginning of the decade. In the USA, more than half of all new HIV infections occurred, with more than a quarter occurring in six countries: France, Germany, Italy, Spain, Turkey, and the UK (ONUSIDA 2017)(Avert 2020f). Those who inject drugs account for nine out of 10 new infections among crucial impacted populations and their sexual partners (Anon 1993)(Avert 2020f). In this region, most of the countries prevalence levels are low because of the high proportion of people on ART. Current scenario of the HIV epidemic in WCE, as well as North America, demonstrates what can be accomplished when sufficient resources and robust health systems combine HIV prevention techniques such as antiretroviral medication and harm reduction. The demographics most impacted by HIV vary by country (Anon 1993)(Avert 2020f). Most HIV transmission in the three Baltic countries (Estonia, Latvia, and Lithuania) happens through injecting drug use and heterosexual intercourse, including sex work (Avert 2020f) (ONUSIDA 2017). HIV transmission is more common in men's same-sex sexual interactions in North America and Western Europe. Despite making up less than 2% of the overall population in the United States, gay men and other men who have

physical relation with men accounted for 67 percent of new infections in 2015 (ONUSIDA 2017). Although new infections are on the decline overall, new infections are on the rise in specific essential populations. In 2019, 88% of PLWHIV are comprehend of their situation, 92% were on ARV medication, and 82% whose viral load has been suppressed (Avert 2020f).



Figure 48 Percentages of PLWHIV who are on ART in WCENA

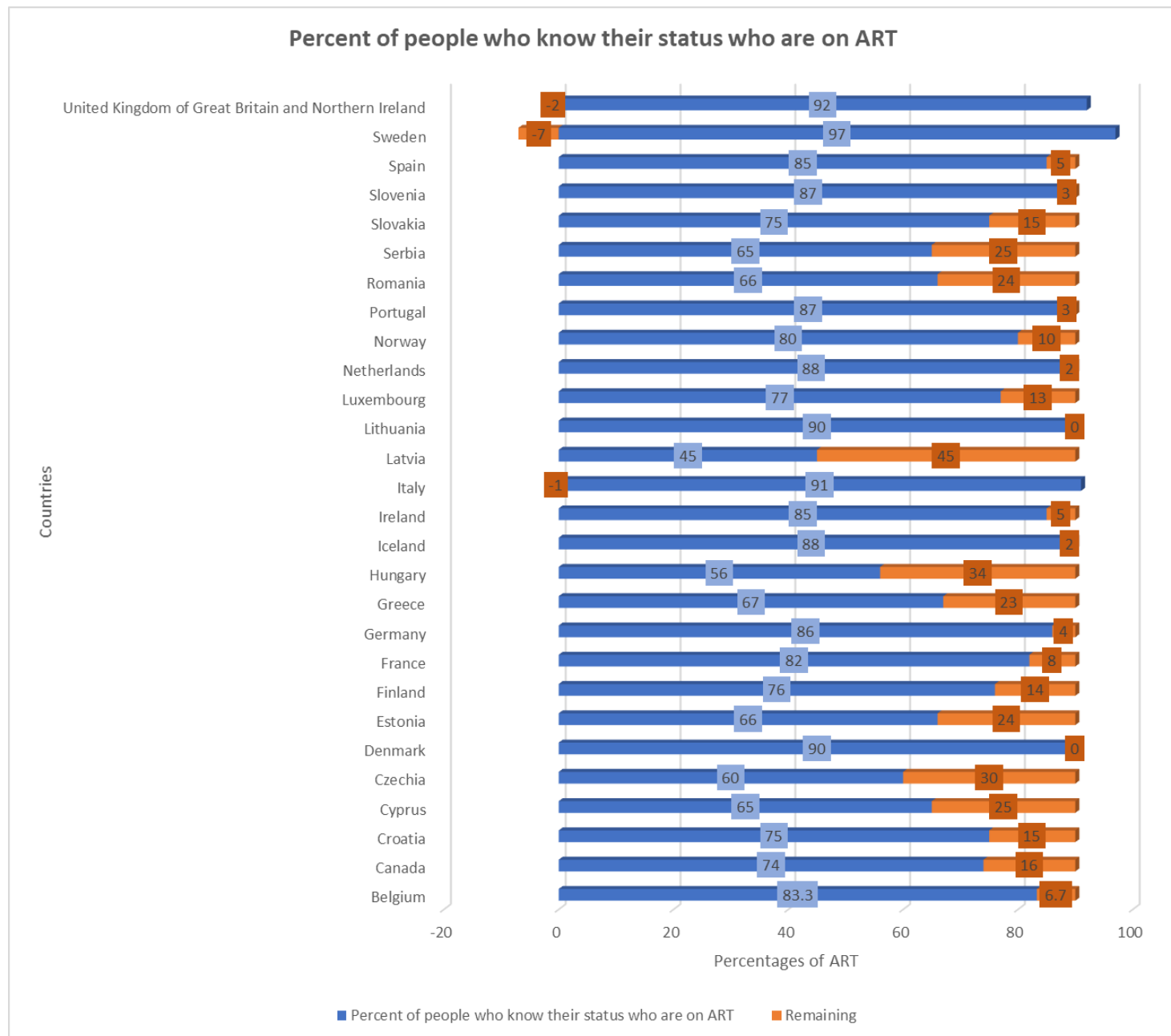


Figure 49 Remaining percentages of PLWHIV who are on ART in WCENA

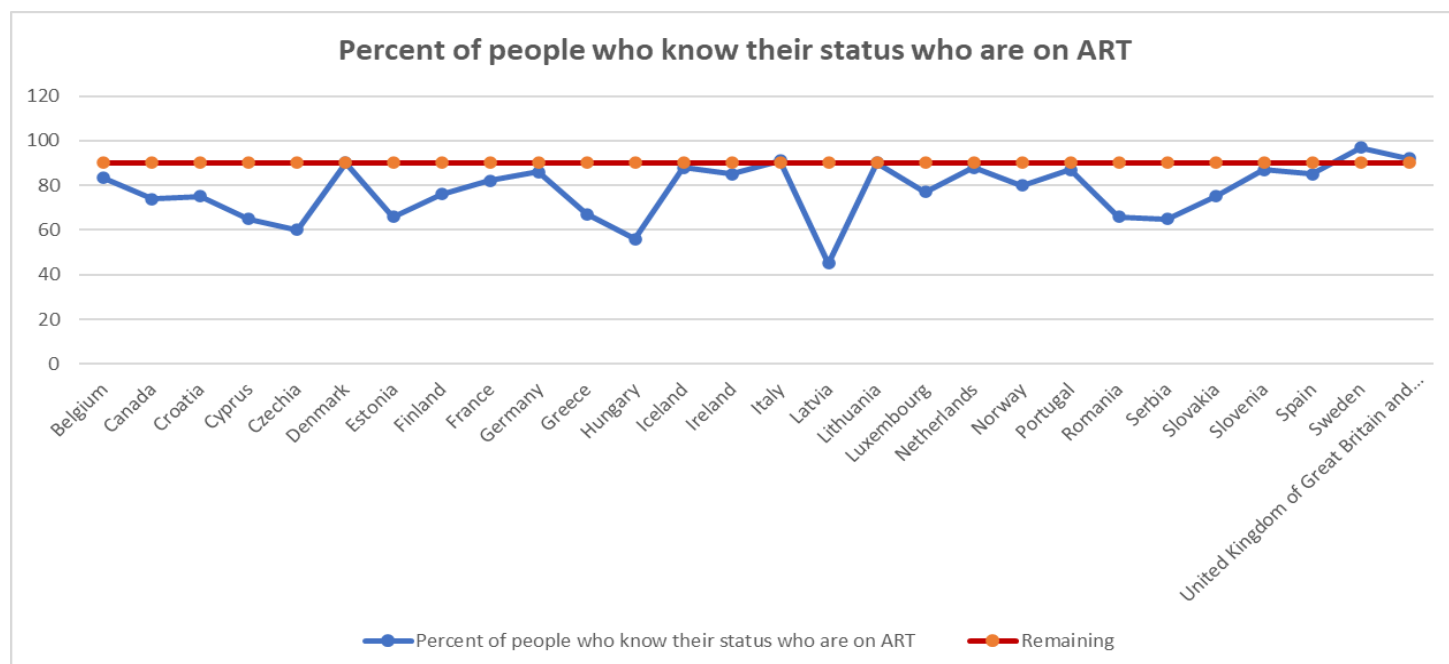


Figure 50 Countries that have crossed 90 percentages goal of ART in WCENA

Figures 48, 49 and 50 shows that values in the United Kingdom of Great Britain and Northern Ireland, Sweden, and Italy are hostile, indicating that these countries have achieved or surpassed 90% of their ART goals. On the other hand, Latvia has the lowest percentage of people taking antiretroviral therapy (ART), which is 45 percent with the remaining 45 percent needed to meet the 90 percent target.



Figure 51 Choropleth map showing ART status across the WCENA

In West and Central Europe and North America, antiretroviral therapy is shown on this map. In light green on the graph, Latvia are represented as having a poor ART status and minimal likelihood of meeting the 95 targets. Nevertheless, Sweden, UK, Italy ART's increased prominence has made it more likely to meet its 95 goals, thus it has a dark green color.

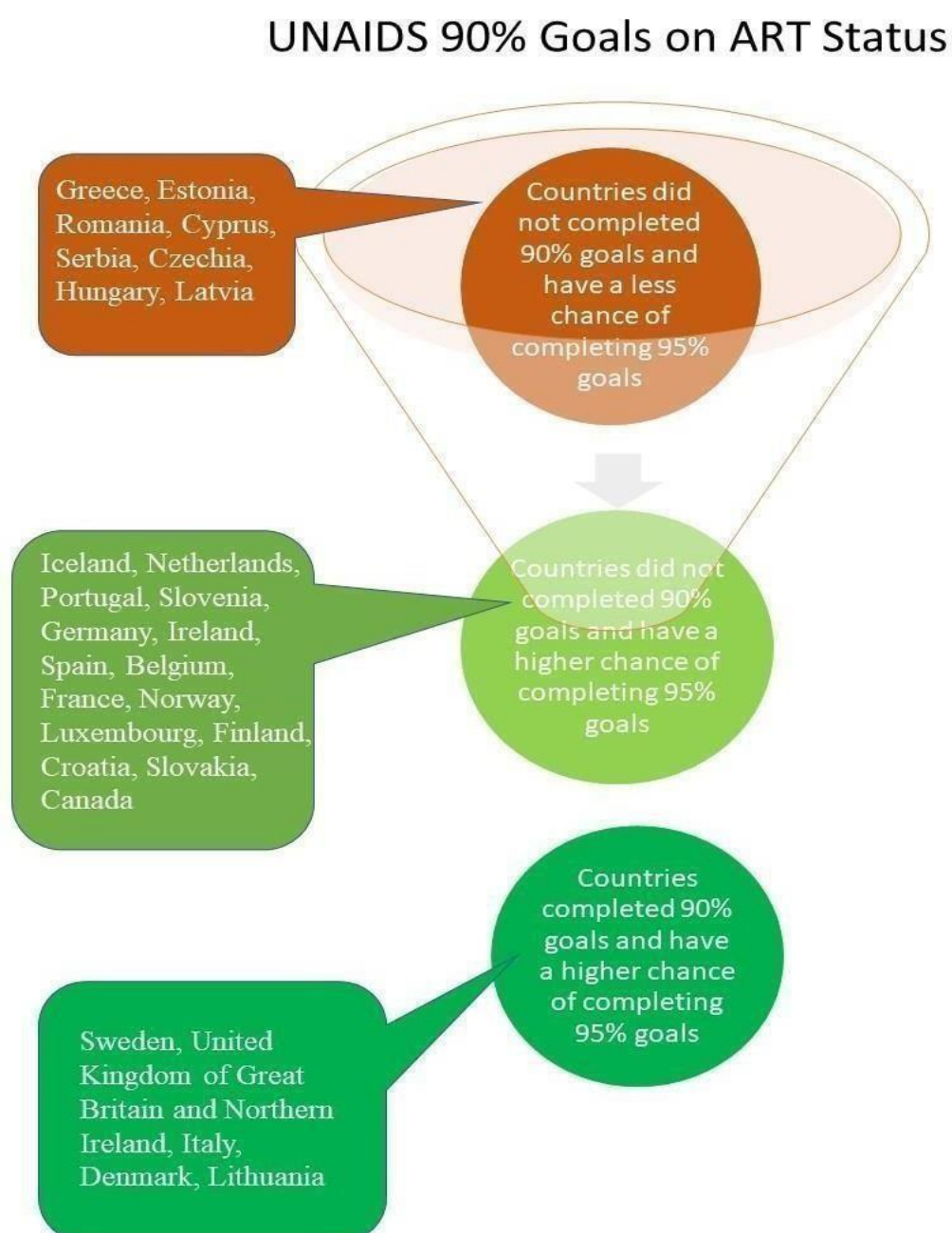


Figure 52 A graphical representation of In West and Central Europe and North America countries that poses higher, moderate and poor chance to accomplish the UNAIDS 90% goal regarding ART

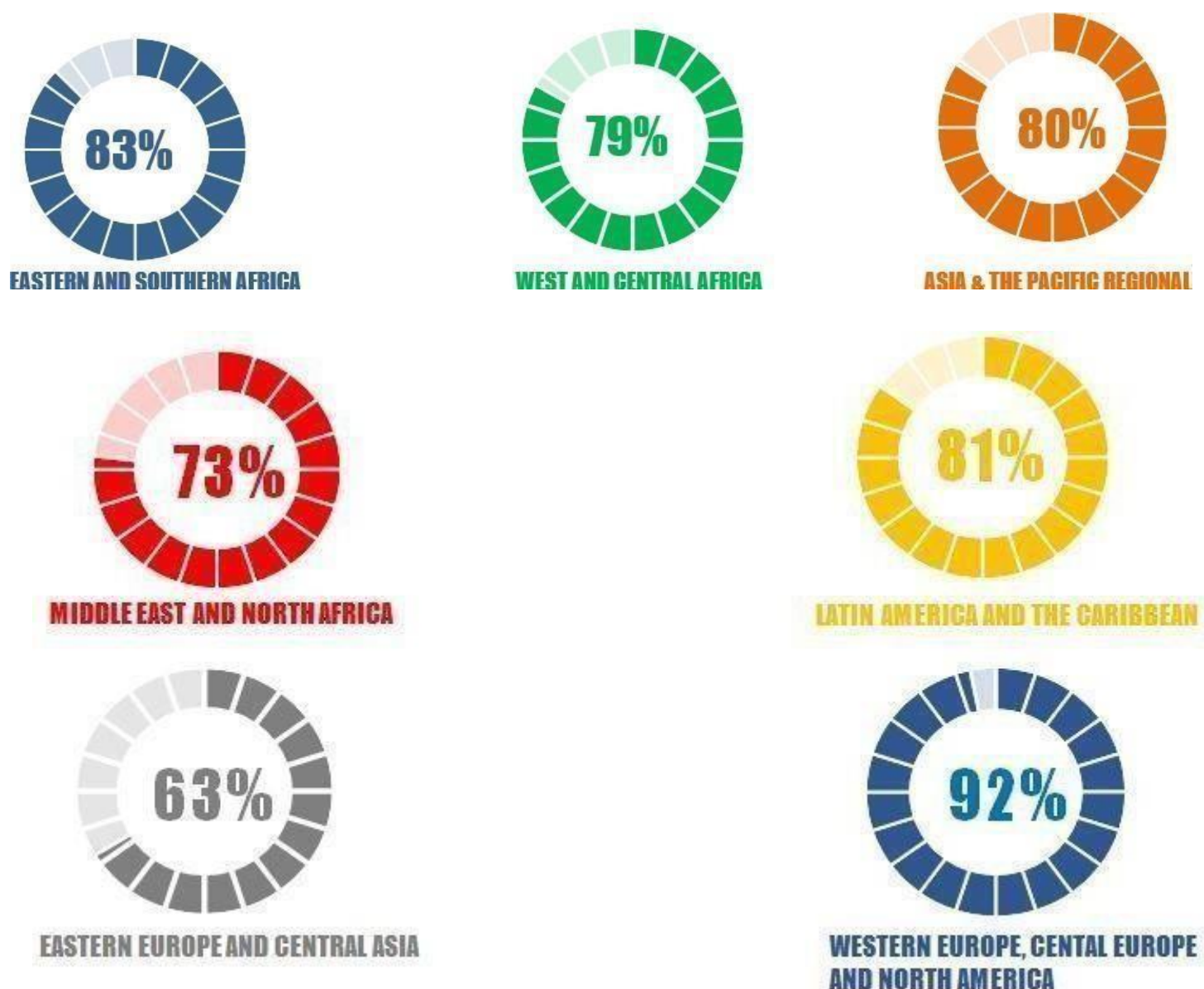


Figure 53 The percentage of ART situations in each of the seven zones is represented by this graphical picture. Consequently, we can observe from these numbers that WECENA have the highest percentage, whereas EECA have the lowest percentage.

Chapter 3

Investment Toward HIV

A significant amount of progress has been made toward bringing an end to the AIDS epidemic as a result of breakthroughs in HIV prevention and treatment. Despite this, there are significant obstacles to overcome. By 2030 the United Nations has proclaimed that it will work toward eradicating the AIDS epidemic, which is a goal shared by several individual countries (UNAIDS 2016). In order to attain this goal, targets have been established for each step in the HIV diagnosis and care continuum, as well as for the overall program. Ending AIDS will not be achieved without significant funding, which will come from increased domestic expenditures, renewed multinational responsibilities, and more efficient deployment of unrestricted resources (Stover et al. 2016)(Avert 2021a).

AIDS still exists, but it can be eradicated if enough money is invested in research and treatment. HIV can be diagnosed and treated using current technology. We are aware of the best methods for preventing new HIV infections. We are well-versed in the art of saving lives. However, money is required in addition to the commitment to scale up HIV programs that have been demonstrated to work and keep people HIV-free and those with HIV alive (End et al. 2019). If all available resources are provided, annual new HIV infections will decrease from 2019 to 2025, approximately 1.7 million to 370 000 in, and yearly mortality, which includes tuberculosis deaths, will drop from 690 000 in 2019 to 250 000 in 2025 (End et al. 2019). If we achieve our aim of preventing vertical transmission of AIDS (from mother to child), child HIV infections as a percentage of the total will decline from 150000 to less than 22 000 by 2025 (End et al. 2019).

However, in poor and middle-income countries, advances in HIV response resources came to an end in 2017, and funding decreased by 7% between 2017 and 2019 (Avert 2021a)(UNAIDS 2020). Only 71% of the 2020 target had been raised (End et al. 2019) by the

end of 2019 for AIDS response in middle and low income countries. Consequently, UNAIDS now projects that by 2025, yearly investments in the fight against AIDS would need to reach US \$ 29 billion (Avert 2021a).

Depending on the region and program, different amounts of money were allotted. ESA and Latin America will have AIDS capitals equal to or perhaps exceed their overall resource requirements by 2020. Many countries such as in EECA (who are dealing with a swiftly rising AIDS epidemic) as well as the MENA, and APAC (which has nonetheless to contain its epidemic), had significant resource shortages (End et al. 2019).

A tenth of a trillion dollars is spent each year by the federal government to support persons in the United States and other countries around the world who have or are at risk of HIV infection. A programme of the United States government to aid in the prevention and cure of AIDS in the more than 36 million individuals living with the infection throughout the world is comprehended as the President's Emergency Plan for AIDS Relief (PEPFAR) 4. It was founded in 2003 with broad bipartisan support and has survived four presidential administrations and 10 sessions of the United States Congress. Now a question arises: What is this country's status in the meantime of pandemics? In 2020 they invested a total of 7,023.6 million dollars whereas, in 2021, they invested 7,187.4 million dollars which are increasing. So here, the pandemic does not affect so much in the AIDS programme (HIV.gov n.d.).

On the other hand, EECA (where the spread of the HIV epidemic is prompt), the MENA and APAC (the outbreak has not been obtained under control) all experienced acute shortages of resources. The total amount of aids obtainable for AIDS responses in middle and low income countries reached a zenith in 2017, a long way from the goal of \$1 trillion by 2020 (UNAIDS 2021). They then had a modest drop between 2018 and 2020. Domestic finance (both private and public), which had been the primary origin of growth in aids available for HIV responses

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in middle and low income countries during the last decade. The rate of growth has recently slowed and may even be starting to decline in some cases (UNAIDS 2021)

The availability of HIV resources in the United States and poor and middle-income nations is depicted in the point. In contrast to other countries, where resources are dwindling year after year, aids in the United States increases with time. Even the epidemic will not be able to derail their plans. A well-executed plan and a strong community aid in the stability of their resource allocation

Chapter 4

Why Many Countries Fall Behind from UNAIDS Strategy

4.1 Is it for COVID-19?

We have already examined the current situation of ART coverage in several geographic areas. Some countries, such as China, Cambodia, Qatar, and others, are doing phenomenal work. Some countries, such as India, Singapore, the United Arab Emirates, and others, have fallen short of the UNAIDS 90 aim. However, there is still hope that these countries may accomplish the UNAIDS 95 target. However, several nations, such as Afghanistan, Pakistan, Sudan, Bangladesh, and others, still do not fulfill the UNAIDS 90 target and have a slight possibility of meeting the 95 targets. Now the question is why there is such a difference that some countries perform exceptionally well, some countries moderately well, and some countries perform poorly. Why aren't all countries' coverage percentages at least equal? A fact may rise that for COVID-19, many countries have failed to meet the target in 90 strategies. Another concern arises now: Is COVID-19 truly to blame for this incident? If it hadn't been for COVID-19, would the committees of those countries have been able to maintain their track?

First and foremost, all countries have been confronted with the COVID-19 dilemma. If COVID-19 were a severe issue in this situation, many countries would not meet the 90-percent target. Second, healthcare systems vary from one country to the next, as already stated. With that in mind, COVID-19 is a consideration, but only for countries on the verge of meeting 90 goals or who are capable of meeting 95 goals. Will COVID-19, on the other hand, apply to countries that are far from meeting the 90-goal mark and have minimal expectations of meeting the 95-goal influence? To find out the answers to these questions, we must first look at ART coverage in those countries before COVID-19. Once we have this information,

we will determine whether COVID-19 contributes to the team's failure to fulfill its 90-goal target.

So here, we will select some countries whose ART status is terrible. We will examine the ART status of those countries for 2018-19. We can observe their deteriorating state in this graph, which is alarming. Afghanistan's ART status was only 36 percent in 2019. However, Bangladesh's ART status is 48 percent in the same year. Even though if COVID-19 did not occur, it was nearly difficult for these countries to fulfill the 90-percent target in one year. As a result, other factors must contribute to the failure to achieve this goal. Many countries, such as Bangladesh, have low HIV prevalence rates, but the country remains extremely vulnerable due to poverty, overpopulation, gender inequity, and a high frequency of transactional sex. Stigma and prejudice against PLHIV are pervasive and they have a negative impact on the physical and mental well-being of persons who are living with HIV. Numerous negative consequences result from discrimination and stigmatization of PLWHIV, including delays in testing of HIV, limited implementation of prevention programs and HIV status disclosure, and hurdles to a regular socio-economic existence, and others. We will go over a few of the major issues that the committee has failed to address in the following sections:

4.2 Awareness and Lack of Knowledge

AIDS is currently the most significant public health epidemic in the globe. The number of people infected with the virus is increasing daily. The need for education and abilities about the disease's prevention and control is essential among people of all educational backgrounds and levels of illiteracy. The information and skills required to defend oneself and others are severely inadequate in the general public. A lack of understanding about HIV transmission and prevention contributes to the menace of HIV transmission. On the report of WHO and UNAIDS, women's awareness of HIV is particularly low, and this is especially the case

among young women (UN Joint Programme on HIV/AIDS (UNAIDS) 2018). Inadequate access to healthcare, unequal culture, socio-economic position, and other factors are contributing to this situation. According to a poll conducted in Sub-Saharan African countries, only 52 % of adolescents and young women and 47% of urban adolescents and young women would have been unable to make decisions about their own health (On, Girls, and Women 2019).

Bangladeshi citizens have also a poor HIV/AIDS awareness level, which puts them at a higher increased risk of acquiring the virus. Compared to urban citizens, those living in rural areas are less likely to be well-informed about HIV and its symptoms. While this is true, it does not indicate that everyone in rural regions has a greater understanding of aids. According to a survey, 17.5 percent of the population in the area is aware of the existence of AIDS (Yun et al., 2013). Only 11 percent of ever-married women between the ages of 15 and 49 years have comprehensive knowledge about AIDS, and 30 percent have never heard of HIV or AIDS before (NASP, 2018). The major serious problem in most countries is that many people's conceptions about AIDS are based on misinformation. According to Bangladesh, there have two widespread local myths, mosquito bites have been linked to the transmission of AIDS and by sharing meals with an AIDS patient. So, why does this misconception exist in the first place? Teachers in Bangladesh's urban and rural communities are reluctant to conduct AIDS lectures because of the stigma attached to the disease. Rather than addressing it, they simply ignore it. As a result, misinformation spreads quickly among people due to word-of-mouth. They don't even give it a chance to be evaluated. Due to their inexperience, they are unable to treat AIDS effectively. The majority of persons in Bangladesh have been diagnosed with HIV lately. According to a study conducted in 2016, only 29% of HIV-infected individuals had the initial CD4 cell count(Global Aids Monitoring

2019, 2019). Antiretroviral therapy is a mystery to them. They are entirely ignorant of the fact that such a thing even exists.

4.3 Sociocultural Norms and Discrimination

In attitude, appearance, and beliefs, socio-cultural norms are guidelines that a group uses to judge what is proper and improper in a given situation. Failure to adhere to the rules may result in negative consequences, such as ejection from the group, if not addressed 2. It is one of the most major roadblocks worldwide and also a major challenge for PLWHIV (Herek and Capitanio 2016). Ensuring high-quality HIV therapy and intervention benefits by reducing HIV-related stigma is a national preventative aim that should be pursued (Li et al. 2010).

In Bangladesh even though the government provides free HIV testing and antiretroviral medications (ARV) for HIV/AIDS care, many patients choose to conceal their illness for fear of social denunciation. Many people in the village are terrified that they will be abandoned if they tell their families about these diseases. There were formerly customs that forbade individuals from conversing with those suffering from AIDS. The rest of society would have locked him away in a separate room. They don't treat them with much respect at all. People treat him with disdain and contempt.

Consequently, not only do uneducated people follow certain norms and discriminate against others, but educated people do as well. In addition, there was widespread discrimination among healthcare workers. According to a survey, about one-fourth of healthcare workers stated they would feel uncomfortable if their other patients or coworkers learned they were treating or caring for HIV-positive patients. In a poll, 35.2% of healthcare professionals stated that they do not want patients at high risk for HIV and AIDS to be patients of theirs (Hossain & Kippax, 2010).

4.4 Poor Management system:

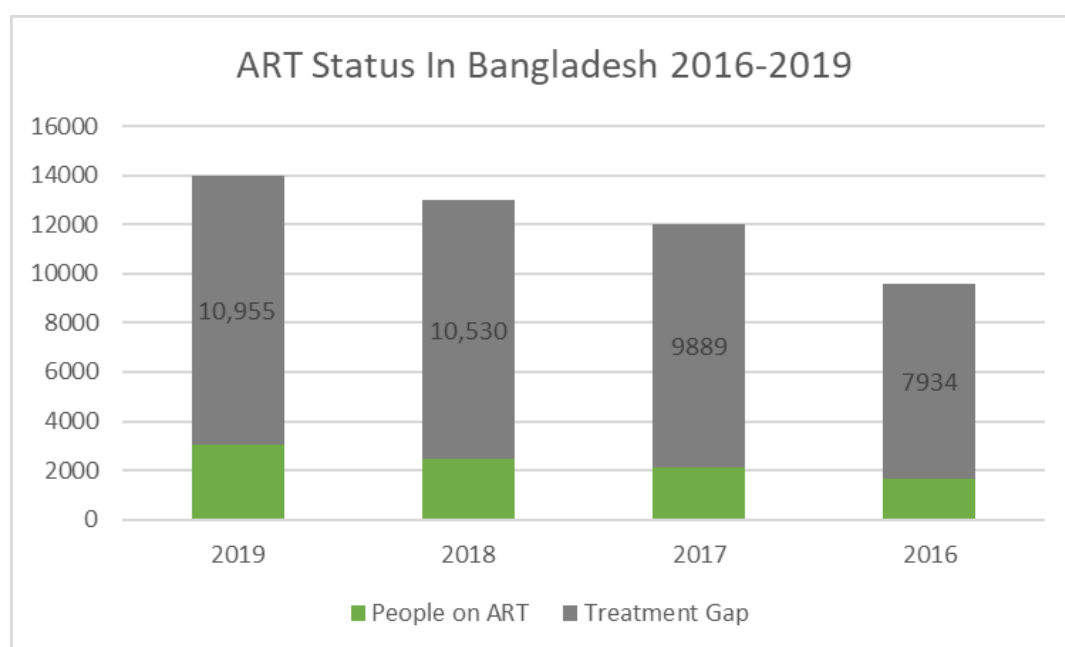


Figure 54 ART Status in Bangladesh (2016-2019)

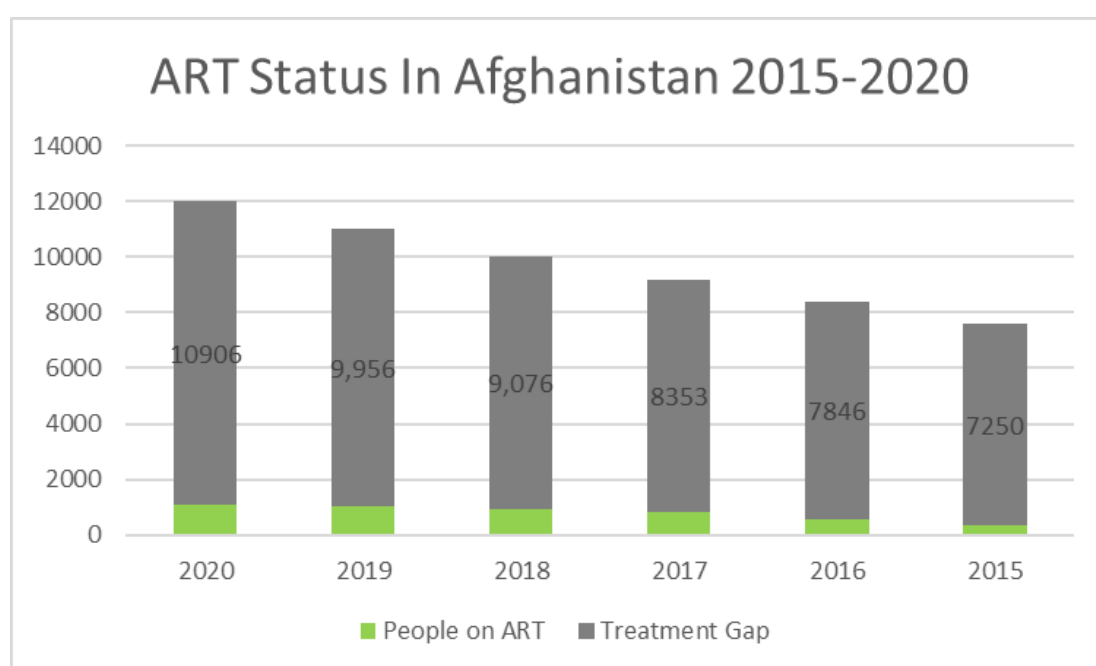


Figure 55 ART Status in Afghanistan (2015-2020)

One of the UNAIDS aims is to have 90% of PLWHIV on antiretroviral therapy. The progress toward their goals is depicted in the two graphs above. The treatment gap in Bangladesh increased from 2016 to 2019 from 7934 to 10,955 patients each year (UNAIDS 2017)(People

et al. 2019)(KPMG 2017)(KPMG 2018). Similar to Afghanistan the gap increased from 2015 to 2020 from 7250 to 10906 (HIV and AIDS DATA HUB 2020). It doesn't matter how much time passes; the mortality rate rises. This is due to a lack of preparation.

Furthermore, there is a lack of a standard procedure for administering supply chains. According to the United Nations Development Programme, in Bangladesh, antiviral medication stockpiles were exhausted by 81 percent in 2016. (Global Aids Monitoring 2019, 2019).

4.5 Less Diagnosis

In Bangladesh, around 14000 people are infected with HIV, but only 5100 have been diagnosed, leaving 8900 people unidentified until 2018. Because these undiagnosed individuals are unaware that they are infected with the HIV virus, a country where most of the population has not been diagnosed with HIV could quickly become infected with the virus. As a result, they will spread the HIV virus rapidly. Those who are infected with HIV in Bangladesh are considered cursed. They fear facing the death penalty because the general public will consider them unfit for society. This is a type of paranoia that no one can identify. When healthcare professionals encourage them to diagnose, they are always scared of finding.

Chapter 5

Discussion and Future Perspective

Ending the AIDS epidemic will serve as a showcase of what can be accomplished with global cooperation, proof action, and collaborative multilateral cooperation, in addition to supporting as an inspiration for enormous worldwide health and development endeavors. So end to the AIDS pandemic once and for all will require a great deal of forethought and effort. If persons with HIV are not treated, it will be inconceivable to end the epidemic. UNAIDS has developed a 90-90-90 treatment method to combat the HIV/AIDS pandemic to the greatest extent possible.

Figure (6, 13, 20, 27, 34, 41) depicts the percentage of persons in each of seven regions that are aware of the existence of HIV positive individuals. We can see from these numbers that the vast majority of individuals in Cape Verde and Peru (98 percent) are aware of their condition, located in West Central Africa, Latin America and the Caribbean, respectively. On the other hand, Congo is a country in the Middle East with a low percentage of PLWHA. Compared to other regions, most nations in LATC have achieved 90 percent of the PLWHA target.

There are seven regions in which the number of PLWHIV on ART is shown in the following table (9, 10, 16, 17, 23, 24, 30, 31, 37, 38, 44, 45, 49, 50). According to these figures, in Cape Verde and Eswantini, both in West Central Africa and the ESA, 98 percent of the population is on ART. In contrast, South Sudan is a country which is situated in ESA, with a low percentage of PLWHA on ART. Comparatively, 90 percent of PLWHA who are on ART targets were met in most WCENA countries.

Figures (8, 15, 22, 29, 36, 43) show the percentages of PLWHIV whose viral load has been suppressed. Among all the countries in Eswantini which is the country in ESA region has the highest percentages(98 percent) of suppressed viral load. Despite this, Mauritius and Tunisia

are the countries which are in the ESA and MENA region with a low number of suppressed viral loads.

Figure (12, 19, 26, 33, 40, 47, 52) illustrates that 95 percent of countries have high, medium, or low possibilities of obtaining ART status, depending on their circumstances. Some countries have done exceptionally well, and some countries have not done as well. Inequality is the root cause of certain countries' regressive development. Countries like Eswantini Namibia all work together, their healthcare people support them, the general public helps HIV patients, and for this reason, they easily achieve 90-90-90 strategies and quickly can achieve the 95-95-95 goal. People in countries such as Bangladesh believe that HIV is a curse or a death sentence because they think that persons who have HIV have committed a grave sin, and as a result, society has expelled them from society. In the same way, their family members do not support them. Healthcare personnel have also discriminated against HIV patients in rare instances.

There is one additional factor contributing to all of this: a lack of education. Many teachers are uncomfortable discussing such topics with their students. So people take what they learn or hear from their family, friends and neighbours as gospel truth.

Another factor is the less investment in AIDS. Countries like China and Singapore invest significant money in AIDS prevention and treatment. In 2008, the overall cost of AIDS in China was 323,834,197 dollars, and it is expected to reach 1,357,454,400 dollars by 2020. The amount of money they spend has quadrupled over the last 12 years. On the other hand, the overall cost of AIDS in Bangladesh was 37,264,781 dollars in 2008, and it was only 15,071,566 dollars in 2018, indicating that the price is dropping day by day.

The 90-90-90 target has been set for 2020. But within this period, the COVID-19 pandemic occurred. Was COVID-19 a factor in certain countries missing the 90-90-90 deadline? As a

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result, while COVID-19 may be a problem, it is not entirely to blame for the current enormous and unsolvable worldwide health crisis.

To achieve the 95-95-95 targets, it is essential to determine goals. First and foremost, funding is vital; but correctly utilizing the cash is a significant difficulty. Second, a few survey-based studies can be conducted to address the issues of a lack of data and a lack of information. For instant, HCW and NGO workers work with HIV people.

Chapter 6

Conclusion

When it comes to HIV patients, antiretroviral drugs are essential. It not only reduces the risk of infection but also reduces the risk of transmission. While the use of antiretroviral therapy (ART) for HIV-uninfected individuals shows considerable promise, public health authorities must balance this against the financial and ecological costs of doing so.

Even while antiretroviral therapy (ART) can be a vital tool in HIV prevention, it must be viewed as part of a more extensive arsenal of tools designed the number of recent infections will be declined around the world. To ensure that the countries meet the 95-95-95 targets with the lowest prospects of success, they should adopt an effective strategy or plan as soon as possible rather than waiting. Create and adhere to a process or plan tailored to their individual needs and circumstances. They should communicate with the NGO and collaborate on developing a proposal. The importance of some of the most significant subjects we discussed previously, especially knowledge and standards, should be emphasized even more strongly. Nothing lasts forever, even the pandemic. This pandemic will eventually end, but the authority of those countries should take crucial precautions in the meantime.

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