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Review Article

Thirty years on with an HIV epidemic in Zimbabwe (1985–2015)

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ABSTRACT

Zimbabwe, like many of her neighbours, is going through an HIV epidemic since 1985. It is imperative to assess progress with epidemic over the past three decades. We conducted a systematic review of reports in Pubmed/ScienceDirect, and a number of sentinel surveillance reports published by local and international organisations that have dealt with HIV/AIDS in the country, including the National AIDS Council of Zimbabwe, Ministry of Health and Child Welfare of Zimbabwe, UNAIDS and World Health Organisation. Thirty-five original research articles and 16 review articles, 4 surveillance reports and 2 conference reports met our inclusion criteria. The first 5 years of the epidemic were characterised by an exponential increase in prevalence (65-fold) and incidence (up to 13-fold) which were fuelled by high risk sexual behaviour. Comprehensive AIDS programmes that were launched between mid-1990s and 2015 and high mortality over the same period are thought to have played a role in slowing down the epidemic since the mid-2000s. Increased uptake of antiretroviral therapy (ART) and prevention-of-mother-to-child-transmission (PMTCT) (95%) prophylaxis accounted for a 70% drop in HIV-related mortality between 2003 and 2013. However, the epidemic has been characterised by a low paediatric ART coverage (35% in 2011 to 46.12% in 2013) and a recent increase in adolescent HIV prevalence. The epidemic has been driven by a number of social factors that include the local traditional beliefs and customs. A more holistic approach which deals with the epidemic in its socio-political context is required to effectively lower the country's HIV burden.

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1. Introduction

The aim of this review is to appraise the epidemiological, socio-cultural and political factors that have influenced the human immunodeficiency virus (HIV) epidemic in Zimbabwe over the past three decades (1985–2015). A timeline of the epidemic, from onset in 1985 until 2015, was established in the context of epidemiological evidence, emerging trends and social ecology. Particular attention was paid to issues of chronology, relativity and completeness of epidemiological evidence. The goal of the review is to provide a holistic analysis that identifies the epidemic as a sum total of its component parts, which have evolved together in space and time. This paper therefore serves as an essential resource to assess progress with the epidemic in the country.

A number of theories have been put forward to explain the origins of HIV, which were refuted as mere conspiracies [1,2] without offering evidence to the contrary. It is not known when the first case of HIV arrived in the country. What is known is that the first case of AIDS in the country was detected 1985 [3,4]. The HIV infection is characterised a relatively long incubation period that lasts between three to eight weeks, or 9 months to 20 years until first symptoms of AIDS appear, a long latency period (up to 10 years) [5] and an ill-defined infectious stage. If detection of the first AIDS case in the country was in 1985, then the disease should have landed in the country weeks, up to a decade, earlier. Anecdotal evidence demonstrates the occurrence of an unidentified AIDS-like African spell or a 'sexually transmitted illness' known as *runyoka* in Shona language and as *ulunyoka* in Ndebele, which presented in its victims with weight loss and high mortality. This review is not concerned the origins of HIV or how it arrived in the country, but offers a bird's-eye view of the epidemic for a better understanding of how it has evolved over time.

At least 1.3 million of the country's 13 million people were reported to have been infected by HIV from onset until 2012

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[6]. The current prevalence of HIV, in 2015, among the country's adult population (15–49 years age group) is estimated at 15.2%, which is one of the highest in the Southern African region. The first decade into the epidemic saw exponential increases in HIV incidence and prevalence rates, which were fuelled by high risk sexual behaviour [7,8] and characterised by high mortality [9], the latter being a result of lack of ART at the time. The Government of Zimbabwe, non-governmental organisations and all grassroots players in the HIV field launched awareness campaigns, which included advertisements in both print and electronic media, which could have contributed to an improved understanding of the disease, improved sexual behaviour, reduced stigma and greater uptake of HIV tests and therapy [8,10]. However, campaigns alone could not have played a central role in reducing the incidence of HIV in the population. The observed decline in incidence, and hence prevalence, could have been due to a number of factors that included increased uptake of condoms, increased uptake of HIV diagnoses and a number of related factors. Improved sexual behaviour, especially between 1995 and 2015 was accompanied by a gentle fall in HIV incidence and prevalence rates. HIV-associated mortality rate assumed a downward trend from mid-2000s as a result of increased access to ART and a reduction in new infections, which in turn was linked to increased awareness and reduced sexual risk. Additionally, Zimbabwe went through economic attrition, especially around year 2008, which is implicated for the massive emigration of Zimbabweans to countries in the region and further afield. Gregson et al. [10] asserted that migration of Zimbabweans to the diaspora since the late 1990s could have led to 'selective out-migration of HIV-positive individuals', which in turn could have contributed to the decline in HIV prevalence. Efforts to control the HIV infection were greatly stifled by its unique biology that is characterised by long incubation period, a long latency period and an ill-defined infectious stage. For a disease that has gripped the country for the past three decades, with potential to grip the country for decades to come, it is important to view it multidimensional event which is influenced by complex social networks that fuel risky sexual behaviour and new infections.

Despite the challenges highlighted above, including a high adult HIV prevalence in 2015 (15.2%) following an increase from 14.1% in 2010, the country attained 93% coverage in its PMTCT programme and 95% coverage of adult ART for its eligible population by 2013 (UNAIDS, 2013), thereby meeting the United Nations' Millennium Development Goal 6 as set out in the year 2000. The wider access to HIV therapy, and care and support services in the country have helped to explain the recent decline in the HIV incidence rate from a peak of 5.21% in 1994 to 0.86% in 2012 [11]. Despite these gains, AIDS continues to claim at least 40,000 lives per annum (2013), despite a drop from 123,000 in 2006 [13].

2. Methods

This treatise is a systematic review of secondary data that is available from publicly available sources, including Pubmed/ ScienceDirect, and a number of reports by key local and international organisations that have dealt with HIV/AIDS in the country, including the National AIDS Council of Zimbabwe, Ministry of Health and Child Welfare of Zimbabwe, UNAIDS and World Health Organisation. HIV/AIDS research in the country has remained grossly underfunded, as such data on the epidemic is characterised by significant gaps. Secondary data were processed into graphs to track trends in the HIV/AIDS epidemic, which, in turn, were modelled into a framework that shows the inherent inter-linkages within the epidemic. This study assessed the role of a number of factors including mortality, awareness of the disease, the uptake of ART, PMTCT and protective methods (condom use), sexual behaviour, gender, cultural beliefs and practices including

complementary and alternative medicine (CAM), and social attributes that underlie the salient trends in the epidemic.

3. Results

3.1. The onset of an HIV epidemic in Zimbabwe

Based on anecdotal evidence, a condition known as *runyoka* in Shona or *ulunyoka* in Ndebele is known to have occurred frequently in men prior to the detection of the first AIDS case in 1985. Based on African beliefs, *runyoka* is a disease that affects a man who had sexual intercourse with another man's wife or girlfriend, when the latter would have, clandestinely, been treated by their husband/ boyfriend to prevent the woman from having sex with other men. The symptoms of *runyoka* included wasting which quickly culminated in death. When the HIV epidemic assumed an upward spiral in the 1990s (Fig. 1), incidences of the *runyoka* 'epidemic' could have declined in the population. Could this have been HIV that was not yet detected? The occurrence of *runyoka*, like all other spells, cannot be verified using scientific methods. Additionally, the contribution of this background epidemic on the spread of HIV was not reported anywhere in literature.

The first case of AIDS was Diagnosed in a Northern District of the country in 1985 [14]. There is evidence to show that research on HIV-1 Type C (HIV-1C), the strain that is endemic in Southern Africa, commenced in the country in 1986 [15]. HIV-1C is thought to have originated in Kinshasa, Democratic Republic of Congo in the 1920s [16]. However, the most recent common ancestor of the HIV-1C epidemic in Southern Africa is inferred, using Bayesian phylogenetic inference analyses, to date back to 1973 [14]. Attempts to decipher the origins of HIV-1C are clouded by a dearth of concrete data and the high rates of recombination that characterise the virus' genome [17].

3.2. Changes in HIV prevalence and incidence rates

The onset of the HIV epidemic in the country (1985–1990s) was marked by exponential increases in prevalence (up to 65-fold) and incidence (up to 13-fold) (Fig. 1). Notably, both incidence and prevalence of HIV peaked in early 1990s before reaching their respective plateaus in early 2000s, which was followed by a downward trend from mid-2000s onwards. The reduction in HIV incidence and prevalence coincided with increased awareness of the disease in the country [18]. From the early years of the epidemic, awareness campaigns were launched at every level of the country's society, including the Government of Zimbabwe, international health organisations, civil society, business, religious sector and AIDS service organisations. HIV-associated mortality increased by 200% between 1993 and mid-2000s, before assuming the downward trend that occurred from mid-2000s onwards (Fig. 2). A peak in

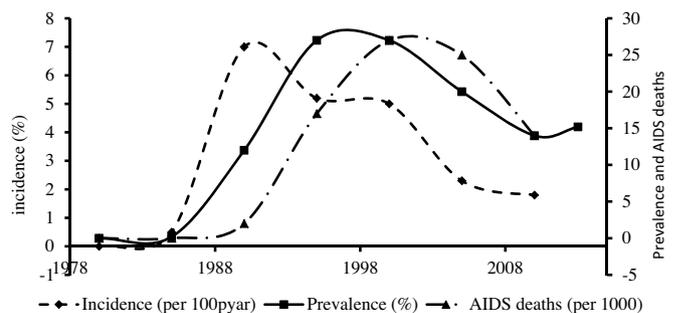


Fig. 1. HIV prevalence (per 100 person years), incidence (%) AIDS deaths (per 1000) and in the adult population of Zimbabwe (15–49 age group) between 1985 and 2013. Adapted from Halperin et al. (2011) [12] and UNAIDS (2013) [11].

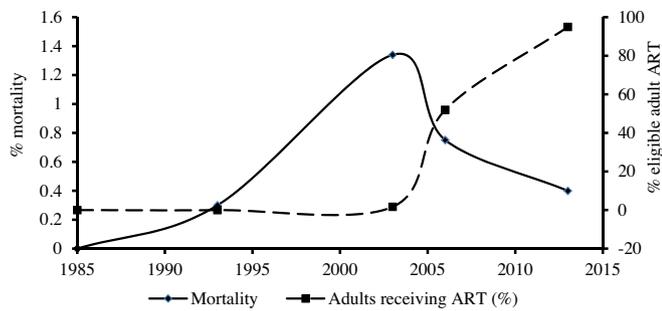


Fig. 2. Rate of ART uptake (%) among HIV infected adults (15–49 age group) vs HIV-related mortality rate (%) in Zimbabwe between 1985 and 2013. Adapted from UNAIDS [11], Gregson et al. [10], Zimbabwe National HIV and AIDS Estimates Report 2013, Zimbabwe Demographic Health Survey Report 2010/11, MOHCW ART programme data.

HIV-related mortality, in 2003, coincided with the introduction of ART at that time (Fig. 2).

3.3. HIV-associated mortality and life expectancy

The rise of the HIV epidemic in the country was shown to have reduced the population's life expectancy from 61 years in 1990 down to 45 years between 2000 and 2005 (Fig. 3). The widespread use of ART in the 2000s coincided with a rise in the country's life expectancy. By 2015, life expectancy had increased to 58.8 years (Fig. 4). The initial declines in HIV-associated mortality, based on the available data, occurred roughly a year after the introduction of ART in the country (2005) (Fig. 2).

3.4. Prevention of mother to child transmission of HIV

An estimated 18,000 children were infected with HIV in the country in 2005 alone [19]. The Government of Zimbabwe, following the recommendations from the World Health Organisation, launched the PMTCT programme in 2001 [20]. Over the following 2 years (2001–2003), there was a 20.4% HIV prevalence rate and a 24% enrolment for nevirapine prophylaxis [20]. Perez et al. (2004) [20] reported a high acceptability of HIV testing (>90%) among pregnant women after counselling. The PMTCT programme was associated with a reduction in mother-to-child-transmission (MTCT) of HIV by 50% between 2001 and 2003 [21]. From the outset, the success of the PMTCT programme was greatly hampered by low retention and antiretroviral treatment adherence rates [22,23]. Patient retention is thought to have increased as a result of adequate social support including the deployment of mother support personnel at PMTCT centres. At least 120,000 children (0–14 years of age) were estimated to have

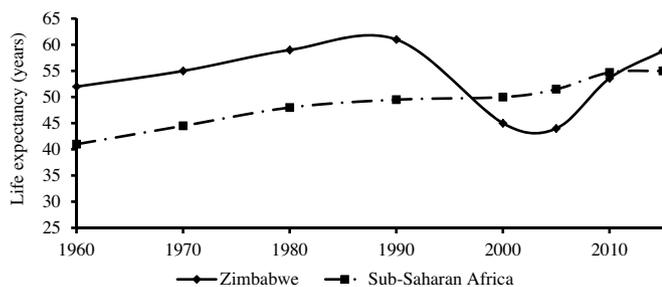


Fig. 3. Life expectancy (years) in Zimbabwe compared to the rest of Sub-Saharan Africa between 1985 and 2013. Data adapted CIA World Factbook, 2015, <https://www.cia.gov/library/publications/download/>, accessed on 23/01/2015.

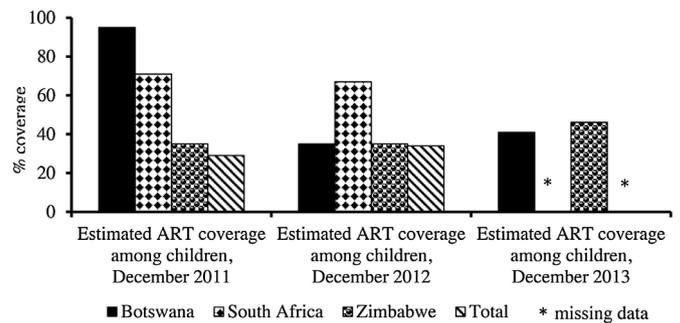


Fig. 4. ART coverage by children from 2011 to 2013. Adapted from WHO and UNAIDS data: <http://www.who.int/hiv/data/en>, accessed on 24/01/2015 and CDC (2014).

acquired HIV by 2010, 3.4% of which reached the age of 10 following MTCT [24]. The coverage of ART for paediatric care in the country has remained low throughout the epidemic (34% in 2007 and 41% in 2013) (Fig. 5) [19] and has remained lower than that of the adult population over the years (Fig. 5). However, the rate of paediatric care in the country is slightly higher than the average for countries with high HIV prevalence worldwide (34% in 2012) (Fig. 4).

3.5. Mortality and patient retention in the era of antiretroviral therapy (ART)

The introduction of ART post 2004 in Southern Africa is known to have lowered mortality by between 10 and 20% per annum [25]. Hogan et al. (2010) [26] showed that maternal mortality in the country was at least twice as high as that of her Southern African neighbours (Fig. 5). The risk of death among HIV infected women was shown to increase 8-fold without use ART compared to HIV negative controls [27]. Adherence to ART (at least 12 months after initiation of therapy) decreased from 93.1% in 2009, followed by an increase to 85.7% in 2013 [28] (Fig. 6). A study by Mutasa-Apollo et al. [29] noted a reduction in patient retention rates with time of ART use, from a high of 90.7% at 6 months to 64.4% at 36 months. Mutasa-Apollo et al. [29] reported cases of segregation against some HIV infected individuals and reduced retention in ART programmes due to logistical challenges. The uptake of ART among eligible adult patients increased from 31.3% in 2007 to 85% in 2012, followed by a decline to 76.9% in 2013 (Fig. 6). The uptake of ART among eligible children increased from 9.7% in 2007 to only 46.12% in 2013 [28] (Fig. 6). The Mutasa-Apollo et al. [29] study showed that the length of ART use accounted for weight gains ranging from 3 kg at 6 months to 5 kg at 36 months and an increase in CD-4+ cell counts from 122 cells/ μ L at 6 months to 279 cells/ μ L at 36 months in a sample of HIV patients in the country.

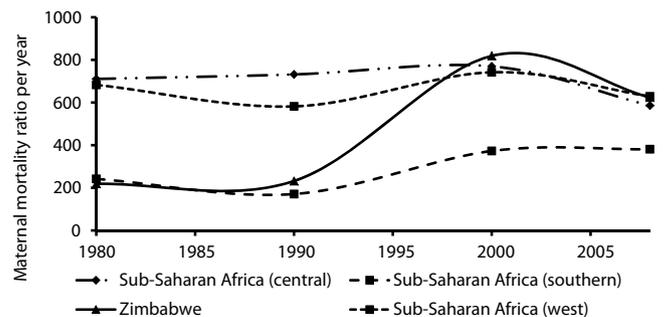


Fig. 5. Maternal mortality ratio (MMR) per 100,000 livebirths for Zimbabwe in comparison to the rest of Africa (Central Africa, West Africa and Southern Africa). Data adapted from Hogan et al. [26].

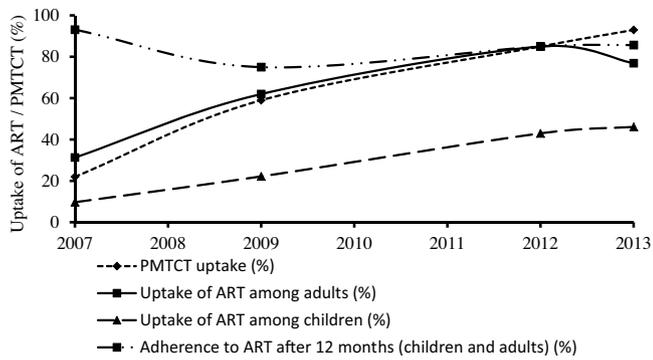


Fig. 6. HIV prevalence (per 100 person years), incidence (%) AIDS deaths (per 1000) and in the adult population of Zimbabwe (15–49 age group) between 1985 and 2003.

Adapted from Halperin et al. (2011) [12] and UNAIDS (2013) [11].

3.6. Low uptake of contraception: role in pregnancy and HIV transmission

Zimbabwe is said to be affected by a low uptake of both male and female contraception [30] and a resultant high rate of unintended pregnancies [30,31]. However, the uptake of condoms in the country remains undetermined due to gaps in research data. A recent study by Smith et al. [32] showed a binomial distribution in condom use, with at least 88% reporting zero or 100% use, and fewer unprotected sexual acts with non-regular compared to regular partners in both men and women. McCoy and colleagues (2014) [30] showed high rates of unintended pregnancies (35.1%) among 8797 women who were drawn from catchment areas of 157 health facilities that were offering PMTCT services in the country's five provinces. A larger proportion (52%) of the women who reported unintended pregnancies in the McCoy et al. (2014) [30] study were not using any contraceptive method prior to falling pregnant. Additionally, the McCoy et al. (2014) [30] study showed a higher likelihood of unintended pregnancy among HIV infected women (44.9%) compared to controls.

4. The spatial dynamics of the HIV epidemic

While data on the epidemic in the country is both largely scarce, the holistic view of the HIV scourge would not be complete without an appraisal of its spatial dynamics. During the first decade or so of the epidemic, data on its distribution was largely unavailable due to low uptake of HIV diagnoses. This trend has more or less been retained across the country. However, Kerina et al. [33] have reported that Matabeleland North and Matabeleland South Provinces have maintained, over an undetermined period, high HIV prevalence figures (18% and 21%, respectively, compared to a national average of 21% in 2013), which were attributed to the provinces' proximity to Botswana – one of the hardest hit countries in Southern Africa. In the Mashonaland regions, Mashonaland East Province had the highest prevalence in 2013 (16% against the national average of 21%), followed by Mashonaland West Province and Midlands (15%), then Mashonaland Central and Manicaland Provinces (14% each), then lastly Harare Province (13%) [33]. While testing for HIV has increased over the past few years, there is no consolidated record of its spatial dynamics across the country. Of note, is the fact that urban centres and business districts (popularly referred to as 'growth points') across the country were associated with the spread of HIV due to high levels of prostitution and related social activities. Additionally, a number of reports have implicated major transport routes as having had high HIV incidence and prevalence rates due to the high levels of prostitution/promiscuity that are associated with truck drivers across the Southern African

region [34]. The epidemic at was largely heterogeneous, with HIV prevalence in small towns, farming estates and mines located in rural areas (22%) exceeding that in the major cities (14.5%) in 2013 [33]. Harare Province may have had the lowest prevalence (in 2013) due to the concentration of unequivocal concentration of resources and campaigns in the capital city compared to the rest of the country. The paucity of data that has characterised the epidemic has not provided clues as to the spread of the epidemic from the initial points of infection (which are largely unknown). The scanty data available sheds light more on the temporal than the spatial dynamics of the epidemic. The drivers of the epidemic have remained the same across Southern Africa, particularly in places of high population densities, high levels of poverty, and along the transport routes.

4.1. HIV in Zimbabwe: a feminised epidemic?

While there could have been differences in the HIV infection trends in terms of age and sex across the country, such trends have been blurred by a paucity of data on such attributes. What has been notable is that the epidemic adopted a feminised character, as shown by the recent higher national HIV prevalence rate among women (18%) than in men (12%) in 2011 (all ages) [28]. The 2011 HIV prevalence rate for the young adults group (15–24 year olds) was 5.5%, with 7.8% prevalence among females and 3.6% among males [28]. Furthermore, younger HIV positive adult women (15–24 years of age) in the country were shown to be 6.7 times more likely to have 2 or more sexual partners concurrently (31.1% in women vs 4.8% in men) and 1.7 times more likely not to use a condom (8.9% in women vs 5.2% in men) [28]. Gregson et al. [7] showed that young women were more likely to form partnerships with men 5–10 years older than themselves, whereas young men had relationships with women of a similar age or slightly younger. However, a study by the ZDHS (2011) [28] showed that in HIV positive adult men (15–49 years) were more likely (62.0–92.0%) to have concurrent sexual partners than women (50.3–57.8%), with the level of risk increasing with age. A similar relationship was observed in a study by Mavhu et al. [35] (37.1% in men compared to 7.3% in women). The data presented here show the great impact of social factors on the spread of HIV in the population, with females having been more prone to catching the virus than men.

4.2. The role of HIV in decision making and functionality

Infection with HIV is widely known to be associated with increased neurocognitive impairment [36,37]. HIV-associated neurocognitive impairment is known to impact negatively on decision making [38], functionality [38] and adherence to treatment [39]. Furthermore, major mental disorders were shown to be significantly associated with most HIV-AIDS risk behaviours [40]. While several studies have established the link between infection with HIV and neurocognitive impairment, and hence impaired decision making and functionality, no studies have reported the effect of this phenomenon on the epidemic in Zimbabwe. Inferences can be made, which may point towards reduced productivity due to loss of experienced labour force due to HIV related mortality, and loss of productive hours due to HIV related illnesses. The effect of HIV on decision making and functionality can be reflected by the increased risky sexual behaviour that is shown to be associated with HIV infected individuals [28].

4.3. Risky sexual behaviour and HIV

Gregson et al. [7] found that a greater proportion of lifetime partners were associated with increased risk of HIV (odds ratio

1.03 [95% CI 1.00–1.05]). Older age of sexual partner was associated with increased risk of HIV-1 infection in men (odds ratio 1.13 [95% CI 1.02–1.25]) and women (1.04 [1.01–1.07]) [7]. A study by Latif et al. [15] revealed that infidelity in long-term heterosexual relationships increased the risk of transmission of HIV in those unions. The Latif et al. [15] study also showed that a greater proportion of men reported having sexual intercourse with multiple heterosexual partners and female prostitutes, and a history of sexually transmitted diseases (STDs). Additionally, the Latif et al. [15] study reported that wives of HIV infected men who had a history of STDs were more likely to be seropositive. However, the Latif et al. [15] study reported 40% sero-discordancy in wives of HIV infected men. In a modelling study on sero-discordancy in stable HIV sero-discordant couples (SDCs), Chemaitelly et al. [41] reported, that SDCs accounted for 29% (mean contribution) and a threshold of 50% of all new HIV infections in Sub-Saharan Africa.

4.4. The role of traditional medicine on HIV

The colonial government of Zimbabwe (then called Rhodesia) concentrated resources to the country's allopathic medical sector. The attainment of the country's independence in 1980 saw the formation of an association of traditional healers (Zimbabwe National Traditional Healers Association (ZINATHA)), which marked the birth of a long antagonistic relationship between allopathic and traditional medicine in the country [42]. The use of traditional medicine in the management of HIV has been noted across the country, but no reports have either quantified the use of these medicines or provided clues as to when the use of such medicines was initiated. The recent years have seen an increase in visits to traditional healers by HIV infected people in the country as a result of high cost of allopathic medicine in the country. A number of natural medicines from the African natural environment, including the African potato (*Hypoxis obtusa*), are commonly used in the country as complementary herbal remedies for HIV/AIDS [43] and to treat HIV-associated opportunistic infections [43,44]. *Hypoxia obtusa*, which is rich in glucosides, sterols and sterolins, has been shown to have potential antiretroviral properties [45]. Extracts of *Plectranthus barbatus*, a herb which is widely used in African countries as a complementary remedy to manage HIV/AIDS and related conditions, were shown to inhibit the protease activity of HIV-1 (inhibitory concentration/IC₅₀) = 62.0 µg/ml [44]. A study by Gwaza et al. [43] demonstrated that co-administration of *H. obtusa* with mainstream ART drugs does not alter the pharmacokinetics of the latter (e.g. lopinavir/ritonavir). While the pharmacokinetic data on traditional medicines is starting to emerge, the effect of such medicines on the trends that have characterised the epidemic in the country have not been reported. While the concurrent use of traditional medicines with orthodox medicines has been reported in Kenya [46], information on any interactions between them have not been reported among HIV patients in Zimbabwe. Studies should therefore be conducted to determine these drug–drug interactions.

4.5. The Millennium Development Goals (MDGs): counting the gains and losses

As pertains UN's Millennium Development Goals (MDGs), the country committed herself to satisfy Goal 6, namely (a) to have halted by 2015 and begun to reverse the spread of HIV/AIDS and (b) to have achieved, by 2010, universal access to treatment for HIV/AIDS for all those who needed it. The country achieved 95% PMTCT coverage in 2013. There have been marked reductions in HIV prevalence and incidence until 2010. However, the recent 8% increase in HIV prevalence may set a trend to reverse the gains recorded up to 2010. Significant gains were also recorded in

condom use, awareness of the disease, HIV testing and the uptake of ART in the adult population, however access of the drugs by children remains low. Furthermore, the country built enough capacity to ensure that 100% safety of blood transfusions. However, there is still a lot of room for improvement to the HIV prevalence and incidence, and HIV-associated mortality beyond the targets set under the MDGs.

5. Discussion

A number of reports have noted that the country's 'first case' of AIDS was detected in a 'Northern District' in 1985. It remains unclear, however, if the disease had not taken hold in the population well before this 'official' first case. The sexually transmitted disease (*runyoka* in Shona or *ulunyoka* in Ndebele), which is linked to *witchcraft* in the country and presented with similar 'AIDS-like' symptoms and progression rate, may have been a result of HIV that may have spread undetected.

As the count-down to the 2015 deadline for the United Nation's Millennium Development Goals nears zero, taking stock of the successes and failures of the HIV epidemic is a noble cause that was spearheaded by this article. We have shown that the overarching strategy to push HIV incidence and prevalence rates down, or better to zero, during the post-2015 era, should be centred on augmenting all strategies for HIV prevention. The exponential increases in HIV prevalence (65-fold) and incidence (13-fold) during the first 5 years of the epidemic (1985–1990s) (Fig. 2) are widely linked to risky sexual behaviour [7,8], as demonstrated by high prevalence of STIs at the time [48]. Other indicators for risky sexual behaviour included low condom use [31,48] and a high rate of unintended pregnancies [30,49] in the population. A number of studies have implicated sexual behaviour as a key factor behind the observed changes in the country's HIV epidemic [10].

The recent fall in the HIV prevalence rate and HIV-associated mortality (Fig. 2) in the country is widely linked to greater access to ART by eligible HIV infected individuals [11]. A number of studies have linked increased uptake of ART (Fig. 3) to a reduced rate of progressive immunosuppression in HIV infected individuals [50–52], and a delay in the appearance of AIDS-defining illnesses [53] and a reduction in the risk of death [9]. The country attained 95% coverage in her adult ART programme (Fig. 3) and only 41% for her paediatric HIV patients (41% in 2013) (Fig. 5) [14]. The widespread use of ART in the 2000 is shown to have led to recovery in the country's life expectancy from an all-time low of 45 years in the early 2000s to 58.8 years in 2015 (Fig. 4). While the widespread use of ART in the country is widely associated with reduced HIV-associated mortality, studies in Sub-Saharan Africa have shown that mortality rate with combination ART has remained higher than that of the general population [9].

This study also revealed that the HIV epidemic in the country has major gender and age biases that have potential to influence the course of the epidemic [8]. Adult men (15–49 years) were shown to have higher propensity for risky sexual behaviour than their female counterparts, with the level of risk increasing with age [8]. However, the ZDHS (2011) [8] study also showed that younger HIV positive female adults (15–24 years of age) had 6.7 times greater chance of engaging in sexual risks and were 1.7 times less likely to use a condom than men in the country. Additionally, younger women were more likely to form partnerships with men 5–10 years older than themselves, whereas young men were more likely to form relationships with women of a similar age, or who were slightly younger [7]. Additionally, women can transmit HIV to their children during pregnancy, labour, delivery and breastfeeding (vertical transmission), which act as extra feeds to the HIV transmission chain [54–57]. However, there is a silver lining underneath the MTCT cloud, since the high uptake of PMTCT

(95% in 2013), if it can be upheld or improved, is has a potential to reduce MTCT by approximately 87% [11].

The past three decades have been marked by HIV awareness campaigns across the country, which are now widely believed to have significantly reduced the HIV incidence rates [18]. Naturally, as incidence rates fell from the mid-1990s onwards, the prevalence rate would start to fall sooner or later depending on a number of HIV specific factors including its incubation period, latent period and infectiousness, and human population specific factors including nutrition and sexual behaviour. During the early years of the epidemic (1990s–2000s), awareness campaigns were visible and audible across all forms of media in the country [10]. The high HIV-associated mortality during the early years of the epidemic, which peaked to approximately 1.4% by 2003, could have helped drive the awareness campaigns' message home. In the 2000s, the high AIDS death rate (approximately 336 lives per day) generated widespread anguish and panic, which in turn reinforced awareness in the population.

The country's traditional medical sector needs reappraisal. Complementary and alternative medicines (CAM) are known to have great potential for use as therapy against any disease. However, such a potential is greatly suppressed by secrecy [58] and lack of scientific evidence [44] which characterise traditional medicine in the country. There is a great possibility for toxicity when CAM is combined with allopathic ART, with major implications on one's health. Only a handful of studies have, demonstrated the activities of a few plants that are used to treat HIV and associated infections in Southern Africa, namely the African potato (*Hypoxis obtusa*) [43], *Plectranthus barbatus* [47] and *Tylosema esculentum* (marama beans) [44].

There is need to augment behavioural strategies with other approaches such as pushing for a delay in the onset of first sex, reduced concurrent sexual partnerships, and an increase in condom use [59–61] to reduce the rate of new infections or reinfection. Like any epidemic, the HIV epidemic in the country is a product of culturally determined limitations and opportunities [62,63]. Certainly, the awareness campaigns that were initiated at every level of the country's social organisation, played a crucial role in influencing changes in sexual behaviour, which in turn led to significant reductions in both HIV incidence and prevalence in the 1990s [64,65]. The fact that the country has met the UN's Millennium Development Goals (MDGs) should not be a basis for complacency. Besides, the recent 8% increase in HIV prevalence may have set a trend to reverse the gains recorded over the last two decades.

5.1. Conclusion

While there are many reports on HIV/AIDS research in Zimbabwe, there are apparent gaps in the country's HIV data. Clearly, the observed epidemiologic trends, and hence the claimed successes in the country's fight against HIV/AIDS, given the gaps in the epidemiological data, have important weaknesses. There is evidence of widespread use of traditional medicines in the management of HIV infections, but no studies have assessed the efficacy of the compliment of such medicines. The epidemic has affected people variably depending on age and gender, with the female members of the society and children having been unequivocally affected. The epidemic also affected regions of the country differently, with the highest rates having been in Matabeleland Province. Transport routes and growth centres have also been implicated in the spread of HIV. Notably, Zimbabwe has scored significant gains in the uptake of HIV testing and ART in the adult population, and uptake of PMTCT among HIV infected pregnant women. However, the uptake of HIV testing and ART among children/adolescence has remained low. Overall, the high

mortality that has characterised the epidemic may have underscored the recent declines in the prevalence rate. The HIV epidemic in the country has therefore adopted a dynamic character that is in tune with the inherent epidemiological, social, economic and political factors. To fill in the gaps, more research is encouraged. To reduce HIV infections in the country, especially where complex heterosexual partnerships abound, and where males are the dominant members of the society, there is need to adopt a more holistic approach that views the epidemic as an organism that is evolving in space and time.

Conflict of interest

None declared.

Financial disclosure

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