

The Influence of Neighborhood Characteristics on HIV Treatment Outcomes Among Adults: A Scoping Review Protocol

Linda Jepkoech Kimaru (✉ lkimaru@email.arizona.edu)

The University of Arizona Mel and Enid Zuckerman College of Public Health <https://orcid.org/0000-0003-2700-1786>

Magdiel Habila

The University of Arizona Mel and Enid Zuckerman College of Public Health

Namoonga Mantina

The University of Arizona Mel and Enid Zuckerman College of Public Health

Purnima Madhivanan

The University of Arizona Mel and Enid Zuckerman College of Public Health

Elizabeth Connick

The University of Arizona Department of Medicine

Kacey Ernst

The University of Arizona Mel and Enid Zuckerman College of Public Health

John Ehiri

The University of Arizona Mel and Enid Zuckerman College of Public Health

Protocol

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Abstract

Background

The HIV pandemic has caused enormous suffering and loss of life in the last forty years. Currently more than 34 million people have died as a result of HIV infection and over 37 million people are currently living with HIV. There have been tremendous global efforts to address the HIV pandemic and although significant progress has been made in treatment and prevention of HIV, many people living with HIV still do not have appropriate access to treatment and care. Current HIV interventions have focused more on individual factors than on community level factors. Community level factors influence individual behavior by enhancing or limiting access to- and utilization of HIV care. The objective of this scoping review is to assess and critically examine the association between neighborhood characteristics and outcomes of HIV treatment.

Methods

The following databases will be searched for studies published on and prior to May 31, 2021: PubMed, PsycINFO, CINAHL, and EMBASE. We will include published full text studies with both experimental and observational study designs that discussed neighborhood characteristics and HIV treatment outcomes. We will exclude abstracts only publications and studies reporting opinion. Data generated from the search will be managed using Mendeley 1.19.8. The review will be conducted using Arskey and Levac's methodological framework for scoping reviews. A narrative synthesis will be conducted on the included studies.

Discussion

Sustainability of HIV interventions that focus on individual behaviors rely on the community level factors that influence those individual behaviors. This review will enhance the understanding of the impact of neighborhood characteristics on HIV treatment outcomes among adults, and possibly shed a light on potential points of intervention that will aid in improving ART initiation, ART adherence, and HIV viral load suppression.

Scoping Review Registration: OSF [10.17605/OSF.IO/MD89T](https://osf.io/MD89T)

Background

Of the 37.6 million people living with HIV (PLWH) globally in 2020, 84% knew their status; 73% were accessing treatment, and 66% were virally suppressed¹. These numbers were far below the UNAIDS 90-90-90 target, where the goal was to have 90% of PLWH becoming aware of their status, of those 90% on treatment, of those on treatment 90% achieving viral suppression by 2020. AIDS-related deaths have decreased since the introduction of antiretroviral therapies (ART), in fact deaths have reduced by 61% since the peak in 2004¹. ART stops HIV from multiplying and reduces the amount of HIV (viral load) in the

blood to such low levels that tests often cannot detect them in a milliliter of blood, which is described as viral suppression. Having an undetectable HIV viral load translates to person being unable to transmit the virus to others (U = U means undetectable equals un-transmittable), and this follows 20 years of evidence²⁻⁷. However, without a considerable proportion of the population living with HIV initiating ART, taking ART consistently as prescribed and achieving viral suppression, the impact of ART will not reach its potential in treating and preventing HIV⁸.

Neighborhood Characteristics and Conceptual Model

HIV prevention and treatment research have mostly focused on individual risk behaviors such as sexual behaviors, substance use, and healthcare seeking behaviors⁹⁻¹¹. Intervening on these factors has only been effective to a certain extent due to limited inclusion of community level factors that influence the sustainability of individual behaviors⁹⁻¹¹. Community level factors influence an individual's risk behavior by modifying norms, attitudes, values, and context of risk behaviors within a defined community¹¹. The socioecological model (SEM) postulates that an individual's health is influenced by interactions with their physical and sociocultural environments¹². The central concept of an ecological model is that behavior has multiple levels of influences: intrapersonal (biological, psychological), interpersonal (social, cultural), institutional or organizational factors, community, and policy¹². The environmental component (institutional or organizational factors, community, and policy) of the ecological model is what distinguishes this model from other behavioral models¹². In this review, we will focus on community level influences on health that consider factors such as formal or informal social norms that exist among individuals, groups, or organizations, that can limit or enhance healthy behaviors¹³. The conceptual model for this review (Fig. 1) is based on the interconnected five-level socioecological model described above that assesses how an individual's access and utilization of HIV treatment and care is influenced by interactions with their physical and sociocultural environments¹⁴⁻¹⁶. The intrapersonal level focuses on the demographic, biological, knowledge, attitudes, and practices. The interpersonal level focuses on the influence of family and social networks on access and utilization of HIV treatment and care. The organizational or institutional level focuses on the organization's (e.g., healthcare facilities) culture, policies, capacity, resources, physical and social environmental influences on access and utilization of HIV treatment and care. At the policy level, the focus is on the content and implementation of policies that promote access and utilization of HIV treatment and care. In Fig. 1, we illustrate the conceptual model for this review, where we highlight our focus on the culture; resources; capacity; and the social and physical environment of a community that influence access and utilization of HIV treatment and care. All the levels in the conceptual model are important in having sustained access and support for HIV treatment and care¹³⁻¹⁵.

The community level explores settings, such as neighborhoods, schools, and workplaces, in which social relationships occur, and seeks to identify the characteristics of these settings that are associated with health¹⁷. We will particularly concentrate on neighborhood characteristics. A neighborhood is described as an area where individuals live and interact with each other, where residents typically have similar

incomes and social characteristics such as education level, housing preference, sense of public order etc.¹⁸ A neighborhood's physical and social characteristics have been known to impact health¹⁹. Physical characteristics refer to the quality of physical structures such as buildings and streets in a neighborhood. Social characteristics refer to the quality of social structures such as employment, education, income, social order etc. Collectively, these physical and social characteristics are typically a way in which a neighborhood's socioeconomic status (SES) is defined. Neighborhood SES provides an overall marker of neighborhood conditions that may shape access to care independent of individual characteristics²⁰. People living with HIV with low SES are more likely to have poorer treatment outcomes²¹. Related to SES, neighborhood disadvantage is also a term used to describe a neighborhood where the percentage of households below the poverty-line are greater than a critical prevalence²². Likewise, neighborhood disadvantage reduces the likelihood of having a standard source of care and of acquiring services, while it increases the likelihood of having unmet medical needs as reduced resources encourage trade-offs between basic needs and health care²³. Neighborhood deprivation is also another term used to describe a neighborhood that refers to the relatively low physical (e.g. abandoned home, graffiti, etc.), social (e.g. loitering, unemployment, etc.) and economical position (ex. education, income etc.) of a neighborhood²⁴, which has been linked to risky health behavior²⁵ and poorer well-being²⁶. Higher prevalence of educated residents within neighborhoods may be demonstrating higher levels of human capital that, collectively encourage health-promoting attitudes and behaviors within the neighborhood²⁷. In looking at specific health literacy, community level HIV/AIDS knowledge is positively associated with ART adherence as it can decrease misconceptions and increase support for PLWH^{28,29}. Another similar term is neighborhood disorder, which refers to observed or perceived physical (e.g. trash, vandalism etc.) and social (e.g. over policing, homelessness, etc.) features of neighborhoods that may signal the breakdown of order and social control that can undermine the quality of life³⁰. Individuals living in situations of constant disorder, the physical signs serve as visible reminders of a dissatisfying living environment³¹. Constant disorder also further heightens feelings of entrapment and fear among those in economic or social situations that may not allow residential mobility³². Through these pathways, neighborhood disorder can contribute to psychological distress³³⁻³⁵. Physiological distress on the other hand has been associated with late ART initiation and ART non-adherence³⁶⁻³⁸, therefore the physiological distress brought on by living in a disordered neighborhood may lead to poorer HIV treatment outcomes. Generally neighborhood characteristics such as deprivation, disadvantage and disorder have been theorized to lead to negative health outcomes influenced by chronic stress and associated maladaptive physiological responses that encourage risky health behavior, and disintegrating social interactions among residents^{19,39,40}.

Why it is important to conduct the review

Understanding and intervening at the community level of influence in HIV research not only has a broad reach of impact, but is also cost effective¹¹. Evidence suggests that community level socio-economic status (SES), physical and social structures have an impact on HIV prevention and treatment outcomes^{31,41,42}. These community level factors then influence individual behavior by enhancing or

limiting access and utilization of HIV care^{31,41,42} essential for ART initiation, ART adherence and achieving HIV viral suppression. A review that specifically looked at community level impacts on HIV treatment among pregnant women found that social stigma was a major barrier to seeking and accessing care⁴¹. Health system use, access to services, and health worker attitudes functioned as barriers or enablers to HIV care depending on various situations⁴¹. Majority of the current reviews have combined their findings on the community level impacts on HIV treatment with HIV risk behaviors^{31,42-44} and reproductive health⁴⁵, making it difficult to disaggregate its impact on HIV treatment outcomes alone. Additionally, current reviews focused more on community structural characteristics than social characteristics (social cohesion, social capital, social disorder, collective efficacy etc.)⁴⁵, others focused on specific groups (adolescents⁴⁵, men who have sex with men⁴⁶, pregnant women⁴³), and describing methodological approaches to assessing community level factors³¹. Furthermore, community level factors were defined and measured³¹ in various ways using geographical boundaries (zip codes, census tracts or blocks)^{42,44,45}, or defined by demographic characteristics of the community. In this review we expand the scope of community level factors to not only assess geographical boundaries, but social and physical neighborhood characteristics. The objective the scoping review is: (i) to examine the extent, range, and nature of research activity on the associations between neighborhood characteristics and HIV treatment outcomes among adults; (ii) to provide a synthesis of findings inclusive of assessment methods used; and (iii) identify research gaps.

Methods

Protocol structure

This protocol is registered in OSF (DOI: 10.17605/OSF.IO/MD89T) and the structure is guided by Arskey et al. and Levac et al. methodological frameworks for scoping reviews^{47,48}. This protocol also follows guidelines for conducting systematic reviews using the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) checklist for systematic review protocols⁴⁹, excluding sections of the PRISMA-P elements that go beyond the scope of a scoping review: risk of bias assessment, meta-biases and evidence strength (GRADE)⁴⁹. The main manuscript will follow guidelines from the Preferred Reporting Items for Systematic Review and Meta-Analysis extension for scoping reviews (PRISMA-ScR)⁵⁰.

Identification of the research question

Arksey et al. emphasize the definition of a research question as an essential initial step that defines and facilitates the identified research strategy⁴⁷. An iterative process of exchange, discussion and literature review led the development of the review's guiding question. The review's research question is '*What is our current knowledge on the impact of neighborhood characteristics on HIV treatment outcomes among adults?*'. This question is centered on the social ecological model, exploring the community level impacts of health. There is no comparator defined as our review will not be limited to studies with controls.

Identification of relevant studies

Potentially relevant publications will be searched for studies published on and prior to May 31, 2021, in the following electronic databases: PubMed, PsycINFO, CINAHL, and EMBASE. The search strategies were drafted in collaboration with an experienced librarian and further refined through discussion. We will also review reference lists of already published reviews for potential inclusion of studies in this review.

The search terms for PubMed is as follows: (Neighborhood OR Community-level OR "neighborhood characteristics" OR "neighborhood environment" OR "neighborhood socioeconomic status" OR "neighborhood deprivation" OR "neighborhood disadvantage" OR "residential characteristics" OR "neighborhood disorder" OR "physical decay" OR "physical disorder" OR "social disorder") AND (HIV OR "Human immunodeficiency virus" OR "HIV treatment" OR "HIV viral suppression" OR "antiretroviral therapy" OR "HIV viral load" OR "antiretroviral therapy adherence" OR "antiretroviral therapy initiation" OR "ART initiation" OR "ART adherence"). These terms will be adapted for other databases.

The final search strategy will be finalized in consultation with an experienced librarian who will run all the searches in the databases listed above. The final search results will be exported into EndNote version 20.1, and duplicates removed by the librarian. After de-duplication, data generated from the search will be managed using Mendeley 1.19.8. We will also check the reference lists of results of the final retrieved studies for additional publications of relevant studies.

Study selection

The study selection process will occur in two phases, title and abstract screening and full text review using Rayyan QCRI⁵¹. Rayyan is a free web-based tool designed for systematic reviews or other synthesis projects. The Rayyan QCRI software will be prepopulated with the study inclusion and exclusion criteria to facilitate the review process. Two review authors will independently screen the title and abstracts of literature search results for potentially relevant studies that should move on to the full text review stage. The full text review stage will require the use of inclusion criteria in reviewing full-text publications with an eligibility checklist (see Appendix A) to ensure that the study has all the components required for inclusion. Similarly, excluded studies will be detailed with reasons for exclusion. Disagreements in both phases will be resolved by discussion and consensus between the two reviewers and the engagement of a third reviewer, where necessary.

Eligibility Criteria

Inclusion Criteria

Type of studies

All experimental study designs (pre-experimental, quasi-experimental, and true-experimental) and observational study designs (cross-sectional, case report or case series, case-control, and cohort studies.) will be included in this review.

Publication status

Published, full-text and peer reviewed

Time frame

Studies published on and prior to May 31, 2021

Setting

No geographical limitations

Language

There are no language exclusions. If a study is not reported in English, we will request translation using a translation service.

Study population

Adults 18 years and above who are HIV positive.

Exposure

Studies focused on neighborhood characteristics as an exposure with at least one of the following definitions or resembling definitions of neighborhood characteristics, AND

- a. **Neighborhood environment** referring to the socio-demographic makeup of the neighborhood and its residents, including relationships, groups, and social processes that exist among people living in the neighborhood⁵².
- b. **Neighborhood deprivation** referring to the relatively low physical (ex. abandoned home, graffiti, etc.), social (ex. loitering, unemployment, etc.) and economical position (ex. education, income etc.) of a neighborhood²⁴.
- c. **Neighborhood disorder** referring to observed or perceived physical (ex. trash, vandalism etc.) and social (ex. over policing, homelessness etc.) features of neighborhoods that may signal the breakdown of order and social control that can undermine the quality of life³⁰.
- d. **Neighborhood disadvantage** referring to a community or neighborhood where the percentage of households below the poverty-line are greater than a critical prevalence²².
- e. **Neighborhood socioeconomic status (SES)** referring to the overall marker of neighborhood conditions that may define residents' access to health care independent of their individual characteristics²⁰.

Outcome

Studies with at least one of the following HIV treatment indicators or resembling indicators

- a. **Antiretroviral Therapy (ART) initiation** – referring to the start of an HIV treatment plan, measured by enrollment into ART⁵³.
- b. **ART adherence** referring to an individual’s ability to follow an ART treatment plan, take medications at prescribed times and frequencies, and follow relevant restrictions⁵⁴. ART adherence is measured using some of the following indicators⁵⁵.
 - i. Self-reported doses of ART missed over a recent period of time (via interviews or medical records)⁵⁵.
 - ii. Number of days ART was dispensed over the last 6–12 months (pharmacy records)⁵⁵.
 - iii. Patient attendance at appointments and number of days until re-appearance of a missed appointment (medical records or logs)⁵⁵.
 - iv. Pill counts at each patient’s medical visit compared to their pill consumption (medical or pharmacy records)⁵⁵.
 - v. ART concentrations in hair and dried blood spots⁵⁶.
- c. **HIV viral suppression** referring to the reduction of HIV viral load to very low levels⁵⁷. The WHO in 2017 reiterated that viral load is recommended as the preferred monitoring approach to confirm treatment failure⁵⁸. Indicators of viral suppression are described as:
 - i. WHO defines viral suppression from the results of a systematic review for Low and Middle Income Countries as having < 1000 RNA copies in a ml of blood⁵⁹.
 - ii. Some high-income countries define HIV viral suppression or undetectable viral load as < 200 RNA copies in a ml of blood⁶⁰.

Exclusion Criteria

Studies will be excluded if they do not pertain to neighborhood characteristics and HIV treatment outcomes, abstract only and those reporting opinions.

Data Extraction

A data extraction form (Appendix B) will be developed in Microsoft Excel to guide data extract from the included studies to address the research objectives. The data to be extracted will include:

- a. Publication author(s), year of publication, study location
- b. Description of neighborhood characteristics, comparators (if any); duration of study
- c. Study population
- d. Objective of the study
- e. Description of methodology used
- f. Interventions (if any)

- g. HIV treatment outcome results
- h. Important results in-line with study objectives

Data extraction will be conducted by two reviewers independently, extracted data will then be discussed and compared between the two reviewers, and disagreements will be resolved with the help of a third reviewer where necessary. When there is a need for more information from the publication authors, we will reach out to the corresponding authors for more information.

Data Synthesis

A narrative synthesis approach will be used to present the results of this scoping review. To describe the extent, range, and nature of research in this topic area. We will summarize publication types, years, geographic distribution, and study populations. The methodologies used will also be synthesized descriptively and presented in tables. That process will detail an overview of current research activity trends and highlight potential research gaps. We will also synthesize quantitative primary data on the outcomes of the publications using tables to summarize key findings, centered around the review's objectives.

Discussion

Despite the availability of multiple behavioral, structural, and biomedical interventions, only 73% of people living with HIV globally were accessing ART and 66% were virally suppressed in 2020¹, indicating that much work remains to be done. Most current interventions focus more on individual factors which have been effective but to a certain extent, with limited inclusion community level factors influence an individual's risk behaviors⁹⁻¹¹. This review will highlight the extent of research activity on the impact of neighborhood characteristics and HIV treatment, assessment methods and research gaps. We anticipate that the findings of this review will enhance the understanding of the impact of neighborhood characteristics on HIV treatment outcomes among adults and indicate potential points of intervention that will aid in improving ART initiation, ART adherence and HIV viral suppression.

Declarations

Competing Interests

The authors have no competing interests to declare.

Ethics approval and consent to participate

This study did not require approval from the Internal Review Board. The proposed study is a secondary analysis of peer-reviewed publications. No human subjects are directly involved in this study.

Author Contributions

LJK conceptualized and initiated the review. LJK, MH, NM, JE, EC, PM, KE drafted and edited the protocol.

All authors approved the protocol.

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Figures

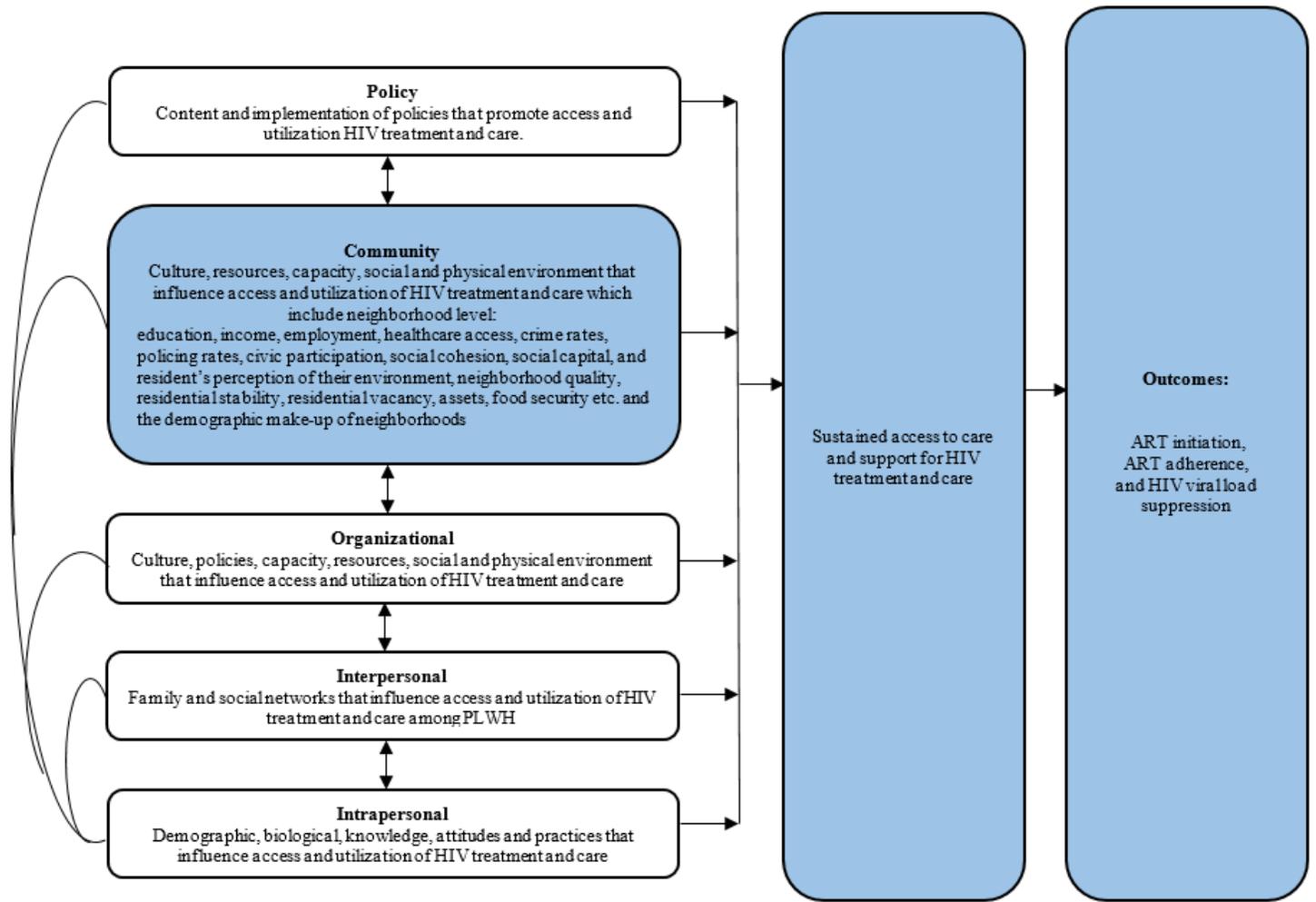


Figure 1

Conceptual model for this review, adapted from the socioecological model

Supplementary Files

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