

URBANIZATION AND THE SPREAD OF HIV IN SUB-SAHARAN AFRICA:
A COMPARISON OF LAGOS, NIGERIA AND JOHANNESBURG, SOUTH AFRICA

BY
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List of Abbreviations

ABC	Abstinence, Be Faithful, Use a Condom
AIDS	Acquired Immunodeficiency Syndrome
ART	Antiretroviral Therapy
BOS	Lagos Bureau of Statistics
CIA	Central Intelligence Agency
CIIR	Catholic Institute for International Relations
CRF	Circulating Recombinant Form
DBSA	Development Bank of Southern Africa
DNA	Deoxyribonucleic Acid
ECOWAS	Economic Community of West African States
FCT	Federal Capital Territory (Nigeria)
FEO	Nigerian Federal Office of Statistics
FMOH	Nigerian Federal Ministry of Health
FSW	Female Sex Worker
GDP	Gross Domestic Product
HDI	Human Development Index
HIV	Human Immunodeficiency Virus
HPA	Hypothalamic Pituitary Adrenal Axis
HSRC	Human Sciences Research Council of South Africa
IBBSS	Integrated Biological Behavioral Surveillance Survey
IOM	International Organization for Migration
IRR	South African Institute for Race Relations
IUDF	South African Integrated Urban Development Framework
LGBT	Lesbian, Gay, Bisexual, Transgender
LLHE	Nigerian Family Life and HIV Education
MTCT	Mother-to-Child Transmission
NACA	Nigerian National Agency for the Control of AIDS
NACOSA	National Advisory Group of South Africa
NAIIS	Nigeria HIV/AIDS Indicator and Impact Survey
NISER	National Institute of Science Education and Research
NPC	Nigerian National Population Commission
NSP	South African National Strategic Plan
OPHI	Oxford Poverty & Human Development Initiative
OPV	Oral Polio Vaccine
PCR	Polymerase Chain Reaction

PEP	Post-Exposure Prophylaxis
PPP	Purchasing Power Parity
PrEP	Pre-exposure Prophylaxis
RDP	South Africa Reconstruction and Development Programme
SACA	Nigerian State Agencies for Control of AIDS
SAP	Nigerian Structural Adjustment Program
SFH	Nigerian Society for Family Health
SIV	Simian Immunodeficiency Virus
SSA	Statistics South Africa
STD	Sexually Transmitted Disease
TB	Tuberculosis
UK	United Kingdom
UN	United Nations
UNAIDS	Joint United Nations Programme on HIV and AIDS
UN DESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UNOCD	United Nations Office on Crimes and Drugs
US	United States
URF	Unique Recombinant Form
VCT	Voluntary Counseling and Testing
WHO	World Health Organization

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ABSTRACT

The first documented infection of HIV was found in blood samples in the Democratic Republic of Congo in central Africa. Despite these origins, southern Africa is the region most affected by HIV in the world. The second most affected region in the world is west Africa. To build upon research about the spread of HIV across the sub-continent, and to assess the impact of demographic change on the differences in HIV prevalence in west and southern Africa, this study investigates the role that urbanization in two regional metropolises—Lagos, Nigeria and Johannesburg, South Africa—plays in creating conditions conducive to the spread of HIV. By analyzing the origins of HIV, urbanization, migrant labor patterns, sex work, urban poverty, and urban policy of Nigeria and South Africa through a comparative lens, this study concludes that, while urbanization, and especially migration, are structural factors that account for an increase in conditions that create heightened risk for the spread of HIV, these factors alone cannot account for the differences in HIV prevalence between Lagos and Johannesburg. The specific timing and history of urbanization in Johannesburg, which was spurred by the city's mining industry in the late 19th century and characterized by the development of

segregated housing and patterns of circular migration, likely intensified the spread of infection before the first case of HIV was diagnosed in the country. More biological dating research should be conducted to determine the exact timing and prevalence of HIV in both Nigeria and South Africa, as well as sub-Saharan Africa as a whole, to help explain differences in regional prevalence rates and the spread of the virus across the sub-continent.

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INTRODUCTION

The first documented infection of HIV-1 was detected in a blood sample collected in 1959 from a man in the Democratic Republic of Congo. Scientists and epidemiologists largely agree that chimpanzees carrying simian immunodeficiency virus (SIV) likely transmitted the disease to humans, which then mutated into human immunodeficiency virus (HIV). While the specific species of chimpanzee that carried SIV was native to west equatorial Africa, eastern and southern Africa are afflicted by HIV more than any other region in the world, accounting for 45% of the world's HIV infections and 53% of people living with HIV globally (UNAIDS 2019). In addition, incidence rates—the share of new infections among the previously uninfected population—in eastern and southern Africa remain higher than those in western and central Africa, and the rest of the world, despite steep declines stimulated by domestic and international investment.

Early studies of HIV emphasized the importance of individual behaviors, such as partner selection, condom use, and sexual practices, in determining risk. Subsequent action by African governments also followed this school of thought, with the notable “ABC”—abstinence, be faithful, use a condom—approach to prevention. While risk behavior is a critical part of the spread of HIV, epidemiologists have started to place more value on social epidemiology, the study of health outcomes with a focus on the role of social determinants in the transmission and progression of infectious disease. Social epidemiologists focus on how risk factors and behavior are shaped by social conditions.

As knowledge about HIV deepened, patterns that increase vulnerability to the disease became classified into three main levels—individual, social, and structural—to better illustrate the complex nature of the diffusion and distribution of HIV in populations. This social epidemiological approach shifts some of the focus off of individual behavior, placing greater emphasis on social and structural factors, such as demographic change, war and militarization, structural violence and discrimination, legal structures, and the policy environment, as well as how these factors interact to create risk conditions.

The factors that influence the spread and treatment of HIV are complex and interdependent. Because of the complex nature of HIV dispersal, this study homes in on one aspect—urbanization—of one structural variable—demographic change.

Urbanization is both caused by and causes patterns of migrant labor; it also brings urban poverty and sex work, which are key factors related to the spread of HIV. The main question this study addresses is: to what extent have differences in urbanization influenced the prevalence rates in west and southern Africa? Information about the origin of HIV—through primates native to west Africa—suggests prevalence rates in that region should be higher than those in southern Africa. Why then, is southern Africa the region most affected by HIV in the world? What role does urbanization play in creating environmental conditions conducive to the spread of HIV?

To assess the impact of demographic change on the differences in HIV prevalence in west and southern Africa, this study investigates the role that urbanization in two regional metropolises—Lagos, Nigeria in western Africa and Johannesburg, South Africa in southern Africa—plays in creating conditions conducive to the spread of HIV. This study postulates that urbanization in these two cases led to the growth of migratory labor systems, which ultimately led to the spread of HIV. Because South Africa has higher

levels of economic development and industrialized earlier than Nigeria, this study hypothesizes that the amount of economic activity a country participates in is an important factor to how susceptible that country becomes to HIV transmission. However, economic development and urbanization can also lead to improved access to jobs, goods, and services for impoverished populations in developing countries. As potential hubs for civilization, cities are expected to offer employment, shelter, stability, prosperity, security, social inclusion, and more equitable access to services (Muggah 2012). According to Celik et al. (2009), all of these resources would make lives safer, healthier, sustainable, and more convenient. Urbanization in Africa has followed a different trajectory from the above premise, leaving urban residents and governments in frustration, despair, and confusion. The opportunities of urbanization are often lost across the sub-continent due to lack of adequate resources, basic infrastructure, services, and well-conceived planning. Urban development in Africa has consequently been described as “pseudo-urbanization” (Lwasa 2009, 32).

Migratory labor systems in Africa are key environmental factors that significantly influence the spread of HIV across the continent. These migratory labor systems resulted from industrial development brought on by colonization of African countries by European powers. Mining, railroad work, plantation work, and primary production facilities absorbed capital investment and became hubs of development in the immense, underdeveloped continent. As these industries absorbed capital, they also absorbed large quantities of male labor from rural areas. This pattern of movement impacted African behavioral, familial, and sexual patterns. Historically, migratory labor systems create populations that suffer from epidemics of sexually transmitted diseases. Commercial sex work and sexually transmitted diseases (STDs) occurred in these populations well before

HIV made an appearance. The roles of industrial development and colonial government structures are thus complex yet relevant socioeconomic determinants in assessing the difference in infectivity between western and southern Africa.

Regional differences in HIV rates are also influenced by epidemiological determinants, including the age of the epidemic, the presence and treatment of ulcerative sexually transmitted infections, nutrition, condom use, and circumcision. One of the obstacles to treatment of HIV is the virus's genetic diversity. HIV is subdivided into types, groups, subtypes, sub-subtypes, circulating recombinant forms (CRFs), and unique recombinant forms (URFs). This viral diversity means that differences in disease progression and responses to vaccines are common. The virus can be divided into two major types: HIV-1 and HIV-2. HIV-1 is related to viruses found in chimpanzees and gorillas in western Africa and is further subdivided into four distinct lineages, groups M, N, O, and P. Each subdivision resulted from an independent cross-species transmission event. The vast majority of AIDS cases worldwide—more than 90 percent—stem from the spread of the 'major' group, group M, which consists of subtypes A through K. Subtype C is the dominant form in southern and eastern Africa. The other groups, N, O, and P are mostly isolated to west Africa—frequently Cameroon—and arise from different primates, mutation, and founder effects. HIV-2 has not been widely recognized outside of Africa and is largely contained to the western region. HIV-2 is related to viruses found in sooty mangabeys (*Cercocebus atys atys*), a species of monkey that inhabits the forests of the Littoral Region. Overall prevalence rates of HIV-2 are declining, and, in west African countries, HIV-2 is increasingly being replaced by HIV-1. Part of the reason HIV-1 has spread globally while HIV-2 has been restricted to west Africa is because viral loads in HIV-2 tend to be lower than those in HIV-1; lower viral loads result in decreased risk of

transferability. The diversity of HIV results in complexities in determining factors of susceptibility, particularly as certain strains are contained to certain regions. Because both strains of the disease originated from chimpanzees and gorillas in west equatorial Africa, it is apparent that vectors spread the disease to eastern and southern Africa, where specific environmental conditions allowed the virus to spread rapidly among human populations. This study thus postulates that, while epidemiological determinants play an important role in adding to the complexity of the spread of HIV, socioeconomic factors—which arise from economic development—create the most conducive conditions for increased HIV infectivity.

By looking at the origins of HIV, urbanization, migrant labor patterns, sex work, urban poverty, and preventative policy of Nigeria and South Africa through a comparative lens, this study aims to provide insight into the complicated questions posed above in a way that has not yet been explicitly connected. While much of the literature regarding HIV in southern Africa investigates the reasons the region faces the epidemic to the extent that it does, little information has been published directly comparing the region to western Africa, the second-most infected region in the world. While both regions are significantly affected by the virus, regional differences in infectivity rate and prevalence open the door to investigation about environmental conditions conducive to the spread of HIV. By better understanding the difference in structural factors that led to greater incidence rates in southern Africa than in west Africa, researchers can better determine how specific strains of the virus spread, which can contribute to robust and accessible HIV policy and planning measures for specific communities, countries, and regions.

While urbanization, and especially migration, are structural factors that account for an increase in conditions that heighten risk for the spread of HIV, these factors alone cannot account for the differences in HIV prevalence between Lagos and Johannesburg, Nigeria and South Africa, or west and southern Africa. This study, instead, determined that historical development of urban areas in both countries created an influx of labor migration and commercial sex work that heightened risk in urban areas. The development of economic activity, especially in mining and resource extraction, and its timing led to the development of road and transportation networks as well as particular urban settlement patterns, which, coupled with trends of circular migration, influenced the spread of HIV from urban to rural areas in both Nigeria and South Africa. Before attempting to explain differences in prevalence rates among regions, more research must be done to explain differences in prevalence rates among specific communities in specific countries.

CHAPTER 1: A WHOLISTIC APPROACH TO STUDYING HIV

In order to develop a model that measures the role that urbanization has played in the spread of HIV in Nigeria and South Africa, a comprehensive review of approaches to studying epidemiology was conducted. This chapter outlines these approaches and how they have developed to better accommodate investigations into structural factors related to public health. Divided into sections that relate to the “epidemiological triad,” this chapter considers the complex relationship between epidemiological factors, behavioral factors, and structural factors in studying the spread of HIV.

Concepts of Disease Causation

According to the United State Center for Disease Control, a critical premise of epidemiology is that disease and other health outcomes and events do not occur randomly in a population. Instead, they are more likely to occur in certain members of a population based on risk factors that may not be distributed randomly. One important use of epidemiology is to identify the factors that place some members at greater risk than others.

Several models of disease causation have been proposed through history. Among the simplest of these models is the epidemiologic triad or triangle, which has become the traditional model for infectious disease. The triad consists of an external agent, a susceptible host, and an environment that brings the host and agent together. In this model, disease is the result of an interaction of the agent and the host in an environment that supports transmission of the agent from a source to that host. These three factors interrelate in a variety of complex ways to produce disease. Agents are biological, physical, and chemical factors whose presence, absence, or relative amount are necessary for disease to occur. Host factors include personal characteristics and behaviors, genetic predispositions, and immunologic and other susceptibility-related factors that influence the likelihood or severity of disease. Environmental factors are external conditions other than the agent that contribute to the disease process and can be physical, biologic, or social in nature. Development of effective public health measures to control or prevent disease usually requires assessment of all three components and their interactions.

Other models have been proposed to account for the multifactorial nature of causation. One such model, known as the “sufficient-component cause model,” was developed by Rothman (1976). This model compares individual factors that cause disease to pieces of pie. After all of the pieces of pie come together, the pie is complete and disease occurs. The individual factors are referred to as component causes and the complete pie is referred to as a sufficient cause. A disease may have more than one sufficient cause made up of various component causes that may or may not be shared between the sufficient cause pies. If a component appears in every sufficient cause pie, it is called a necessary cause, because without it, disease does not occur. The component

causes may include host, agent, or environmental factors and Rothman argued that a single component cause is rarely a sufficient cause by itself.

An additional metaphor developed to capture the interconnectedness of causal components in a population is the causal web. Causal webs are made up of direct and indirect causes, where direct causes are proximal to pathogenic events and indirect causes are distal from pathological events. Levels of cause in a causal web may be classified as macrolevel—which includes social, economic, and cultural determinants—individual-level—which includes personal, behavioral, and physiological determinants—and microlevel—which includes organ system, tissue, cellular, and molecular determinants. While these models are the generally accepted foundations for studying epidemiology, the past few decades have brought new research and theory that expand on the traditional models of causation and the field of epidemiology. These approaches demonstrate the complexity of determining how disease spreads and have influenced the ways in which researchers study epidemiology.

Approaches to Studying Epidemiology

This section discusses some of the concepts and approaches of studying epidemiology with a focus on methods that go beyond biological determinants by including social and structural variables. Building on the traditional epidemiological triad, these theories demonstrate the development of research within the field of epidemiology. The following theories all relate to the social and structural aspects of epidemiology with the aim of identifying social characteristics that affect the pattern of

disease and health distribution in societies. The theoretical considerations of factors like social inequalities, social relationships, social capital, and the influence of structural factors can enrich epidemiological research by specifying research questions, clarifying methodological issues, and elucidating how social factors are related to healthcare, all of which can help public health authorities develop and implement effective interventions.

Risk Factor Epidemiology

A risk factor is a variable associated with increased risk of disease or infection. Risk factor epidemiology focuses on individual risk factors, attempting to describe what places people at risk of acquiring infection and what individual characteristics are associated with disease progression (Poundstone et al. 2004). After World War II, epidemiologists in the United Kingdom used the risk factor approach to link lung cancer with smoking. These researchers searched for unknown and multiple causes of chronic disorders—in fact, one named his endeavor the “search for causes” (Morris 1957).

Since its early use in epidemiology, the risk factor approach has been criticized for being too narrow in scope. The calls for a move away from a risk factor approach have been numerous and compelling over the past few decades. Susser notes that while early risk factor research has contributed much to public health and clinical medicine, the phase of focusing on causation was “narrowing the field of investigation, and even introducing neglect of the objective of improving the public health” (1998, 608). Rockhill asserted that the traditional approach keeps researchers bound to “the increasingly reductionist hunt for causes” (2005, 124). Keyes and Galea (2017) argue the emphasis on direct causation between risk factors and disease leads researchers to estimate risk ratios

of relatively small magnitude in an attempt to make the case for their role in public health. Researchers thus pushed the discipline to consider expanding beyond the “black box” of direct causation, integrating multiple levels of disease causation into their methodologies. The following approaches were influenced by the push to expand beyond the limits of risk factor epidemiology.

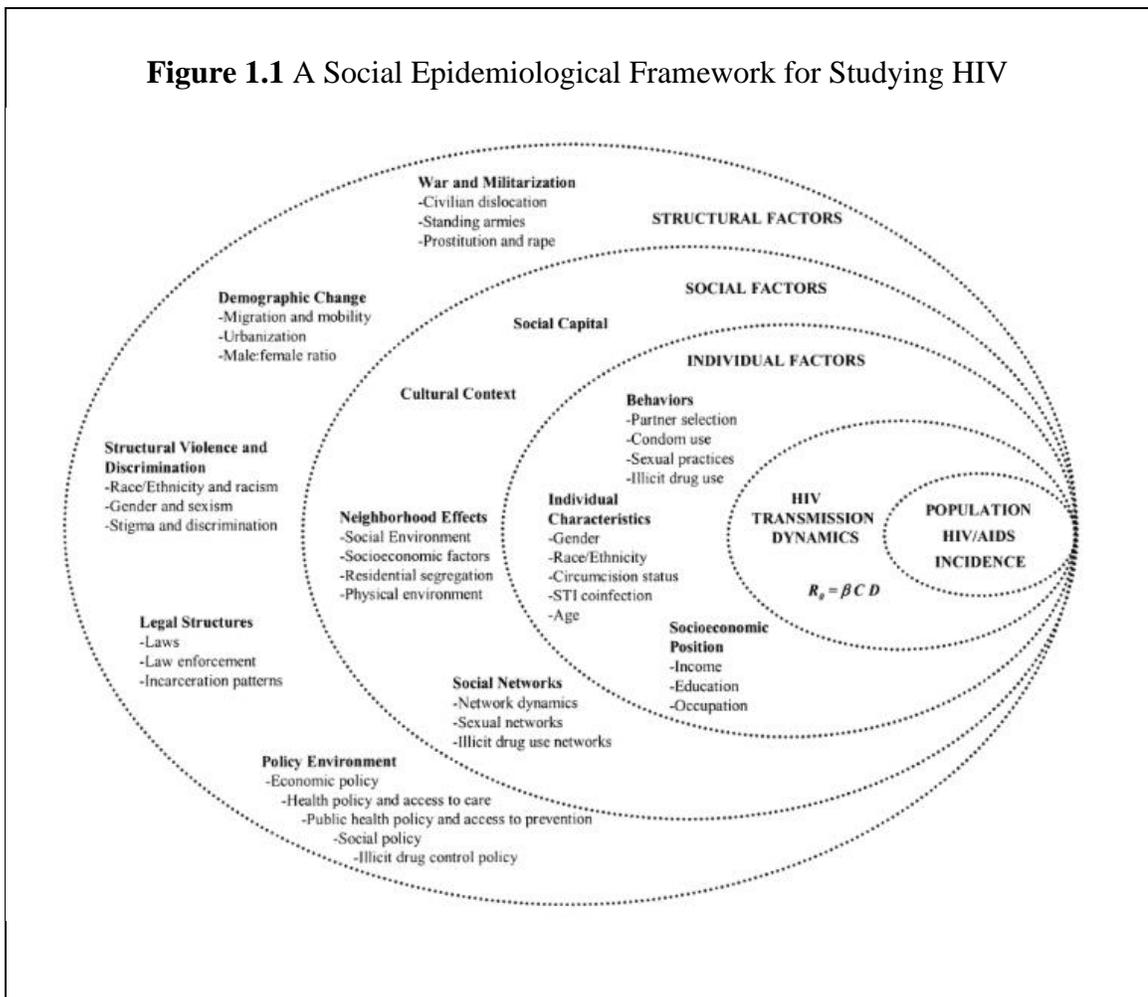
Social Epidemiology

Defined by Berkman and Kawachi (2000), social epidemiology is the study of the distribution of health outcomes and their social determinants. This concept builds upon the classic epidemiological triad to focus on the role of social determinants in the progression and transmission of infectious disease. Early studies on HIV focused heavily on individual behaviors and characteristics in determining risk, an approach referred to by Fee and Krieger (1993) as “biomedical individualism.” In contrast to biomedical individualism, the social epidemiology perspective emphasizes social conditions as fundamental causes of disease (Link and Phelan 1995). Social epidemiologists focus on how individuals become exposed to risk or protective factors and under what social conditions individual risk factors are related to disease. Social factors thus become the focus of this approach; they are not merely adjusted as potentially confounding factors.

Contact patterns that enhance HIV vulnerability can be divided into three levels: individual, social, and structural, as demonstrated in Figure 1.1. Individual factors include biologic, demographic, and behavioral risk factors that play a role in HIV acquisition and disease progression. Social factors include pathways by which community and network structures link people to society. These structures have become important for social

epidemiologists to determine the diffusion and differential distribution of HIV/AIDS in population subgroups. Structural-level factors include socioeconomic factors, such as demographic change, war and militarization, structural violence and discrimination, laws, and policies. These factors affect the transmission dynamics of HIV and the differential distribution of the virus. Figure 1.1 shows a heuristic framework for the social epidemiology of HIV. The dotted lines separating the levels illustrate the porous nature of the distinctions made between levels of analysis. There are extensive linkages between factors at all levels that give rise to patterns in the transmission of HIV.

Figure 1.1 A Social Epidemiological Framework for Studying HIV



Reprinted from: Poundstone et al. 2004, 30.

Models of the mechanisms through which social determinants affect HIV transmission have been developed in the field of infectious disease epidemiology. The basic reproductive number of an infectious disease, R_0 , for example, describes secondary infections that arise from a primary infection (Garnett 1998). In the equation $R_0 = \beta CD$, β is the probability of infection per contact, C is the number of contacts, and D is the duration of infectivity. Intervention efforts attempt to reduce the empirical value of these variables by modifying the social conditions under which individual risk factors lead to disease. Factors that affect β include condom use, low infectivity of HIV, viral load, coinfections, circumcision status, antiretroviral therapy, and sexual practices. Social or structural approaches that have been proposed to reduce the value of this variable include 100% condom policies, which have been successful in Thailand (Hanenberg et al. 1994; Rojanapithayakorn and Hanenberg 1996; Phoolcharoen et al. 1998), and access to care treatment for other sexually transmitted infections. Factors that affect C include number of sex or injection drug use partners, rate of sex partner acquisition, timing of sexual partnerships, mixing patterns, size of core groups, and population turnover in core groups. Proposed social or structural approaches include needle exchange programs, network interventions, structural interventions, and increased availability of counseling and testing programs. Factors that affect D include natural history of infection, diagnostic interventions, and therapeutic interventions. This variable can be reduced by ensuring access to care for HIV/AIDS to reduce infectiousness by decreasing viral loads.

The need for epidemiologists to focus more on social and structural factors was well-demonstrated by Poundstone et al. (2004). The study investigated the contributions of social epidemiology by searching databases of published literature to identify

conceptual and empirical research reports on the approach. They concluded that, by focusing on the “under-theorized and under-researched” blend of social and biological determinants, new grounds for action can be developed (Poundstone et al. 2004, 22). While social epidemiology is relatively under-researched, interest is growing as researchers attempt to explain problems that prior paradigms fail to address. Three main theories have been used by social epidemiologists to attempt to provide more comprehensive answers to complex questions: psychosocial theory, social production of disease or political economy of health, and ecosocial theory. All seek to explain social inequalities in health and have been termed by Krieger (2001) as theories of “disease distribution” as opposed to “disease causation.” The key differences between the two categorizations are the emphasis on different aspects of social and biological conditions in shaping population health, how they integrate social and biological explanations, and the policies and general action they recommend based on their approach.

Psychosocial Theory

Psychosocial theory developed from the question of why not all people exposed to germs become infected and not all infected people develop disease. An early response to this question was the expansion of an etiological framework from only including the “agent” to including the “host—agent—environment” (Gordon 1953). While the model expanded previous thought about the spread of disease and still holds important relevance today, restrictive assumptions must be made about this framework. Krieger (2001) notes that the terminology alone suggests the “host” has no “agency” and that “environment” serves as a broad category with no distinction offered about the influence humans can

have on it. The model gained complexity without an explicit accounting of social agency and, by 1960, the “web of causation” was developed (Krieger 1994).

The “host—agent—environment” triad is important for psychosocial theory. One of the field’s defining researchers, John Cassel, linked the host’s vulnerability to disease to the “social environment” and physical and psychological stress (1976). Cassel argued that, to explain disease distribution in “modern” societies, where exposure is undeniable, factors affecting susceptibility must be investigated. Relevant modifying factors include psychosocial factors generated by human interaction: dominance hierarchies, social disorganization, rapid social change, marginal status in society, social isolation, bereavement, and social support. Cassel speculated that these factors explain why particular social groups are disproportionately burdened by certain diseases, concluding that the most promising interventions to reduce disease will be “to improve and strengthen the social supports rather than reduce the exposure to stressors” (1976, 107).

Following Cassel’s research, the number of studies related to psychosocial epidemiological increased exponentially. Sterling and Eyer (1988), for example, introduced the term “allostatis” to describe systems that achieve balance through change. This idea was then expanded on by McEwen, when he described “allostatic load” as the “wear-and-tear from chronic over-activity or underactivity” of systems “that protect the body by responding to internal and external stress” (1998, 33). These systems, McEwen argued, include the “autonomic nervous system, the hypothalamic-pituitary-adrenal (HPA) axis, and cardiovascular, metabolic, and immune systems” (1998, 34). This study thus implied that psychosocial stressors can be directly pathogenic, as opposed to only alter susceptibility. Other perspectives supported this argument, such as the long-term effects of both chronic and acute stressors explored by Kuh and Ben-Shlomo (1997), who

argue that health status at any given age reflects not only the present living conditions of a specific person, but also prior living circumstances.

Social Production of Disease / Political Economy of Health

This school of thought, emerging in the politically turbulent 1960s and 1970s, introduces agency into the question of how people become infected by disease. With a goal of explicitly addressing economic and political determinants of health and disease, these analyses were developed in part as critique of “lifestyle” theories, which often blamed the victim by emphasizing individual responsibility to “choose” healthy lifestyles and to cope better with “stress” (Crawford 1977; Doyal 1979; Tesh 1988). Focusing on structural barriers to people living healthy lives, this approach investigates capital accumulation and enforcement by the state. Determinants of health are thus analyzed with the goal of determining who benefits from specific policies and practices and at whose cost. The underlying hypothesis of this approach is that political and economic institutions that create, enforce, and perpetuate economic and social privilege and inequality are fundamental causes of social inequalities in health (Link and Phelan 1996).

Use of this approach in research often focuses on conceptual and empirical analyses that emphasize class inequalities in health within and between countries. This approach has also been used in attempting to explain the health impacts of rising income inequality, of programs imposed by the International Monetary Fund and the World Bank, of neoliberal economic policies favoring dismantling of the welfare state, and of free-trade agreements imposed by the World Trade Organization (Krieger 2001).

Krieger and Birn (1998) argue that this approach has four main implications for action. The first is that strategies for improving health in communities require a vision of social justice supported by active organization to change unjust social and economic policies and norms. Another deals with the relationship between economic growth and inequality. If social equity, economic growth, and public health interventions do not interact, social inequalities in health may be aggravated in the development process (Szreter 1997). The third is the assumption that enhanced knowledge with the emerging field of health and human rights is likely to improve the real-world efficacy of social epidemiologists' work by providing frameworks for governments to embrace the interconnectedness and interdependence of civil, political, economic, social, and cultural rights. Finally, Krieger and Birn conclude social epidemiologists must be key actors in ensuring studies of social inequalities in health are viable and promoted, for without that information, it is impossible to “gauge progress and setbacks” (1998, 1605).

However, the complexity of studying the impact of social determinants of population health is also addressed by Krieger (1994). The social production of disease/political economy of health perspective relies chiefly on population distributions of known risk and protective factors, which, ironically, are individual-level characteristics. Krieger also argues that a focus on “fundamental social causes” fails to offer thinking through “*whether*” and “*which*” public health and policy interventions are needed to alleviate social inequalities in health. While McKeown (1988) famously argued that 19th century declines in disease mortality in the UK and US are primarily due to economic development—and thus improved nutrition—Szreter (1988) and other public health historians have demonstrated that McKeown is only half right, arguing that economic growth alone did not improve health. Rather, specific public health policies

were of fundamental importance. Krieger (2001) thus concludes that, to appropriately study and advance social epidemiology, it is crucial to move from an “either/or” to a “both/and” logic, which requires multi-level frameworks that integrate social and biological reasoning and history.

Ecosocial Approach

One of the leading thoughts in contemporary social epidemiology is that pictorial depictions of newer frameworks to explain current and shifting patterns of disease distribution refuse to stay in a single plane. Instead, unlike prior diagrams—such as the epidemiological triad, the web or causation, or the causal pie—the new mental pictures are both multidimensional and dynamic (Krieger 1994; McMichael 1999; Susser 1996). The terminology suggests the importance of ecology, situating humans as one notable species among many cohabiting, evolving, and altering our dynamic planet. The term “ecosocial theory” was introduced by Krieger in 1994, with a fractal metaphor of an evolving bush of life intertwined at every scale, micro to macro, with different core social groups who alter the scaffolding of society (Krieger 1994). The term “eco-epidemiology” was proposed by Susser in 1996 alongside an image of “Chinese boxes” that referred to nested “interactive systems,” with localized structures and relationships. A “social-ecological systems perspective” was also developed by McMichael in 1999, which depicted a cube that represents the present and past, whose three axes extend from individual-to-population, proximate-to-distal, static or modular life course, to “future” (McMichael 1999). The goal of these researchers is not to explain everything—and therefore nothing—but to generate a set of integral and testable principles useful for

guiding specific inquiry and action. An ecological approach concerns itself with scale, level of organization, dynamic states, mathematical modelling, and understanding unique phenomena in relation to general processes (Krieger 2001). Following the theories of ecosocial epidemiology, researchers can begin to shine light on population patterns of health, disease, and wellbeing as biological expressions of social relations, and can likewise begin to note how social relations influence basic understandings of biology.

The Agent

When approaching questions related to the role of social and structural factors in the spread of HIV, one must understand the history and biological background of the disease. These epidemiological factors interact with behavior and structural factors in the spread of the disease. Part of what makes studying the spread of HIV so difficult, especially in specific countries, is that research related to molecular dating is sparse. As technology advances, more detailed spatial molecular dating research is being pursued. One such study related to the geographic dating in Nigeria—the first of its kind—was published just recently (Nazziwa et al. 2020). This study has provided researchers more information about both the estimated emergence and geographic spread of HIV in the country, though since it is the first of its kind, it has not yet been corroborated. In addition, the biological diversity of HIV and the various groups and sub-types of which it is comprised further complicate researchers' ability to determine the exact origins of the virus. Despite these challenges, there is general consensus on the origins of HIV, though patterns of its spread are less clear.

Origins of HIV

The first known case of HIV was discovered in an adult Bantu male who died in Belgian Congo in 1959. A team of researchers used preserved plasma samples and, through immunofluorescence, western blotting, and radioimmunoprecipitation methods, determined the sample tested positive for HIV-1 (Nahmias et al. 1986). The findings of this study—primarily that the Bantu male was infected with HIV, making him the oldest documented case—are widely accepted by researchers in the field.

HIV-1 and HIV-2 are lentiviruses whose closest relatives, found infecting other primates, are termed simian immunodeficiency viruses (SIVs). SIV has been found in more than 20 species of primates, all from sub-Saharan Africa (Hahn et al. 2000). Some of these species exhibit very high rates of infections with diverse but species-specific strains of SIV. The number of species with closely related SIVs suggests that at least some African primates have been infected with SIV for a long period of time (Beer et al. 1999; Hahn et al. 2000). The diversity of SIV in African primates parallels the diversity of viral strains for HIV-1 and HIV-2 in sub-Saharan Africa, providing compelling evidence that HIV arose through cross-species transmission from primates in Africa (Peeters and Sharp 2000). This evidence is bolstered by sub-Saharan Africa having the highest infection rates in the world.

An overwhelming amount of research suggests cross-species transmissions occurred through humans eating “bush-meat.” Chimpanzees, sooty mangabeys, and other species of primates are often hunted, butchered for food, and sold at city markets. Commercial logging also greatly increases the harvest and consumption of primates (Robinson et al. 1999). Sharp et al. (2001) argue SIV likely spread to humans during the

hunting of primates or the consumption of contaminated uncooked meat, during which humans were directly exposed to animal blood or mucosal secretions. While this hypothesis is most widely accepted to explain the cross-species transmission, iatrogenic human-induced modes of transmission have also been proposed.

One of the divergent proposed modes of transmission that gained widespread attention was the idea that AIDS viruses were transferred from primates to humans via contaminated preparations of oral polio vaccine (OPV). The main source of this hypothesis was journalist Edward Hooper, who investigated the potential OPV-AIDS link in a book entitled *The River: A Journey to the Source of HIV and AIDS* (Hooper 1999). Hooper argued that the cause of the HIV-1 group M—the HIV subtype affecting most of the world—pandemic is likely the polio vaccine developed by a team led by Hilary Koprowski, which was administered to approximately one million people in the Belgian Congo, Rwanda, and Burundi in the late 1950s. The research group used chimpanzees at a primate facility near Stanleyville for polio vaccine safety testing and research projects. Hooper asserts that the kidneys of these primates were used to produce polio vaccines in the United States and that kidneys derived from SIVcpz-infected chimpanzees contaminated the vaccines. There is no direct evidence to support these claims, though Hooper presents circumstantial evidence in a thorough and persuasive way that led to the hypothesis being considered by scientists and shared through the press (Ridley 2000).

Hooper's 1999 hypothesis was swiftly refuted by the scientific community. Following up on testimonies from people Hooper had interviewed and analyzing research from a number of leading HIV scholars, Stanley Plotkin published a paper responding to Hooper's two main assertions that the vaccine prepared in the kidneys of SIV-infected chimpanzees was obtained from a colony established in the Belgian Congo, specifically

in the vicinity of Stanleyville, now Kisangani, and that there was a coincidence in the place between administration of the vaccine and early cases of AIDS (Plotkin 2001). Plotkin argued that, based on eyewitness testimony, documents of the time, epidemiological analysis, and ancillary phylogenetic, virologic, and PCR data, the polio hypothesis is false and without factual foundation. Worobey and a team of researchers (2004) expanded upon Plotkin's argument, referencing the diversity of the strains of SIV and their relation to different subtypes of HIV. Worobey's team aimed to confirm the existence of SIVcpz in Kisangani chimpanzees and apes. In their field work, they determined that chimpanzees in the vicinity of Kisangani are endemically infected with a new strain of the SIV virus, dubbed SIVcpzDRC1. This strain represents a lineage within the *P. t. schweinfurthii* SIVcpz radiation, which is clearly distinct from the *P. t. troglodytes* SIVcpz clade that includes all known strains of HIV-1. The results thus indicated that the chimps in the vicinity of Kisangani could not have been the source of HIV-1 (Worobey et. al 2004). These findings, tied in with prior research suggesting HIV-1 group M originated 30 years before OPV trials were conducted, refuted Hooper's OPV theory (Korber et. al 2000; Sharp et. al 2001).

Diversity of HIV

Part of the complexity of determining the exact origins of the virus comes from the various groups and sub-types of which it is comprised. Acquired immunodeficiency syndrome (AIDS) is caused by two lentiviruses, human immunodeficiency virus types 1 and 2 (HIV-1 and HIV-2). The initial epicenters of HIV-1 and HIV-2 were Central Africa and West Africa, which reflect the natural habitats of chimpanzees and sooty mangabeys.

Due to its high replication rate and the error-prone nature of reverse transcriptase, HIV-1 evolves at an extraordinarily fast rate (Li et al. 1988; Korber et al. 1998). Analyses of various strains of HIV-1, isolated from different geographic origins, revealed three distinct groupings of the viruses, termed Group M (main), N (new, non-M, or non-O), and O (outlier). Gao et al. (1999) determined the subspecies identity of all known SIVcpz-infected chimpanzees through mitochondrial DNA analysis and concluded that, since SIVcpz lineages are interspersed among these three HIV-1 lineages, each of the groups must have arisen from a separate cross-species transmission event. They also indicated that *P. t. troglodytes* coincides uniquely with areas of HIV-1 Group M, N, and O endemicity, which confirmed *P. t. troglodytes* has been the source of at least three independent introductions of SIVcpz into the human population (Gao et al. 1999).

A majority of HIV strains found worldwide belong to the group M lineage. Within Group M, there is further phylogenetic structure, which has allowed the classification of strains into numerous sub-types. Africa has the greatest genetic diversity of HIV-1, though Group M subtypes A and C are most common (Gao et al. 1999). A wide variety of recombinants have also been reported in Africa because of the prevalence of numerous co-circulating subtypes. In North America, Europe, and Australia, Group M subtype B is by far the most common (Gao et al. 1999). To determine the diversity of the viruses, researchers use a variety of methods. Sequence determination is the most accurate approach to characterize virus genomes, but this method is expensive. Serological methods and polymerase chain reaction (PCR)-based techniques have been refined to define the subtype affinity of a particular region of the viral genome, but they will not detect whether other regions are mosaic or belong to a different subtype (Peeters and Sharp 2000).

While HIV-1 has been spread across the world, HIV-2 is largely isolated to West and Central Africa. Multiple factors account for the difference in global epidemiology between HIV-1 and HIV-2. Using internally controlled quantitative reverse transcriptase-polymerase chain reactions, researchers determined that, biologically, HIV-2 has lower viral loads, which correlates with a lower transmissibility (Popper et al. 1999; Shanmugam et al. 2000).

Tracking the spread of HIV-2 was crucial for researchers to better understand differences between the two lentiviruses. A key method in determining the origin dates of both HIV-1 and HIV-2 is through molecular clock analysis. The molecular clock hypothesis that genes or proteins evolve at a constant rate is an important tool in revealing phylogenetic relationships among species. Using this method, researchers are able to trace an infection back to transmission using HIV sequences from a single time point.

Attempts to date when cross-species transmission occurred have focused on HIV-1 Group M. Early studies placing a time-scale on the evolution of the primate lentiviruses gave wildly divergent results. After estimating the rate of the molecular clock, however, it was estimated that the common ancestor of Group M existed around 1960 (Li et al. 1988). This date made sense with the early knowledge of the AIDS epidemic and with the earliest known antibody-positive serum sample obtained from the 1959 Bantu male. This impression of the time scale, which would have been consistent with the OPV-AIDS hypothesis, became well established and remained unchallenged for nearly ten years. Sharp et al. (2001), however, argued that the time-depth of the M group was severely underestimated, as the estimate had been derived from an analysis that assumed an oversimplistic model of nucleotide sequence evolution. At the time the refutation was

published, more complex models had been developed that took into account heterogeneous rates of evolution at different sites within genes. These models were important, as HIV-1 sequences evolve in that way; ignoring the heterogeneity leads to an underestimation of the true amount of divergence among sequences and thus an underestimation of the time-depth of the phylogeny (Sharp et al. 2000). Thus, using a model of sequence evolution that allowed individual sites to evolve at different rates, Korber et al. (2000) estimated the common ancestor of Group M to 1931, with a confidence interval of 1915 to 1941. One of the first research teams to estimate the introduction of HIV-2 into the human population, Lemey et al. (2003) used a similar comprehensive molecular clock analysis to conclude that HIV-2 subtypes A and B can be traced to 1940 ± 16 years and 1945 ± 14 years, respectively.

The Host

Human behavior is shaped by multiple factors in individuals and the environment. Micro-level factors, such as molecular and biological conditions, and macro-level factors, such as social and environmental conditions, often interact in mutually reciprocal relationships to shape behavior. The behaviors most closely linked with the epidemiology of AIDS are sexual contact and injection drug use. While much of the research and preventative measures regarding the spread of HIV have focused heavily on individual behaviors, approaching these behaviors—especially in the study of infectious disease—requires a cross-disciplinary effort that examines their biological, psychological, and social bases and the ways in which they interact.

Sub-Saharan Africa accounts for approximately 67.5% of people in the world living with HIV (UNAIDS 2019). Unprotected heterosexual sex is the leading cause of HIV in the region. Sexual risk in the region is substantial and there is evidence that preventive behaviors have not generally been adopted. Condom use, for example, remains elusive for the majority of the population despite general knowledge of the prophylactic properties of condoms (Maticka-Tyndale 2012; UNAIDS 2009). A consistent observation from many studies is that those at risk for HIV, whether through sex or drug use, do not recognize the repercussion and dangers to which they subject themselves (Brunswick et al. 1993; Klepinger et al. 1993; Kline and Strickler 1993). Research also suggests that, even when those at risk are aware of the dangers they face, knowledge alone is not enough to effect behavior change to reduce their risks.

Various initiatives have been launched to educate the public on HIV/AIDS, many of them combination HIV prevention strategies. Many researchers agree that no single prevention strategy will be sufficient to contain the spread of the disease (Bekker 2012; Brown 2014; Kurth 2010). Instead, researchers advocate the development of “prevention packages” that combine various arrays of evidence-based strategies that are tailored to the needs of diverse subgroups and targeted to specific populations. Kurth (2010) identified HIV risk target levels to consider for combination HIV prevention packages. Those grouped under sexual behaviors include delaying coitarche, increasing consistency and correctness of condom use, reducing number of sex partners, reducing age-mixing and intergenerational sex, increasing contraceptive use, and developing antiretroviral-based preventive strategies.

AIDS intervention studies use a range of methodologies. The “gold standard” of methodologies has been experimental studies that randomize subjects into control and

experimental groups, but most studies do not adhere to this design because of difficulties associated with maintaining the conditions involved. The most common means of assessing the effects of prevention programs, therefore, have been pre-post comparison studies. The standard outcome measures for determining whether an intervention is successful have been specific changes, such as increased condom use, and mediating variables, such as demonstrated self-efficacy.

Perspectives on Risk Behavior

Psychological theoretical models that deal with HIV risk behavior can be classified into two main groups: those that predict risk behavior and those that predict behavior change. Those that predict risk behavior attempt to recognize variables that, for example, explain why some people perform a given behavior at a given time while others do not (Fishbein et al. 1991). They also often focus on different stages the individual may go through while attempting to change behavior.

The Health Belief Model and the Theory of Reasoned Action were developed early in the HIV/AIDS epidemic to explain health behaviors and identify determinants of HIV risk behavior. The Health Belief Model, developed by Rosenstock (1974) and expanded on by Maiman and Becker (1974), relates psychological theories of decision making to an individual's decision about alternative health behaviors, particularly in regard to the uptake of health services. The model suggests that people's beliefs about health problems, perceived benefits of action, barriers to action, and self-efficacy explain engagement or lack thereof in health-promoting behavior (Rosenstock 1974). The Theory of Reasoned Action, developed by Ajzen and Fishbein (1977), is mainly used to predict

how individuals will behave based on their preexisting attitudes and behavioral intentions. Fishbein theorized a relationship between attitude and behaviors with a purpose of understanding voluntary behavior by examining an individual's motivation to perform the action. Critics of the theory asserted that attitude theories were not proving to be a good indicator of human behavior, however, and the theory was later revised. In the context of HIV risk behavior, these models focused on perceived susceptibility, perceived benefits, constraints to behavior, and intentions to behave in particular ways, such as using condoms.

Social Cognitive Learning Theory, developed by Bandura (1977), was originally used to help people overcome phobias, but has also been applied to HIV risk behavior. It deals with concepts of "modeling," the process by which people are influenced by observing others, and "efficacy beliefs," which includes the belief that a given behavior will result in a given outcome. Related to HIV, outcome efficacy includes the belief that wearing a condom will prevent HIV transmission. Self-efficacy, a crucial component of the theory, deals with the individual's belief that they can effectively carry out a desired behavior in a particular setting. This belief could be related to successfully negotiating the use of a condom during a sexual encounter. In recent years, self-efficacy has been viewed as one of the main social cognitive learning variables in predicting risk behavior.

A merging of variables from the health belief models and social cognitive learning theory came to make up most models of the mid-1980s. These merged theories assume that, if individuals form an intention to behave in a particular way and have the skills and self-efficacy to do so, they are likely to carry out their intended behavior. Many of the intervention studies and prevention strategies developed to combat the spread of

HIV build upon and are influenced by these models, especially the variables relating to susceptibility, skills, and efficacy.

Behavior Change Models

Changing behavior is a process. Recognizing that, scholars have developed models that describe the process and identify benchmarks that show progress. These models, known as stage theories of behavioral change, provide the tools for identifying benchmarks so that researchers can tailor intervention strategies to specific groups or communities. The success of these intervention methods is thus not determined by the cessation of risk behavior, but rather the advancement of an individual or group from one stage to another. In the context of HIV, two stage models of change have been adapted for relevant risk behavior: the AIDS Risk Reduction Model and the Stages of Change Model.

The AIDS Risk Reduction Model, developed by Catania, Kegeles, and Coates (1990), builds upon elements of the health belief and social cognitive learning models in determining the process through which individuals modify their behavior. One of the model's goals is to assess why people fail to progress over the change process. The model identifies three stages in the change process. The first stage is labeling high risk behavior as problematic, which relates to the notion of susceptibility described in health belief models. In order to fully label risk behavior as problematic, individuals must know which sexual activities are associated with HIV transmission, believe they are personally susceptible to contracting HIV, and believe having AIDS is undesirable. The second stage involves making a commitment to changing risk behaviors and incorporates the

concept of efficacy from social cognitive learning theory in evaluating the weight of costs and benefits through response efficacy. The third stage involves seeking and enacting solutions. Individuals must take steps to perform new behavior and then actually perform it.

The Stages of Change Model, developed by Prochaska, DiClemente, and Norcross (1992), was originally used in psychotherapy and has only recently been applied to HIV risk behavior. The model is being used by the Centers for Disease Control and Prevention in its AIDS Community Demonstration Projects, which targets hard-to-reach groups at risk for HIV infection (O'Reilly and Higgins, 1991). The model is comprised of four stages of change: precontemplation, contemplation, preparation, and action. During precontemplation, the individual does not intend to change behavior within the next six months. This stance changes at the contemplation phase, where the individual does intend to change behavior within the next six months. The preparation phase occurs as the individual seriously plans for behavior change within the next 30 days. Finally, the action phase marks the modification of an individual's behavior, having met specific criterion related to the specific behavior to be changed for less than six months. The period during which the individual continues the behavior change beyond six months is described as the maintenance phase. Movement between the phases is not always linear, and individuals must often attempt behavior change several times before they achieve their goals. The model also outlines ten cognitive, affective, and behavioral strategies and techniques for people to use as they progress through the stages. These strategies include consciousness raising, self-reevaluation, social reevaluation, self-liberation, social liberation, counter-conditioning, stimulus control, conditional stimulus,

contingency management, dramatic relief, and support relationships (Prochaska and DiClemente 1983).

An alternative to stage models is Diffusion Theory. While diffusion models have long been used in social sciences, Rogers (1983) applied those insights to behavior change in communities. Diffusion Theory involves members of a social system and describes the process by which change is communicated through certain channels over time in that system. This method involves entire communities instead of just individuals, relying on sociocultural influences to determine how to go about modifying behavior. In any social system, there may be an opinion leader who is able to influence behavior change at an accelerated rate in the community. Interventions based on this model often focus on training or persuading peer opinion leaders. Once a critical portion of the targeted community adopts the new behavior, additional intervention is not needed.

While these theoretical models have made important conceptual contributions, they are limited in their ability to predict risk because, with the exception of the Diffusion Theory, they do not easily accommodate contextual personal and sociocultural values. Gender roles and cultural values and norms influence the behaviors of individuals and the nature of the sexual activity that occurs. Risky sexual behavior is often not the result of a lack of knowledge, motivation, or skill, but instead the result of a given personal and sociocultural context. Models designed to explain or predict behavior tend to separate social and environmental factors as independent variables, though there is substantial evidence that they are mutually reciprocal. The models focus more on the individual than the culture and community to which the individual belongs (Institute of Medicine 1994).

The Environment

The structural factors associated with HIV/AIDS, also regarded as the environment in the epidemiological triad, are most important to this study. These factors are external conditions other than the agent that contribute to the disease process and can be physical, biologic, or social in nature. Behavior is easier to measure quantitatively, but behavior is often shaped by larger socioeconomic and cultural factors. As previously noted, biological, social, and structural factors are all interconnected in spreading HIV. It is critical, albeit difficult, to include analyses of structural factors in understanding the process of HIV infection and proposing effective preventative and treatment strategies.

Structural Factors of HIV

Poundstone et al. (2004) identified five main categories of structural-level factors related to HIV/AIDS epidemiology: structural violence and discrimination, legal structures, demographic change, the policy environment, and war and militarization.

According to Farmer (2003), *structural violence* highlights institutionalized harm by historical processes—often driven by economics—to constrain agency. Structural violence is often manifested in discrimination based on race or ethnicity, gender, sexual orientation, and HIV status. This discrimination can lead to emotional and behavioral damage or limited life chances related to education, employment, and income, all of which can lead to high-risk behaviors that make individuals more susceptible to HIV/AIDS (Poundstone et al. 2004).

Legal structures refer to laws and the institutions involved with their creation, implementation, and interpretation (Burriss 1999). According to Burriss et al. (2002), laws have the ability to affect health in two ways. First, laws may have a direct effect, as potential pathways through which social determinants affect health. Second, laws may have an indirect effect, as they influence social conditions associated with health outcomes. For example, legal restrictions on access to sterile injection equipment, which have been associated with higher HIV incidence, show the potential for laws to have a direct effect on HIV health (Friedman et al. 2001). An example of an indirect effect is the way tax laws influence income inequality, which may foster social conditions that increase HIV vulnerability. Many social determinants of HIV, such as housing, poverty, income inequality, racism, and community social organization, are influenced by the legal structure of a country or community (Lazzarini and Klitzman 2002).

Demographic change focuses on how population mobility and migration, urbanization, and the age and gender structures of subpopulations affect HIV/AIDS patterns. Globally, mobile populations experience higher HIV infection rates than nonmobile populations, regardless of HIV prevalence in the origin or destination location (Decosas et al. 1995; Kane et al. 1993; Pison et al. 1993). HIV transmission rates are affected by labor migration, refugee migration, resettlement, internal migration, and commuting. Epidemiologic studies of migration have fallen into two main categories: studies of the spread of HIV along transportation corridors and studies of the migration process that increased vulnerability to HIV/AIDS (Decosas et al. 1995). Researchers are able to take advantage of the molecular techniques in genetics to track the spread of viral subtypes and patterns of mobility and migration. Perrin (2003), for example, reviewed evidence that linked travel patterns to HIV. Other studies also suggest that travel patterns

influence the spread of HIV, specifically that long-distance truck driving spreads HIV in Africa, India, and South America (Gysels et al. 2001; Singh and Malaviya 1994; Lacerda et al. 1997; Bwayo et al. 1994; McLigeyo 1997). Finally, studies have also indicated that migrant labor populations play a significant role in the creation of markets for prostitution (Jochelson et al. 1991). Poundstone et al. (2014) argue that HIV is a classic example of an urban health problem, “yet few have directly examined the role of urbanization processes in generating population HIV/AIDS patterns” (Vlahov 2002, S1).

The *policy environment* plays a central role in the emergence and control of HIV/AIDS epidemics. Macroeconomic policy, health policy, social policy, and illicit drug control policy are all realms of policy that are particularly relevant to the study of HIV. HIV is exacting a high toll on the macroeconomic health of many developing nations. According to Poundstone et al. (2014), macroeconomic policies are likely to be contributing to increasing HIV burdens. The complex and reciprocal relations between macroeconomic policies and HIV have been very under-researched, with studies linking potential connections only starting to appear recently. In addition, structural-level health policies governing prevention, treatment, and care can contribute to dramatic reductions in HIV incidence.

War and militarization can also increase HIV risk indirectly and directly by disrupting normal social and risk networks, weakening or destroying medical infrastructure, and increasing poverty and social instability in conflict areas (Hankins et al. 2002). Changes in risk behaviors in times of military conflict have been documented. In Afghanistan, for example, war was associated with increased needle sharing among injection drug users in neighboring Pakistan, potentially as a result of the disruption of regular heroin trafficking from Afghanistan (Strathdee et al. 2003). In addition, military

forces are often located near urban centers and consist of young men away from home. In a study for the World Bank, Kaplan (1999) found that a reduction in the size of the military from 30 percent to 12 percent as a proportion of the total urban population could reduce HIV prevalence among low-risk urban adults by 1 percent. Policies to limit the presence of troops in urban areas are likely to reduce HIV risks (Poundstone et al. 2014).

Interacting with Behavior

Structural-level factors interact with social factors and individual behavior in complex ways. Neighborhoods represent the intersection of social networks and physical spatial locations, a confluence Wallace (1991, 847) dubbed the “sociogeographic networks” through which infectious diseases spread. Both direct and indirect mechanisms may determine how neighborhood-level factors shape population HIV patterns. Direct mechanisms are those that increase the likelihood of a person coming into contact with someone who is HIV positive. For example, structural factors such as residential segregation and the social isolation of marginalized populations could influence these social and sexual networks. Indirect mechanisms include those that increase general population vulnerability to HIV, such as exposure to poor socioeconomic conditions, high unemployment, or the proliferation of illicit drug markets. Social disorganization and loss of resources due to powerful social and economic forces shape HIV patterns at the neighborhood level. In addition, social policies assume a critical role in the lives of those most vulnerable to HIV, such as low-income, marginally housed, or addicted persons. HIV prevention strategies have typically centered on individual behavior

change, but the scope of HIV prevention policy is widening with recognition of the need for multisectoral programs that address the social and economic aspects of HIV.

Developing A Methodology

The aim of this study is to investigate the impact of one factor of demographic change—urbanization—on the differences in HIV prevalence in west and southern Africa. Many studies have been conducted on the transmission of HIV/AIDS using the basic reproduction number, R_0 , which captures the epidemic potential of an infection in a population based on certain social determinants. Using this method, researchers have proposed both behavioral and social changes that would reduce the basic reproduction number. Behavior is an important—and measurable—aspect of HIV transmission, but, according to theories of social epidemiology, social groups and behavior are often influenced, whether directly or indirectly, by structural determinants. There is a clear call in the field for incorporating structural approaches to HIV as part of combination HIV prevention in order to enhance preventative strategies and better alleviate problems that prior paradigms fail to solve.

Despite many journal articles and theories for studying HIV epidemiology—even dating back to the 1980s—that address this call, national AIDS responses cling determinedly to information, education, and communication programs, while the biomedical research community has maintained a focus on behavioral interventions that can be tested in experimental trials. This way of thinking fails to build upon what has been learned about factors influencing patterns of sexual behaviors, especially in sub-

Saharan Africa. While HIV/AIDS educational programs in North America and Europe led to a reduction in the spread of the disease, AIDS cases continue to rise in sub-Saharan Africa despite education (Perlin and Cohen 2002). Even when individuals know their HIV/AIDS status, risky sexual behaviors have not changed. Condom use has remained low in many African countries (Panchaud et al. 2002). Auerbach et al. argue that, after nearly 30 years of the HIV/AIDS pandemic, there have been “woefully few examples of truly successful HIV prevention initiatives conceived and implemented by national policy makers and program planners” (2011, S293). The limited impact of individualist and urgency-based approaches of the past suggests the need to identify social and structural factors that contribute to the lack of behavior change and, ultimately, the long-term response to HIV.

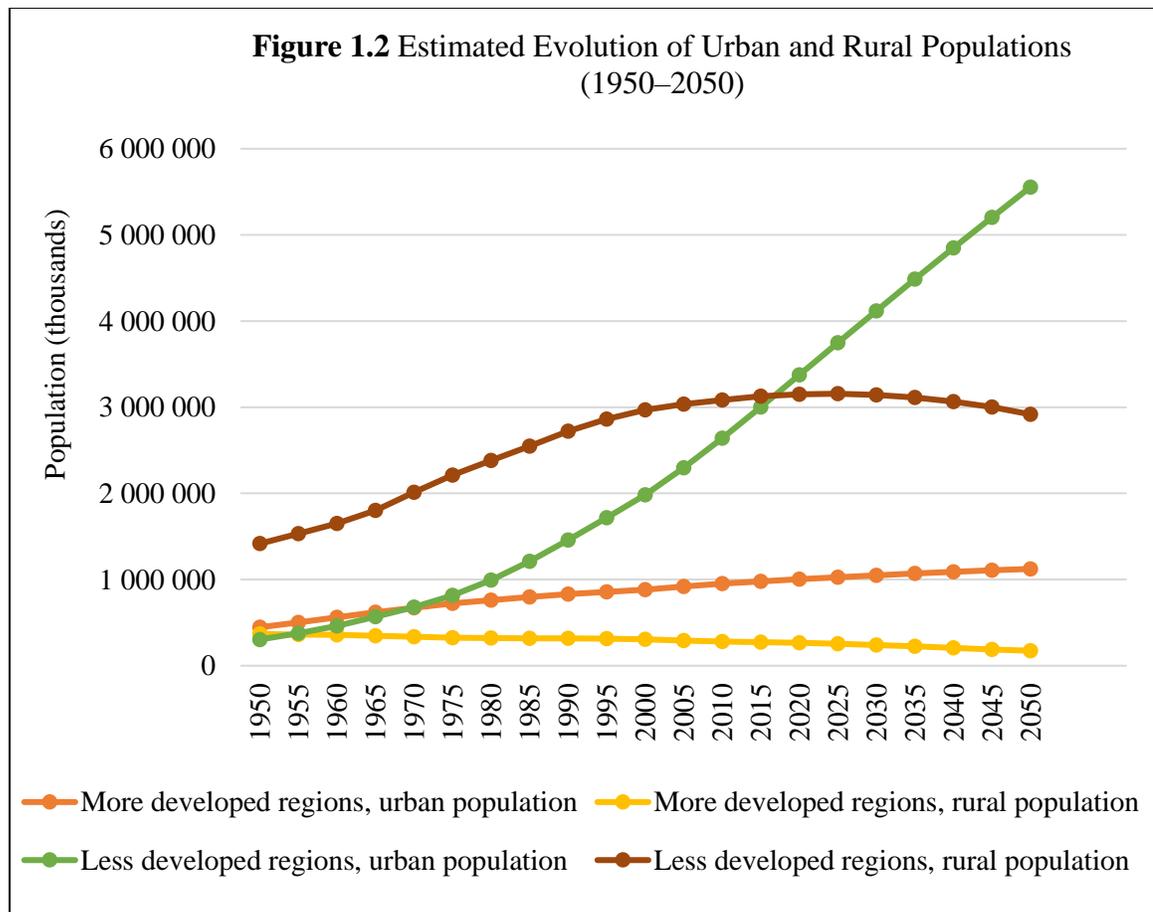
Models may be used to represent theoretical explanations of biological, social, and structural influences on disease processes and can serve as useful guides for practice, research, intervention, and policy development (Krieger 1994). While models such as the health belief model, the theory of planned action, and the model of behavior change have been used to articulate the underlying individual motivations for behavior, this study attempts to conceptualize and demonstrate the role of determinants related to urbanization. A relevant model, then, can be found in social epidemiology, as it situates health and health behaviors in the context of physical, social, and policy environments. The model contextualizes individuals’ behaviors using dimensions including intrapersonal (knowledge, attitudes, behavior), interpersonal/network (social networks, social support), community (relationships among organizations/institutions), and public policy to provide a framework for describing the interactions among these levels.

While this model is important to keep in mind, the complexity of describing the HIV epidemic must be noted. No one model can describe all risk factors across the diverse domains, especially because the HIV epidemic is arguably a group of interrelated epidemics, each with its own individual, social, and structural risk factors. McLeroy notes that “one of the problems with many ecological models of social behavior is that they lack sufficient specificity to guide conceptualization of a specific problem or to identify appropriate interventions” (1988, 351). To adequately describe and address the complexity of an HIV epidemic, models can be developed for specific populations to measure relevant risk and risk contexts. After a comprehensive review of the literature, Baral et al. (2013) determined that, as of 2013, there was no model that encapsulated individual HIV transmission risks in the context of social and structural drivers of the epidemic. While specific quantitative epidemiological models, such as the basic reproductive number, may not be applicable to the study of structural risk factors, Auerbach et al. (2011) note there are a number of innovative options derived from recent interdisciplinary work and critical social theory. Among these options is qualitative comparative analysis, an approach this study will use in explaining specific structural relationships, largely because of the complex nature of examining these factors in researching HIV.

Urbanization, Health, and HIV

Of the aforementioned structural factors of HIV/AIDS, this study focuses on the influence of *demographic change* on HIV transmission in the regions of west and southern Africa. Urbanization is both a driver and an outcome of *demographic change*

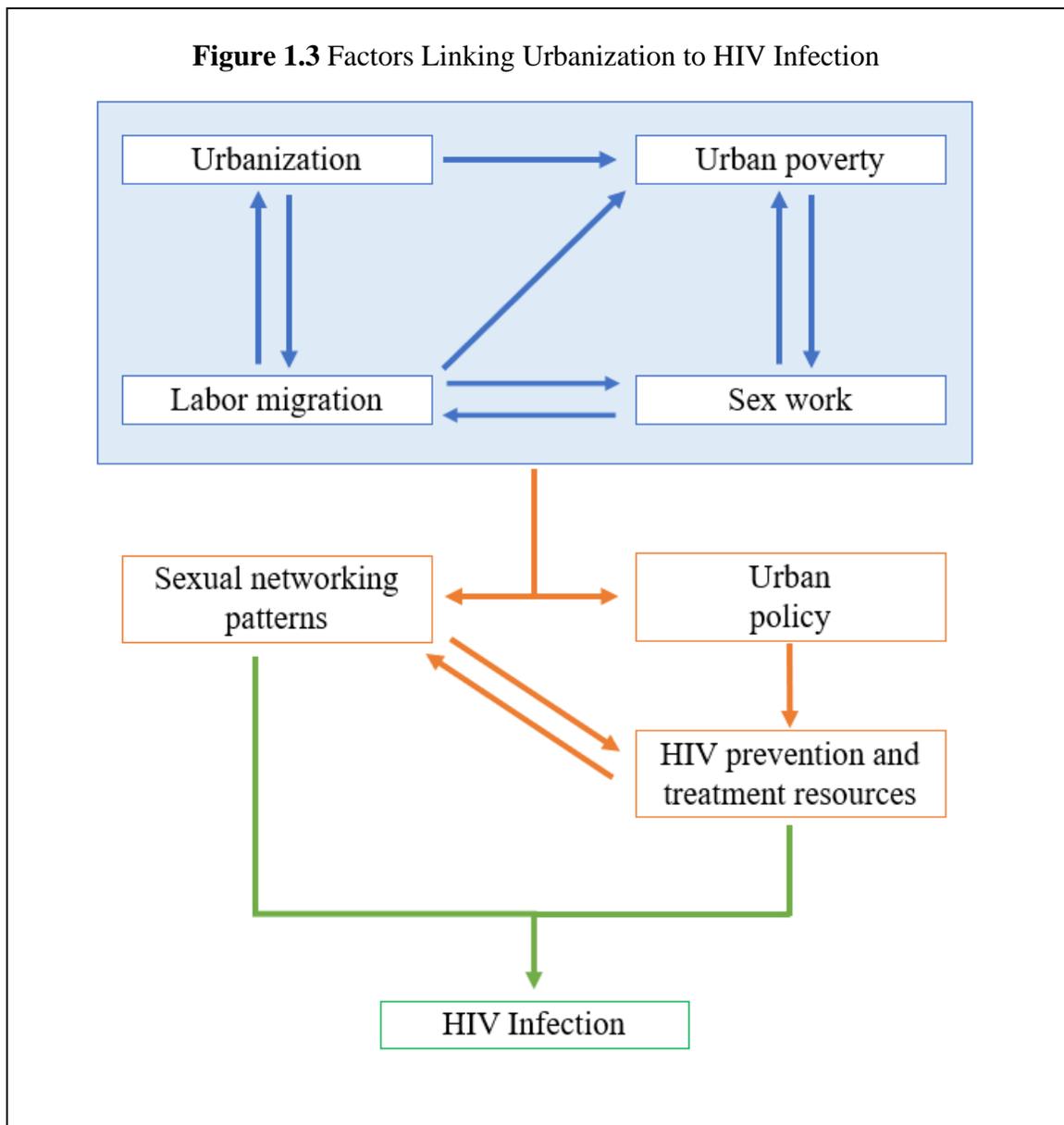
and is the main structural issue this study investigates. The 20th century has witnessed the rapid and unprecedented urbanization of the world’s population. The global urban population increased from 13% in 1900 to 29% in 1950, 49% in 2005 and, by 2030, it is estimated that 60% of the population will live in cities (UN DESA 2015). That percentage equates to an estimated 4.9 billion people living in cities by 2030. Even more striking, the United Nations predicts that the world’s urban population will almost double from 3.3 billion in 2007 to 6.3 billion in 2050. Almost all this growth is expected to occur in developing regions (see Figure 1.2). In Africa, the urban population is expected to triple, and in Asia it will more than double (UN DESA 2010).



In industrialized nations, urbanization has contributed to an overall improvement of health and to a major shift in disease patterns towards a rise in chronic diseases. In many low-income countries, however, economic growth does not keep pace with the rise in urban populations. Many national and municipal governments do not have the resources to cope with the steady influx of migrants or with the demographic growth of urban centers. The urban sector's share of the poor is therefore on the rise. The health transition that has taken place in developed countries is out of reach for most low-income countries, with infectious diseases remaining a leading cause of mortality and morbidity in the developing world. Socioeconomic disparities have also sharpened in urban centers, leading to profound health inequalities (Harpham and Tanner 1995). Urban populations are more susceptible to disease transmission for a number of reasons, including increased rates of contact, mobility of people, and a general heterogeneity in health. As Alirol et al. (2011) noted, cities become “incubators” where “all the conditions are met for outbreaks to occur.” Typically, poor urban areas are affected first, but infections have the potential to propagate to other parts of the city, including wealthy neighborhoods and tourist areas. As the world becomes more interconnected, cities become gateways for the worldwide spread of infections. Urbanization thus raises health challenges for the international community. Since rapid urbanization predominantly takes place in low-income countries with health consequences that result from the scarcity of resources, the effects of urbanization within these countries should be considered in the epidemiology of infectious diseases.

By examining three key elements of urbanization—labor migration, urban poverty, and sex work—in two case studies, this paper attempts to draw connections between this structural factor and the spread of HIV. These three aspects of urbanization

affect HIV vulnerability and are analyzed in relation to sexual networking patterns, urban policy, and HIV prevention and treatment resources. An original schematic model (Figure 1.3) illustrates the factors and connections this paper aims to address. It is not my intention to suggest that HIV/AIDS is exclusively or even predominantly an urban phenomenon. Rather, I explore factors in urban development that are associated with increased vulnerability to HIV infection.



Two methodological difficulties affect this study. First, in sub-Saharan Africa, there is no official or common definition of what constitutes “urban” and “rural.” Many countries use a population figure of 2,000 to distinguish between the two types of settlements, but the figure varies from 100 in Uganda to 20,000 in Nigeria and Mauritius (UNCHS 2001). Second, the reliability of both urban data and HIV statistics is questionable. Given the absence of regularly updated census data for many countries in sub-Saharan Africa, global statistics on urbanization on the subcontinent are often speculative and not particularly reliable (Satterthwaite 2005). Sentinel surveillance sites are generally located in urban areas and in larger settlements in rural districts, creating an implicit urban bias in surveillance systems. For this reason, UNAIDS prefers to use the term “outside major urban areas” rather than “rural areas.”

While a lack of consistent and reliable data on the geography of HIV in sub-Saharan Africa hinders an assessment of the epidemic’s trends in urban and rural areas, it is widely accepted that large urban areas tend to show higher HIV prevalence rates than smaller urban centers and rural areas (Dyson 2003). In the early 1990s, urban areas were identified as a main locus of the spread of HIV in sub-Saharan Africa. In the worst affected countries, approximately 25 to 33 percent of the urban population were HIV-positive, compared to less than 5 percent in rural areas (Panos 1992). Towards the end of the 1990s, HIV prevalence was observed to be four times higher in urban areas than in rural areas (Harpham and Molyneux 2001). In a number of African countries, this disparity between urban and rural HIV prevalence has become less stark over time. Trends of parallel spread of the epidemic in urban and rural areas point to the intricate linkages that exist between urban and rural areas. Researchers argue these linkages are

caused by population flows, circular migration, and multi-location households, among other factors. These linkages may serve to obscure the full scale of HIV in urban areas.

Urban residents, especially urban youth, tend to show higher levels of awareness of HIV and ways of avoiding HIV infection than rural residents (Zulu et al. 2004). This research suggests that factors other than knowledge and awareness of HIV need to be considered as possible explanatory factors for the concentration of HIV across sub-Saharan Africa. Various interrelated factors that are associated with increased vulnerability to HIV infection can be identified, including those represented in this paper's methodology. It is unlikely that any of the factors presented in this paper alone are sufficient in explaining the scale and manifestation of HIV in particular urban contexts. Van Donk (2006) argues that case study research is essential in determining the nature, balance, and interaction of these factors that enhance vulnerability to HIV in specific urban localities. Thus, using the schematic model developed above, a qualitative comparative analysis will be conducted with Nigeria and South Africa as case studies. An explanation for the choice of these two cases is presented at the end of this chapter.

Key Factors Influencing Urban HIV Vulnerability

Four key factors that influence HIV vulnerability have been selected as the main points of focus for this study. Each of these factors is influenced by, and often develops as a result of or with urbanization. They are also interconnected and work in tandem to propagate risky HIV behavior. This paper calls for a broader perspective on the social ecology of HIV to be taken into account. While urbanization is just one part of a plethora of structural factors, this investigation aims to find connections between this structural

factor and HIV infection to support the argument for more comprehensive research related to social epidemiology.

Migrant Labor

The International Organization for Migration has noted that migration is the strongest single predictor of HIV risk and prevalence in sub-Saharan Africa (IOM 2002). More than any of the other factors presented in this paper, migration influences urbanization and demographic change. At the same time, as cities urbanize, migrant labor increases with the prospects of new employment opportunities. In this way, migrant labor and urbanization follow a cyclical trend. This idea has been described by researchers as a “push” and “pull” effect of industrialization. Rural populations are “pulled” by large capital developments in emerging migrant labor markets, but also “pushed” by declining agriculture with reduced labor inputs. These effects, as Epstein and Packard argue, led to the social creation of a population “especially vulnerable to venereal disease and particularly to AIDS” (1987, 10).

Early research suggests that the pattern of development in sub-Saharan Africa was largely based on a migrant labor system (Crush 1984; Doyal 1979; Freund 1984). Mining, railroad work, plantation work, and primary production facilities absorbed capital investment and became enclaves of development in the underdeveloped continent. As these industries absorbed capital, they also absorbed large quantities of labor from rural areas. This process concentrated large numbers of male workers. Murray (1981) argues that the combination of migrant labor with a heavy preponderance of male laboring jobs and long familial separations caused a breakdown in the family and sexual patterns in sub-Saharan Africa. Doyal suggests that the disruption of the economic and

personal foundations of family life led to the growth of prostitution as an “adaptation to the intolerable strains faced by men and women alike” (1979, 121).

Rates of HIV infection tend to be higher among labor migrants than among those who do not migrate (UNAIDS 2004). In sub-Saharan Africa, it is common for male migrant workers to have multiple casual sexual partners in the city (Campbell 2003; Kalipeni et al. 2004; Lurie et al. 2004). The prolonged separation from one’s spouse or sexual partner seems to be a driving factor for the spread of HIV, particularly among men. A study on mobility, sexual behavior, and HIV infection in Cameroon found a correlation between the duration of absence and HIV prevalence among men (Lydie et al. 2004). Those who had been away from home for periods of more than 31 days saw an HIV prevalence rate of 7.6%, compared to 3.4% among those who had been away for less than 31 days. For those who had not been away from home in the year preceding the study, the prevalence rate was 1.4% (Lydie et al. 2004). In addition, workers’ ability to combat poor working conditions and to demand health benefits from employment is severely compromised because, historically, migrant laborers are difficult to organize for resistance to employers (Stichter 1985).

It is worth noting, however, that the relationship between migrant labor and HIV is not simple nor unidirectional. It has been assumed that male migrant workers typically pass on HIV infection to their female partners in rural areas. Evidence has emerged to suggest that this phenomenon is not always accurate. In a rural district in South Africa, for example, researchers discovered that in nearly 30 percent of the cases in which only one partner was infected with HIV, the infected person was the female partner who stayed home in the rural area (Lurie et al. 2004). Other research has determined that in

nearly 40 percent of migrant couples, the woman is first infected with HIV (Van Rensburg et al. 2002).

Urban Poverty

Between 1990 and 2001, the subcontinent experienced a significantly higher growth in the number of slum dwellers relative to overall population growth. UN-Habitat (2003) estimates seven out of ten urban residents in sub-Saharan Africa live in slums. Research suggests that slum residents begin sexual intercourse at earlier ages, have more sexual partners, and are less likely than other city residents to know of or adopt preventative measures against HIV infection (UN-Habitat 2004). Studies have found that economic deprivation and precarious living conditions contribute to enhanced vulnerability to HIV infection for slum dwellers. In South Africa, for example, HIV prevalence in urban informal settlements is estimated to be almost double that of urban formal settlements (HSRC 2002). Urban poverty is argued to be the most important predictor of the environmental health risks because it includes other forms of deprivation: lack of physical assets, political influence, access to basic services, and access to social capital (WHO 1995).

Various characteristics of the urban economy serve to further propagate HIV spread. First, urban economies are often linked to rural and other urban economies through transportation networks. These networks facilitate the flow of goods and people, which ultimately leads to facilitating the flow of infectious diseases like HIV. Cities and towns along main transportation routes typically show higher HIV infection rates than surrounding areas (CIIR 1999). Second, urban economies are vulnerable to changes in the global and macroeconomic environment. Whereas industries depending on highly skilled

workers have benefited from processes of globalization, labor-intensive industries have declined. Factors such as growing levels of urban unemployment, informalization of the economy, lack of secure income, growing proportions of the poor in urban areas, and increasing income inequality all contribute to this decline. All of these factors are present in cities in sub-Saharan Africa. The proportion of the urban poor on the subcontinent is growing faster than the total urban population, a phenomenon described as the urbanization of poverty (UN-Habitat 2004). Van Donk (2005) argues poverty, unemployment, lack of secure income, and income inequality are all core determinants of vulnerability to HIV infection. These factors are exacerbated by inadequate access to appropriate healthcare services and the inability to afford the means for HIV prevention.

Sex Work and Gender-Based Violence

Sexual assault, encompassing a wide variety of activities ranging from rape to less physically intrusive sexual contacts, whether attempted or completed, is a traumatic experience that disproportionately affects women and girls (Adeleke et al. 2012; Badejoko et al. 2014). Sexual assault involves the lack of consent, the use of physical force, coercion, deception, or threats. It can also include the involvement of a victim that is asleep, unconscious, under-aged, mentally incapacitated, or physically impaired as a result of voluntary or involuntary alcohol or drug consumption (Akinlusi et al. 2014). According to the World Health Organization, one in every five women is a victim of sexual assault. Globally, 35% of women have experienced either physical or sexually intimate partner violence or non-partner sexual violence (WHO 2013). These figures are reported to be inaccurate and often underestimated, however, as most cases of sexual

assault is underreported by the victims as a result of accompanied stigma (Kullima et al. 2010; Garcia-Moreno and Watts 2011).

Gender-based violence is recognized as a crucially important dimension of wider gender inequalities and gendered power relations. Defined as violence in which the gender of the victim is directly related to the motive for the violence, gender-based violence is not only social in nature, but can also be a form of political, institutional, and economic violence. While the underlying causes of gender-based violence are rooted in patriarchal relations, certain “triggers” or “risks” can lead to variations between geographic areas. McIlwaine (2013) noted the difficulty in comparing urban and rural differences because of lack of existing data, but argued that cities themselves do not generate gender-based violence. Rather, urbanization leads to the development of paradoxical processes, wherein risk factors that make women more vulnerable to violence are heightened at the same time as opportunities to better deal with risk, whether through informal or formal means.

Women are most likely to be vulnerable to gender-based violence, especially in urban slums (Kullima et al. 2010). While some data on physical and sexual violence in sub-Saharan Africa suggests that violence against women by male partners is less prevalent in cities than in rural areas, gender-based violence by a non-partner is higher in urban than rural areas. Pickup et al. (2001) outlined three related sets of factors that account for violence against women. The first relates to psychological factors, where men who engage in gender-based violence have “impaired masculinity,” which they often are thought to have learned through witnessing violence as the norm as they grew up. The second relates to external factors, including poverty, which may aggravate or increase violence (Morrison, Ellsberg, and Bott 2007). Social instability linked to male

unemployment and women's increased labor force participation, as well as armed conflict, can also contribute to gender-based violence (Flake and Forste 2006). The third set of factors emphasizes the patriarchy and inequalities between women and men, in which violence against women is the ultimate weapon for men wishing to assert power and control. Some of these factors manifest themselves in particular ways in cities.

Van Donk (2005) also argues that power imbalances, loss of self esteem—for example, where men are unable to fulfil their gender role as bread-winners—frustration and disillusionment, and a preoccupation with immediate survival needs also interact with urban poverty and the urban economy in influencing vulnerability to HIV. Campbell (2002) suggests that in this context of disempowerment, physical and sexual power may be seen as the only way to assert one's masculinity. It is important to note, however, that gender-based violence and rape are obviously not restricted to lower socioeconomic groups. In circumstances of urban poverty, sexual bargaining or sexual networking may become an essential livelihood strategy. In addition, the commercial sex industry often contributes significantly to the urban economy. Researchers agree that HIV prevalence rates among commercial sex workers in cities significantly exceeds those of the city populations. Part of the reason for increased prevalence is because commercial sex workers are generally not in a position to negotiate safe sex, even if they are aware of the risk of HIV infection as a result of targeted awareness campaigns (CIIR 1999).

Gender inequality is widespread in sub-Saharan Africa. This inequality manifests itself in many ways, including unequal access to and ownership of assets, such as housing and land. Lack of access to housing in urban areas gives women less leverage over their partners' sexual behavior. UN-Habitat (2004) notes that this inequality also compels women to stay in abusive relationships. Other studies note that violence against women—

especially sexual violence—is more prevalent in urban areas than in rural areas, though this issue is under-investigated and underreported (SACN 2004).

Urban Policy

Recognizing the sociocultural, political, and economic context in which the HIV epidemic seems to flourish is essential for a comprehensive review of the spread of HIV—as well as the development of an effective response—in urban areas. Urban development policies related to housing, infrastructure, healthcare, poverty, and social safety nets are all relevant in linking urbanization to HIV vulnerability.

Rural development continues to be privileged by national governments and international aid organizations. At the national level, many governments are reluctant to allocate resources to urban development and prefer to ignore growing urban areas. These governments often view urbanization as a problem to be stopped rather than an inevitable trend that necessitates policy changes. This perspective was supported by a World Bank report (1999) that concluded African cities “are part of the cause, and a major symptom of the economic and social crisis that has enveloped the continent.” More recent research—including from the World Bank itself—debunks this assertion, concluding that urban poverty and development issues are caused by limited political and institutional capacity. The effects of low capacity can be seen in the lack of planning for urban expansion, particularly in regard to infrastructure and urban poverty. A UN report notes that, “given the economic, social, and environmental implications of the inevitable explosive growth of urban populations in developing countries, the absence of a coordinated proactive approach is astounding” (2007, 12).

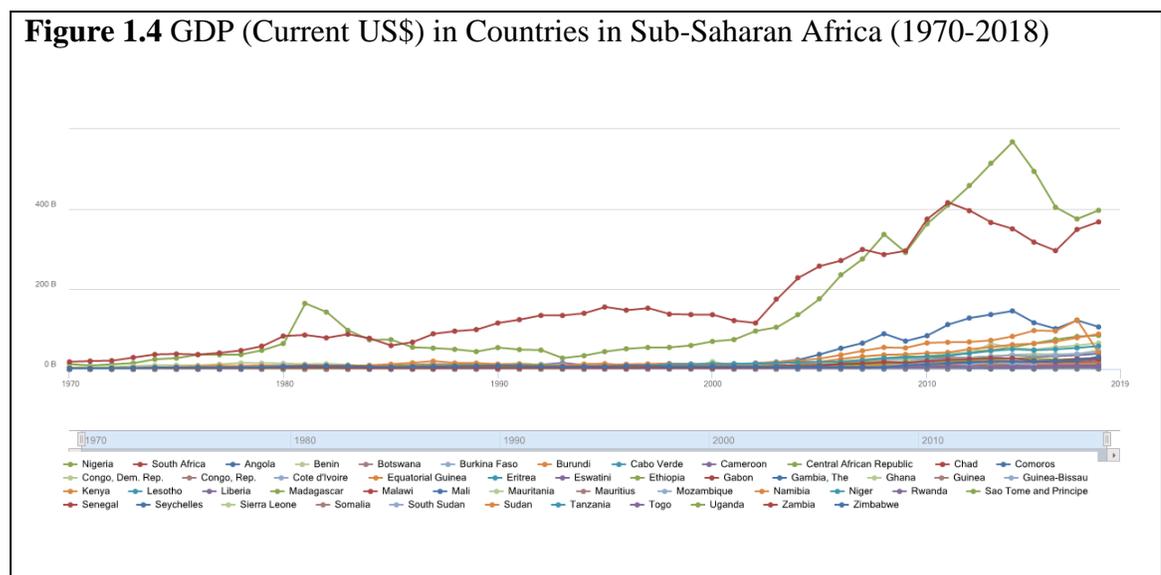
A degree of comprehensiveness, both conceptually and strategically, is necessary for the development of effective policy. However, Hanson (2007) argues a major roadblock to urban policymaking in sub-Saharan Africa is the lack of recent and reliable data on the region's urban populations, poverty levels, and growth rates. Data is primarily collected at the national level, not the city level. Even as of 2007, much of the region's census data was from the late 1980s or early 1990s. Resource allocation is often based on the definition of an area as rural or urban and, because of this distinction, these classifications are sometimes manipulated for political purposes. Economists thus caution against generalizing about sub-Saharan cities, emphasizing that data on urbanization on the continent is not accurate enough to advise individual cities on policy.

Choosing Relevant Case Studies

This study comparatively analyzes the key factors influencing urban HIV vulnerability in Nigeria and South Africa to determine whether there are links between these factors and the HIV prevalence disparities in the regions of west and southern Africa. Nigeria and South Africa are the best case studies for this investigation for four main reasons: they have the highest GDP on the sub-continent, they have experienced significant amounts of labor migration in tandem with economic development and urbanization, they have the two largest HIV epidemics in the world, and they account for a significant amount of the HIV infections in the regions of west and southern Africa respectively.

Key economic players in sub-Saharan Africa, Nigeria and South Africa boast the first and second highest GDP rates on the continent. According to the World Bank

(2019), Nigeria’s 2018 GDP (current US\$) was approximately 397,269,616,080. South Africa’s 2018 GDP (current US\$) was not far behind, at approximately 368,288,939,768. In terms of nominal GDP, Nigeria has the 27th-largest economy in the world, with South Africa ranking as the 35th-largest. While both countries have made great economic strides to place their economies well above any other in sub-Saharan Africa (as shown in Figure 1.4), they both grapple with significant levels of inequality, poverty, and public health challenges.



Source: World Development Indicators 2019.

Economic development and industrialization—based around oil extraction in Nigeria and mining in South Africa—influenced the growth of cities in each country. This study examines the growth of Lagos, Nigeria and Johannesburg, South Africa, as these are the largest cities in their respective countries. The estimated population of Lagos is 21 million, accounting for approximately 10.7% of the total population in

Nigeria. In Johannesburg, the estimated population is 5.6 million, accounting for approximately 9.7% of South Africa's total population (UN Population 2019).

South Africa has the largest HIV epidemic in the world, with 7.7 million people living with HIV. In southern Africa, approximately a third of new HIV infections happen in South Africa. In 2018, the adult HIV prevalence rate was 20.4%. Nigeria has the second largest HIV epidemic in the world, with 1.9 people living with HIV. Prevalence in the country is lower than many sub-Saharan countries, at 1.5%, mainly due to its large population. UNAIDS estimates that around two-thirds of new HIV infections in west Africa occur in Nigeria. Together with South Africa and Uganda, the country accounts for around half of all new HIV infections in sub-Saharan Africa every year (UNAIDS 2017). By comparing the growth of each country's largest city in relation to historical HIV trends, this study assesses the extent to which urbanization and its accompanying processes influence the spread of HIV and create conditions more susceptible to HIV infection.

CHAPTER 2: URBANIZATION & HIV IN NIGERIA

Three countries—Nigeria, India, and China—are expected to account for 37% of the projected growth of the world population between 2014 and 2050. Today, over 400 cities are comprised of a population larger than one million people, with approximately 70% of them found in developing countries. In 2007, for the first time in history, more people lived in cities and towns than in rural areas. In 2018, according to World Bank data, Nigeria’s urban population became larger than its rural population. Nigerian society is undergoing both demographic transitions, as life expectancy increases, and epidemiological transitions, as population health changes due to changes in lifestyle, mainly as a result of urbanization.

The characteristics of urbanization in Nigeria have been alarming. Nigeria is notably the most populous African nation, is expected to become the third most populous country by 2050, and is predicted to be a key driver of urban population growth. While urbanization could spur economic growth and bring improved access to jobs, goods, and services for the country, urbanization in Nigeria has followed a different trajectory. The opportunities of urbanization are lost in Nigeria due to lack of adequate resources, basic infrastructure, services, and well-conceived planning. While the country’s rapidly growing urban population would presumably be a key issue policymakers address in

development, the Nigerian federal government has failed to keep up with urbanization. Consequently, urban areas experience stark levels of inequality, poor housing, and inadequate water and sanitation infrastructure.

This chapter presents the historic growth of Nigeria's urban population, urbanization in Lagos, and data on the progression of the socioeconomic indicators—migrant labor, urban poverty, sex work and sexual violence, and urban policy—outlined in the methodology section in Lagos. These socioeconomic indicators are then analyzed in relation to HIV/AIDS trends in Nigeria and Lagos.

Urbanization in Nigeria

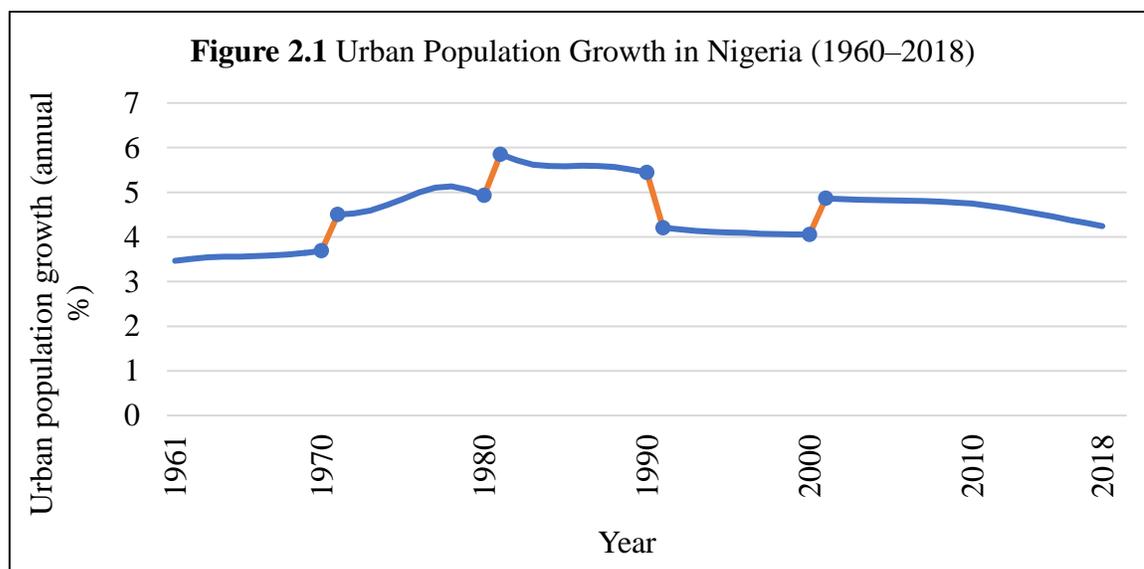
Early data on urbanization in Nigeria is conflicting (Gould 1995; Adepoju 1995; Ouchou 1998). UN-Habitat and the World Bank are sources cited frequently in research related to Nigeria's urban population. Potts (2012) notes, however, that their data are sometimes misleading and appear exaggerated. In Nigeria, almost every census since 1952 has been highly contested. Opoko and Oluwatayo (2014) suggest these issues arise from political and economic reasons. Economically, they argue, since federal statutory allocation to states is influenced by population, states with reportedly low populations are disadvantaged in federal resource allocation. Politically, political parties controlling large populations can gain advantages, as population is one of the indices upon which parliamentary representation is based. While these controversies are important to note, World Bank data is used in this study and are determined to be sufficient indications of Nigeria's urban status (Opoko and Oluwatayo 2014).

Before Nigeria gained independence from British colonial rule in 1960, the country had a very low urban population and low levels of urban population growth (Aniah 2001). In 1921, only 10 Nigerian cities had urban status and, by 1931, only two cities, Lagos and Ibadan had populations in excess of 100,000 people. A more rapid rate of urbanization happened after independence. By the early 1960s, Lagos and Ibadan's populations each exceeded 500,000. In addition, by 1963, 24 cities sported populations of over 100,000 people (Aniah 2001; FGN 1997; Rotimi 2003).

It was not until the period between 1970 and 1995, however, that Nigeria witnessed an unprecedented high level of urbanization. As seen in Table 2.1, from 1970 to 1975, the urban population growth rate jumped from 3.69 to 4.85. The following years saw it rise to the highest it has ever been, at 5.9 in 1981. The percentage of the population living in urban areas increased from approximately 17.76 in 1970 to 32.21 in 1995. This urban growth rate was reportedly the fastest in the world at the time (Aniah 2001). However, these growth rates should be taken with a grain of salt, as the World Bank data presents significant changes in the urban population growth statistic at the end of each decade. Figure 2.1 shows that each decade follows a justifiable trend in data, but the jumps between decades (shown in orange) are significant. While these disparities pose problems for determining the exact trend in urban population growth in Nigeria, researchers agree, using myriad data sources, that the oil boom of the 1970s and early 1980s spurred largely incomparable urban growth (Opoko and Oluwatayo 2014; Aniah 2001).

Time	Population, total	Population growth (annual %)	Urban population	Urban population (% of total population)	Urban population growth (annual %)
1960	45,138,458	1.98	6,955,836	15.41	3.45
1965	50,127,921	2.14	8,296,672	16.55	3.56
1970	55,982,144	2.29	9,942,429	17.76	3.69
1975	63,374,298	2.71	12,535,436	19.78	4.85
1980	73,423,633	2.85	16,131,172	21.97	4.93
1985	83,562,785	2.56	21,421,320	25.64	5.58
1990	95,212,450	2.58	28,259,055	29.68	5.44
1995	107,948,335	2.49	34,764,761	32.21	4.10
2000	122,283,850	2.50	42,603,693	34.84	4.05
2005	138,865,016	2.59	54,260,116	39.07	4.82
2010	158,503,197	2.67	68,917,190	43.48	4.74
2015	181,137,448	2.65	86,652,532	47.84	4.45
2018	195,874,740	2.59	98,611,179	50.34	4.24

Source: World Development Indicators 2019.



Source: World Development Indicators 2019.

The oil boom prosperity of the 1970s resulted in a number of massive development projects that catalyzed a large influx of people into urban areas. Workers began to migrate to cities searching for economic opportunity in the new government-sponsored construction projects in sea ports, refineries, and steel companies. The main factors for urban growth in this period can be summarized by the oil boom, government policies that resulted in the creation of new states and local government areas, the creation of the new federal capital territory in Abuja, the establishment of new universities, and large-scale government-sponsored construction projects.

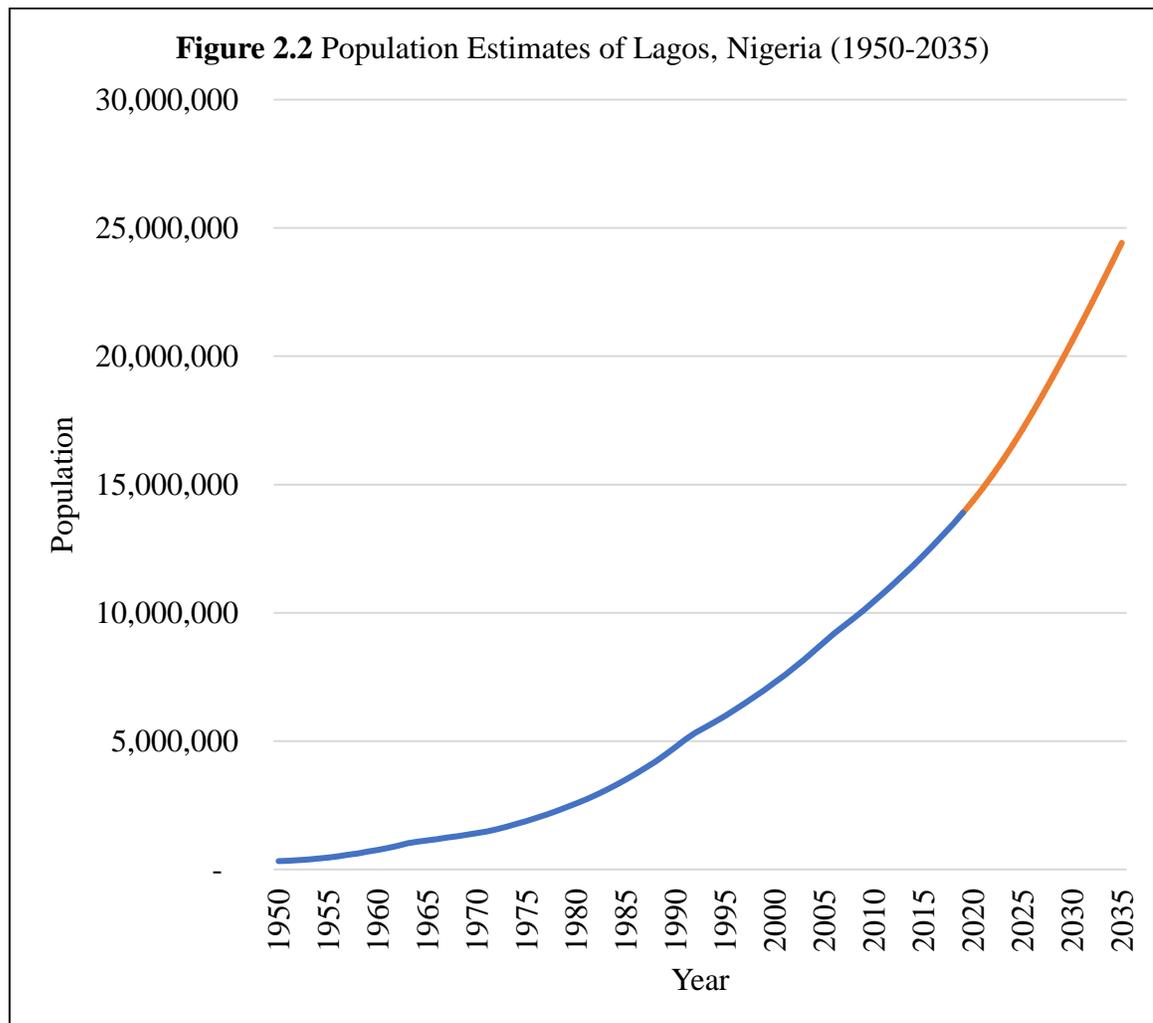
City growth and expansion in Nigeria has been largely uncontrolled and rapid, outpacing the government's capacity to plan for it (Oyesiku 2002; Egunjobi 2002; Olanrewaju 2004). Growth often occurs so quickly that government officials do not have relevant statistics needed for sustainable development. In addition, the depletion of national resources by massive and uncontrolled corruption presents further barriers to meeting these development goals. Effective redistributive measures required to alleviate poverty and create economic opportunities needed to improve living standards and quality of life of the general population have consequently been ignored. Weaknesses in government planning have led to urban infrastructure problems, including inadequate and poor housing, slum areas, inadequate water quality and supply, inadequate waste disposal, traffic and human congestion, high rates of unemployment, poverty, crime, and health (Rotimi 2003, Dun-Gwom et al. 2008). Rapid urbanization has also had a negative effect on the environment, as the development of slums has led to lagoons being polluted and destroyed. According to Dun-Gwom and Oladosu (2004), approximately 60 to 70 percent of Nigerian urban dwellers live in slums.

Growth of Lagos

With a total landmass of approximately 2,797 square kilometers and a total water area of 779 square kilometers, Lagos is the smallest state in the country, representing only 0.4% of the total land area (Agbola and Agunbiade 2009). Despite its small landmass, Lagos is the most populated state in Nigeria. Before the colonial period, Lagos grew as a trade center and seaport in the 15th century. In the 17th century, the city focused on its fishing and farming settlements. Because of its geographic location and physical characteristics, the city became an important slave-exporting port in the 18th century. With the advent of British colonial rule in West Africa, Lagos became a favored colonial possession in 1861 because of its prevailing political and economic order (Owoade 2007). When the country gained independence nearly a century later in 1960, Lagos became the capital of Nigeria until 1991, when the seat of the federal government was moved to Abuja. In 1967, Lagos was created a Nigerian state by virtue of the State Creation and Transitional Provisions of Decree No. 14.

Although some of the previously mentioned controversies continue to affect Lagos population figures, there is a general consensus that population growth of Lagos has been very rapid (Abiodun 1997; Potts 2008; Akinmoladun and Oluwoye 2007; Akiyode 2012). As journalist Alastair Leithead (2017) noted, “nobody knows exactly how many people live in Lagos, but they all agree on one thing—Nigeria’s biggest city is growing at a terrifying rate.” Since the colonial era, the city has expanded dramatically, both in terms of its demography and land area. United Nations statistics reveal that, in 1995, Lagos became the world’s 29th largest urban agglomeration, with approximately 6.5 million inhabitants. This number grew to approximately 8.8 million people in 2000,

moving the city to the 23rd largest in the world (UN-Habitat 2004). The World Urbanization Prospects 2011 Revision ranked Lagos as the 19th most populous city in the world in 2011, with a population of approximately 11.2 million people. The same report projected that, by 2025, Lagos will overtake several other cities to become the 11th most populous city in the world with 18.9 million people (UN DESA 2012). These population figures exceed the United Nation’s population projections displayed in Figure 2.2, though they are not drastically different.



Source: UN World Population Prospects 2012.

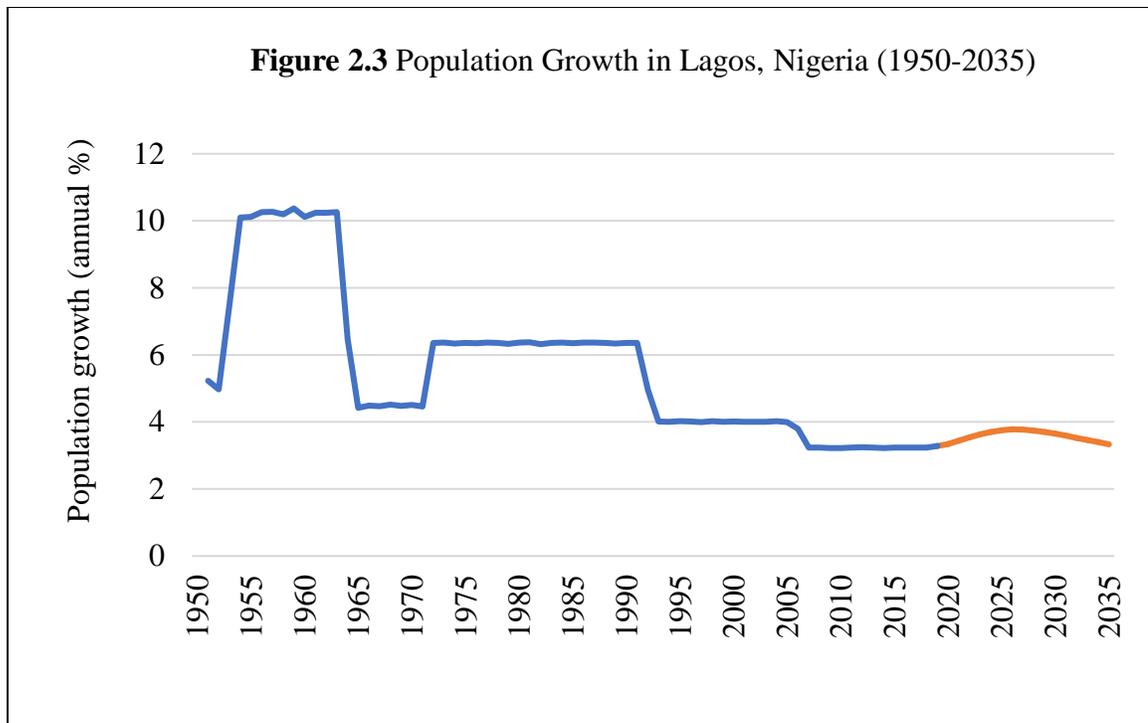
The Role of Migration

The main cause for rapid growth in Lagos over the past 50 years has been rural to urban migration. Post-independence Nigeria witnessed heightened labor migration from several parts of the country to main administrative and economic centers and to more varied destinations than ever before. The relatively large scale of immigration into the country that took place before independence was interrupted by flight or expulsion. This interruption, coupled with the changing political economy of Nigeria, affected the course of migration in the country. Many government policies led to a lopsided development, with more employment opportunities and provision of infrastructure and facilities in urban centers than in rural areas. Employment opportunities were outside of the population's primary productive activity—agriculture—and were created in areas such as the tin mines of the Jos Plateau, the Enugu coal mines, and the coastal industrial and port cities of Lagos, Port Harcourt and Calabar (Afolayan, Ikwuyatum, and Olumuyiwa 2008). In addition, during the colonial period, the development of cash-cropping systems brought about the movement of people to the cocoa and rubber plantation belts of the southwestern and southeastern parts of Nigeria (NISER 1998; Udo 1997).

The 1970s saw a significant amount of migration to urban hubs in Nigeria. The creation of states and more local government areas in the 1970s, as well as the development of the federal capital territory of Abuja, brought about new dynamics of internal migration within the north central zone of the country. Abuja was long known to be a sparsely populated area, but when it was established as the federal capital territory, it became the administrative and economic nerve center of the country. It is second only to Lagos as the major migration pull center (Afolayan 1998).

In addition, the Economic Community of West African States (ECOWAS), a regional political and economic union of 15 countries located in West Africa, was established in 1975 with the signing of the Treaty of Lagos. Its stated mission was to promote economic integration across the region. The immigration of ECOWAS citizens into Nigeria increased after the Protocol on Free Movement of Goods, Capital, and People was ratified in 1980 (Afolayan 1988). This inflow coincided with the period of economic buoyancy in Nigeria following the oil boom of the 1970s. This economic buoyancy was short-lived, however, due to a sharp decline in the price of oil in the early 1980s. Consequently, in January and February 1983 and April and June 1985, many ECOWAS citizens who had exceeded the 90 days of grace without residence permit they were granted through the union were expelled from the country.

By the late 1980s, other changes in political and economic policies resulted in changes in the pattern of migration in Nigeria. The Structural Adjustment Program (SAP), for example, was adopted in 1986 and dictated a shift in policy from the official policy of full employment to a substantial reduction in government spending on critical services, such as health, education, and housing. This policy created a greater tendency for persons to emigrate, such as the relatively large number of women traders that shuttled between Lagos and Abidjan in Cote d'Ivoire (Afoyalan 1991). The high population growth rates in Lagos in the 1970s, as well as the drop by the end of the 1980s can be seen in the UN World Population Prospects data adapted in Figure 2.3. The constant growth rate displayed between 1975 and 1990 suggests a lack of comprehensive data, but the data do show the period of increase in the 1970s and the subsequent decline in growth rate by the 1990s.



Source: UN World Population Prospects 2012.

It is important to note, however, that the cause of human mobility was not always economic. Civil war and ethnic conflicts had spurred the dislocation of minorities from their destination back to their home region. The Biafra War of 1967 recorded the largest dislocation and dislodging of many ethnic groups from the northern part to the southeastern and southwestern parts of the country. Some of these displaced people left the country altogether, escaping to the Republic of Benin and the outlying islands of Sao Tome and Principe (Afolayan, Olumuyiwa, and Ikwuyatum 2008).

Lagos has remained the industrial and commercial hub of the country, attracting numerous migrant and immigrant settlers (Adepoju 1995). People are forced to leave the countryside by push factors such as few job opportunities, an increasing shortage of land, drought, heavy pollution in the Niger Delta region due to the oil industry, and Boko Haram's influence in the north of Nigeria since 2011. Pull factors that attract people to

Lagos include more healthcare centers and hospitals, more secondary education opportunities, a demand for construction jobs, and overall hope for economic prosperity.

The Internal Migration Survey conducted by the Nigerian National Population Commission (NPC) in 2010 (NPC 2012) revealed that 23% of the sampled population of Nigerians were migrants, having changed residence within 10 years. With 2% of the sampled population being return migrants, this survey shows that a quarter of Nigeria’s population is on the move internally. The survey indicated that approximately 60% of internal migrants were residing in urban areas. In Lagos, the percentage of the population who are migrants is larger than in Nigeria as a whole, at 40.1%, as shown in Table 2.2.

Location	Percentage distribution of migrants			Percentage distribution of migrants by area of residence	
	Migrants	Non-migrants	Return migrants	Urban	Rural
Nigeria	23	75	2	59.9	40.1
Lagos	36.4	59.9	3.7	97	3

Source: NPC 2012.

Overall, migration in Nigeria has been complex. As the population of Lagos rapidly increases, largely due to migration, people become more at-risk for HIV infection (Weine and Kashuba 2012). The reasons for this increased risk are associated with

complex, multilevel determinants—including prolonged absence, family separation, poverty, housing, infrastructure, and sexual violence. The states of these factors are analyzed in relation to the spread of HIV in Nigeria at the end of this chapter. As the pace of urbanization and growth proceeds rapidly in Lagos, the state government's capacity to manage the challenges of undesirable urban trends decreases due to inadequate funding and institutional capacities (Cohen 2006; Dun-Gwom, Hirse, and Pwat 2008). Poor urban planning, development policy, and lack of effective government response to urbanization have contributed to the rise of urban poverty, inadequate housing and infrastructure, sex work, and sexual violence in Lagos.

Urban Poverty in Lagos

In a 2016 poverty report, the Lagos State Bureau of Statistics measured poverty in the state in two ways: objectively and subjectively. The objective measure of poverty adopted the World Bank Purchasing Power of Parity (PPP) standards. The World Bank specified the international poverty line as \$1.25 a day between 2005 and 2008, which is equivalent to \$1.00 a day in 1996. In 2015, however, the poverty line was adjusted to \$1.90 a day. In the 2016 report, the PPP of \$1.90 per day was adopted using an exchange rate of N305, which translates to N86,925 per month. Using these standards, the Bureau of Statistics revealed that over 87% of the sampled households earned less than N86,925 per month and were unable to feed themselves and their families adequately due to lack of money (Lagos BOS 2016). The report also used a subjective measure of poverty to gauge economic status as perceived by the respondents. This indicator revealed 86% of household heads self-assess as poor.

In addition, 64.2% of urban populations in Nigeria live in slums, settlements built to accommodate the overcrowded communities (UNDP 2019). Many families and individuals who inhabit these slums came to Lagos or other cities from other regions of Nigeria with the hope of escaping the rural poverty, deprivation, and political instability of their home states. However, the Lagos city center has offered little solace. Slum-dwellers live in poverty that is not better, and often worse, than rural people (Borgen Project 2015). A study conducted by the Oxford Poverty and Human Development Initiative found that 22.1% of Nigeria's urban population is vulnerable to poverty, while only 14.4% of the rural population is vulnerable (OPHI 2018). Frantic efforts have been made to reclaim land from the ocean in Lagos. The unregulated physical expansion of the state's built-up area has serious social and environmental consequences, including the segregation of low-income groups in the worst located and often most dangerous areas. Informal settlements are often concentrated on land sites subject to flooding, such as the Ajegunle district, which is located in the heart of Lagos and is home to some three million Nigerians who live in poorly built structures with little to no infrastructure and poor standards of living. Many residents lack access to clean water and proper sanitation and families often do not have sufficient resources to send children to school (Owoade 2007; Satterthwaite 2007).

The measurement of poverty in Lagos is not just monetary. Rather, poverty is multidimensional. Studies have linked poverty to demographics, health, education, the economy, housing, infrastructure, the environment, and safety. The World Health Organization notes that, the higher a person's socioeconomic status, the more likely they are to enjoy good health, a good education, a well-paid job, and good healthcare. In 2017, 51.4% of Nigeria's population were living in multidimensional poverty (UNDP 2019).

The Multidimensional Poverty Index looks at *deprivations* at the household and individual level in health, education, and standard of living. These key indicators are also used in the UN Human Development Index (HDI), though HDI measures a country's *progress* and achievement in health, education, and standard of living. Nigeria ranks 158 out of 189 countries on the UN Human Development Index with a score of 0.534 for 2018. This score has increased since 2010, when it was 0.484, but, even with slight improvement, Nigeria's HDI is one of the worst in the world.

Sex Work and Gender-Based Violence in Nigeria

In Nigeria, the national Integrated Biological and Behavioral Surveillance Survey (IBBSS) conducted across nine states reached female sex workers (FSW) by visiting hotspots identified by the State Agencies for Control of AIDS (SACA). While this survey did not derive population size estimates of the FSWs at these locations, it showed that the HIV prevalence among brothel-based sex workers in Nigeria varied considerably. It ranged from a low of 12% in Lagos state to a high of about 46% in Benue and Nasarawa state, incidentally states that also have high antenatal clinic surveillance. This heterogeneity may be partially explained by regional differences in socioeconomic and cultural factors which may influence empowerment, opportunities, and stigma of FSWs, which in turn influence vulnerability to HIV infection (Onwuliri and Jolayemi 2007). There were an estimated 126,489 FSWs in the states investigated, ranging from 5,920 in Anambra to 46,691 in Lagos. A total of 10,233 active FSW spots were identified through the mapping research, with the fewest in Anambra (618, 6%) and the most in Lagos (4,056, 39.6%) (Ikpeazu et al. 2014). Lagos, which is the commercial nerve center and

most populous state in the country, understandably has the largest FSW size estimate.

When comparing this number with the adult male population, however, the less populous states such as the Federal Capital Territory (FCT), Nasarawa, and Ondo, which have one-third the population of Lagos, have larger populations of FSWs relative to adult men.

Various prevention programs have been implemented for FSWs by both governmental and nongovernmental organizations in Nigeria. These include programs that are designed to increase their knowledge of HIV, increase condom use with clients through provision of free condoms and condom negotiation skills and offer free HIV voluntary counseling and testing (VCT) (NACA 2010; SFH 2005a; SFH 2005b). Knowledge about the typologies and operational dynamics of female sex work within their states is also enabling the SACAs to determine which strategy to employ in designing targeted FSW programs that are applicable to their own local context (Chersich et al. 2013). States such as Nasarawa and Cross River, where a significant proportion of sex workers operate from street or public places emphasize peer outreach and provision of appropriate clinical services. In Lagos, Ondo, and Benue, where most sex workers solicit at hotels, lodges, bars, and night clubs, alternative outreach strategies, such as engaging pimps, hotel staff, and bar and night club staff to facilitate outreach and services have been developed. This is a novel approach in most of these states, as prevention programs traditionally only targeted brothel-based FSWs due to the impression that they constitute the majority of FSWs operating within states (NACA 2010).

Sexual assault and gender-based violence are also an important factors to consider in the spread of HIV. In Nigeria, only two of 40 cases of rape are reported, largely because of the arduous legal requirements needed to prove the cases, as well as stigma (Akhiwu, Umanah, and Olueddo 2013). This lack of accurate data makes it difficult to

capture the severity of sexual assault in urban Nigeria. The management of sexual assault—especially prevention—was and continues to be a major challenge in Nigeria. The Antiretroviral Drug Access Program, launched by the Nigeria federal government in 2002, helped establish various post-exposure prophylaxis (PEP) and public health education campaigns across the country to combat HIV (Kullima et al. 2010). Researchers are hopeful that more victims of sexual assault will avail themselves of the offered preventive services even if they do not report their assaults to the police.

One of the key studies on the trend and pattern of sexual assault in Lagos, conducted by Ezechi et al. (2016), gathered data from patients at the HIV treatment center of the Nigerian Institute of Medical Research, which started operations in 2002 following the introduction of the government drug access program. According to the study, there was a tenfold increase in the proportion of patients presenting with sexual assault, starting from 0.2% in 2006 to 2.0% in 2015. A second study in Lagos, conducted by Akinlusi et al. (2014) concluded that a vast majority of victims were under the age of 19 years old. Those under 19 years old represented 83.6% of the victims, with those under 10 years old making up 39% and those between 10 and 19 years making up 44.6% of total victims. The assailants were well-known to the victims in 73.1% of cases and 54.9% were neighbors, which lends plausibility to the previously mentioned argument of increased gender-based violence in slums. In only 26.9% of cases was the assailant a stranger, the rest being made up by acquaintances (12.6%), family members (4.6%) and partners (1%). Although 77.3% of all victims were assaulted in daytime, as many as 88.9% of victims raped during the day were less than 19 years old. The chance of teenagers experiencing daytime sexual assault was more than 17 times higher than that of an older adult. The methods for assailants overcoming the victim included threats

(33.5%), deceit (24.1%), physical violence (282.7%), money (9.8%), or alcohol (2.1%).

Both studies concluded that there is a heightened risk for sexual victimization among adolescents and young girls in Lagos and that there is a need for more comprehensive evaluation and care of victims to enhance safety.

Urban Policy in Nigeria

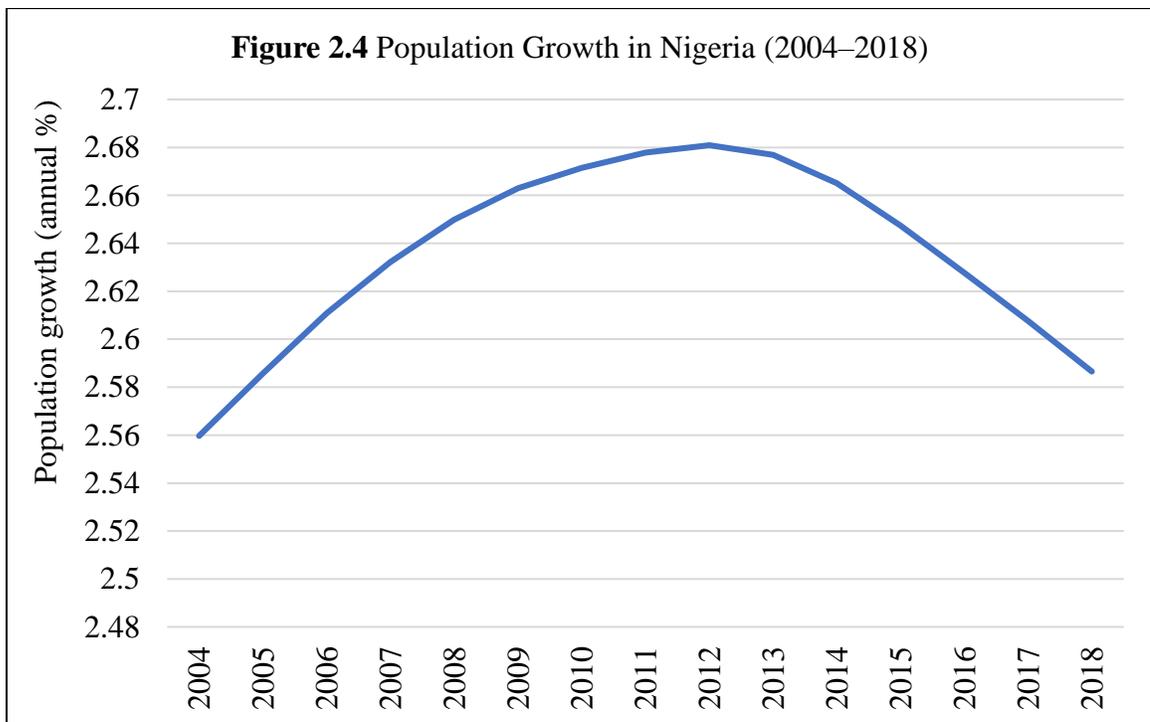
In the early to mid-1980s, the fall in price of crude oil and Nigeria's structural adjustment and stabilization policy led to a comprehensive restructuring of the economy. In 1988, the federal government of Nigeria approved the National Policy on Population for Development in response to the population growth rate and its adverse effects on national development. Emerging issues, such as HIV/AIDS, poverty, and gender inequality, gained wider recognition and led to a review of the 1988 policy. The recognition of these issues drove the formation of the 2004 National Policy on Population for Sustainable Development, signed by then-President Chief Obasanjo. This policy recognized that population factors, social and economic development, and environmental issues are "irrevocably interrelated" and are therefore critical to achieving sustainable development in Nigeria. With main goals of "improving the standards of living" and "promoting health and welfare," the policy set targets to, among other things, reduce the national population growth rate by 2 percent or lower by 2015, minimize infant and maternal mortality rates, and achieve at least a 25% reduction in HIV/AIDS adult prevalence every 5 years (NPC 2004). Table 2.3 shows a comprehensive list of targets the policy developed to guide program planning and implementation.

No.	Target
1	Reduce the national population growth rate to 2 percent or lower by 2015
2	Reduce the total fertility rate by at least 0.6 children every five years by encouraging child spacing through the use of family planning
3	Increase the contraceptive prevalence rate for modern methods by at least two percentage points per year through the use of family planning
4	Reduce the infant mortality rate to 35 per 1,000 live births by 2015
5	Reduce the child mortality rate to 45 per 1,000 live births by 2010
6	Reduce the maternal mortality ratio to 125 per 100,000 live births by 2010 and to 75 by 2015
7	Achieve sustainable universal basic education as soon as possible before 2015
8	Eliminate the gap between males and females in school enrollment at all levels and in vocational and technical education by 2015
9	Eliminate illiteracy by 2020
10	Achieve at least a 25 percent reduction in HIV/AIDS adult prevalence every five years

Source: NPC 2004.

Researchers who have appraised the 2004 policy conclude that its implementation and success have fallen short of its goals (Turnwait and Odeyemi 2017; NPC 2015; Shofoyeke 2014; Enang and Ushie 2012). Using data from Nigeria’s 2009 and 2014 National Demographic and Health Surveys, these studies compared actual reported outcomes with the goals of the policy. The first target, reducing the population growth rate to 2 percent or lower by 2015, has not yet been met, though population growth has slightly declined since 2012 (Figure 2.4). However, much of the current data suggests Nigeria’s population growth is not going to slow down anytime soon. A United Nations report projected that, by 2050, Nigeria will become the third largest country in the world by population (UN DESA 2019). Looking at the third target, the use of contraceptives has increased from 6% in 1990 to 15.1% in 2013, but has not reached the 2% per year the policy outlined. In 2003, the use of contraceptives was 12.6%, only increasing to 14.6%

by 2008, to 15.1% by 2013. Regarding the fifth target, the survey displayed a moderate decline of mortality among children under 5 years from 1993 to 2013, with the biggest fall taking place more recently, between 2008 and 2013. While child mortality has decreased, it is nowhere near the goal that the policy set for it to reach by 2010. In relation to the final target of the policy, HIV prevalence has decreased from 1.7 in 2004, to 1.6 in 2009, to 1.5 in 2018, falling short of policy goals but still showing progress.



Source: World Bank 2019.

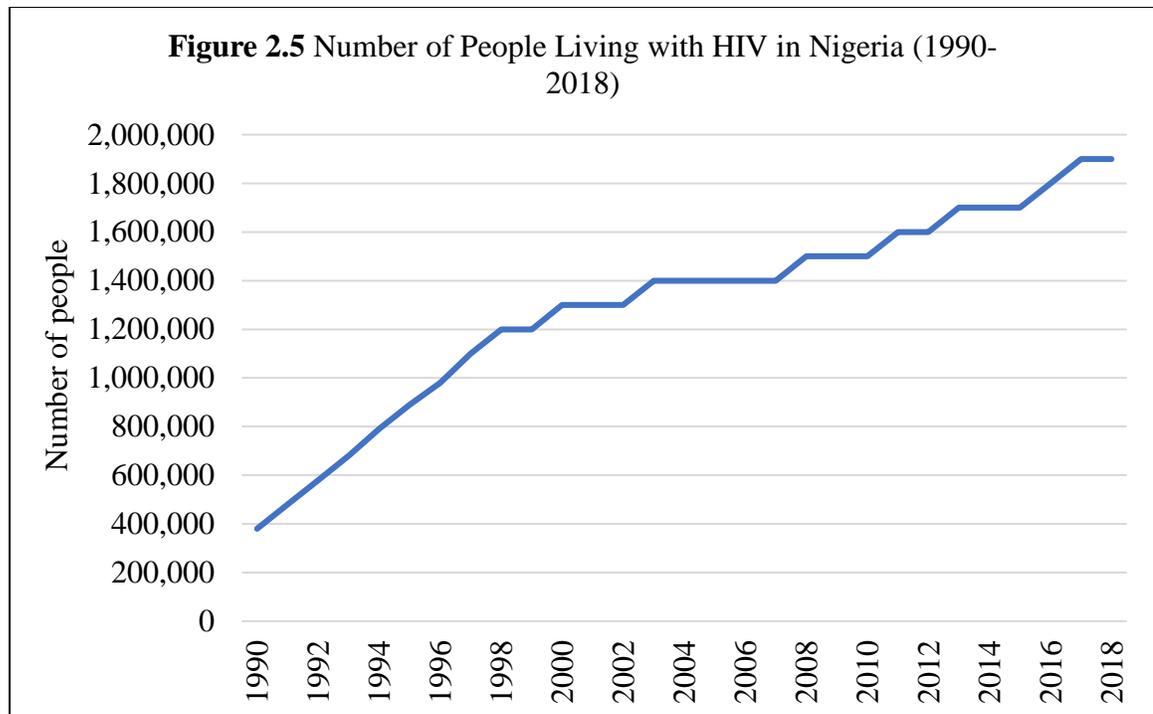
Enang and Ushie (2012) argue that the reason the policy was not successful may be attributed to the process and force of acculturation; that using a “one size fits all” approach does not work for Nigeria because of cultural differences across geographic zones. They emphasize the intertwined relationships of culture, population policy, and health, citing demographic differentials in health outcomes in the country.

A report developed by the National Population Commission (2015) suggested an additional angle to the shortcomings of the 2004 policy: lack of effective implementation. The commission interviewed “key informants,” focusing on the heads of institutions and organizations at the national and state level who had experience with the implementation of the policy. The report found that, while the majority of respondents had heard of the 2004 policy, nearly two-thirds had never read any part of the policy, demonstrating a lack of familiarity with much of its content. Three-quarters of interviewees rated themselves as having little to no knowledge of the content of the policy. Overwhelmingly, 74% of respondents believed that the goals, objectives, and targets of the policy were not achievable in the 2004 to 2015 timeframe given the low capacity of implementers to execute it—largely due to little or no skill building or training.

The State of HIV in Nigeria

Nigeria has the second highest burden of HIV infection in the world, albeit due to its large population, with approximately 3.6 million people infected throughout history. In 2013, Nigeria contributed 9% of the people living with HIV, 10% of new HIV infections, and 14% of HIV-related deaths in the world (UNAIDS 2018). In 2018, approximately 1.9 million people were living with HIV in Nigeria. Figure 2.5 shows how the number of people living with HIV in Nigeria has increased drastically from 380,000 in 1990 to 1.9 million in 2018. Based on data from UNAIDS, growth between 1990 and 1998 was especially stark. The main mode of HIV transmission in Nigeria is through unprotected heterosexual intercourse. Intravenous drug use and same-sex intercourse are

also growing in importance (UNAIDS 2019b). In an attempt to find connections between urbanization processes and the spread of HIV in Nigeria, this study will examine the progress of HIV in Nigeria over time with data that is available—most of which begins in the early 1990s.



Source: UNAIDS 2019b.

The History of HIV in Nigeria

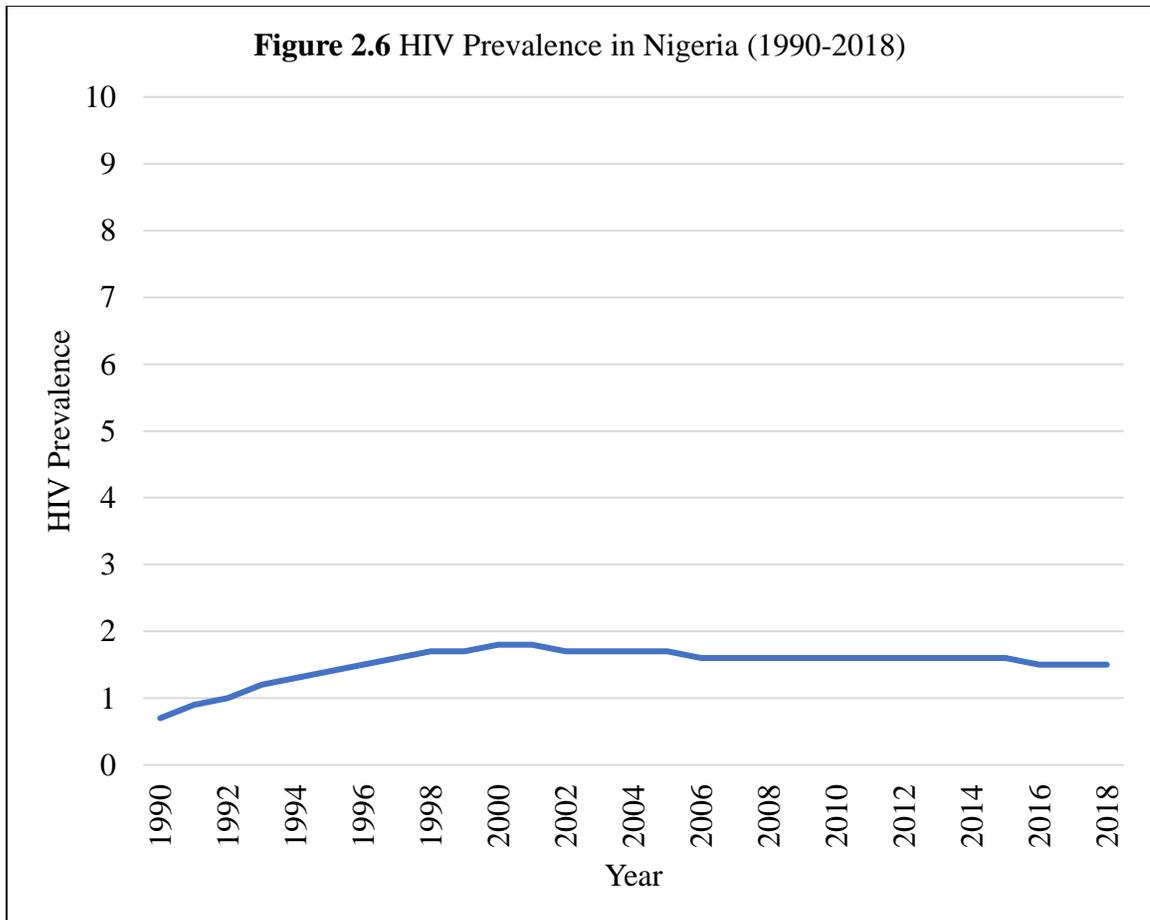
The first two cases of AIDS in Nigeria were diagnosed in 1985 and reported in 1986 in Lagos. One of the cases was a 13-year-old sex worker, who migrated from another West African country (Nasidi and Harry 2006). According to researchers, the news of this case created widespread panic and skepticism in the country, as AIDS was perceived as the disease of American homosexuals. Some Nigerians theorized the case was an American ploy to discourage sex, which was represented by the acronym

“American Idea for Discouraging Sex” that emerged at the time. This disbelief is cited as a contributing factor to Nigeria becoming one of the countries most affected by the HIV/AIDS pandemic, as the Nigerian public underreacted to the news and the government did virtually nothing to curb the spread of the disease (Eze 2009). Almost 35 years after the first case was reported, the disease has become a massive epidemic which has had negative implications not only on health, but also on Nigeria’s society and economy.

Early studies on the prevalence of HIV in Nigeria note that, because of the country’s geographic location between the well-established HIV-1 epidemic of Central Africa and the epicenter of the HIV-2 infection in the extreme west coast of Africa, HIV-1, HIV-2, and dual infection (HIV-1/2) were documented in the 1990s (Harry, Ekenna, and Chikwem 1993; Abimuku et al. 1994; Dada et al. 1993; Olaleye et al. 1993). While studies conclude that HIV-1 was the predominant HIV viral type in circulation in Nigeria, accounting for 95.5% of all HIV infections, they do find HIV-2, though in much lower rates, appearing mainly in commercial sex workers and the south of the country (Esu-Williams et al. 1997).

Since 1991, the Nigerian government has conducted national sentinel surveys in order to monitor the trend and extent of the epidemic. The most comprehensive national data on HIV/AIDS in Nigeria comes through this sentinel surveillance system, where data is collected regularly from all zones, cities, and rural areas in the country. The prevalence rate emerging from these surveys was 1.8% in 1991, rose to 5.8% in 2001, declined slightly to 5.0% in 2003 and, by 2018, had declined to 1.5% (FMOH 2000, 2001, 2003, 2006). It is important to note that this federal data does not align with UNAIDS estimates for HIV prevalence in Nigeria, which, shown in Figure 2.6, did not

exceed 1.8% between 1990 and 2018. Regardless, both sources suggest that prevalence has peaked and is on the decline. The number of new HIV infections, however, is documented to have risen from 120,000 in 2010 to 130,000 in 2018. Two factors could explain this increase in HIV infection but decrease in overall prevalence: a growing population, which would proportionately grow the denominator of the prevalence statistics, or a proportionate amount of HIV-related deaths. Data shows that since 2010, AIDS-related deaths have decreased by 26%, from 72,000 to 53,000 (UNAIDS, 2019a). Therefore, it is likely the decrease in prevalence is the result of a growing population in Nigeria.



Source: UNAIDS 2019b.

HIV Treatment Campaigns in Nigeria

The main preventive strategy in Nigeria is the National HIV and AIDS Strategic Framework laid out by the National Agency for the Control of AIDS (NACA). NACA was established in 2000 to coordinate the various activities surrounding HIV/AIDS in Nigeria. The most updated strategy, which is for the years 2017 to 2021, outlines key targets for the next five years, aiming to provide 90% of the population with HIV prevention interventions by 2021 and have 90% of key populations to be adopting risk reduction behaviors by 2021. One of the main ways the plan attempts to achieve these goals is by strengthening community structures.

The National HIV Strategic Framework identified condom uptake as being a major challenge. Approximately 57.6% of men between the ages of 15 and 49 reported using a condom when they last had sex, compared to 39.8% of women. Condom use is lowest among people who inject drugs at 16.8% (UNAIDS 2019b). The framework identified problems with cost, low availability, and resistance to condom use from key religious and cultural groups as main barriers and aims to increase condom use among young people and those who have never been married. It has set a goal of 90% of people to be using condoms regularly by 2021 (NACA 2017).

Pre-exposure prophylaxis (PrEP) is not available to the general public. In 2016, 242 people were on PrEP in Nigeria, as they were able to access the drug through certain projects. NACA hopes to scale up the number of people taking PrEP as part of a comprehensive HIV prevention package (NACA 2017).

In terms of education, Nigeria recently has integrated HIV lessons into its curriculum. By 2015, more than 48,500 schools were providing Family Life and HIV

Education (LLHE) lessons, where students learn basic facts about transmission and prevention. They also learn about more complex issues such as stigma and gender-based violence. The National Strategic Framework outlines plans to expand access to education initiatives in the coming years.

Reducing mother-to-child transmission (MTCT) is a major target area and has been for years, as over a quarter of MTCT of HIV in the world happens in Nigeria (UNAIDS 2017). Only 32% of pregnant women living with HIV in 2016 received antiretroviral treatment and only 34.7% were tested for HIV as part of their antenatal care. MTCT has thus remained high in Nigeria, at approximately 22% in 2016 (UNAIDS 2019b). The National Strategic Framework aims to provide 95% of health facilities with MTCT prevention services by 2021 to address this issue.

Nigeria adopted a “test and treat” policy in 2015, making anyone who receives a positive diagnosis eligible for treatment. An additional 212,000 people were enrolled on antiretroviral treatment between 2016 and 2017 (UNAIDS 2017). Weaknesses in the health system, however, create an additional barrier to many people accessing or staying on treatment. Drug supplies are known to run out and cause stockouts (NACA 2014). The national framework has made strengthening supply chains and improving logistics around treatment a priority. The UNAIDS catch-up plan identifies removing “user-fees,” which is also an important part of expanding treatment coverage. Nigeria plans to triple treatment from 33% of those diagnosed in 2017 to 90% by 2021. Progress has been made towards this goal, as 80% of those who know their status are on treatment (UNAIDS 2019b).

One of the biggest challenges Nigeria faces is that it has the fourth largest tuberculosis (TB) epidemic in the world. Approximately 4% of global TB cases occur in

Nigeria. The TB epidemic is closely linked with the HIV epidemic. Only 29% of people living with HIV have access to the TB drug Isoniazid, which is advised to be taken as a preventative therapy for those living with HIV. In addition, cases of TB are often underreported in Nigeria. The government must take TB into account when aiming to minimize the impact of HIV in the country.

In addition to the barriers mentioned above, there are several cultural and legal barriers that make fighting HIV in Nigeria quite challenging. The Nigerian government increased the punishment for homosexuality to 14 years in jail in 2014. Those who “assist couples” can also face up to 10 years in prison (NACA 2015). These laws make it more difficult for organizations to work with LGBT communities and push men who have sex with men to be more covert in their sexual actions, making them more vulnerable to HIV. Studies show that since the law was passed, more men who have sex with men are afraid to seek healthcare (Schwartz et al. 2015). Women also face gender inequality, including female genital mutilation, denial of women’s access to inheritance, widowhood rites, encouragement of multiple sexual partners for males, and marriage of young girls to older men (NACA 2017).

Urbanization and the Spread of HIV in Lagos

Because Lagos is the largest city in Nigeria, it carries a majority of the state’s HIV burden, ranking fourth out of all the states in the country. Though the burden is high, HIV prevalence in Lagos is relatively lower than in other Nigerian states—particularly in the South South region. Prevalence statistics gathered by the NAIIS categorize Lagos

state as one with “medium prevalence,” with a 2018 rate of approximately 1.2. In a 2008 sentinel survey conducted by the National Agency for the Control of AIDS (NACA), the state prevalence of HIV in Lagos was 5, with an even higher urban prevalence of 6.1. The lack of adequate and complete historic HIV/AIDS data by state or city constrains the effort to provide comprehensive analysis of the epidemic in Nigeria. A major implication of this shortcoming is the inability of experts to conduct in-depth spatial epidemiological analyses of the epidemic. Consequently, this study will not be able to make direct links between patterns of urbanization in Lagos and HIV prevalence trends in the city, as a full range of data over time is not available. Rather, connections are made between what is known of HIV statistics in Nigeria as a whole, applied to specific indicators and circumstances in Lagos.

NACA suggests that the HIV epidemic in Nigeria remains a mixed epidemic driven by significant urban key populations, particularly female sex workers, men who have sex with men, and people who inject drugs, and the overlap with urban causal sexual networks. These key population groups make up an estimated 1% of the adult population, but contribute nearly 39% of new HIV infections. Roughly 20% of infections may be attributed to female sex workers. People who inject drugs and men who have sex with men respectively contribute 9% and 10% of annual new infections in Nigeria.

In a study appraising female sex work in Nigeria, Ikpeazu et al. (2014) estimated there were 126,489 female sex workers in the 7 states in which they conducted their survey in, with most—46,691—coming from Lagos. Moreover, active female sex worker hotspots were far greater in Lagos, with 4,056 hotspots representing 39.6% of the 10,233 total identified. There is an average of 20.5 female sex workers per 1000 adult men in Lagos. The study concluded that there is a correlation between Lagos having the largest

female sex worker size estimate and being the commercial nerve center and most populous state in the country. Decosas (1995) found that deteriorating standards of living and low employment opportunities forced many young unemployed women to migrate to cities in West Africa to work as prostitutes in the late 1980s. These push factors, coupled with pull factors related to perceived economic opportunity, suggest a link between urbanization and female sex work. As 20% of new infections are attributed to female sex workers in Nigeria, these push and pull factors—especially socioeconomic determinants—should be considered important factors in the spread of HIV in the country.

In many sub-Saharan societies, high HIV prevalence is hypothesized as an outcome, as well as a contributor, to poverty (Gillies et al. 1996; UNAIDS 2004; Zwi and Cabral 1991). It has been suggested that the decline of agriculture in Nigeria results in shortages of food and employment, increases vulnerability to HIV, and complicates the management of AIDS-related opportunistic infections because of hunger and malnutrition (FEO 2003, Udoh et al. 2006). As previously noted, the Lagos state government reports approximately 87% of its population live in poverty, with 86% of households self-assessing as poor. In addition, 64.2% of urban populations in Nigeria live in slums. In Lagos, approximately 70% of residents live in slums (UNDP 2019).

Evidence has grown of large health inequalities between the urban poor and other city residents (Bocquier et al. 2011; Fotso et al. 2007; Harpham 2009). In virtually all of sub-Saharan Africa, urban residents have higher HIV prevalence than rural residents, but there is limited knowledge of the HIV infection rates of different socioeconomic groups within urban areas. There exists ample evidence, however, of risky sexual practices among slum residents. Greif, Dodoo, and Jayaraman (2011) studied urban poverty and

sexual behavior in five African cities—Accra, Dar-es-Salaam, Harare, Kampala, and Nairobi—and concluded that, while risky behavior varies across the cities, slum residents demonstrate riskier sexual behavior than non-slum residents. They found that there is earlier sexual debut, lower condom usage, and more multiple sexual partners among those residing in slum households regardless of setting, suggesting a relatively uniform effect of urban poverty on sexual risk behavior. In Lagos, approximately 53.1% of never-married women age 15-24 and 60.3% of men reported using a condom at last sexual intercourse. In addition, 14.4% of men in Lagos reported having two or more sexual partners in the past 12 months, which is slightly higher than the national average of 12.8% (NPC 2014).

Sexual violence is reportedly more prevalent in slums than in other locations. In Nigeria, a national survey found that 6.6% of girls between the ages of 15 and 19 had experienced sexual violence. A survey conducted among adolescent girls in an urban slum in Lagos, Iwaya, found that 18% of those within the age group of 15 to 19 had experienced forced sex (Kunnuji and Esiet 2015). The same study found that there is a clear association between basic deprivation, defined in the study as circumstances that lead to those “going hungry” or “without food,” and sexual abuse and that basic deprivation can be used as a predictor of sexual abuse in Lagos. Adult men are more likely than adolescents to have jobs, cars, and money to spend, which might appeal to adolescent girls with disadvantaged backgrounds. Deprived adolescents, in their search for means of survival, may find themselves in compromising circumstances and at the mercy of potential abusers who take advantage of them.

Attitudes toward sexual abuse in Lagos are captured in the government’s Demographic and Health Survey (2014). Only 53.1% of men in Lagos feel that a woman

is justified in refusing to have sexual intercourse with her husband if she knows he has sex with other women. In contrast, 73.2% of women in Lagos feel a woman is justified in that scenario. The male response to that question in Lagos is much lower than the national average of 73.5%. In addition, the percentage of men who paid for sexual intercourse is higher in Lagos than any other state, at 17.5%. The national average for men who pay for sexual intercourse is 4.7%. Of the 948 men surveyed in Lagos who paid for sex in the past 12 months, only 27 reported using a condom. With approximately 70% of Lagos' population living in urban slums, these statistics—which vary significantly from the national averages—show a potential connection between urban poverty and sexual violence. These factors, as noted previously, put people at greater risk for HIV infection.

CHAPTER 3: URBANIZATION & HIV IN SOUTH AFRICA

Like all developing countries, South Africa has undergone a massive process of urbanization. However, the country is often considered an unusual case in economic geography. One difficulty is whether to label it as a developing country (like neighboring countries), a former colony (like the United States and Australia), or an emerging economy (like the BRICS group) because of its unevenly developed character. Its history of colonialism and apartheid strongly shaped its development, with unique and long-lasting effects. Heterogenous settlement dynamics, accompanied by differentiated social, economic, and political systems, have exerted a powerful influence on processes of urbanization in the country.

Urbanization in South Africa

For a number of reasons, urbanization in South Africa differs from what is observed in other African countries. First, South Africa urbanized earlier than other parts of the continent because of its economic history of mineral extraction and accompanied industrialization. In the late 19th century, the country was sparsely populated with

extensive arid regions for the predominantly agrarian society. Some localized areas of great industrial dynamism emerged and quickly became powerful drivers of growth with substantial multiplier effects on the economy of the whole region. They also brought about far-reaching social consequences, as they pulled in large quantities of labor from the wider sub-continent. The country's urban population grew rapidly during the 20th century, and the number of urban areas increased more than ten-fold. The urban share of the population increased from approximately 17% in 1890 to around 57% in 2000. With an urban share of the population of 66.36% in 2018, South Africa is one of the most urbanized countries on the continent (Turok 2014).

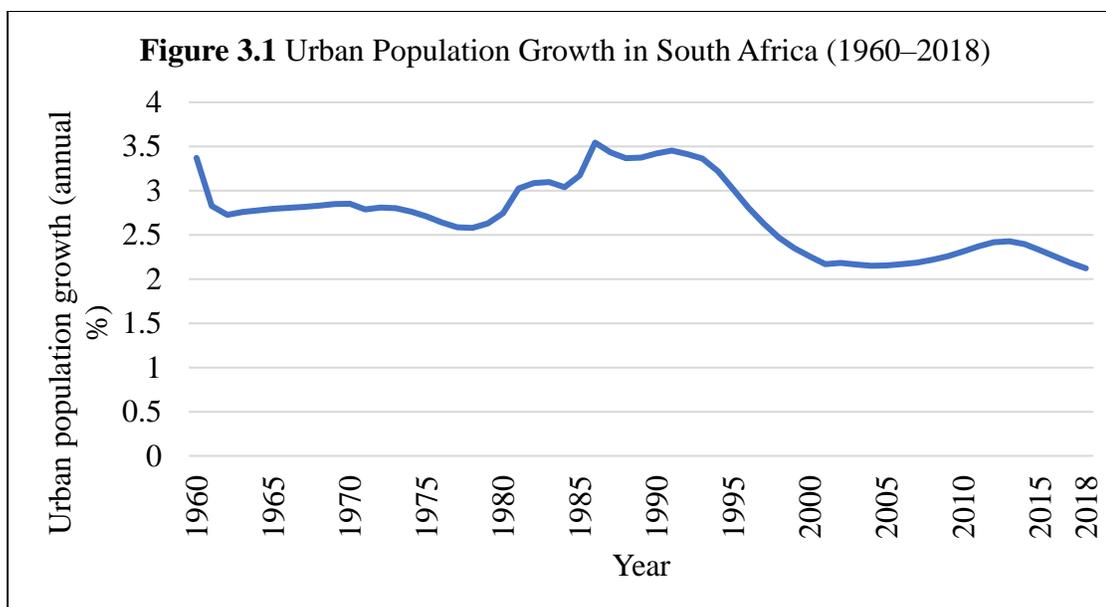
Second, the processes and patterns of urbanization in South Africa have been deeply influenced by the country's political history. With the promulgation of segregation laws at the beginning of the 19th century and the implementation of "separate development" during apartheid, a distinctive pattern of urban growth took place, one that departed from trends observed elsewhere. During the first half of the 20th century, urbanization accelerated significantly before slowing down in the second half. Rapid industrialization during the first half led more and more people from the countryside to migrate towards cities in search of better livelihoods. As the black African population grew in cities, the ruling white minority group enacted stringent state controls to restrict further urbanization. Although the controls did not stop the process, they dampened it, particularly at the height of apartheid between the late 1950s and early 1980s (Turok 2014). Laws such as the Group Areas Act at the urban scale and the implementation of "displaced urbanization," which limited the living space for Africans, Coloureds and Indians, imposed restrictive and uneven urbanization of the country.

Third, in the 1990s, the country removed restrictive laws and opened itself to global economic forces, leading to an imposition of new spatial dynamics onto the inherited patterns. The polarization of economic activities has been reinforced by the adoption of orthodox macroeconomic measures, such as the Growth, Employment, and Redistribution program in 1998. The socio-spatial inequalities that were inherited from the country's unique history constitute major challenges for the different spheres of national, provincial, and metropolitan government. The difficulties of addressing the inherited inequalities are exacerbated by the state's reluctance to constrain private actors in their choice of location. As a result of desires for economic connections to international networks, South Africa has tended to concentrate development within restricted areas in the biggest cities. These dynamics are part of the reason that South Africa remains one of the most unequal countries in the world, with a Gini coefficient of 0.63 in 2015 (Todes and Turok 2017).

The most rapid acceleration in urban growth in the history of South Africa took place between 1870 and 1930 (Giraut and Vacchiani-Marcuzzo 2009). This phenomenon, in addition to the political unification of the country by the Union Act in 1910, led to a continuous reinforcement of territorial cohesion during the 20th century. Railway lines were developed, which ultimately led to the region around Johannesburg becoming a railway center vital to the process of urban growth. In the 1920s, a prolonged drought also accelerated population migration from the countryside to the towns. The speed of evolution was linked to economic upheavals in the last decade of the "late Colonial Transition stage," which was characterized by the healthy mining sector and the intensification of agriculture. During this time, the foundations of the industrial expansion of the 1930s were laid. Unprecedented rural exodus, mostly made up of

Afrikaner farmers, played a significant role in the growth of towns. After the discovery of mineral wealth, the intense industrial development from 1933 progressively affected the major part of the South African territory. Towns created after 1933 were concentrated in the most dynamic industrial regions, in particular the mining interior.

Stringent apartheid restrictions on migration suppressed urbanization between the 1950 and the 1980s. Influx controls restricted the flow of the black population towards the towns and cities and were implemented by extractive laws and policies. New entities created after the 1960s were often located in the peripheries of main urban areas and acted as de-concentration points to reduce the growth of the black population in the main cities. When restrictive laws related to migration were removed in 1986 as the apartheid system disintegrated, the urban population growth rate rebounded, as seen in both Figure 3.1 and Table 3.1. Overall, despite a relatively high level of urbanization at the national level, South Africa is characterized by marked spatial disparities. The features inherited from colonial histories led to migratory flows that contributed to a complex territorial structure (Giraut and Vacchiani-Marcuzzo 2009). The different phases of urbanization generated three main zones of urban concentration: Cape Town, Johannesburg, and Durban. In addition, the degree of urbanization is unequally spread among the nine provinces that were established at the end of apartheid. Gauteng province, which includes the metropolitan areas of Johannesburg, East Rand, and Pretoria ranks highest on the list, with an urbanized population level of 99.6%. This region is followed by the Western Cape Province at 96.1%. The Northern Province is the lowest in the country at under 20%. The process of urbanization in the country has thus been different for each city and region. Provinces are at different stages of urban transition and different cities and towns perform different functions and interact with each other in multiple ways.



Source: World Development Indicators 2019.

Table 3.1 Population in South Africa (1960–2018)

Time	Population, total	Population growth (annual %)	Urban population	Urban population (% of total population)	Urban population growth (annual %)
1960	17,099,840	2.42	7,971,774	46.62	3.37
1965	19,384,841	2.55	9,158,950	47.25	2.79
1970	22,069,776	2.63	10,551,339	47.81	2.85
1975	25,195,187	2.58	12,121,153	48.11	2.71
1980	28,556,769	2.59	13,828,615	48.43	2.74
1985	32,678,874	2.60	16,134,214	49.37	3.17
1990	36,800,509	2.39	19,149,881	52.04	3.42
1995	41,435,758	2.13	22,576,687	54.49	3.01
2000	44,967,708	1.41	25,582,579	56.89	2.26
2005	47,880,601	1.24	28,506,195	59.54	2.15
2010	51,216,964	1.46	31,866,171	62.22	2.31
2015	55,386,367	1.53	35,905,874	64.83	2.33
2018	57,779,622	1.36	38,339,668	66.36	2.12

Source: World Development Indicators 2019.

Turok and Borel-Saladin (2014) investigated whether urbanization in South Africa is on a sustainable trajectory, analyzing three features of urbanization that are particularly significant to South Africa: the spatial alignment between population and economic growth, the availability and form of essential urban infrastructure, and the nature and condition of household shelter. They concluded that population trends across the main cities have tended to coincide with employment growth patterns over the last decade, providing benefits in terms of access to economic opportunities, bolstering livelihoods, and supporting balanced and self-sufficient development. They found little sign of “excessive” urbanization, where growth in the workforce outpaces growth in jobs, but note that there remains a serious employment shortfall in all the cities—a trend that is common throughout the country. Urban infrastructure has also kept pace with population growth in cities. As a result, access to essential services has improved and a higher proportion of urban households enjoy decent living conditions than previously. Because the largest metropolitan areas have been more capable in providing infrastructure than smaller cities and towns, their residents tend to be better-off. However, a sizable minority of urban citizens are still deprived of basic amenities. Their final finding relates to formal housing. They conclude that the building of formal housing, unlike that of infrastructure, has failed to keep up with household growth in big cities. Consequently, there are approximately 10% more households living in shacks in the metros than there were a decade ago. The proportion of urban households living in shacks has fallen, but the absolute number has risen. These extra households are often backyard shacks as opposed to free-standing shacks, which have some advantages in terms of access to services. These advantages need to be set against drawbacks of overcrowding and overloaded infrastructure, especially when examining correlation between these patterns and health

outcomes. The broad message in terms of progress in urban housing conditions is thus mixed.

Growth of Johannesburg

The construction of a railway network began in 1860 under British colonial rule. When rich mineral discoveries were made in Kimberley in 1867 and the Witwatersrand in 1886, a gold rush took place that led to the subsequent foundation of Johannesburg, as well as other small mining towns along the 80-kilometer-long ore deposits. The need to carry heavy machines from the seaports to the Witwatersrand to extract gold was one of the main reasons for rapid extension of the railway line toward Kimberley and then Johannesburg. By 1892, a train from Cape Town entered Johannesburg. The rapid growth of the industry was characterized—and driven—by the influx of a large workforce. Low skilled workers, mostly Africans, reached Johannesburg by train from the most remote parts of South Africa and neighboring countries, whereas more skilled workers arrived from England or other British colonies. Only ten years after its foundation, Johannesburg had a population that exceeded that of Cape Town. The mining discoveries in Johannesburg led to a major upheaval in southern Africa due to the synergies among urban growth, industrialization, and the extension of railways. The largest cities and towns were located on the coast during the colonial era, but the exceptional growth in Johannesburg brought about a switch in the urban structure: the center of gravity in the urban system and railway network moved more inward, starting a profound and persistent pattern of “spatial polarization” (Browett and Fair 1974).

Gold mining remained the engine of the South African economy for almost 100 years and, for many years, was the only source of export revenues (Turok 2014). At the

peak of gold production in 1970, South Africa contributed more than 78% of global output of gold. Because of its mining companies, Johannesburg grew in power, economic size, and population. The stock exchange was headquartered in Johannesburg, channeling more profits towards the city. The expansion of mining in Gauteng, the province where Johannesburg is located, led to major local multiplier effects, including a process of diversification that saw the development of supplier industries including chemical explosives, metal manufacturing, timber, and other building materials, civil and mechanical engineering, and electricity production and distribution. Mining companies were also directly involved in establishing subsidiaries producing cement, clothing, food, beer, steel, chemicals, and paper. The mining industry prompted the emergence of the financial services industry, which has replaced mining as Johannesburg's leading economic sector for the last two decades (Harrison and Zack 2012).

The mining boom of the 1930s brought rapid growth to Johannesburg, which included dramatic urban transformations. Around this time, the inner city started to construct high-rise buildings. White spaces were experiencing a massive building boom alongside the control and repression of black settlement in the city. Over 10,000 apartments were created on the north-eastern edge of the inner city. The rapid development of manufacturing in the 1940s was linked to the emergence of industrial estates along the mining belt and around the edge of the inner city. Commerce and finance industries, along with a majority of the tertiary sector, consolidated in the inner city (Tomlinson et al. 2003).

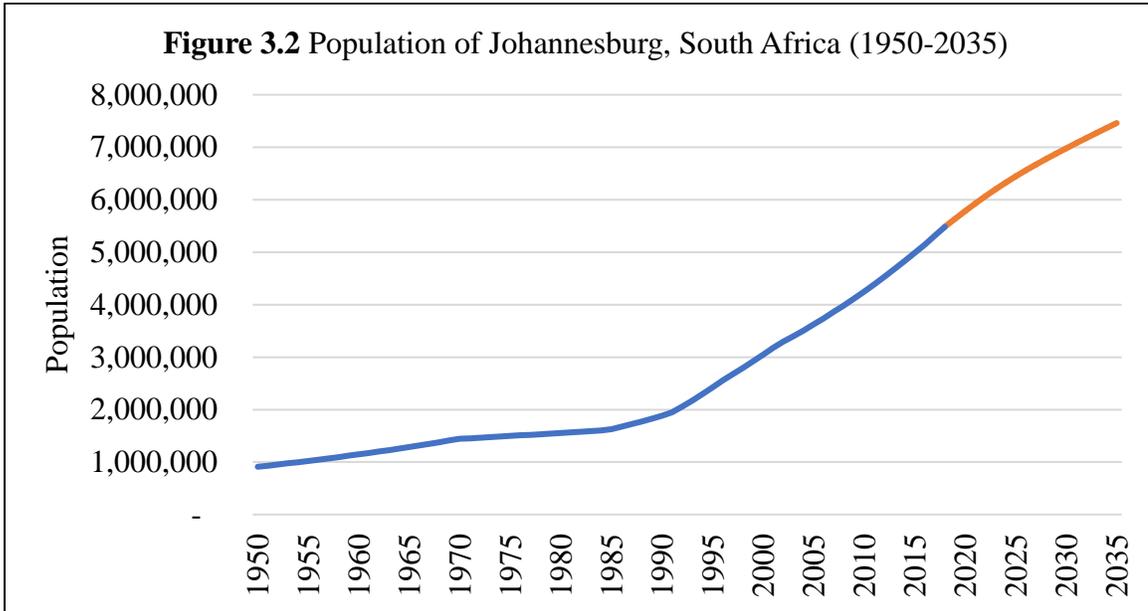
One of the most striking outcomes of mining was the city's changing demographic profile. In 1911, there were only 36 females per 100 males, with 77 per 100 for the white population and only 5 per 100 for the black African population. In 1946, the

overall figure was 75 females per 100 males, with 101 for whites and 56 for black Africans. As sex ratios narrowed, class differentiation widened (Van Onselen 1982). One of the central themes in many accounts of the city's growth has been the socially and racially segregated and unequal nature of its development. Beavon (2004) notes that Johannesburg's geography of segregation was apparent from as early as 1887 and that the patterns that shaped almost all future development were firmly in place by 1904. By 1904, over 100,000 black Africans, and large numbers of Chinese, were corralled in regimented single-sex compounds on mining property along the Witwatersrand. These compounds were initially build out of iron and wood, but later became concrete, barrack-like structures with rooms housing 20 to 50 workers (Crush and James 1991; Crush, Jeeves, and Yudelman 1991). As black Africans entered other sectors of employment, migrants found accommodation in compounds and in slums in and around the center of Johannesburg and in domestic white residential areas. This sort of migration led to an interracial proximity that the government refused to accept, provoking a long history of attempts to segregate the race groups (Parnell and Mabin 1995). Starting with the Native Urban Areas Act of 1923, which prevented black Africans from purchasing or renting land in white areas, the local authority slowly developed segregated housing estates to which black Africans were moved. By 1933, the whole municipality of Johannesburg was proclaimed white and by the late 1930s, the government had used the provision of the Slums Act of 1934 to clear mixed-race inner city neighborhoods and move black African residents to newly built townships. Because many of these townships were situated significantly further from the mining belt in the area, a fundamental divide in the structure of the city was developed. Indian and coloured communities maintained residence in communities near the inner city, until the apartheid era, when they were also

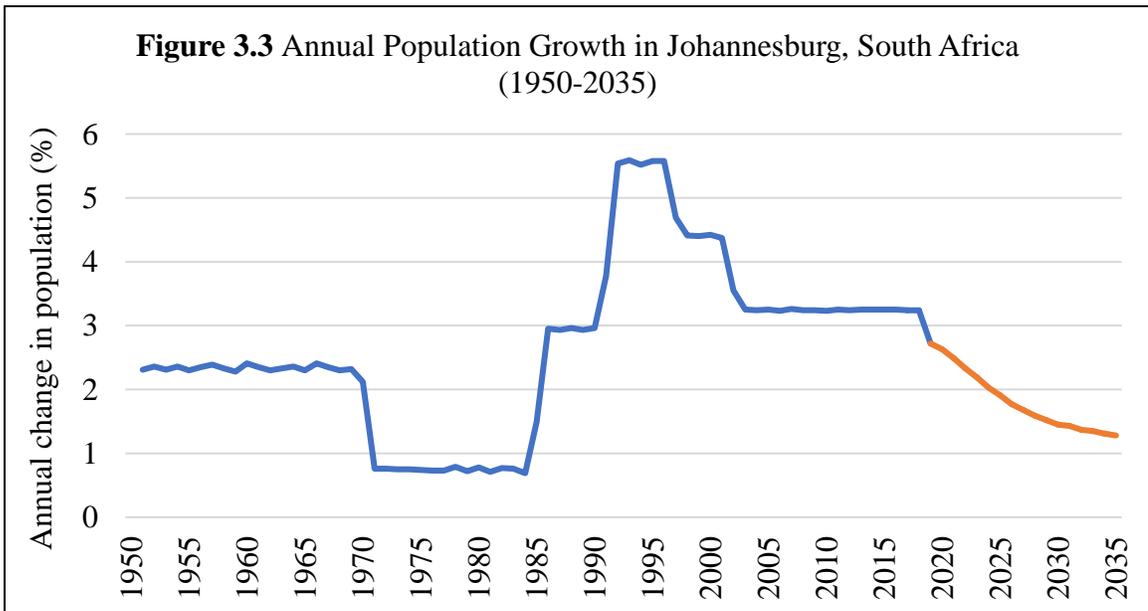
forced into peripheral townships. While the dominant representation of Johannesburg's historical development has been one intrinsically linked to segregation, recent literature directs attention to the cross-over and syncreticity that was also a feature of Johannesburg's development. In the era before apartheid, there were cultural melting pots where new cultural formations emerged. Immigrants from Britain, Europe, and Russia forged a new English-speaking identity in Johannesburg, while a creolized African working class identity arose from the inner city slums. Some racial mixing also persisted into the 1940s despite the local government's efforts to separate the various groups (Nuttall and Mbembe 2008; Nuttall 2009; Bremner 2010).

The lifting of the restrictive migration laws of the apartheid government had a significant effect on the growth of Johannesburg. As seen in Figures 3.2 and 3.3, after the laws were lifted in 1986, the city's population grew much higher and at a much quicker rate than in previous decades. The dismal annual growth rates of the 1970s, which remained below 1%, shot up after 1985, reaching 5.58% by 1995. Once the government halted its large-scale township development and lifted the restrictions on migration, informal settlements and backyard shacks reappeared in the city. The government tried to direct new settlement by black Africans to newly created townships like Orange Farm and Diepsloot on the urban edge. Despite mining employment in South Africa falling by 40% in the 1990s and hitting a 50-year production low in 2012, Johannesburg continued to grow economically because of its position as the economic hub of South Africa's national economy since 1948. It played a continued role as the corporate—rather than physical—center of mining companies. In addition, in the post-war era, when Johannesburg's economy diversified, manufacturing interests dramatically increased.

Multi-sector conglomerates, especially finance, helped ensure that the decline of mining production had a minimal effect on the city.



Source: UN World Population Prospects 2019.



Source: UN World Population Prospects 2019.

The Role of Migration

Controls on human mobility and efforts to undermine them continue to shape South Africa's politics, economy, and society. Historically, the majority of residents, citizens, and non-nationals faced limitations on where they could live and own land, and when and how they could move in South Africa. While the system of control was never as absolute or incorruptible as many imagine, those who disobeyed state regulation did so at considerable risk. As apartheid powers waned in the late 1980s, so did formal restrictions on movement into and within South Africa. After the country's first democratic elections in 1994, South Africa's previously forbidden cities became primary destinations for migrants from around the country. Over time, these cities have become increasingly important for migrants from around the continent seeking profit, protection, and the possibility of onward passage. Human mobility continues to transform the country's population and economy.

The role of migration in the growth of Johannesburg cannot be understated. With the discovery of gold mines, a new mining labor force formed, originally comprised of white workers from Great Britain and Australia who provided high-level skills. A conventional colonial colour bar protected the interests of these workers by keeping black Africans out of high-level jobs. When profits were squeezed, however, mine owners tried to modify the colour bar and replace white workers with cheaper black African labor (Yudelman 1984). The Chamber of Mines recruited black African labor through the Witwatersrand Native Labor Association, but it failed to secure an adequate supply of labor from South Africa's "native reserves" and, consequently, two-thirds of black African workers from 1910 to 1928 came from the Portuguese East Coast—now

Mozambique. However, following a demand from the Portuguese government that this labor supply be capped, the Witwatersrand Native Labor Association recruited from further-reaching territories such as Nyasaland (Malawi), Bechuanaland (Botswana), South West Africa (Namibia), Basutoland (Lesotho), Southern Rhodesia (Zimbabwe), and Northern Rhodesia (Zambia) (Innes 1984; Crush, Jeeves, and Yudelman 1991; Crush and James 1991). The recruitment efforts of the Native Labor Association tied much of southern Africa to Johannesburg's growing economy, which Crush, Jeeves, and Yudelman (1991) describe as "South Africa's labor empire." "[T]here is little doubt that if large numbers of low-wage, unskilled migrant miners had not been recruited from throughout the subcontinent, there would never have been a deep-level gold mining industry in South Africa" (Crush, Jeeves, and Yudelman 1991, 34).

The use of cheap labor from outside the country allowed mining companies to strategically manage costs for a prolonged period (Wilson 2001). However, when the price of gold dropped from 111 shillings per fine ounce to 97 shillings in 1921, a crisis ensued. The Chamber of Mines responded by modifying the colour bar and replacing expensive white labor with black African workers. This provoked a bloody rebellion in which white workers notoriously marched under the banner "Workers of the World Unite for a White South Africa." This rebellion was ruthlessly suppressed after 250 people died and the white workers' struggle ended. The government of the early 1920s pacified white workers by legislating the colour bar but otherwise did not act against mining interests. Throughout this formative period, the state played a critical role in supporting the reproduction of low labor costs to ensure the survival of gold mining, which was growing in importance and became central to the national economy (Innes 1984).

The late 1940s to the early 1970s were the heyday of apartheid and a period of economic growth underpinned by the expansion of manufacturing. This economic growth led to a suburban expansion of white residential areas in the north and south of the city. The south of the city initially became a white working class neighborhood driven less by mining and more by the presence of iron and steel works. During this time, the apartheid government developed large segregated townships with no industrial or commercial base for black Africans. One of the most notable agglomeration of townships became known as Soweto. The government also eliminated racially mixed cultural melting pots such as Sophiatown and Western Native Township. By 1948, 445,000 Africans had moved to the city. The mining workforce remained in compounds, but also spurred the development of townships. In the 1950s, the founder and head of Anglo American, Sir Ernest Oppenheimer, provided a loan to Johannesburg City Council to construct 50,000 housing units in Soweto for families who were living in shanty towns and emergency camps (Beavon 2004). Mining compounds remained almost exclusively the residence of black African mineworkers until the arrival of democracy in the 1990s.

The composition of the labor force of Gauteng changed radically in the 1970s and 1980s, with a dramatic reduction in the use of foreign workers on the mines and their replacement by domestic labor (Turok 2014). In the early 1970s, foreign workers accounted for nearly 80% of South Africa's mining workforce, but political transitions in Mozambique and other neighboring countries led to large-scale withdrawal. The number of domestic workers employed in the mines rose rapidly from 87,000 in the mid-1970s to 333,000 in the mid-1980s (Harrison and Zack 2012).

As of 2007, the Gauteng province had the largest percentage of foreign-born migrants and non-nationals of any province, at 5.53% and 2.41% of the province's

population respectively. Because of its location and infrastructure, Gauteng is as much a place of transit as it is a destination. This transit takes on multiple characteristics, including the continuation of long-standing patterns of circular migration from rural South Africa and elsewhere in the region, traders and refugees who come seeking opportunities for profit or temporary protection, and those who see Gauteng as a stepping-stone. The Province's wealth often attracts those who expect to accumulate the money needed for onward journeys outside of Africa, typically to Europe, North America, and Australia (Landau and Segatti 2009).

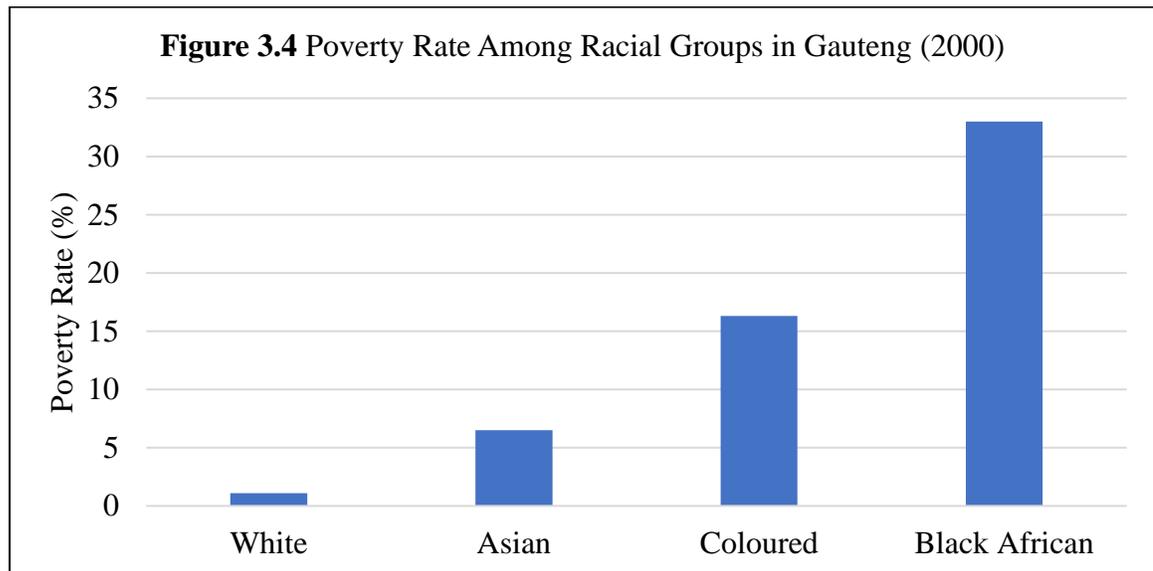
Urban Poverty in Johannesburg

Over the last 20 years, Johannesburg has become the main destination for migrants from rural South Africa, the southern African region, and the African continent. Diversity and inequality are defining characteristics of the city, and social and economic divisions of a spatial nature have been based on race, class, gender, national origin, and age. The end of apartheid presented Johannesburg an opportunity for restructuring itself from a divided city to one more inclusive (Beall, Crankshaw, and Parnell 2000). Apartheid created not only an unequal and inefficient system of municipal government, but also a huge lack of basic services and infrastructure provisions in poor areas. Poverty and unemployment, urban violence, insecure housing, a high prevalence of HIV/AIDS, chronic diseases, and food insecurity are some of the human development issues facing residents of the city. The urban poor, especially those who live in certain pockets of the city, are particularly vulnerable and struggle to gain access to services and opportunities to improve their livelihoods. Settlements located on the periphery of the city have recorded the highest rates of population growth, unemployment, and poverty levels.

When the Gauteng province was first established in 1994, it offered 27% of all formal employment opportunities in South Africa and generated 37% of national GDP (DBSA 1994). In addition to being South Africa's economic heartland, Gauteng is riddled with enormous economic and social contrasts. In 1996, the average white household income was approximately R6,653 per month, compared to only R1,439 per month for African households. Racial inequalities were represented in the stark contrast of physical spaces, with the high living standards and residential circumstances of the most luxurious suburbs on the continent coinciding right next to "environments of urban poverty" that manifested themselves in townships and informal shackland settlements. Estimated per-capita income in Gauteng in 2000 was R20,925, almost twice as much as the national average of R12,411. Despite the province's relative fortunes, high levels of poverty and inequality persist.

Various absolute and relative poverty lines are used in South Africa. In the early 2000s, the 40th percentile cut-off point of adult equivalent per capita income became a popular poverty line. This amount equaled R5,057 per annum in 2000 (SSA 2002a; SSA 2002b). Using this indicator, South Africa experienced a poverty headcount ratio of 49.8% in 2000. The 20th percentile cut-off of adult equivalent income, R2,717 per annum, is sometimes used as the "ultra-poverty line." About 28.2% of South Africa's population lives below this poverty line. In Gauteng, the poverty rate is lower than the national average at 25.8%. The province's ultra-poverty rate is 11.2%. Overall, the urban poverty rate in Johannesburg is approximately 26.1%. This statistic is similar to South Africa's national urban poverty rate of approximately 25.4% in 2015 (World Bank 2018). These rates vary greatly between racial groups. There is virtually no poverty among white people, at 1.1%, and only 6.5% of Asian populations are poor. In contrast, the poverty

rates for coloured and African people are 16.3% and 33.0% respectively. These figures are displayed in Figure 3.4. In addition, Gauteng's Gini coefficient, at 0.65, was lower than South Africa's in 2000, at 0.70, but both figures are still some of the highest in the world, representing the high levels of inequality in the province and country (SSA 2002a; SSA 2002b).



Source: SSA 2002a; SSA 2002b.

Sex Work and Gender-Based Violence in South Africa

HIV prevalence among female sex workers in South Africa is estimated to be as high as 59.6% (Baral et al. 2012). According to Konstant et al. (2015), sex workers are among the most hidden, least understood, and most marginalized people in the country. Selling sex has been illegal in South Africa since at least the early 1900s, and buying sex was criminalized in 2007. Largely due to criminalization, sex workers face severe rights abuse, regular violence, public stigma and discrimination, and minimal access to justice. Some report being beaten or raped by their clients and the police, as well as regularly not

being paid for services rendered, with objections frequently leading to violence. Sex workers also describe being publicly identified and insulted by health workers, and are less likely to seek services for HIV and sexually transmitted infection.

Konstant et al. (2015) set out to estimate the distribution of sex workers in South Africa and concluded that female sex workers represent approximately 0.86% of the total adult female population based on 2011 census data. Their findings suggest 89% of female sex workers live in urban areas, with 48% living in urban areas with more than 100,000 people and 41% in urban areas with less than 100,000 people. Only 11% of sex workers live in rural areas. Hidden, home-based, and high-cost sex workers are not captured in their estimates, and are assumed to represent an additional 5% of the overall female sex worker estimate.

Vandepitte (2006) reported female sex worker rates in capital cities to range between 0.7% and 4.3% of adult women aged 15 to 64, with an average of 2%. Based on the data above, these were overestimates for South Africa, with a range for metropolitan areas of 0.5% to 0.7% of the female population. The Vandepitte average of 2% would translate to approximately 31,000 sex workers in Johannesburg. Konstant et al. (2015) estimated approximately 11,000 sex workers in Johannesburg. They note this figure is likely an underestimate, but after visiting the most popular sex worker hotspots, they argue their data does not support a 2% ratio. One possible reason for lower-than-estimated rates could be lower sex worker numbers in the populous peri-urban low cost townships that surround most South African cities. Konstant et al. (2015) observed that townships have far lower numbers of sex workers than other urban settings, as sex workers stated they prefer not to work near their homes in those areas. Assuming that mining employees were men and that 80% live in single-sex hostels, Konstant et al.

determined a ratio of 200 sex workers for every 12,000 male residents in single sex hostels in mining centers. This translates to a ratio of one sex worker per every 60 mining residents, a statistic higher than the national averages determined for urban areas.

The rate of sexual violence in South Africa is among the highest in the world. According to the United Nations Office on Crimes and Drugs, for the period of 1998 to 2000, South Africa was ranked first for rapes per capita. In 1998, one in three of the 4,000 women questioned in Johannesburg had been raped (UNOCD 2000). While women's groups estimate that a woman is raped every 26 seconds in South Africa, the country's police estimates that a woman is raped every 36 seconds. A survey from 2000 indicated the 2.1% of women aged 16 years or older across population groups reported that they had been sexually abused at least once between 1993 and 1998. Similarly, the South African demographic and health survey of 1998 gave results of rape prevalence at 4.0% of all women aged between 15 and 49 years. In 1998, the region of Gauteng accounted for the largest percentage of prisoners in custody for sexual offenses with 20.6% (Sigsworth 2017).

The Centre for the Study of Violence and Reconciliation notes that many acts of sexual violence go unreported, not only to state or private institutions, but also to the victim's family and friends. The Medical Research Council estimates that the number of rapes in the country may be up to nine times that of the reported statistics (Jewkes and Abrahams 2002). Between 2004 and 2009, 71,500 sexual offenses were reported in South Africa. The highest region was the Gauteng province, with 19,106 cases, followed by the Kwa-Zulu Natal province with 13,329 cases (Sigsworth 2017). With so many sexual violations going unrecorded, and the recorded violations being broadly categorized as "sexual offences," it is difficult to ascertain the true nature and extent of sexual violence

in South Africa. Sexual violence in South Africa is caused by a number of complex and interrelated factors, including an overarching ideology of patriarchy, masculinity, familial relationships, male failure to reach social standards of economic success, political and economic changes, and poverty. While individuals are responsible for instituting and maintaining healthy behaviors, Sigsworth (2017) argues that individual behavior is largely determined by the social environment. Barriers to healthy behaviors are shared among the country as a whole.

Urban Policy in South Africa

Before 1994, urban policy in South Africa was based predominantly on apartheid spatial planning, with South African cities being codified by the 1950 Group Areas Act and the notion of segregated urban space. Current urban policy has therefore been founded on an intention to reintegrate cities and move towards more compact urban forms. Ideas surrounding inclusive city development emerged as planners and urban scholars mounted a huge critique of urban apartheid. Negotiated during the inclusive forum processes that characterized South Africa's transitional period and endorsed by the Urban Foundation (in 1990) and World Bank (in 1991), these ideas became the dominant discourse and played a significant role in the development of legislation by the new government (Pillay 2004; Todes 2000).

Between 1994 and 2004, there were three main components to urban policy in South Africa. During the township struggles, the "one city, one tax base" slogan emerged, which related to policies that included re-demarcating municipalities to create integrated and democratic local governments, the comprehensive restructuring of the local government system, and the design of municipal financial systems that support

service delivery to the poor (Pillay 2008). A second set of policies revolved around the creation of “developmental local governments” and included integrated development planning and local economic development. The third set of policies referred to the mass delivery of free housing and services within municipalities. Urban policy over the past two decades has sought to enable local government to undertake delivery, plan for delivery, and implement delivery in consolidating democracy. The government’s urban policy has thus focused on meeting the commitment in the Reconstruction and Development Programme (RDP) to provide for the basic needs of all South Africans and build democratic local government institutions with a goal of promoting socioeconomic development in urban areas.

Despite these goals, Bond (2003) argued that the core characteristics of post-apartheid urban policy—especially a focus on neoliberal, market-oriented development—unintendedly resulted in an equally oppressive structured process that can be termed class apartheid. He argued that the mainstream approach was ameliorative and worked with, rather than against, market inequalities. Harrison et al. (2003) echoed this critique, noting that there was a real and growing concern that government’s neoliberal turn may be exacerbating social and class divides, prioritizing South Africa’s standing in the global economy at the expense of its poorest citizens.

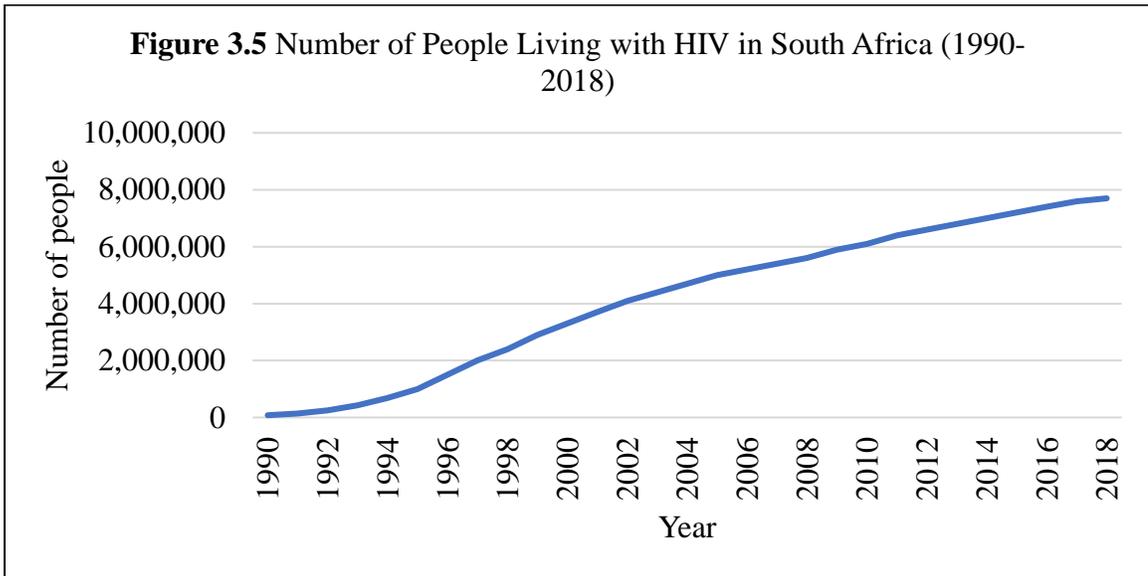
South Africa’s most recent urban development policy is the Integrated Urban Development Framework (IUDF). This policy responds to the post-2015 Sustainable Development Goals, particularly Goal 11, which aims to make cities and human settlements inclusive, safe, resilient, and sustainable. It also builds upon the country’s National Development Plan. There are four overall strategic goals for the IUDF: spatial integration, inclusion and access, growth, and governance. Beer (2016) notes, however,

that the language and proposals of the IUDF, although important in addressing serious gaps and challenges in urban development, seem to be more managerialist than political in opening up spaces for disenfranchised populations. The report does not indicate how the government will resist the overpowering influence of capital and markets in continuously shaping urban socioeconomic inequalities, thereby excluding the masses from participating in just discourse as urban citizens and agents. Beer (2016) argues that the policy fails to address the societal culture that perpetuates socio-spatial exclusions and would continue to do so without any significant political change.

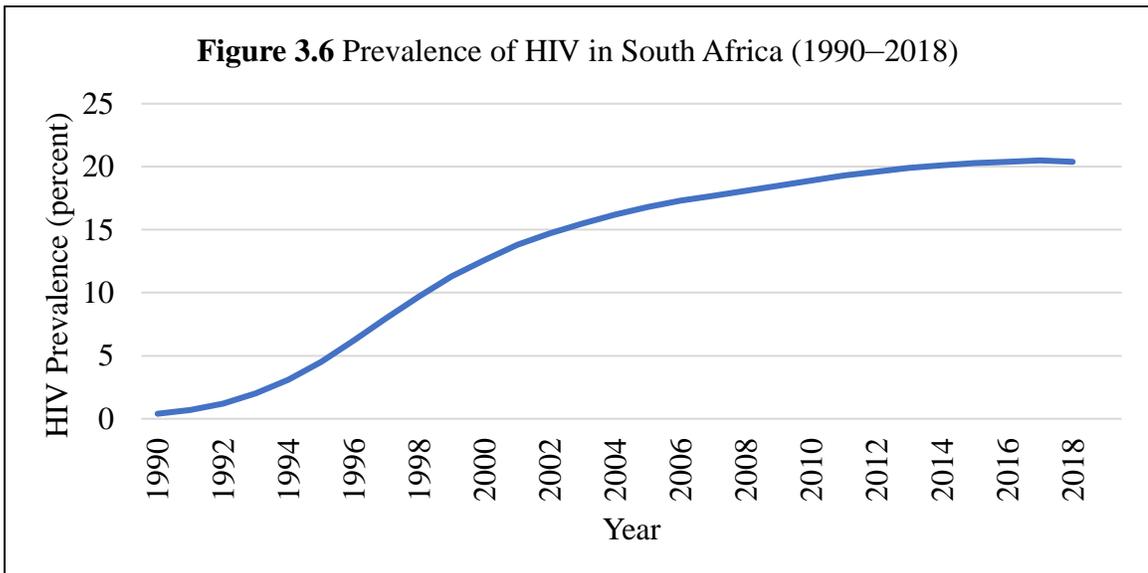
The State of HIV in South Africa

South Africa has the largest and most high-profile HIV epidemic in the world, with approximately 7.7 million people living with the disease in 2018, as shown in Figure 3.5. The country accounts for a third of all new HIV infections in southern Africa, with 240,000 new HIV infections in 2018. In the same year, 71,000 South Africans died from AIDS-related illnesses (UNAIDS 2019b). South Africa has the world's largest antiretroviral treatment program, which has helped increase the general national life expectancy significantly. The country is making solid progress towards the UNAIDS 90-90-90 targets, especially in regards to testing and viral suppression. Women are disproportionately affected by HIV in South Africa. In 2017, an estimated 26% of women were living with HIV, compared to 15% of men. Poverty, gender-based violence, and the low status of women in South African culture have been cited as reason for this disparity. In addition, HIV prevalence among young women is almost four times higher than among young men. Figure 3.6 shows the rapid increase in HIV prevalence between 1990

and 2000, but also suggests that the curve is beginning to level out. For the first time since HIV was identified in South Africa, prevalence decreased from 20.5 in 2017 to 20.4 in 2018 (UNAIDS 2019b). While it will take years to minimize the prevalence of HIV in South Africa, steps have been taken by the government, resulting in a slowing of the spread and a slight decline in prevalence.



Source: UNAIDS, AIDSinfo 2018.



Source: UNAIDS, AIDSinfo 2018.

The History of HIV in South Africa

Following the first death from AIDS in South Africa in 1985, the Department of Health established the AIDS Unit and National Advisory Group in 1988. This unit was a small group of officials who were made responsible for addressing the emerging pandemic. The scope of these early efforts by the apartheid administration were minimal and have been criticized by many public health researchers. In 1991, a national conference was held and a new group called the National Advisory Group (NACOSA) was established to develop more comprehensive government policies to combat HIV. By the end of 1991, heterosexual sex became the dominant mode of HIV transmission in the country, but stigma continued to surround the disease. Some prominent white leaders publicly claimed that a supposed “promiscuity” of gays and blacks was the reason for higher than average contraction levels among these two populations. In 1992, a member of the apartheid parliament promoted the utilization of the disease as a tool to rid South Africa of its black population. In 1994, the Government of National Unity was elected in South Africa’s first democratic elections. One month after Nelson Mandela became president and appointed Doctor Nkosazan Clarice Dlamini-Zuma Minister of Health, 22 lead projects on the new government’s Reconstruction and Development Program (RDP) were introduced. Early optimism surrounding these projects turned to disillusionment. The Department of Health spent R14.27 million that had been provided by the European Union for combatting HIV/AIDS on a play called *Sarafina II*, which was designed to educate the public about the disease. Critics and HIV/AIDS activists denounced the play as inappropriate and confusing. Government funding for the play was consequently halted in 1996 and consensus among civil society was that the government worsened the pandemic and turned out to be grossly insufficient. The government launched a new

Strategic Plan for South Africa 2000-2005, premised on the view that HIV “is not just a health problem that can be contained by adopting a few medical or health-centered interventions” (Tshabalala-Msimang 2003). While the plan drew upon the strategic plan outlined by the United Nations, it lacked concrete commitments and timeframes and created controversy by lacking analysis of antiretroviral therapy options. Overall, South Africa’s initial response to HIV/AIDS has been largely criticized, with researchers citing that the opportunity to divert a major public epidemic had already been missed by 2005 (Butler 2005).

HIV Treatment Campaigns in South Africa

While the common consensus is that South Africa’s original response to HIV was inadequate, Chibango (2013) argues that recent policy and legislation show great determination by the government in reversing the epidemic. One such plan, the National Strategic Plan (NSP) for 2007-2011, set out to make substantial improvements based on failures of the 2000-2005 plan. Some of its goals included improving prevention, treatment, access to treatment, care and support, research, monitoring, surveillance, and human rights. In terms of prevention, the plan sought to decrease new infections by 50%, with a focus on the 15-24 age group. Though the goal was not attained, the mother-to-child transmission was significantly reduced. The plan also sought to facilitate access to the appropriate treatment to 80% of people living with HIV by the end of the five-year period. Despite challenges regarding implementation, monitoring, and evaluation, the decrease in general adult mortality in this window suggest a positive increase in treatment access. In terms of monitoring and surveillance and human rights and access, Mthembu, Khan, and Manengela (2018) argue these areas were riddled with implementation barriers

and therefore did not reach their goals. The second NSP (2007-2011) made significant gains in managing HIV, but structural changes needed to be addressed to ensure greater success.

The NSP 2012-2016 introduced a comprehensive response. It expanded upon the main goals of the previous plan to include reducing the rate of tuberculosis among those infected with HIV. While many of its goals related to treatment, prevention, and human rights were achieved, gaps were also identified. Notable achievements were reported in reducing new HIV and tuberculosis infections, but the goal to reduce new HIV infections and new tuberculosis infections by a figure of 50% had not been achieved. The takeaway from the country's five-year plans is that reducing incidence and stabilizing prevalence will require the scaling-up of HIV and tuberculosis prevention, testing, linkage to care, and life-long adherence strategies, with a focus on high-risk populations, particularly among women, men who have sex with men, injection drug users, and commercial sex workers.

While policies consistently fail to reach the goals they outline, the country is making solid progress towards the UNAIDS 90-90-90 targets, especially in regards to testing and viral suppression. In 2016, the Minister of Health, Aaron Motsoaledi, announced that the country would implement a new evidence-based policy of offering HIV treatment to all people living with HIV by September of that year. This announcement brought South Africa into line with the latest World Health Organization guidelines on HIV treatment. South Africa has the world's largest antiretroviral treatment program, financed largely from its own domestic resources of more than \$1.54 billion annually. In 2018, 90% of people living with HIV were aware of their status, of which 68% were on treatment. On the whole, this means 62% of all people living with HIV in

South Africa are on treatment and 56% are virally suppressed. Despite these significant improvements, HIV prevalence remains high, with approximately 1 in 5 people (20.4%) living with HIV (UNAIDS 2019b).

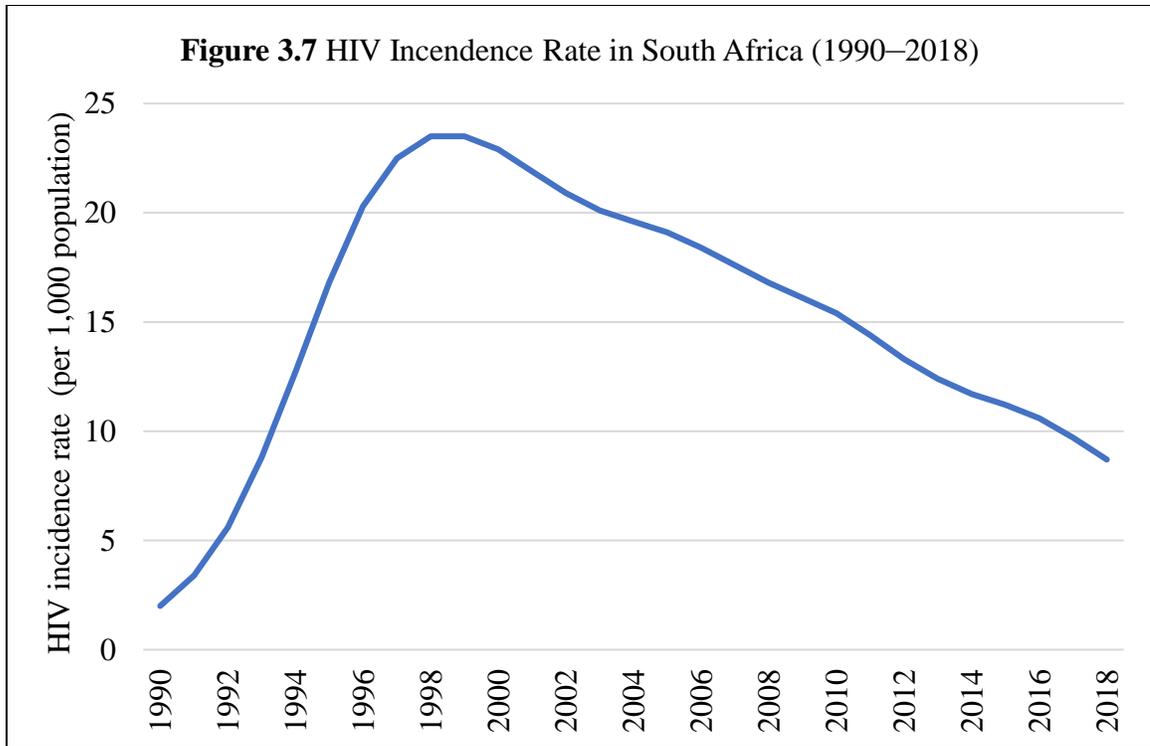
Urbanization and the Spread of HIV in Johannesburg

In South Africa, data suggests HIV/AIDS is neither exclusively nor predominantly an urban issue. Instead, there is evidence of a parallel spread of the epidemic in both urban and rural areas. These statistics point to the complex and intricate linkages between urban and rural areas, largely as a result of migration, flows of people, and multi-local households. Closer scrutiny of the data, however, reveals that the HIV prevalence rates in urban areas are often higher compared to regional data. Based on the findings of the 2000 antenatal survey, the Eastern Cape Department of Health has estimated that the average HIV prevalence rate in urban areas is 23.1% compared to 18.8% in the rural areas of the province (Eastern Cape 2001). Johannesburg also recorded a higher-than-average HIV prevalence rate of 26%, compared to the provincial rate of 24%. Cape Town also recorded slightly higher rates, at 8.1% compared to the provincial rate of 7.1% (City of Johannesburg 2001; Thomas and Crewe 2000). These figures suggest a higher concentration of HIV/AIDS in urban areas in South Africa (Van Donk 2002).

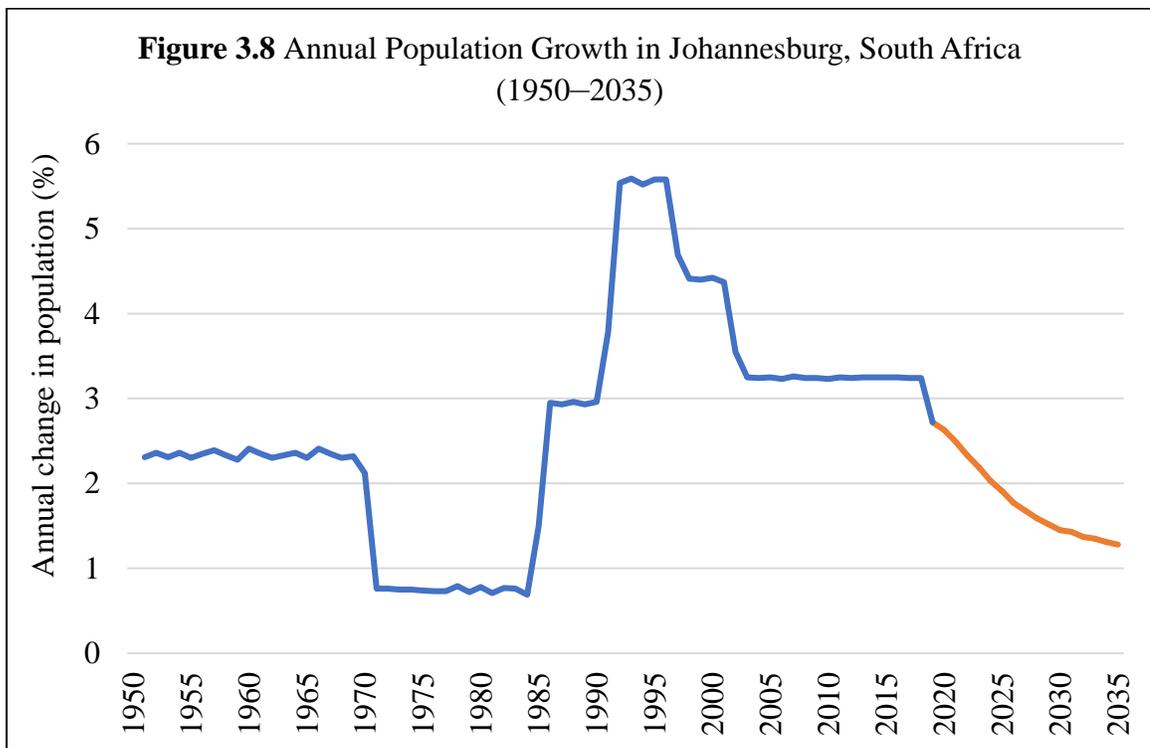
In terms of the historical spread of HIV in South Africa, the incidence rate, which measures the number of persons newly infected with HIV during a specified time period, peaked at 23.5 in 1999. As seen in Figure 3.7, there was a significant upward trend in HIV infection from 1990 until 2000. The population growth of Johannesburg also peaked

in the late 1990s, as shown in Figure 3.8, demonstrating a similar trend to the growth of the incidence rate. While no direct correlation can be made between an increase in population and an increase in infectivity, research has suggested that increased infection leads to an increased mortality rate, which decreases fertility and the adult population (Clark 2006; Joint United Nations Programme on HIV/AIDS 2002). In fact, in the year 2000, it is estimated that 40% of all adult deaths in South Africa were due to AIDS. This pattern could potentially explain the lowering of the population growth rate in Johannesburg towards the end of the 1990s.

The presence of mobile populations, especially mobile men, is accepted as a strong determinant for HIV vulnerability. These are (mostly) men who are in transit or away from home, such as migrant workers in construction or mining, truck drivers, and seasonal agricultural workers. As urban areas are both actual and perceived centers of employment and income-generating opportunities, many young adults migrate to urban areas in search of economic security. The migrant labor system was the foundation for growth in Johannesburg, as well as the apartheid urban planning system, which led to the fragmentation of social structures and family life, especially among black Africans. Because of the disruption of familial and spousal relationships, migration is associated with higher levels of HIV infection. Data suggests that the HIV prevalence rate among South African migrants is higher than that among non-migrant counterparts in their areas of origin (Lurie et al. 2002). The relationship between migration and HIV/AIDS is not simple, however, and recent research warns against assuming that HIV transmission in migrant couples is unidirectional, or strictly the result of the migrant's sexual behavior during periods of absence from his sexual partner.



Source: UNAIDS, AIDSinfo 2018.



Source: UN World Population Prospects 2019.

Migration also alters the composition of urban areas in terms of age and sex, with the majority of migrants being young adults (between 15 and 49 years old) and male. In South Africa, the four most urbanized provinces show a higher than average proportion of men (South Africa IRR 2001). In Johannesburg, the median age is 29 years old and a slight majority of the population is male. The city also has an employment rate of 52.6%, meaning approximately half of the population is unemployed. Urban economies are particularly vulnerable to changes in the global and macroeconomic environment. In recent years, highly skilled industries have largely benefited from processes of globalization, whereas labor intensive-industries dependent on low-skilled and semi-skilled labor have declined. The volatility of the economy directly affects employment prospects in urban areas. Endemic unemployment is likely to enhance feelings of social disillusionment, frustration, and boredom, which could discourage safe sex, especially when immediate survival needs are more urgent than the long-term and invisible threat of ill health and death due to HIV/AIDS. These patterns encourage livelihood strategies of sexual networking, which includes commercial sex work and sex in exchange for money, goods, or protection. Sexual networking leads to situations of unequal power relations, where it is highly unlikely that safe sex can be demanded. Because the reward for unprotected sex is usually higher, the use of condoms in these sexual transactions is discouraged (Van Donk 2002).

Mobile populations are consequently linked to increased concentrations of sex workers (WHO 2011). Based on census data adapted by the Council for Scientific and Industrial Research, it is clear that Johannesburg has the largest mining population, at 9,005 people, as well as the largest adult female population, at 1,590,499. Johannesburg is also a critical trucking destination. The spread of HIV in South Africa has been

attributed in part to efficient transport networks which have linked areas and populations of high prevalence to those of lower prevalence, leading to the subsequent dissemination of HIV within the general population (Lurie et al. 2003; Welz et al. 2007). Over 3000 road freight companies are registered in South Africa, most of which are private, and together they are estimated to operate over 200,000 vehicles (IOM 2003). Despite the size of the industry, only one study involving 100 truck drivers had been published as of 2014. In the study, truck drivers reported low levels of condom use (29%), high levels of casual sex (37%), and high levels of self-reported STIs (66%) and HIV (56%) (Ramjee and Gouws 2002).

Urban areas also attract people because of the expectation there will be improved access to and better quality of services, such as housing, education, healthcare, and welfare facilities. The inadequacies of public services and lack of infrastructure in rural areas often serves as a “push factor” to urbanization. While urban areas generally have higher levels of public services, these services are not necessarily accessible to and affordable for all urban residents, especially those in urban poverty. With an urban poverty rate of 26.1%, approximately a quarter of those living in Johannesburg likely struggle with access to public services. The apartheid policy of non-provision to or limited development of certain residential areas in the urban center has created a legacy of inequitable service provision and significant service delivery backlogs. Current public services are insufficient in addressing these backlogs, let alone accommodating increasing demand. Urban areas also tend to have higher costs of living, which means poor households are often unable to take advantage of public services. In South Africa, poor households often must choose between quality of services and proximity to economic opportunities. New housing developments, for example, are generally located

on the periphery of urban areas, far from employment opportunities or social facilities, and without adequate and affordable public transportation. As a result, some poor households choose to remain in informal settlements characterized by poor environmental conditions and lack of infrastructure development, as they are more centrally located. These conditions are conducive to the spread of a sexually transmitted epidemic (Van Donk 2002). Although there is no official data on HIV prevalence rates by income groups in South Africa, local evidence suggests that HIV/AIDS is concentrated in townships and informal settlements. Communities such as Soweto, Walmer Estate, and black communities in Cape Town show higher HIV rates compared to other parts of the same suburban areas.

While incomplete data, especially historical data, and lack of research make it difficult to link urbanization in Johannesburg with the spread of HIV, processes that interact with urbanization create conditions more conducive to the spread. A key part of Johannesburg's development has been labor migration, especially in the mining industry, which has been correlated to HIV "hotspots" and increased risk. In addition, urban areas are linked to increased rates of sexual violence and sex work in general. They also host a variety of people from different social, cultural, religious, economic, and political backgrounds, which can lead to social change that can influence norms, values, and practices, including in relation to sexual behavior. Lack of employment and urban poverty lead to poor populations who are least likely to have the means, knowledge, and power to prevent HIV infection. It is incredibly difficult and inappropriate to directly link urbanization to HIV risk, but in specific instances of urban development, processes related to migration, sex work, and poverty increase vulnerability to HIV.

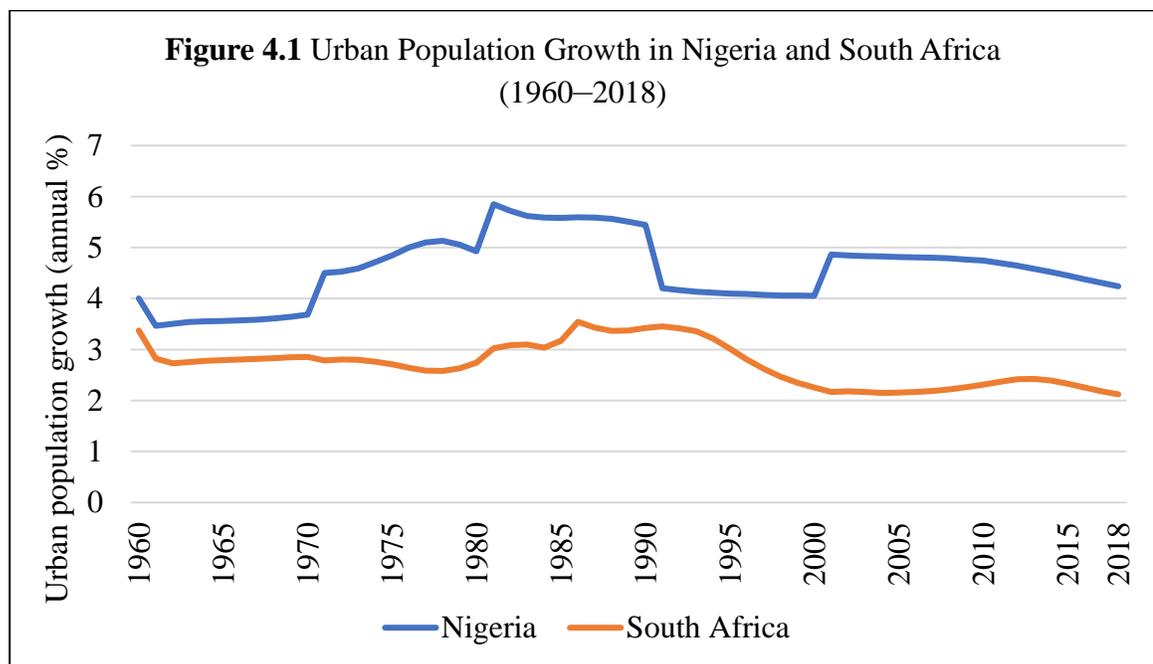
CHAPTER 4: COMPARING URBANIZATION AND HIV IN NIGERIA AND SOUTH AFRICA

To account for differences in the urbanization processes of Lagos, Nigeria and Johannesburg, South Africa, which can then be investigated in relation to the spread of HIV in each country, this chapter directly compares the data discussed in the previous two chapters. It also examines historical trends between HIV hotspots and urban areas in both countries to determine the link between urbanization and the spread of HIV in Nigeria and South Africa. While lack of information and the complex nature by which HIV spreads pose significant challenges to formulating conclusive results, this chapter ends by discussing how differences in the urban processes of Johannesburg and Lagos may account for differences in the spread of HIV in both countries.

Comparing Urbanization in Nigeria and South Africa

As expected, patterns of urbanization in Nigeria and South Africa are different, reflecting each country's unique history and development. Until it gained independence from British colonial rule in 1960, Nigeria experienced low levels of urban population growth. South Africa, on the other hand, urbanized significantly earlier than most

countries on the sub-continent because of its economic history of mineral extraction. The most rapid acceleration in urban growth in South Africa took place between 1870 and 1930, whereas Nigeria’s urban growth was most rapid between 1975 and 1995. These historical differences are part of what explains the differences in urban population growth rates depicted in Figure 4.1. Despite the unique process of urbanization each country experienced, and despite an overall lower level of urban population growth in South Africa than Nigeria after 1960, there are similarities in changes in urban population growth in both countries. The 1980s, for example, saw the highest urban population growth for each country between the period of 1960 and 2018. In Nigeria, this increase was partly the result of the oil boom of the 1970s, the creation of new state and local government areas, and the creation of new federal capital territory in Abuja. In South Africa, the increase is largely attributed to the removal of restrictive laws related to migration in 1986 and the gradual disintegration of the apartheid system.



Source: World Development Indicators 2019.

The Role of Mining and Labor Migration

While Nigeria and South Africa urbanized at different times in history, urbanization in each country was greatly influenced by the extraction of natural resources and the consequent migration of the labor force to meet the demand of the new mining processes. Urban growth in South Africa was largely driven by the discovery of gold in Johannesburg. This discovery led to the creation of a new mining labor force and, though it was originally comprised of white workers from Great Britain and Australia, the increase in demand for gold led to mine owners modifying the colour bar and replacing white workers with cheap black African labor (Yudelman 1984). An influx of migrants from countries near South Africa also contributed to the growth of urban mining cities. In Nigeria, the discovery of oil and oil boom of the 1970s resulted in a number of massive development projects which catalyzed a large influx of people into urban areas. Employment opportunities in the tin mines of the Jos Plateau and the Enugu coal mines further led to heightened migration and provisions of infrastructure and facilities in urban centers (Afolayan, Ikwuyatum, and Olumuyiwa 2008).

Comparing Urban Poverty

Both Nigeria and South Africa have high rates of urban poverty and inequality. World Bank data suggests that, in 2009, 53.5% of Nigeria's population was living on no more than \$1.90 a day. This percentage jumps to 92.1% when looking at those who live on less than \$5.50 a day. The Lagos State Bureau of Statistics revealed that 87% of sampled households in the city in 2016 earned less than N86,925 per month, an amount that was calculated to relate to poverty measurements of \$1.90 per day. In addition, 86%

of households in the survey self-assessed as poor (Lagos BOS 2016). In South Africa, poverty statistics are not as stark as they are in Nigeria, but they are still high and are rooted in inequality. Nigeria's 2009 GINI index score was 43, compared to South Africa's 2010 score of 63.4. While South Africa experiences more inequality than Nigeria, largely due to the historical influences of apartheid, Nigeria's score is still high. When the Gauteng province was first established in 1994, it offered 27% of all formal employment opportunities in South Africa and generated 37% of national GDP (DBSA 1994). In 1996, the average white household incomes were approximately R6,653 per month, compared to only R1,439 per month for African households. In the early 2000s, approximately 49.8% of South Africa's population were considered impoverished, with 28.2% of the population living below the "ultra-poverty" line. In Johannesburg, the poverty rate is lower than the national average, but still high, at approximately 26.1%. This statistic is similar to South Africa's national urban poverty rate of approximately 25.4% in 2015 (World Bank 2018).

During the process of urbanization, both Lagos and Johannesburg saw the formation of slums. In Lagos, rapid population growth exceeds the state government's capacity to manage the challenges that accompany it. Approximately 64.2% of urban populations in Nigeria live in slums, which have developed to accommodate overcrowded communities (UNDP 2019). Many families and individuals migrate to Lagos from other regions in Nigeria with the hopes of escaping rural poverty, deprivation, and political instability of their home states. However, Lagos has offered little solace. Slum-dwellers live in poverty that is often worse than rural people (Borgen Project 2015). In South Africa, labor migration in the early 1900s led to over 100,000 black Africans being corralled in regimented single-sex compounds on mining property.

As black Africans entered other sectors of employment, migrants found accommodation in compounds and slums in and around the center of Johannesburg and domestic white residential areas. Government policy prevented black Africans from purchasing or renting land in white areas, leading to the development of segregated housing estates. By 1933, the entire municipality of Johannesburg was proclaimed white and the government had used the provisions of the Slums Act of 1934 to clear mixed-race inner-city neighborhoods. Black Africans were relocated to newly built townships. While little data is available to suggest what percentage of the urban population lived in slums during Johannesburg's most rapid urban growth, recent data suggests that 29% of residents in the city still live in informal dwellings (SSA 2019). In addition, black Africans experience poverty at significantly higher rates than any other racial group in the Gauteng province, a testament to inequality and the history of segregated development in Johannesburg. Based on these statistics, the population living in urban poverty and in slums in Nigeria is higher than in South Africa, largely due to the rapid increase in the growth of Lagos and the stark inequalities of the two countries.

Comparing Sex Work

In both Nigeria and South Africa, more sex work hotspots are found in large cities. A study conducted in Nigeria found that out of 10,233 active sex work spots reported by 126,489 female sex workers, 4,065 were found in Lagos state. This number of hotspots was significantly greater than any other state, with the second highest being 1409 in Nasarawa. The study notes that Lagos, which is the commercial nerve center and most populous state in Nigeria, understandably has the largest female sex worker size

estimate at 46,491 workers. In terms of average number of female sex workers per 1,000 adult men, the greatest proportion—69.3 per 1,000—was found in the Federal Capital Territory (FCT), where the capital Abuja is located. Lagos had a proportion of 20.5 per 1,000 (Ikpeazu et al. 2014). Trends also suggested more sex work occurred in the business districts of Nigerian cities. In South Africa, 89% of female sex workers live in urban areas. Konstant et al. (2015) estimated approximately 11,000 sex workers in Johannesburg, but notes that townships on the outskirts of the city have a far lower number of sex workers than other urban settings, as sex workers stated they prefer not to work near their homes in those areas. This finding has two implications: the first is that sex workers in Johannesburg are often black Africans and the second is that they are often impoverished, living in townships or slums. In addition to cities, sex work is observed near mines and around military bases in Nigeria. In South Africa, the influence of mining on the growth of Johannesburg has witnessed a large influx of labor migrants and the accompanied development of a commercial sex network near mining areas.

Comparing HIV in Nigeria and South Africa

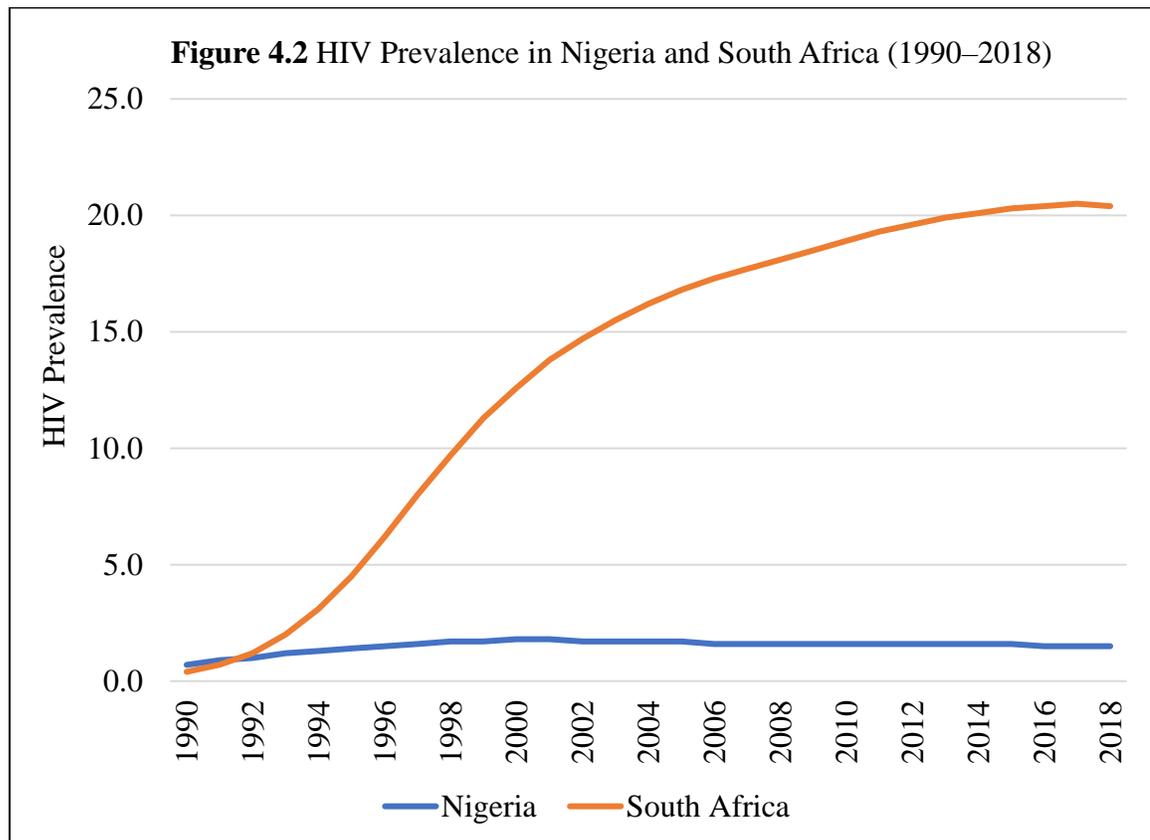
South Africa has the largest HIV endemic in the world, with 7.7 million people living with HIV. Largely due to its huge population, Nigeria accounts for the second largest HIV epidemic in the world, with 1.9 million people living with the virus. While these two countries have the highest numbers of people living with HIV in the world, their prevalence and incidence rates are significantly different. This section analyzes differences in the prevalence and incidence rates between the two countries, looks for

trends in the historical and geographic spread of the disease, and compares both countries' progress toward the UNAIDS 90-90-90 goals based on their healthcare systems and access to antiretroviral therapy (ART).

Differences in Prevalence and Incidence Rates

Prevalence and incidence rates are significantly different in Nigeria and South Africa, representing the broader trends of HIV in the regions of west and southern Africa. Southern Africa is the region hardest hit by HIV in the world. It is home to approximately 20.6 million people living with HIV, representing over half (54%) of the total number of people living with HIV globally. An average of 7% of the population is infected with HIV in southern Africa. South Africa is one of the main contributors to this regional rate, with 20.4% of its population infected by HIV in 2018. Women are disproportionately affected by HIV in South Africa. In 2017, an estimated 26% of women were living with HIV, compared to 15% of men. Poverty, gender-based violence, and the low status of women in South African culture have been cited as reason for this disparity. In addition, HIV prevalence among young women is almost four times higher than among young men. Figure 4.2 shows the rapid increase in prevalence between 1990 and 2000, but, for the first time since HIV was identified in South Africa, prevalence decreased from 20.5 in 2017 to 20.4 in 2018 (UNAIDS 2019b). West Africa is the second-most affected region in the world, with five million people living with HIV. An average of 1.5% of the population is infected with HIV in west Africa. Nigeria's prevalence rate has remained relatively low and similar to regional rates, as shown in Figure 4.2. In 2018, the prevalence rate in Nigeria was 1.5. The main mode of HIV transmission in both Nigeria

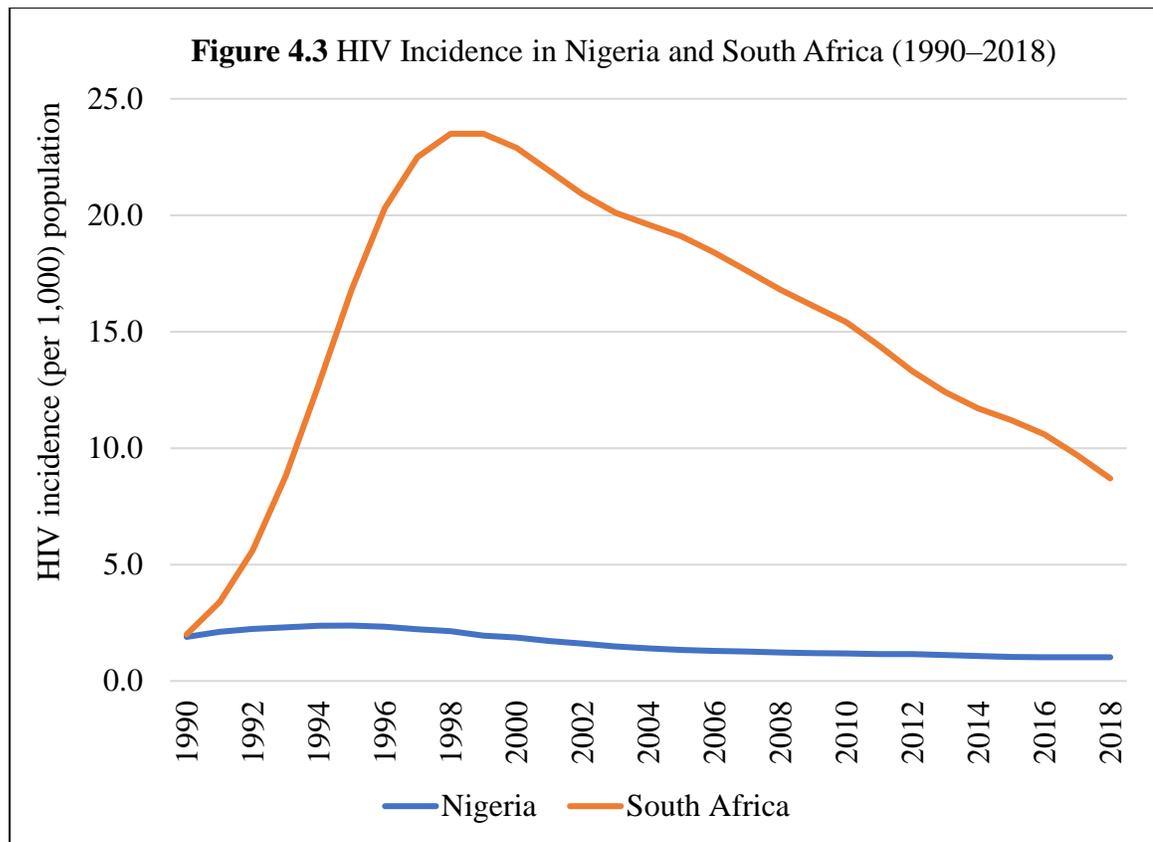
and South Africa is through unprotected heterosexual intercourse, and vulnerable populations, such as sex workers, men who have sex with men, and injection drug users are disproportionately affected by the disease.



Source: UNAIDS, AIDSinfo 2019.

In terms of incidence, southern Africa experienced 800,000 new HIV infections in 2018, just under half of the global total. South Africa accounted for more than a quarter of the region’s new infections in 2018, with 240,000 people newly infected. Overall, new infections in the region have declined by 28% since 2010 and, as shown in Figure 4.3, South Africa has also experienced a significant decline in its incidence rate since around 2000. While incidence has shown steady declines, it still remains high at 8.70 in 2018.

The number of new infections in South Africa is not far off of the 280,000 new infections that the region of west Africa experienced as a whole. UNAIDS (2019b) estimates that around two-thirds of new HIV infections in west Africa occur in Nigeria, with 130,000 people newly infected in 2018. This high number of infections is linked to the country's large population, as its incidence rate remains relatively similar to the rest of the region at 1.02 in 2018, as shown in Figure 4.3. South Africa, Nigeria, and Uganda account for around half of new HIV infections in sub-Saharan Africa every year (UNAIDS 2019b). While both countries see a large amount of newly infected people each year, differences in incidence rates show there is more risk of becoming newly infected in South Africa.



Source: UNAIDS, AIDInfo 2019.

HIV Hotspots in Nigeria and South Africa

There are noticeable and complicated spatial clusters and disparities in geographic HIV trends in both Nigeria and South Africa. Six states in Nigeria account for 41% of people living with HIV in the country, including Kaduna, Akwa Ibom, Benue, Lagos, Oyo, and Kano (NACA 2017). HIV prevalence is highest in Nigeria's southern states, where the prevalence is approximately 5.5%. It is lowest in the southeastern states, where the prevalence is 1.8%. There is evidence of shifts in the hotspot locations of HIV/AIDS over time, however. Djukpen (2012) notes that historical examination points to the north central and southeastern states as areas of significant interest, as they had high prevalence rates in 1999, 2001, and 2003. Historically, the western states have remained some of the least affected by HIV in the country. Using cluster analysis, Djukpen (2012) notes that, for 2001 and 2003, the states of Benue, Nassarawa, Cross Rivers, Oshun, and FCT form major clusters of high prevalence rates. He attributes the existence of these clusters to social and economic factors specific to each state. Utulu and Lawoyin (2007), for example, explained that prevalence of HIV in pregnant women in Benue was associated with various sociocultural, political, and economic factors. Djukpen concluded that spatial clustering in Nigeria indicates a pattern that has a nucleus in the middle belt of the country. Factors that explain this clustering include knowledge about HIV, level of education, sociocultural practices, condom use, and economic activities. Gender inequality and social power relations also may explain regional differences in Nigeria. Obidoa (2005) argues that unequal gender relations played a significant role in the proliferation of HIV in Nigeria. Certain cultural practices and kinship systems, such as patriarchy, matriarchy, and monogamous relationships vary geographically and affect the

choices people make in sexual relationships and networks (Akeroyd 2004). The Okun people in Central Nigeria practice “spouse-sharing” between men and wives of their male relatives. Osagbemi et al. (2004) cite this practice as a potential high risk factor in HIV transmission, especially as the Okun people live in the periphery of the high cluster states in north central Nigeria. Commercial sex work is also an important factor in explaining spatial differences. Prevalence rates among sex workers in major urban areas in Nigeria rose from 30.5% to 34.2% between 1996 and 1998. The cities of Makurdi, Calabar, and Abuja are located in the zone that Djukpen identified as the major spatial cluster of high HIV rates. Ultimately, there are differences in the spatial distribution of HIV in Nigeria. These differences become even more complicated as time progresses. Because of the overall lack of significant trends in spatial patterns in the country, it is difficult to conclude specific reasons for why HIV is more prevalent in certain areas.

In South Africa, prevalence of infection does not abruptly change at provincial boundaries, but instead follows a continuum across these boundaries. In general, there is a trend of high prevalence in the eastern half and low prevalence in the western half of the country. HIV prevalence rates of men and women differ significantly. Young women are approximately three times more likely to become infected with HIV than young men. The highest prevalence rates for both men and women can be found in the provinces of KwaZulu Natal and Mpumalanga, but the differences between the two genders are striking: in KwaZulu Natal, geographical models estimate a prevalence of between 3% and 5% for men, compared to 25% to 35% for women (Kleinschmidt et al. 2007). An area being urban was independently associated with risk of HIV infection in young men. This association is accredited to increased mobility and the possibility of a different youth culture that is less affected by parental control. The survey did not find a difference

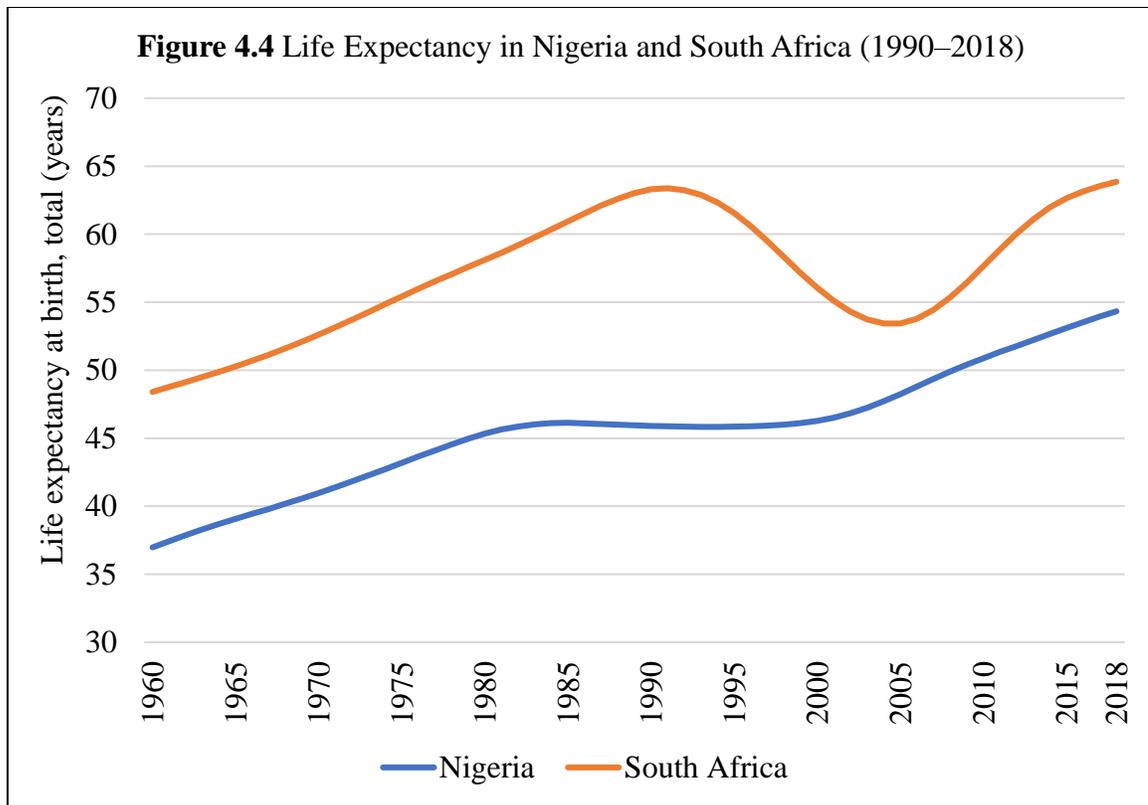
in the mean age for first time having sex between rural and urban men, however. It also did not find an association between informal housing and HIV infection in young men, but it did find such an association in young women. This finding could be the result of informal settlements not being homogenous in their socioeconomic and cultural environment. There was also a strong correlation between the proportion of black African residents in an area and the prevalence of HIV. This strong association is likely to be the result of the historical differences in the HIV epidemic between black Africans and other race groups in South Africa. The system of migrant labor during the apartheid era directly fueled the HIV epidemic in South Africa's black population (Lurie et al. 2003). Interestingly, KwaZulu Natal and Mpumalanga contain the highest prevalence rates, as well as most of the mining areas in the country. Migration in South Africa is characterized by a high prevalence of temporary or circular migration. As a result, there is extensive mixing between city dwellers and rural populations that likely had a significant impact on the pattern of the HIV epidemic in the country, with high prevalence of infection not only in urban centers, but also in many rural areas and small towns (Lurie et al. 2003).

Because of the complex geographic nature of HIV in both Nigeria and South Africa—and because of the complex interactions of structures that facilitate the spread of HIV among different areas in each country, let alone on the sub-continent—it is difficult to compare spatial trends between the two countries. In both countries, HIV rates tend to be higher where economic activity occurs. Because sex work is also an important geographic indicator in both countries, there is a potential link between these economic activity spots and sex work. Migration has played a role in spreading HIV from urban areas to rural communities in both countries. In Nigeria, certain cultural practices and

ethnic groups may account for the geographic distribution of HIV in the country, whereas the importance of labor migration in mining seems to be a driving factor for the distribution in South Africa.

Healthcare and Access to Antiretroviral Treatment

When it comes to progress made towards the United Nation's sustainable development goals, Nigeria struggles with health. Nigeria's health indicators are some of the worst in sub-Saharan Africa and the world. Health expenditure accounts for only 3.6% of Nigeria's GDP (UNDP 2020). In addition, Nigeria accounts for approximately 10% of the global disease burden, largely due to rapid population growth, urbanization, poverty, lack of sanitation infrastructure, and disproportionate human resources for health. Conflict insecurity and humanitarian crises, such as Ebola, are putting further strains on health systems in west Africa, weakening many countries' HIV responses. Nigeria's life expectancy is the fourth lowest in the world at 54.3 years in 2018. As seen in Figure 4.4, life expectancy in Nigeria increased from 37 in 1960 to 45.3 in 1980. These statistics represent a growth rate of approximately 22.43% between the two decades. In the 1980s, life expectancy stagnated, likely due to the spread of HIV/AIDS in the mid-1980s. By 2000, life expectancy had only increased by one year, to 46.3. Subsequently, the growth rate in life expectancy between 1980 and 2000 decreased almost tenfold to a meager 2.21%. From 2000 to 2018, this growth rate climbed to 17.28%, showing progress, but failing to surpass historic rates (World Bank 2020).



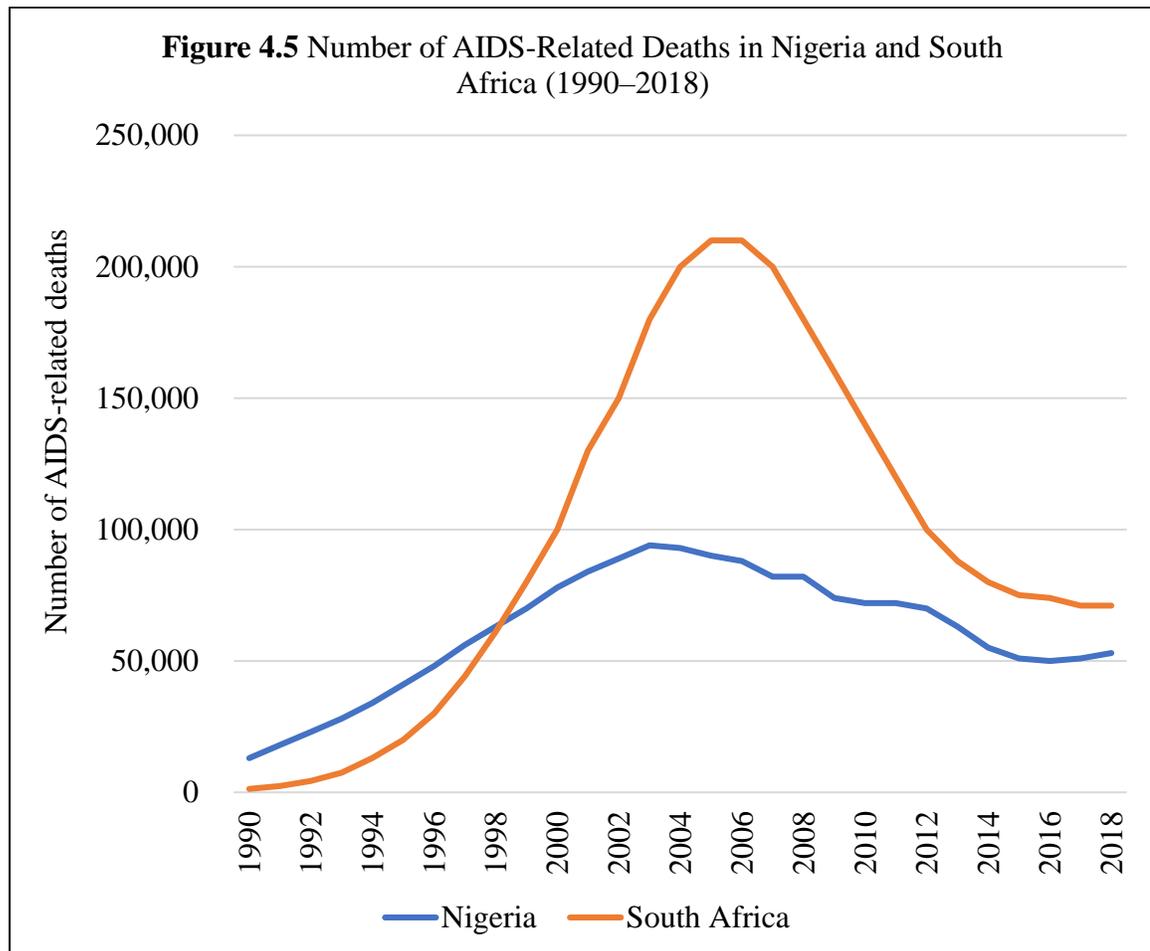
Source: UNAIDS, AIDSinfo 2019.

South Africa’s health indicators are significantly better than Nigeria’s, but the country still faces a number of health challenges. One of the youngest democracies in the world, South Africa has introduced a range of pro-poor and pro-equity policies to combat the oppression and extreme inequalities of apartheid. Researchers agree that considerable social progress has been made toward reversing the discriminatory practices that pervaded life before 1994, but the health of most South Africans remains plagued by a heavy burden of infectious and noncommunicable diseases, persisting social disparities, and inadequate human resources to provide care for the country’s growing population (Mayosi et al. 2012; Whiteside 2014). According to the UN Human Development Report (2020), the average life expectancy at birth for South Africa is 63.9 years. This current figure is the highest life expectancy has ever been in the country, finally surpassing its

previous peak of 63.4 in 1991. These trends are displayed in Figure 4.4. Progress had been made to extend life expectancy in South Africa until the early 1990s, when life expectancy dropped due to HIV-related deaths skyrocketing. South Africa is one of only 11 countries worldwide where life expectancy fell between 1990 and this year. HIV and AIDS, in addition to tuberculosis, inadequate perinatal and maternal conditions during the epidemic, injury and violence, and noncommunicable diseases, accounted for the sharp decline in life expectancy until 2005, when the curve began to even out again, largely due to the introduction of universal antiretroviral therapy by the federal government. While great strides have been made since the worst of the AIDS epidemic, South Africa still ranks 188 out of 219 countries in terms of life expectancy (CIA 2020).

HIV is less prevalent in west Africa than in southern Africa, but a large proportion of global AIDS-related deaths occur in the western region, as most countries continue to struggle to offer antiretroviral treatment to those who need it. In the region of west Africa as a whole, 160,000 AIDS-related deaths occurred in 2018. Nigeria accounts for about a third of these deaths, with a figure of around 53,000. As shown in Figure 4.5, Nigeria experienced the most AIDS-related deaths in 2003, when 94,000 people died. Since 2003, this number has declined significantly, largely because of programs to increase access to antiretroviral treatment. In southern Africa, 310,000 AIDS-related deaths occurred in 2018, of which South Africa made up 71,000. The first recorded death from AIDS occurred in South Africa in 1985. In 1990, AIDS-related deaths took approximately 1,300 lives. In 1995, this number grew exponentially to 20,000 annual deaths and by 2000, 100,000 people had died from AIDS in that year alone (UNAIDS 2019). AIDS-related deaths in South Africa peaked at 210,000 in 2006, and have since

declined substantially due to the introduction of universal antiretroviral treatment programs by the federal government.



Source: UNAIDS, AIDSinfo 2019.

Progress toward UNAIDS 90-90-90 goals of testing, access to antiretroviral treatment (ART), and lower viral loads has been made in both Nigeria and South Africa, though Nigeria has further to go to reach these goals than South Africa. In west Africa, approximately 53% of adults infected with HIV are on ART. At 28%, less than a third of children living with HIV in the region are on treatment, which is the lowest coverage rate for this age group in the world. Nigeria’s ART rates are marginally better than those of

the region, with 55% of adults and 35% of children on treatment. Between 2015 and 2018, the proportion of people living with HIV who know their status increased significantly from 54% to 67%, as displayed in Table 4.1. The percentage of this group who are accessing ART did not keep up with the increase in knowledge of status, accounting for a drop from 85% in 2015 to 80% in 2018. While this increase shows positive efforts toward testing in Nigeria, the country still lags behind the global average of 79% (UNAIDS 2019b).

Table 4.1. Progress toward UNAIDS 90-90-90 Targets			
2015			
Country	Percent of people living with HIV who know their status	Percent of people who know their status who are on ART	Percent of people on ART who achieve viral suppression
Nigeria	54	85	-
South Africa	85	58	76
Global	70	68	82
2018			
Country	Percent of people living with HIV who know their status	Percent of people who know their status who are on ART	Percent of people on ART who achieve viral suppression
Nigeria	67	80	80
South Africa	90	68	87
Global	79	78	86

Source: UNAIDS, AIDInfo 2019.

South Africa has the world's largest antiretroviral treatment program, which, as previously noted, has helped increase the national life expectancy significantly. Its ART program is now financed largely from its own domestic resources of more than \$1.54 billion annually. The country is making solid progress towards the UNAIDS 90-90-90 targets, as shown in Table 4.1, especially in regard to testing and viral suppression. In 2018, 90% of people living with HIV were aware of their status, of whom 68% were on treatment. Of those diagnosed with treatment, 87% were virally suppressed. Overall, this means 62% of all people living with HIV in South Africa are on treatment and 56% are virally suppressed. Despite these significant improvements, HIV prevalence remains high, with approximately 1 in 5 people living with HIV (UNAIDS 2019b).

Of those who know their status, more are on ART in Nigeria than South Africa, although the differences between the countries in those who know their status results in a lower percentage of the total HIV-positive population on ART in Nigeria than in South Africa. In Nigeria, 55% of adults are on treatment, while 62% of adults are on treatment in South Africa. Nigeria needs to focus its efforts on providing resources and facilities for testing, whereas South Africa needs to focus its efforts on providing more ART to those who know their status.

Conclusion

This study attempts to answer the question: to what extent have differences in urbanization influenced the prevalence rates in west and southern Africa? In attempting to answer this question, other questions, arise. Why is southern Africa the region most

affected by HIV in the world? What role does urbanization play in creating environmental conditions conducive to the spread of HIV? To attempt to answer some of these questions, this study has looked at historical trends of HIV with respect to key factors of urbanization—labor migration, urban poverty, sex work, and urban policy. While these factors all account for an increase in conditions that create heightened risk for the spread of HIV, they cannot alone account for the differences in HIV prevalence between Lagos and Johannesburg, Nigeria and South Africa, or west and southern Africa. The findings of this study, however, do suggest that urbanization played a significant role in the historical spread of HIV across the sub-continent.

The Role of Urbanization in the Spread of HIV

The first known case of HIV was discovered in an adult Bantu male who died in the Belgian Congo in 1959, but researchers suggest the disease had spread to humans from primates decades prior. A recent study investigated the spatiotemporal origin of HIV-1 Group M in the central African region and demonstrated that the ancestral subtype C strain of HIV-1 migrated from Kinshasa to the southern provinces of the Democratic Republic of Congo. The study argues this migration occurred via major rail networks (Faria et al. 2014). Phylodynamic analyses suggest that the ancestral subtype C strain of HIV-1 was introduced in the southern Katanga region of the Democratic Republic of Congo in the late 1930s and then spread independently to east and southern Africa. Wilkinson et al. (2015) suggest this spread was likely facilitated through migrant mine laborers, as the bulk of mining activities within the Democratic Republic of Congo were centered in the mineral-rich south of the country at the time.

In southern Africa, Wilkinson et al. (2015) suggest the estimated date of origin is around 1960, with strong growth during the 1970s and 1980s. These researchers genotyped strains from the start of the epidemic and applied phylodynamic techniques to determine the history of the southern Africa and South African HIV-1 subtype C epidemic. They assert that HIV in South Africa originated through the introduction from neighboring countries and took off in the 1980s and 1990s, coinciding with sociopolitical changes in the country. They found a wide diversity of genetic variants of subtype C in South Africa and attributed that variety to the country's diverse population, fueled by migration and the country's colonial history. The study suggests that a large number of infections were introduced into South Africa via foreign migrants from other southern African nations during the 1970s and 1980s. South Africa, as the largest country in the region, saw a massive degree of inward migration during the 20th century. In the mid-1980s, it is estimated that approximately 1.5 million foreign workers were employed as migrant laborers in the country (Chirwa 1996; Wiseman 1998). The vast majority of these migrants were employed in the mining sector. The role of circular migration—from both domestic and foreign sources—and its effects on the HIV epidemic within South Africa have been well documented and is particularly true for migrant mine workers living in single-sex dormitories for long periods of time. The extreme isolation of workers, coupled with prolonged periods of separation from their families, led to a large number of migrants who sought out multiple sexual partners. The close proximity of commercial sex workers to the mines further put migrant miners at high risk for infection (IOM 1998).

In the early years of the HIV epidemic in South Africa, HIV cases were largely confined to the large urban centers of the country. While there is little accessible quantitative data, researchers suggest HIV in South Africa grew exponentially in the

1980s and 1990s. As seen in Figure 4.1, those two decades were when South Africa experienced its largest urban growth rates. This evidence suggests there are links between migration, urbanization, and the spread of HIV in South Africa. The epidemic quickly spread from urban areas to rural areas within the country in the early 1990s (Wilkinson et al. 2015). This spread was facilitated by domestic migrant labor and by the increased mobility of the population within the country following the abolition of restrictive migratory laws in 1986. The dynamics of urbanization in South Africa are slightly different from other areas of the world, as a substantial number of individuals in urban centers—over 80 percent—maintain strong links with their rural roots and frequently return to visit family (Todes et al. 2010). This strong connection and the nature of circular migration further accelerated the early spread of HIV from urban to rural communities in South Africa.

Whereas HIV-1 subtype C dominates southern Africa, HIV-1 subtype CRF02_AG is most prominent in west and west central Africa. Both subtypes are part of HIV-1 Group M, the strain of HIV that is responsible for the global HIV epidemic. Some studies suggest that certain subtypes have greater risk of transmission or faster disease progression than others, pointing to subtype C emerging as the most prevalent strain of HIV-1 worldwide, but more recent research suggests that this may not be the case. Kahle et al. (2014), for example, argue that HIV-1 subtype C was not associated with increased risk of HIV-1 transmission compared to non-C subtypes A, D, and G. A second prospective multicenter study in west and west central Africa did not show a significant difference in survival or clinical disease progression among people infected with CRF02_AG, as compared with those infected with other subtypes (Laurent et al. 2002). HIV-2, on the other hand, has been more concretely linked to lower transmissibility than

HIV-1 because of its lower viral loads (Poppet et al. 1999; Shanmugam et al. 2000). HIV-2 has historically been largely isolated to west Africa, though HIV-2 prevalence has been declining substantially in several west African countries, instead being replaced by HIV-1 subtype CRF02_AG.

In a very recent study, Nazziwa et al. (2020) became the first researchers to perform a nationwide analysis of the molecular epidemiology of HIV-1 in Nigeria. These researchers determined that HIV-1 subtype CRF02_AG likely originated between 1963 and 1970, with estimates that it was closer to 1963 than 1970. They also suggest that urban areas like Abuja and Lagos were the major hubs of HIV-1 transmission in Nigeria. Similarly to the spread of HIV in South Africa, HIV in Nigeria spread from urban areas to rural areas as a result of circular migration. Using demographic analyses, they indicated an increase in the number of effective infections from 1970 to 1995, which paralleled a rapid urban population growth in the same period. This increase was followed by a decline in the number of effective infections, which coincided with the introduction of free antiretroviral treatment in Nigeria in 2006. According to the Nigerian National Agency for the Control of AIDS (2015), this treatment reduced HIV-1 prevalence from 6% to 3% in the following years. These prevalence statistics do not line up with those gathered from UNAIDS, however, which speaks to the unreliability of Nigeria's government data—data that has been contested by various researchers.

This study aimed to investigate the historic differences in HIV prevalence and incidence rates in west and southern Africa in relation to factors of demographic change—urbanization, labor migration, sex work, and urban poverty—in an attempt to better understand the role demographic change played in spreading the disease and to support the argument for emphasizing structural intervention as part of a general

combination prevention strategy. Parkhurst notes that, despite insights that address the need to include influential social, economic, and legal structures into HIV prevention, there remains “a pervasive strategy to try to achieve sexual behavior change through single, decontextualized interventions or sets of activities” (2014, 1). Urbanization, and especially migration, are structural factors that account for an increase in conditions that create heightened risk for the spread of HIV, but these factors alone cannot account for the differences in HIV prevalence between Lagos and Johannesburg, Nigeria and South Africa, or west and southern Africa. This study, instead, determined that historical trends in the development of urban areas in both countries created an influx of labor migration and commercial sex work that heightened risk. The development of economic activity, especially in mining and resource extraction, led to the development of road and transportation networks, which, coupled with trends of circular migration, influenced the spread of HIV from urban to rural areas in both Nigeria and South Africa. While mining was far more prominent around Johannesburg than Lagos, this factor alone cannot account for differences between regional prevalence rates, especially because of the stark geographic differences that are observed within each respective country. Before attempting to explain differences in prevalence rates among regions, more research must be done to explain differences in prevalence rates among specific communities in specific countries. There is no “one size fits all” cause that accounts for the differences in prevalence rates along the sub-continent. Rather, a comprehensive blend of structural, social, behavioral, and biological conditions influences the spread of HIV, and in different ways for different communities. While trends and patterns can be weakly observed at the macro level, more comprehensive analysis can and should be pursued at the micro level.

Limitations and Future Research

This investigation is largely inconclusive. While researchers have determined links between HIV and urban areas, labor migration, mining, urban poverty, and sex work, inconsistent, unreliable, and unavailable data pose significant challenges to investigating the nature of these phenomena in the spread of HIV across the sub-continent. For example, Nigerian government statistics on population, urban growth, HIV prevalence, incidence, and more have all been critiqued by researchers. Reliable data from UNAIDS show different prevalence rates for Nigeria than those gathered by the country's federal government. It is also unclear how accurate the prevalence estimates for South Africa are in the early years prior to the end of apartheid. This lack of clarity derives from the existence of the homelands system within apartheid South Africa. The homelands under apartheid were ruled as independent or quasi-independent states with their own healthcare systems, actively designed to separate society into geographical units along racial and ethnic lines. It is unclear whether prevalence estimates for South Africa during the early years of the epidemic—from 1981 to 1994—include estimates of people living in these homelands. Demographic statistics for this period are largely derived from national census data, which did not include former independent homelands. Thus the rising prevalence estimates, derived from antenatal surveys prior to 1994, could possibly have underestimated HIV prevalence, as they did not cover all of present day South Africa. With the large degree of uncertainty in prevalence trends for South Africa during the 20th century, it is therefore possible that the epidemic could have entered a period of growth anywhere between 1980 and 1990. Much of the reliable data offered on HIV starts in 1990. With HIV spreading decades before 1990 in both Nigeria and South

Africa, available data makes it difficult to find correlations between the early spread of HIV and urbanization.

This study is also very broad in scope. Recent spatial analyses of the origin and history of HIV in Nigeria and South Africa note stark differences in prevalence among areas of each country, province, and city, let alone region. Future research should focus on specific communities, especially if such research plans to propose policy recommendations. While this study found trends between the historical emergence of mining communities, migration, sex work, and HIV, additional cities should have been analyzed to strengthen any conclusions. An urban mining center and a rural community in both countries, for example, should have been compared. Researchers attempting to compare specific communities should develop methodologies that allow them to obtain their own information in these communities, as the lack of data—especially at the local level—poses significant challenges. In addition, stronger methodologies should be developed to link risk behavior to these structural factors in specific communities. Based on some of the findings of this study, further and deeper research examining the role of war and militarization, political upheaval and instability, and state and federal government policies in the development of urban areas in the spread and prevention of HIV should be pursued.

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