



## Review Article

## The history and impact of HIV&amp;AIDS. A decade of INDEPTH research

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## ABSTRACT

**Aim:** To evaluate the contributions of the member health research centres of the INDEPTH Network which operate health and demographic surveillance system (HDSS) field sites to research efforts on the epidemiology and impacts of HIV/AIDS in low- and middle-income countries, via a review of peer-reviewed published papers on HIV/AIDS that use the HDSS framework.

**Methods:** Publication titles were sent to INDEPTH by member centres. These were uploaded onto the Zotero research tool from different databases (most from PubMed). We searched for publications using the keyword “HIV” and the publication date. The 540 relevant papers were all published in peer-reviewed English language journals between 1999 and 2012. 71 papers were finally selected which met the key criterion for inclusion: papers must deal with the spread and impact of HIV.

**Results:** The study found that alcohol consumption, socioeconomic status, educational attainment and age are factors that put certain groups at higher risk of HIV infection. The study found strong effects of AIDS on household dissolution. Women with HIV whose husbands were uninfected faced a higher risk of separation and divorce than women in uninfected households or in households where both female and male partners were infected. Elderly women also face social stigma and isolation as a result of either living with HIV/AIDS themselves or caring for an individual who has the virus as well as financial difficulties on household welfare. Children with mothers who are infected with HIV appear to face threats to survival even while the mother remains alive.

**Conclusion:** INDEPTH member centres have tracked the course of the HIV/AIDS epidemic in sub-Saharan Africa. They have analysed how the virus is transmitted, how and where it emerged, which groups are most affected, and how the virus impacts families, communities and economies. The robust and extensive data they have generated provide critical insights to policy-makers as the epidemic moves into its fourth decade.

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## 1. Introduction

INDEPTH – the International Network for the Demographic Evaluation of Populations and their Health – is a growing network of 42 member centres running 49 health and demographic surveillance system (HDSS) field sites across Africa, Asia and the Pacific region. Its member centres use robust longitudinal data, collected through regular visits to all households in a geographically defined

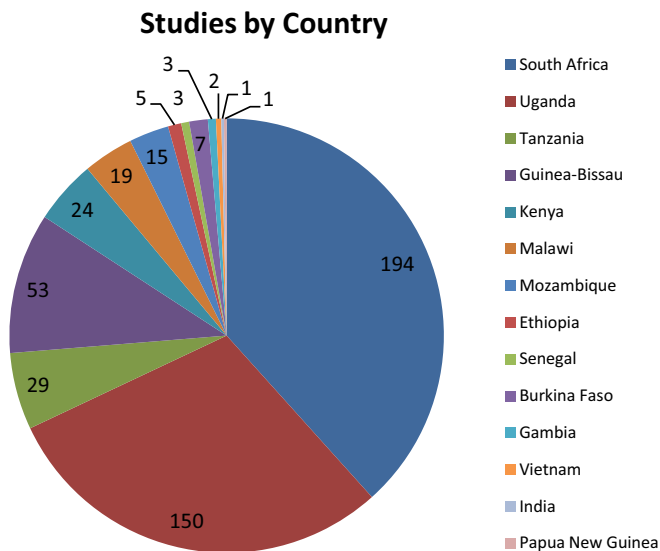
area, to address the critical gaps in information on population health in low- and middle-income countries (LMICs). By monitoring new health threats, tracking population changes through fertility rates, death rates and migration, and measuring the effect of policy interventions on communities, HDSSs provide information that enables policy-makers to make informed decisions that adapt to changing conditions. Many health interventions that are now used routinely across the world were trialled on HDSS research platforms. There are no other sustainable sources of longitudinal data that can provide the knowledge and policy-relevant evidence needed to serve health and development in the Global South.

For the past three decades, HIV/AIDS has been one of the Global South's most pressing health problems. The epidemic has so far taken the lives of 36 million people, and 35 million are currently

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\*NB remaining studies were conducted by 2 or more centres.

**Fig. 1.** Distribution of studies by countries. \*NB remaining studies were conducted by 2 or more centres.

living with the virus. In 2012 alone, 1.6 million people died of AIDS-related causes, and 2.3 million were newly infected with the virus.<sup>1</sup> The United Nations recognised the importance of the epidemic by including combating HIV/AIDS, malaria and other diseases among its eight Millennium Development Goals. Reversing the spread of HIV/AIDS by 2015 and providing universal access to AIDS treatment by 2010 were key UN development targets.

HDSSs have been at the forefront of global efforts to understand and help halt the virus. Centres in Africa, Asia and the Pacific have analysed how the virus emerged, how it is transmitted, and how it can be prevented and treated. They have also assessed its effects on individuals, communities and economies, and endeavoured thereby to strengthen the case for action by policy-makers. The uniquely robust data gathered by HDSSs over long periods of time have enabled them to track the progress of the epidemic and to test rigorously the effectiveness of policies and technologies designed to stop it.

In this paper, we review only studies conducted by HDSSs between 1999 and 2012. Drawing on 540 papers published in peer-reviewed English language journals, we outline the key findings unearthed by INDEPTH member centres and discuss their implications for future HIV/AIDS policies. Of INDEPTH's 42 member centres, 23 published papers on HIV between 1999 and 2012, covering 14 countries in 3 continents (see Fig. 1). All except four of the papers were produced in Africa, where the HIV epidemic is most widespread. Two centres – the Africa Centre Demographic Information System (ACDIS) in South Africa and Rakai HDSS in Uganda – were responsible for over 140 papers each.

Studies included cross-sectional surveys, cohort studies, nested surveys, qualitative focus group discussions, key informant interviews, literature reviews, clinical trials, testing of diagnostic tools, and multi-site studies (the latter accounting for 8% of total studies). In this paper we discuss the main themes of the studies in terms of the history and impacts of HIV/AIDS. In part 1 we trace the epidemiology of HIV/AIDS as reported by HDSSs. In part 2 we discuss the social and economic impacts of the virus.

## 2. One: HIV/AIDS epidemiology

### 2.1. History of HIV/AIDS in Africa

Human immunodeficiency virus (HIV), the virus that causes acquired immunodeficiency syndrome (AIDS), emerged in central Africa in the first half of the 20th century. In a paper published in *AIDS* in 2009, researchers from the Rakai HDSS in Uganda examined molecular epidemiology and geographical and historical data to trace the spread across Africa of subtypes HIV-1A and D of the HIV-1 strain of the virus [1].

Cities in what is now the Democratic Republic of Congo (DRC) were among the first areas to be affected by HIV-1. HIV prevalence rates in that country have remained low, in part because the isolation and inaccessibility of its urban centres meant that there were few channels along which the virus could spread. Although isolated from each other, however, Kinshasa, Lubumbashi and Kisangani have historically had a small degree of connectivity with other parts of Africa. Kinshasa is connected to Angola in south-western Africa, Lubumbashi to Zambia in southern Africa, and Kisangani to east Africa. HIV appears to have travelled along these routes. Gray and co-authors found that 'Distribution of subtypes in west, south, and east Africa is similar to the distribution of the DRC city with which they share a network: high diversity is found in Kinshasa and western Africa, subtype C is highest in Lubumbashi and southern Africa, and subtype A is highest in Kisangani and east Africa.'

DRC's eastern and southern neighbours lacked the protection afforded to Congolese cities by their isolation, and once the virus spilled out from central Africa in the 1970s its expansion was rapid. Population centres in eastern and southern Africa were well connected by major highways, and trade and migration along these routes was prolific. As the Rakai paper suggests, 'The major highways likely served as a transit route with groups such as mobile prostitutes and their clients, soldiers and truck drivers introducing the virus into new networks and villages.' In Ethiopia, on the other hand, which is cut off from the main East African trade routes, subtypes A and D are almost absent, with subtype C accounting for 99% of infections. 'The unequal spread of subtypes in Africa does appear to reflect founder effect as well as the distribution in the DRC urban centre from which a particular wave of infection originated,' the authors conclude.

West Africa has been less hard hit by HIV/AIDS. This is largely because the more infective and more pathogenic HIV-1 strain of the virus has been less prevalent there than the HIV-2 strain. Researchers at the Bandim HDSS in Guinea-Bissau traced the early history of HIV-2 infection in the former Portuguese colony [2]. HIV-2 prevalence is high among people in older age groups, and a 1989 survey in two districts of Bissau found that among older women, variables including having had sex with a white man and having lived in neighbouring Senegal were associated with a higher risk of infection. The authors surmise that these risk factors may be associated with Guinea-Bissau's long war of independence, which saw Portuguese soldiers descending on the colony and also led to large-scale population movement, including into Senegal. That infection rates are highest among the 50–69 years age group, which would have been most sexually active during the war years of the 1960s and 1970s, lends further weight to the theory that the conflict accelerated the virus's spread.

### 2.2. How is the virus spreading and who is at risk?

Two further risk factors for HIV-2 transmission were identified by Poulsen and co-authors. Older women who had worked as prostitutes or engaged in extra-marital sex were at higher risk of infection, as were people who had received blood transfusions in the 1960s. While transmission via unclean syringes has been a

<sup>1</sup> UNAIDS (2013): 2013 Fact Sheet. UNAIDS Report on the Global AIDS Epidemic 2013. Geneva.

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