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# Obstacles and Proposed Solutions to Effective Antiretroviral Therapy in Resource-Limited Settings

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More than 3 million people were receiving antiretroviral therapy (ART) at the end of 2007, but this number represents only 31% of people clinically eligible for ART in resource-limited settings. The primary objective of this study is to summarize the key obstacles that impede the goal of universal access prevention, care, and treatment. We performed a systematic literature search to review studies that reported barriers to diagnosis and access to treatment of HIV/AIDS in resource-limited countries. Persons living with HIV/AIDS commonly face economic, sociocultural, and behavioral obstacles to access treatment and care for

HIV. A variety of programs to overcome these barriers have been implemented, including efforts to destigmatize HIV/AIDS, enhance treatment literacy, provide income-generation skills, decentralize HIV services, promote gender equality, and adopt a multisectoral approach to optimize limited resources. An understanding of these obstacles and suggested methods to overcome them must be addressed by global policy makers before universal ART access can be achieved.

**Keywords:** AIDS; ART; barriers; HIV; resource-limited

## Introduction

The earliest cases of HIV/AIDS were detected in 1981 in hospitals in the United States, in the Democratic Republic of the Congo, and on the shores of Lake Victoria, East Africa.<sup>1</sup> By 1985, cases were reported in every region of the world and the HIV epidemic spread rapidly. The 2008 progress report by the World Health Organization (WHO) estimated that by the end of 2007, 33.2 million people were living with HIV, of whom 2.1 million were children.<sup>2</sup> In the same year, an estimated 2.5 million new people were infected with HIV and 2.1 million people died from AIDS. The worldwide epidemic has caused

unprecedented suffering, debilitation, loss of life and disruption of family, and social and economic instability, especially in developing countries which are most affected by the virus.<sup>3,4</sup>

Antiretroviral therapy (ART) has reduced the morbidity and mortality due to HIV/AIDS and improved the quality of life of people living with HIV/AIDS (PLWHA).<sup>5,6</sup> Properly treated, HIV/AIDS can be a manageable, chronic illness rather than a life-threatening condition.<sup>7</sup> Although the development and use of ART has transformed the prognosis for PLWHA in developed nations, serious limitations in access to ART remain in resource-limited countries. According to the 2008 WHO progress report, ART was available to only 31% of the clinically eligible HIV-infected population in resource-limited countries.<sup>2</sup> A worldwide consensus has emerged on the need to fight HIV/AIDS with a comprehensive response including prevention, treatment, care, and impact mitigation.<sup>8</sup> In late 2003,

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WHO and the Joint United Nations Program on HIV/AIDS launched the time-delimited “3 by 5” initiative to ensure treatment to 3 million PLWHA in resource-limited countries by 2005. Although behind schedule, the world met the “3 by 5” target by the end of 2007.<sup>2</sup> At the United Nations General Assembly Special Session on HIV/AIDS (UNGASS) in 2006, countries committed to reaching as close as possible to the goal of universal access to HIV prevention, care, and treatment by 2010. Only 31% of people in need of therapy in the resource-limited countries received ART by the end of 2007, and uncertainty exists whether the 2010 goal for universal access will be achieved.<sup>2</sup> Our primary objective is to summarize the key obstacles that impede the universal access goals and offer pragmatic solutions.

## Methods

We performed a systematic search of the literature using PubMed (the US National Library of Medicine) to identify studies reporting barriers to diagnosis and access to treatment of HIV/AIDS in resource-limited settings. We used the search terms “HIV,” “AIDS,” “access,” “barriers,” “impediments,” “obstacles,” “antiretroviral therapy,” “resource-limited,” “low-income,” and “middle-income.” In addition to searches on PubMed, we also searched for abstracts presented at the International AIDS Society Conferences on HIV Pathogenesis and Treatment and the International AIDS Conference (IAC) from 2001 onwards using the search terms mentioned above. Only studies that were published in 1996 or after and those that presented primary data on barriers to accessing care and treatment for HIV/AIDS in developing countries<sup>9</sup> were included. The year 1996 was chosen because the highly active ART for HIV/AIDS became available for use during that year.<sup>10,11</sup> Editorials, reviews, and letters to editors were excluded. In addition, studies that presented barriers to adherence to ART and those performed in resource-rich or developed nations were also excluded.

Information from the studies was abstracted in a standardized manner as follows: (1) journal citation information; (2) region; (3) sample size and characteristics; (4) reported barriers to appropriate ART use; and (5) potential solutions offered to overcome barriers. The data on barriers and solutions were categorized into 3 main groups: economic, sociocultural, and behavioral. Economic issues were further

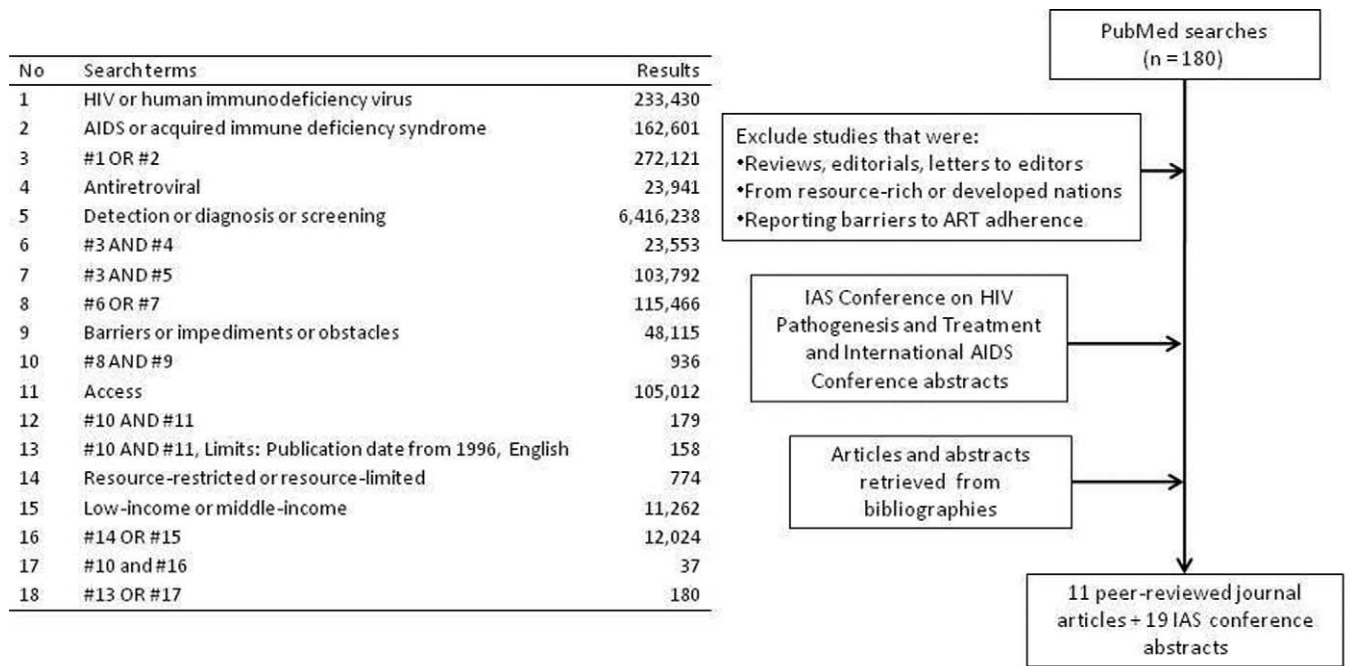
classified: (1) relating to costs and poverty; and (2) infrastructure and lack of resources. Sociocultural issues were further divided into 2 main subcategories: (1) stigma and fear of discrimination; and (2) traditions and social norms. Behavioral issues mainly pertained to individual beliefs that prevented people from seeking treatment. Given the descriptive nature of data reported in these studies, we elected not to undertake a formal quantitative analysis (eg, meta-analysis) of the combined set of studies.

To assess the validity of the findings from the literature review, we sought to collect data across countries on some economic and epidemiologic indicators such as HIV prevalence, ART coverage in terms of percent adults and children with advanced HIV infection receiving ART, AIDS spending, and the gross domestic product (GDP). The data on AIDS spending and ART coverage were obtained from the progress reports submitted by UNGASS member countries toward the achievement of the Millennium Development Goals through the globally agreed UNGASS indicators.<sup>12,13</sup> The data on HIV prevalence and the GDP for each country were obtained from the World Bank.<sup>14</sup> Only those data that were reported in English were collected. For each variable (indicator), the best available and most recent estimate was used. We performed correlation and simple univariate regression analyses on these data using Stata 9 and Microsoft Excel software.

## Results

Figure 1 summarizes the literature search that was performed to identify relevant studies. Thirty relevant studies were identified, of which 11 were in peer-reviewed journals<sup>15-25</sup> and 19 were in conference abstracts.<sup>26-44</sup> The earliest studies included in this review were from 2004, reflecting a greater emphasis on research in this field after major initiatives were undertaken (such as “3 by 5” by the WHO and the President’s Emergency Plan for AIDS Relief [PEPFAR]) to increase ART access in resource-limited countries. Among the 30 studies, 21 were from Africa,\* 6 from east/southeast Asia,<sup>18,24,25,31,35,43</sup> 2 from North America, including 1 each from Mexico<sup>17</sup> and Jamaica,<sup>37</sup> and 1 from Latin America.<sup>38</sup>

\* References 15, 16, 19-23, 26-28, 30, 32-34, 36, 39-42, 44.



**Figure 1.** Literature search. This figure shows a table of search terms, number of citations resulted from each term, and flow diagram to obtain relevant studies for the literature review.

The data collection methods described in the papers comprised mostly of interviews (22 studies),<sup>†</sup> surveys (7 studies),<sup>16,27,29,34,39,40,42</sup> review of clinical data (7 studies),<sup>18,20,22,27,31,36,38</sup> and focus-group discussions (6 studies).<sup>21,23,28,32,42,43</sup> Respondents included PLWHA with/without ART (22 studies),<sup>‡</sup> noninfected people including elders, teenagers, and university students (11 studies),<sup>§</sup> health care workers including nurses, doctors, social workers, laboratory technologists (7 studies),<sup>15,21,25,28,30,42,43</sup> family members and/or friends of PLWHA (5 studies),<sup>17,19,21,25,43</sup> traditional healers (1 study),<sup>21</sup> and representatives of nongovernmental and community-based organizations (NGOs and CBOs; 1 study).<sup>28</sup>

### Obstacles to Detection and Access to Treatment Against HIV

Tables 1, 2, and 3 list the obstacles to ART access that were reported and the suggested solutions by the authors.

<sup>†</sup> References 15, 17, 19, 20, 22-28, 30-33, 35, 37, 38, 41-44.

<sup>‡</sup> References 15-26, 28, 29, 31-33, 35, 37, 38, 41, 43.

<sup>§</sup> References 21, 23, 25, 27, 33, 34, 36, 39, 40, 42, 44.

*Economic issues.* Extreme poverty and insufficient resources remain key issues in resource-limited regions. In such settings, PLWHA have difficulty buying or producing enough food to maintain normal caloric balance. Respondents also indicated challenges associated with taking time off from work and associated lost wages to attend regular clinic visits for treatment.<sup>24,25,31</sup> Long commutes to treatment centers also resulted in lost work wages and other income-generating opportunities.<sup>24</sup> Inconsistent supply of drugs and breaks in the supply chain caused interruptions in treatment.<sup>16,30</sup> Although free or discounted ART was available, some respondents claimed difficulty in affording the costs of laboratory testing, which is a prerequisite for the treatment.<sup>17,31,41</sup> Some studies reported an insufficient number of laboratories and poor quality equipment.<sup>30</sup> These factors may delay testing and obtaining results, which further prevented the timely initiation of ART. Lack of coordination among services, some of which are part of the ART programs (eg, testing and counseling, physician clinics and drug pharmacies, preventing mother-to-child transmission and family planning services, and the CBOs and faith-based organizations [FBOs]), also impeded optimal management.<sup>15,19,30,44</sup>

**Table 1.** Economic Issues

Issues	Solutions
<b>Costs and poverty</b>	
<ol style="list-style-type: none"> <li>1. ART and care in general are perceived to be expensive and out of reach for all but the most wealthy, even if free or heavily discounted care is available.<sup>**</sup></li> <li>2. Costs of laboratory testing are unaffordable<sup>19</sup> (even though ART is available for free, patients cannot afford the cost of laboratory testing which might be prerequisite for free ART).<sup>17,31,41</sup></li> <li>3. Loss of wages due to routine clinic visits.<sup>24,25,31</sup></li> <li>4. It is difficult to meet the expenses associated with treatment including transportation to the hospital for regular appointments<sup>23</sup> and supplementary food.<sup>15,23,33</sup></li> <li>5. Living in collective housing and poor living conditions such as no access to tap water, no refrigerator.<sup>22</sup></li> <li>6. Lost job since HIV diagnosis.<sup>22</sup></li> </ol>	<ol style="list-style-type: none"> <li>1. Drugs and routine laboratory monitoring tests should be made more affordable.<sup>16,25</sup> Care facilities can offer credit to patients.<sup>25</sup></li> <li>2. Strategies will need to focus on economic empowerment of seropositives.<sup>37</sup> Offering food and cash supplements for patients and their families might help.<sup>23</sup></li> <li>3. Income generation and skills-building projects to offer ongoing support.<sup>23,41</sup></li> <li>4. An effective response involving a multisectoral approach to meeting the needs of PLWHA, weighing the social and economic costs associated with providing care and treatment against the benefits.<sup>16</sup></li> </ol>
<b>Infrastructure</b>	
<ol style="list-style-type: none"> <li>1. Lack of sophisticated facilities and sufficient resources.<sup>21,25,33,36,37,43,44</sup></li> <li>2. Lack of awareness and insufficient HIV/AIDS training for service providers.<sup>25</sup></li> <li>3. Paucity of laboratory facilities for ART<sup>33</sup> and HIV/AIDS disease monitoring, thus prompting long distances travelled<sup>24</sup> and greater delay in obtaining results.<sup>17,30</sup></li> <li>4. Lack of consistent supply of drugs and other laboratory materials.<sup>30</sup></li> <li>5. Long distances to travel to care facilities<sup>15-17,31,33,42,44</sup> and long waiting lines,<sup>36</sup> resulting in exhaustion and hunger for patients, particularly in combination with journey times.<sup>23</sup> ART is being offered only at certain clinics which might be inaccessible to a large number of people needing care.<sup>21</sup></li> <li>6. Lack of advertisement for HIV/ART clinics offering free treatment.<sup>19</sup></li> <li>7. Lack of collaboration and consistency across different service providers, particularly community-based organizations, HIV testing services, PMTCT and ART programs, and family planning services.<sup>15,19,30,44</sup></li> </ol>	<ol style="list-style-type: none"> <li>1. Funds should be made available to increase ART coverage.<sup>31,33</sup></li> <li>2. Transportation to care centers might be offered through ART program.<sup>23</sup> Development of adequate laboratory infrastructure for ART and HIV disease monitoring should precede the ongoing scaling-up of ART programs to expedite the uptake and also to avoid collapse of the ART scaling-up mid-way into implementation.<sup>30</sup></li> <li>3. Efforts should be directed toward developing efficient procurement mechanisms and supply management programs.<sup>16</sup></li> <li>4. Decentralization of treatment and care and making treatment available at local facilities.<sup>15,23</sup></li> <li>5. ART programs should be publicized with far-reaching media such as radio<sup>16</sup> and using local languages.<sup>15</sup></li> <li>6. Collaborating with experts from other successful programs such as a tuberculosis program would help in expanding ART programs in all directions.<sup>44,45</sup></li> </ol>

Abbreviations: ART, antiretroviral therapy; PLWHA, people living with HIV/AIDS; PMTCT, preventing mother-to-child transmission.

**Sociocultural issues.** Stigma and fear of discrimination were reported as major challenges to HIV screening and access to ART. People living with HIV/AIDS experience the fear of isolation and discrimination and sometimes run a risk of losing their jobs upon diagnosis/disclosure of HIV.<sup>15</sup> In some cultures, support from families and communities for PLWHA was limited or nonexistent. In some instances, PLWHA have received negative reactions from FBOs.<sup>21</sup> For example, people in the community

have been unwilling to sit next to PLWHA during services or refused to discuss the cause of death at funerals if AIDS was the cause of death.

The legacy of apartheid in Africa made many people and government leaders suspicious about any knowledge or treatment regarding HIV that was derived and communicated from Western sources.<sup>21</sup> In addition, lack of willingness to break social traditions led many people to trust approaches advocated by their traditional healers more than the approaches endorsed by Western medicine.<sup>24</sup> Antiretroviral therapy access was especially difficult for people

\*\* References 15, 16, 19, 22, 23, 25, 27, 29, 33, 35, 41, 43.

**Table 2.** Sociocultural Issues

Issues	Solutions
<b>Stigma and fear of discrimination</b>	
<ol style="list-style-type: none"> <li>1. Pervasive stigma around HIV and discrimination.<sup>23,25,28,36,42,43</sup></li> <li>2. Lack of social and family support.<sup>16,23,29,31,43</sup></li> <li>3. Resistance to getting tested and seeking treatment for fear of being seen at the clinic,<sup>16,21,27</sup> especially the nearest one because of possible abandonment,<sup>19,32</sup> violence,<sup>29</sup> or unemployment.<sup>15</sup></li> <li>4. Negative reactions experienced in faith-based organizations such as refusing to sit near a PLWHA during services or refusing to allow the cause of death to be discussed at funeral if it was AIDS.<sup>21</sup></li> </ol>	<ol style="list-style-type: none"> <li>1. Promoting family and community support for HIV-infected members.<sup>23</sup></li> <li>2. Better education of communities and health care workers on HIV and ART to reduce stigma<sup>23</sup> and engender hope in communities.<sup>15</sup></li> <li>3. Intensification of community sensitization to curb stigma and discrimination.<sup>28</sup></li> <li>4. Emphasizing where HIV-infected persons have received support or found experience of ART better than expected.<sup>23</sup></li> </ol>
<b>Health care system deficiencies</b>	
<ol style="list-style-type: none"> <li>1. Refusal of care by a physician.<sup>24</sup></li> <li>2. Hospital was seen as impersonal, difficult to negotiate, and intimidating to rural people.<sup>23</sup></li> <li>3. Staff was poorly trained<sup>21,42</sup> and did not respect confidentiality;<sup>15,42</sup> were impolite, judgmental, and unresponsive<sup>36</sup>; did not speak local languages; and sometimes demanded bribes for access to services.<sup>23</sup></li> <li>4. Hospitals would deny treatment to certain patients once they were past a certain stage of illness progression.<sup>21</sup></li> <li>5. Counselors were sometimes indifferent, insensitive, or unknowledgeable.<sup>21</sup></li> <li>6. Occasional favoritism in the allocation of ART.<sup>21</sup></li> <li>7. Donor influence on drug regimens.<sup>19</sup></li> <li>8. No access to treatment because of the following: <ol style="list-style-type: none"> <li>a. Availability to treatment through workplace insurance making access time-dependent<sup>17</sup></li> <li>b. Being wait-listed<sup>17</sup></li> <li>c. Insurance schemes—only those schemes for civil and government or private employment or being self-paid assures access to treatment.<sup>18</sup></li> </ol> </li> <li>9. Fear of getting fake or substandard ART if the program is expanded.<sup>16</sup></li> </ol>	<ol style="list-style-type: none"> <li>1. Improved training of service providers on HIV/AIDS.<sup>32</sup></li> <li>2. Efforts need to be focused on breaking the traditional paternalist view of the physician's role, in which the patient is expected to submit himself or herself to the directives and authority of the physician without questioning, sharing his or her opinion, or seeking other opinions.<sup>17</sup></li> <li>3. Training of treatment support workers to help explain the role of ART and support and encourage people on ART.<sup>32</sup></li> <li>4. Models which provide a nondiscriminatory environment, effective counseling, affordable treatment, and which involve the participation of PLWHA should be initiated.<sup>43</sup></li> <li>5. The path from HIV testing to treatment and ongoing care must be a "seamless path" that is better coordinated and easier for patients. Integrated referral systems must be developed to support this path.<sup>15</sup></li> <li>6. Standards should be developed and adhered to across the range of activities and services necessary to provide HIV treatment, regardless of location as emphasized by WHO.<sup>16</sup></li> <li>7. The drug supply chain for the ART program should be enhanced for optimum conditions of implementation to allay the fear of the patients about the quality of the drugs.<sup>16</sup></li> </ol>
<b>Traditions and social norms</b>	
<ol style="list-style-type: none"> <li>1. More trust in traditional healing medicines.<sup>24</sup></li> <li>2. Legacy of apartheid might be causing government leaders and ordinary citizens alike to be suspicious of information about HIV, AIDS, and ART coming from Western sources.<sup>21</sup></li> <li>3. Belonging to a vulnerable group such as prisoners, young people, orphans, rural, and lower educational populations.<sup>15</sup></li> <li>4. Belonging to remote nomadic communities.<sup>44</sup></li> </ol>	<ol style="list-style-type: none"> <li>1. To complement the efforts of the government on the ART program, community-, and faith-based organizations need to be involved and encouraged to carry out large scale, effective psychosocial interventions with far-reaching effects into local rural areas.<sup>16,36</sup></li> <li>2. Community-based interventions aimed at deconstructing male sexual roles and behavior, empowering women, and prompting early testing should be implemented.<sup>32</sup></li> </ol>
<b>Gender inequalities</b>	
<ol style="list-style-type: none"> <li>1. Lack of woman-specific counselors and information and gender bias against women.<sup>34,42</sup></li> <li>2. Women may have a harder time leaving their household duties.<sup>24,34</sup></li> <li>3. Women thought they would need permission from partners to start therapy.<sup>34</sup></li> <li>4. Women may fear abandonment or violence if they disclose their status as stigma and discrimination is worse for them.<sup>29</sup></li> <li>5. Being nonreproductive or not desiring children.<sup>38</sup></li> </ol>	<ol style="list-style-type: none"> <li>3. Increased collaboration between government and civil society and strengthening involvement of communities, especially PLWHA in program planning process.<sup>28</sup></li> <li>4. Antiretroviral therapy should be made more accessible for people belonging to vulnerable groups.<sup>15</sup></li> <li>5. Adequate provision of therapy for females in childbearing age in the population will go a long way in controlling the spread of HIV.<sup>16</sup></li> <li>6. Educating young people with scant knowledge of the mechanisms of HIV transmission and ways to avoid the infection would be very effective in controlling the spread of the virus.<sup>16</sup></li> </ol>

*(continued)*

**Table 2.** (continued)

Issues	Solutions
Media	
Negative images of people dying from AIDS-related causes presented in the media. <sup>15</sup>	Media should promote positive images of people starting to feel better with ART. <sup>15</sup>
Jealousy	
People with other major illnesses such as hepatitis, leukemia, etc, feel that it is unfair to offer free or discounted health care only to PLWHA and not to the people with other illnesses. <sup>25</sup>	

**Table 3.** Behavioral Issues

Issues	Solutions
Personal enabling factors	
1. Patients would not seek care unless they have severe illness. <sup>16,17,25</sup>	1. Strong counseling that use multiple channels and target entire communities should be implemented. <sup>29</sup>
2. Not considering oneself at risk, <sup>40</sup> refusal to be tested <sup>22</sup> , fear of terminal diagnosis <sup>32,40</sup> , disbelief in test result. <sup>16</sup>	2. Sexual and reproductive health education emphasizing vulnerability to HIV infection in the community must be given to the population in the prime working age of 15 to 49 years. <sup>16</sup>
3. Perception of HIV as a different type of disease. <sup>42</sup>	3. Health care institutions such as clinics and hospitals should vigorously encourage PLWHA to contact other HIV-positive individuals, groups and organizations of HIV-positive people to increase the exchange of advice, strategies, experiences and successes. <sup>17</sup>
4. Difficult to leave home due to family responsibilities. <sup>24</sup>	4. Increased access to treatment and care must be linked with prevention. Reinforcing and strengthening prevention efforts will help avoiding the dilemma emphasized by the WHO in which the benefits of reduced morbidity and mortality among PLWHA have been undermined by rising infection rates. <sup>16</sup>
5. Being the head of the household, receiving treatment is unaffordable in lieu of other family responsibilities. <sup>15,22</sup>	5. Family members can be a motivation and a reason for living (seeking treatment) for PLWHA. <sup>17</sup>
6. Instability and mistrust in partner relationship. <sup>39</sup>	6. Psychosocial support should be more readily available to people on ART, preferably through clinics and in the community, to support treatment, encourage prevention, and help in dealing with personal losses and finding motivation for the future. <sup>15</sup>
7. Requirement of a "treatment buddy," <sup>23</sup> attending a support group <sup>21</sup> (issues with disclosing the HIV serostatus <sup>22,26,29,43</sup> ).	
8. Alcohol consumption. <sup>20,21</sup>	
9. Mental health problems such as depression, loss of hope arising due to stigma, and discrimination. <sup>15</sup>	
10. Fear of being used as "guinea pigs" by the medical practitioners and herbalists claiming to have a cure. <sup>16</sup>	
Lack of knowledge/misinformation	
1. Having a doubt that HIV causes AIDS. <sup>21</sup>	1. Providing knowledge to people about the disease, treatment and its impact on life and changes needed to make in their general lifestyle <sup>15</sup> using far-reaching media such as radio. <sup>16</sup>
2. No or low awareness and knowledge about HIV/AIDS and its prevention. <sup>42</sup>	2. Sensitization of communities regarding HIV/AIDS with an increased frequency and varying methods of information dissemination. <sup>42</sup>
3. No or low awareness of treatment availability <sup>22,23,42</sup> and free drugs. <sup>15,16,24,28,39,43</sup>	3. To improve treatment education, health professionals could implement strategies that involve groups of individuals with similar challenges. For example, health services could design interventions for specific groups such as, women with young children, depressed men or women or individuals dealing with addictions. <sup>17</sup>
4. Lack of knowledge regarding existence of ART. <sup>16,24,35,41</sup>	4. Better communication between health care officials and patients to aid information <sup>17</sup> and knowledge sharing. <sup>15</sup>
5. Lack of knowledge of laboratory (CD4 T-cell counts and viral load) testing. <sup>22,24,40</sup>	5. Knowledge of HIV status in a socially supportive environment will be a significant motivator for individuals to seek ART just as positive perceptions about ART programs could motivate individuals seeking HIV testing and counseling. <sup>16</sup>
	6. Making people aware of the importance of adherence and commitment to taking drugs for lifetime. <sup>15,16</sup>

belonging to socially more vulnerable groups, such as prisoners, orphans, rural populations with lower educational levels, and remote nomadic tribes. In many societies, women suffered gender bias. Women were not involved in decision making and were financially dependent mostly on their partners or families. They faced a fear of potential domestic violence, which prevented them from disclosing their HIV serostatus to partners and families. Married women and those with children found it difficult to leave home and take time away from familial responsibilities to go to HIV clinics for treatment. Lack of counselors and staff oriented toward women's needs prevented some women from seeking help. Nonreproductive women or those who did not desire children faced inequitable access to care and treatment because of the social disrespect toward such women.<sup>38</sup>

Discouraging images in the media of the deaths of sick people with AIDS led some to believe that there was no cure to their condition, which caused them to avoid seeking care.<sup>15</sup> In places where care was available, a number of deficiencies existed in the system that intimidated people and kept them away from treatment. In some places, PLWHA have complained of favoritism in allocation of drugs.<sup>21</sup> The drug regimens offered in the care centers were influenced by the donor and were not clinically appropriate for all patients.<sup>19</sup> Some hospitals refused to treat patients once they were past a certain stage of severity in their illness.<sup>21</sup> In some instances, health care staff had been perceived as impolite and insensitive toward the problems faced by PLWHA.<sup>21,36</sup> The staff also lacked training in medical ethics, as there were complaints of breach of confidentiality from health care staff.<sup>15,42</sup> Members of a Chinese rural community talked about "jealousy" as a social issue; people having other major illnesses such as hepatitis and leukemia felt that it was unfair to offer free or discounted treatment for people with AIDS and not to the people with other severe illnesses.<sup>25</sup>

*Behavioral issues.* Lack of awareness is a major issue faced by PLWHA who do not have access to drugs. Many people have misconceptions regarding this disease and even doubt that HIV causes AIDS.<sup>21</sup> High numbers of people have not heard about ART and are unaware of the free or discounted treatment that is available to them. Those who are unaware of laboratory testing cannot meet the prerequisite to receive HIV treatment in some settings.

Many beliefs and feelings associated with health and health care have prevented PLWHA from receiving or seeking treatment. For example, some people have not seen a doctor because of their belief that the illness was self-healing and could be managed without treatment.<sup>16</sup> Some people, especially those who believed that they are not at risk for HIV, had reservations about testing for HIV or were fearful of a diagnosis with a poor prognosis.<sup>22,32,40</sup> Some have not sought treatment after being diagnosed with HIV because they lacked confidence in the test result.<sup>16</sup> Stigma-related fears of disclosing HIV status have prevented many people from enrolling into novel programs that enlisted "treatment buddies" and "support groups."<sup>21,23</sup> Comorbid conditions also infringed on care of HIV. Alcohol consumption and depression have been shown to be related to not receiving treatment.<sup>15,20,21</sup> Some people were fearful of being used as "guinea-pigs" or "subjects" in medical experiments.<sup>16</sup>

*Universal and regional issues.* The cost of drugs and laboratory testing were common issues discussed by PLWHA in all regions. Extreme poverty and poor living conditions were highlighted more commonly from sub-Saharan Africa. Infrastructure limitations such as a lack of adequate resources and sufficient training for staff were reported across all resource-limited countries in Africa, Asia, and North America.

Stigma and fear of discrimination are key concerns for African and Asian PLWHA populations. Traditions and social norms, including gender inequality, that impede access to treatment and care for HIV were highly prevalent in Africa and Asia. Health care system deficiencies indicating lack of social and civic awareness were evident across all regions. Personal characteristics such as not seeing a physician unless experiencing severe symptoms were found to be universal. Other personal issues related to the inability of disclosing one's HIV serostatus were particularly highlighted in Africa and Asia, where a strong stigma around HIV is persistent. Lack of knowledge of the disease and its treatment was a universal issue present across all regions.

### Solutions—What Has Been Done?

We aimed to document programs that are being implemented in resource-limited regions and which offer practical solutions to overcome the obstacles to effective ART. There are many challenges in

characterizing the multitude of responses to the problems of scaling-up access to ART. Moreover, we found it difficult to identify a publicly available data source that describes all organizations worldwide working on universal access and the benchmarking of their accomplishments against the goals. The HIV/AIDS Implementers' Meeting gathers together program implementers to share best practices and lessons learnt in the fight against global AIDS.<sup>46</sup> We searched the abstracts presented at the 2007 and 2008 Implementers' meetings with aforementioned search terms to obtain examples of programs implemented in various resource-limited regions. In addition, we also searched the abstracts presented at the 2008 IAC to obtain relevant examples. We only searched the latest conferences to obtain the most recent information. Herein, we have highlighted a few selected studies or initiatives taken to improve HIV care.

*Access to ART.* Jordan faced specific issues related to resources, sustainability, and PLWHA involvement in its HIV treatment programs.<sup>47</sup> As a result, the Jordanian National AIDS program sought assistance from the US Agency for International Development (USAID) to identify operational barriers to program implementation. The USAID Health Policy Initiative assisted the Jordanian Ministry of Health in establishing working groups to address barriers such as the high prices of medications. Private drug-importing companies and PLWHA were involved in the policy dialogue resulting in 2 major policy changes: (1) the national health scheme was amended to cover medications for HIV-related opportunistic infections, extending access to PLWHA who could not afford treatment; and (2) drug companies substantially reduced the price the government had to pay to import ART drugs.

*Alleviating poverty and economic empowerment.* Lack of education for many Nigerian women results in higher unemployment rates and subsequent increase in adopting prostitution as a means for subsistence living.<sup>48</sup> Lady Mechanic Initiative, a women's empowerment NGO, with support from the Mobile Telephone Network (MTN) Foundation in Nigeria, carried out a poverty alleviation project that sought to train women with technical skills required as an auto mechanic. Such programs would result in economic empowerment for women, boosting their self-confidence and making them less vulnerable.

*Decentralizing access to health services.* A District Health Management Team and its partners in an isolated region of Kenya designed a strategy to decentralize HIV services to peripheral health facilities.<sup>49</sup> A central hub was established at the district hospital. Weekly support involving clinical mentoring and technical assistance was provided to peripheral sites by a multidisciplinary team, including clinical officers, nurses, community health workers, and laboratory and pharmacy staff. Task shifting of nonmedical responsibilities to lay health workers allowed clinicians to focus on patient care. A systematic strategy toward decentralization significantly increased the number of ART sites and considerably increased the number of enrollees. Similar efforts in Uganda to decentralize laboratory services improved accessibility to clinics and reduced the turn-around times for laboratory testing.<sup>50</sup> More examples of task shifting are reported from Haiti<sup>51</sup> and Mozambique,<sup>52</sup> whereby mid-level clinical health providers, such as nurses, took up the responsibilities of managing less complicated cases, thereby leveraging their limited resources in an efficient manner.

Using data from pilot studies in 3 primary health care centers in Rwanda where nurses provided first-line treatment for HIV under the supervision of physicians, a simulation model was created to estimate the number and length of provider consultations.<sup>53</sup> The results of the simulation model demonstrated that task shifting can reduce the demand on physician time by 76%, allowing the Government of Rwanda to scale-up HIV treatment while limiting strain on the health care system. Physician time freed by task shifting could be used to manage complex HIV cases, improve the quality of HIV care, and deliver primary health care.

Project HEART is an Elizabeth Glaser Pediatric AIDS foundation project funded by the PEPFAR and the US Centers for Disease Control and Prevention (CDC), initiated to rapidly expand HIV treatment access to patients in 5 countries of sub-Saharan Africa: Côte d'Ivoire, Mozambique, South Africa, Tanzania, and Zambia.<sup>54</sup> Project HEART results also concluded that decentralization and integration of services within primary care systems were key strategies to improve access and ensure local ownership and sustainability.

*Mobile HIV care.* The indigenous people in the 4 main hinterland regions of Guyana who constitute less than 10% of the total population have limited

access to HIV services due to geographic and natural barriers that include rivers, dense rainforests, and poor roads. The Ministry of Health's National AIDS Program and Regional Health Authorities of the 4 hinterland regions collaborated with the François Xavier Bagnoud Center, the CDC/PEPFAR implementing partner for HIV care and treatment in Guyana, to institute biweekly mobile care, treatment, and support visits to remote health posts, mining and logging camps, and villages.<sup>55</sup> Mobile care provided remote communities with access to HIV care, treatment, and support. Integration of mobile HIV care with existing community health systems in remote areas can reduce stigma and increased acceptability for HIV testing in small, remote communities.

*Optimizing limited resources.* To address the long waiting lists at government facilities for patients to initiate ART, Botswana's National ART Program embarked on a public-private partnership initiative.<sup>56</sup> Public sector patients (ie, patients attending government facilities) were outsourced to a private disease management company with an aim to accelerate uptake into the ART program by decongesting government facilities. This initiative also sought to have stable patients managed by the private sector at government cost. This triaging system expedited public patient access to therapy and maximized limited manpower resources by tapping into the private sector. A similar public-private partnership was initiated in an Eastern Cape Province of South Africa, which resulted in employees of small- and medium-sized enterprises seeking prevention, treatment, care, and support for HIV.<sup>57</sup>

*Scale-up of laboratory services.* Strengthening urban and rural laboratories in the regions where ART expansion is ongoing is critical to achieve program goals. Coupling the laboratory upgrades with improved quality control guidelines helps maximize the public health system investment. In the Sofala and Manica provinces of Mozambique, efficiency of number of CD4 tests performed increased 4 times in a 6-month period after the implementation of the laboratories scale-up activities and turn-around times of the results decreased from 15 to 3 days.<sup>58</sup>

*Standardizing policies.* Standardization of laboratory testing policies has been a proven strategy for strengthening laboratory systems to support scale-

up of HIV/AIDS services. In Kenya and Zambia, key stakeholders standardized the laboratory test menus, testing techniques, instrumentation, and operating procedures for HIV/AIDS-related laboratory services.<sup>59</sup> Standardization reduced the total number of laboratory supplies from over 3000 to fewer than 300. Standardization also reduced the need for training while easing the burden on laboratory staff, maximized the use of limited resources for procurement, facilitated overall management of laboratory system, increased efficiency of the laboratory supply chain, and ultimately resulted in improved quality of laboratory testing services for patients.

*Stigma reduction.* Stigma and shortage of health workers pose 2 of the greatest barriers to scaling-up HIV/AIDS care treatment services in Tanzania.<sup>60</sup> Kilimanjaro Christian Medical Center (KCMC) has taken a strong approach to addressing these issues by establishing a support group for HIV-positive employees who have disclosed their status to KCMC management. The KCMC Huduma Group conducts activities such as quarterly meetings, dialogue with hospital management on ART and positive living, and participation as paid master trainers in HIV sensitization trainings for health workers in Kilimanjaro region. The group members also receive hospital benefits such as free medical care, leaves of absence, meals, transportation support, and reassignment to light duty as appropriate. In establishing the group and employing its members as educators and advocates for other health workers, KCMC has initiated an important stigma reduction activity that should be adopted in other facilities.

*PLWHA and community involvement.* Total Control of the Epidemic (TCE) is distinctive in its ability to overcome barriers by training local residents to provide comprehensive behavior change counseling to their community.<sup>61</sup> Each area is covered by 50 locals employed as field officers who are individually responsible for working with 2000 people to take control of HIV/AIDS through risk-reduction strategies. Officers provide individual counseling on HIV facts, prevention methods, accessing existing services, living positively with AIDS, and proactively responding as a community. As the program is outreach-based and the key implementers are community members themselves, TCE is easily transferable across regions. By partnering with health sector, host government, and international agencies, it can

be an effective vehicle for scaling-up a comprehensive response to the HIV epidemic worldwide.

The International Center for AIDS Care and Treatment Programs (ICAP) is partnering with government and mission hospitals to provide HIV prevention, care, and treatment services at 6 hospitals in semi-urban, rural, and hard-to-reach communities in Nigeria.<sup>62</sup> To address stigma and discrimination, to enhance service uptake, and to ensure the needs of PLWHA are met at both the facility and the community level, ICAP promotes and supports partnerships between health facilities and PLWHA. Three ICAP staff members openly living with HIV provide technical direction and assistance to the initiative. After identifying PLWHA living positively with HIV in the communities surrounding project sites, ICAP and hospital staff works to provide support, and training to enable PLWHA to play key roles in service delivery. They now make critically important contributions to HIV programs as adherence counselors, peer health educators, treatment advocates, and support group coordinators. The Network Model in Uganda was also developed to expand the role of PLWHA to increase access to HIV care, treatment, and support.<sup>63</sup> This model has strengthened referral systems and increased capacity of 63 PLWHA groups to deliver HIV and AIDS services.

The International Center for AIDS Care and Treatment Programs also partners with FBOs, CBOs, and NGOs to deliver quality prevention, care, and treatment services in underserved areas.<sup>64</sup> Partnering with FBOs, CBOs, and NGOs led to a marked increase in the number of communities accessing HIV testing, care, and treatment services at and around 6 ICAP-supported sites.

*Extending community support.* Similar to the successful establishment of hotlines and warmlines (a warmline is a form of hotline for noncritical matters) in the developed world to provide clinical advice, a warmline was established in a rural district of Uganda to support the ART program.<sup>65</sup> This exemplified successful leveraging of the skills of a limited workforce to provide increased access to HIV/AIDS care, advice, and education in a rural environment.

*Eliminating gender inequity.* Building from collaborations begun at the IAC 2000 in Durban, international and local women's organizations formed an alliance prior to the IAC 2006 in Toronto, to develop, implement, and monitor a strategy to

ensure that women's issues were adequately addressed in the conference agenda.<sup>66</sup> The alliance also organized events including a women's march, a women's networking zone and satellite sessions aimed to (1) advance the recognition and protection of women's human rights as a fundamental component of policies and programs for HIV; (2) ensure gender equity in HIV research; and (3) promote and facilitate the leadership of women, especially those living with HIV.

African Transformation (AT) is designed with input from men and women throughout Africa to promote gender equity, participatory development, and community action.<sup>67</sup> It was initially implemented in 4 districts of Uganda and has since been adapted for the Côte d'Ivoire, Nigeria, Malawi, and Zambia. African transformation comprises a series of profiles of real-life men and women who overcame gender barriers and challenges in their own lives and became role models. The profiles are discussed during interactive community-based workshops led by trained facilitators from CBOs and NGOs. The evaluation and assessment interviews and testimonies highlighted how AT improved couple communication on HIV-related issues. Couples reported going for testing together and some men testified that they now choose to spend more time and resources at home instead of drinking alcohol. Community-based organizations mentioned improved capacity to address gender issues.

*Treatment literacy.* The key issue of lack of awareness of HIV and its implications was addressed by a project jointly implemented and supported through Save the Children, United States, and The Global Fund to Fight AIDS, Tuberculosis & Malaria and relevant government ministries in Bangladesh.<sup>68</sup> One of the major components of the project was the integration of HIV/AIDS prevention information into the national school curricula. Age- and developmental capacity-specific information was integrated into the curricula of students from sixth grade to twelfth grade.

The National Network of Tanzanian Women with HIV/AIDS, in partnership with Family Health International (FHI) have undertaken a 1-year project on improving community ART literacy and treatment expectations for women living with HIV/AIDS.<sup>69</sup> The program identified more women interested in attending the training sessions than expected, signifying a reduction in stigma associated with the

disease, and encouraging women to participate. The study results also indicated higher demand for such training programs, considering that doctors were unable to spend more time with the patients in education.

*Political mobilization.* HIV counseling and testing (HCT) in Tanzania is performed through voluntary counseling and testing in the community or at health facilities. However, HCT uptake is low because of fear of stigma and lack of awareness of and access to testing sites. On July 14, 2007, President Jakaya Kikwete and his wife launched an HCT campaign in Dar es Salam by both being tested for HIV.<sup>70</sup> Between July and December 2007, 3.2 million persons were tested and counseled, a number similar to the total number of Tanzanians tested between 1990 and 2003. HIV programs can reach greater numbers of people, given political commitment and promotion.

### Correlation Analyses

Complete data on some economic indicators such as the HIV prevalence, ART coverage in terms of percent adults and children with advanced HIV infection receiving ART, AIDS spending, and the GDP could be obtained for 52 countries, most of which were resource-limited.

The HIV prevalence varied between 0% and 26%. The linear relationship between AIDS spending as a proportion of GDP and HIV prevalence explained only 10% of the variation in the data (Figure 2). Similar analyses involving AIDS spending and ART coverage could not explain much of the variation in the data (data not shown). Although it is not possible to verify from the available data, the remaining variation may be explained in part by the cultural and behavioral issues summarized in the literature review.

### Discussion

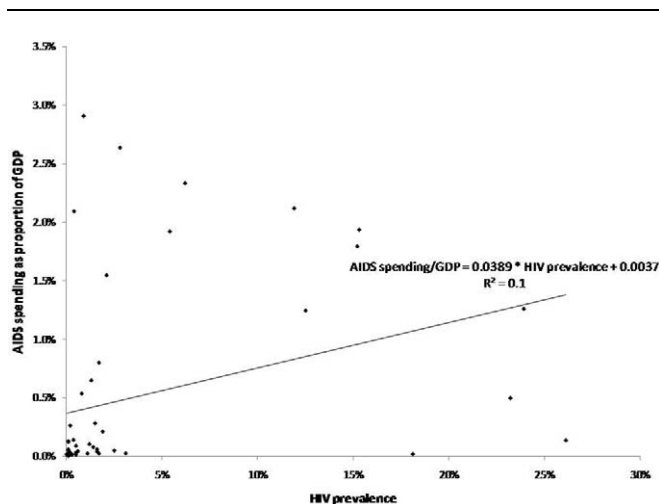
Combined efforts of countries and international partners have resulted in significant progress toward providing HIV-related interventions such as testing services, care, and ART in resource-limited countries. In spite of such remarkable progress, 69% of people needing treatment were not receiving ART by the end of 2007.<sup>2</sup> We reported the population-level barriers to accessing care and treatment for

HIV/AIDS to help public health leaders and policy makers obtain a comprehensive understanding of the current challenges and design further steps to increase treatment uptake.

Most of the economic, sociocultural, and behavioral issues were consistently reported in the literature across regions. Although free or heavily discounted treatment is available in many countries, the cost of the drugs or care in general is still a critically important issue. Many people live in extreme poverty and have difficulties maintaining subsistence living for themselves and their families. Even if PLWHA have access to free drugs, they may not be able to afford lost wages due to missing work to attend the clinic visits or cannot afford the laboratory testing which might be a prerequisite for free treatment. There are a myriad of logistical issues, such as lack of sufficient resources and consistent supply of drugs and other laboratory materials that may cause interruptions in treatment, resulting in the potential development of drug-resistant strains.<sup>16</sup> Strong stigma around the disease represents a major barrier that prevents people from accessing treatment in comparison to other chronic health conditions. Pervasive stigma and lack of knowledge on a personal and community level directly hinder the uptake of HIV interventions in the resource-limited countries.

Along with the economic, sociocultural, and behavioral issues which were common across all regions, some region-specific issues were also elucidated during this review. A study from Thailand reported on the association between different insurance schemes and access to ART.<sup>18</sup> Thailand achieved universal coverage of health insurance in 2001. This study found that only those people with insurance policies from civil or private employers or those with self-paid insurance had increased access to ART. A study from India illustrated significant differences between the public and the private sector HIV patient populations, finding low levels of ART knowledge and access within both groups.<sup>24</sup> The Indian government has focused its resources on scaling-up ART access in the public sector, and the study concluded that the efforts should not ignore the private sector. Xu et al<sup>25</sup> reported a tendency in some parts of China to favor intravenous medications instead of pills, which makes the treatment regimen more expensive.

Antiretroviral therapy programs should be initially designed to address universal issues and then



**Figure 2.** Scatter plot: HIV prevalence and AIDS spending expressed as proportion of gross domestic product (GDP). This figure shows a scatter plot of HIV prevalence and AIDS spending expressed as proportion of GDP along with a linear regression line for the data.

target region-specific problems to ensure success. It has been shown that once ART is initiated in resource-limited settings, HIV-infected persons demonstrate high levels of adherence and the treatment outcomes are very much comparable to those from developed nations.<sup>31,71-76</sup> Sebastian et al<sup>45</sup> described a collaborative effort between groups of experts from the scale-up of the Peruvian national program to treat multidrug-resistant tuberculosis and the National HIV Program to scale-up access in Peru. Numerous key challenges such as establishing interinstitutional cooperation, decreasing loss to follow-up, medical stabilization prior to initiation of ART, providing adequate human resources, and ensuring medication supply could be resolved through multidisciplinary collaboration such as that with the tuberculosis consultants in Peru.<sup>45</sup>

While progressing toward universal access, efforts should also be targeted at reducing barriers to access second and subsequent lines of therapy. Second-line ART is available in some countries, but third-line ART is not yet available in most countries. Recent developments in India and Brazil have resulted in the production of cost-effective, generic antiretroviral drugs. Potent ART combinations with fewer drug-related toxicities are needed. Tuberculosis is a leading cause of morbidity and mortality among PLWHA in resource-limited regions,<sup>77,78</sup> and therefore, the ART programs should provide drugs

that can be coadministered with tuberculosis medications. Such advancements will help address cost-related issues for ART and accelerate governmental and nongovernmental efforts to scale-up the use of ART.<sup>24,79</sup>

Our research also carries limitations. We have only included studies and quantitative data that were reported in English in this review. Considering the wealth of data available from francophone, lusophone, and Spanish-speaking countries, this poses a major limitation on our review. This study used a qualitative approach to describe the obstacles faced by PLWHA in resource-limited countries. The information presented on the solutions to reduce the obstacles to effective treatment access is anecdotal in nature. The majority of the studies included in this review were from Africa, and therefore, the findings presented might not sufficiently represent other regions. The literature search yielded only 1 study from Latin America. Although helpful, the experience of industrialized countries is not totally applicable in developing nations. Therefore, it is of utmost importance for resource-limited regions to assess their experience with HIV/AIDS treatment to optimize the use of scarce resources, minimize errors, and most importantly evaluate the effect of treatment programs on the progression of the epidemic.<sup>80</sup> Guanira<sup>81</sup> described the roll-out of the Peruvian ART program and the experiences encountered during its implementation. Actions such as increasing resources in a progressive manner, strategic alliances, and coordination of services among various parts of the ART program and the political will of decision makers to assure sustainability were highlighted in the Peruvian program implementation. The results of this effort may provide direction to other similar countries in scaling-up their access of ART.

The economic findings reported should be interpreted in light of the limitations of the data; there are 189 UNGASS member countries, but we were able to obtain complete data only on 52 countries. Data could not be obtained for other countries as they were either not reported or reported in local languages other than English.

We hope that the study presented here will serve as an evaluation tool for policy makers to design and implement future ART scale-up programs. Further research to assess the success of the ART programs on a regular basis would be useful to improve outcomes. The world is currently engaged in an

unprecedented scale-up of medical care and treatment services to HIV-infected populations through the universal access goal, and this study helps develop an evidence base to guide best practices.

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