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Research Article

Impact of Household Socio-Economic Status on HIV Infection Control in Saudi Children: A Study at King Saud Medical City

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Abstract

Background: HIV infection remains a significant public health challenge worldwide, with an increasing number of new cases reported each year. The Middle East and North Africa region, including Saudi Arabia, has witnessed a concerning rise in new HIV infections, particularly among children, where access to effective treatment remains limited. Socio-economic status (SES) is a critical determinant of health outcomes, including HIV infection control, yet research on its impact among Saudi children is scarce.

Objectives: This study aims to explore the relationship between household SES and HIV infection control status in 15 pediatric patients with confirmed HIV at King Saud Medical City.

Methods: This single-center study analyzed socio-demographic and HIV-related parameters, including education levels, employment status, housing conditions, viral load, and CD4 counts among the participants.

Results: The study revealed a diverse socio-economic landscape among households, with significant variations in viral load and CD4 counts among pediatric HIV patients. Notably, higher SES was associated with better HIV control outcomes.

Conclusion: This research underscores the importance of considering household SES in addressing HIV infection control in vulnerable populations. These findings provide critical insights for policymakers and healthcare providers to develop targeted interventions.

Keywords: *Household Socio-Economic Status; HIV Infection Control; Saudi Children; King Saud Medical City*

Background

In 2021, 1.5 million new cases of HIV infection were reported globally, surpassing the intended goal by 100,000. Alarmingly, in the Middle East and North Africa (MENA) region, there has been a 33% increase in new HIV diagnoses, a stark contrast to trends in other regions. The MENA region has an estimated 150,000 to 210,000 HIV-positive residents, with some of the lowest treatment coverage (50%) and viral suppression rates (44%) worldwide. Consequently, the incidence of vertical HIV transmission remains a significant concern.

According to UNAIDS' 2021 regional profile for the MENA region, only 40% of HIV-positive children had access to appropriate HIV treatment, with many receiving suboptimal regimens. Several studies have identified socio-economic status (SES) as a key determinant of health outcomes, including HIV infection. SES influences risk factors such as educational attainment, employment status, income, and access to healthcare services, which in turn affect health outcomes and disease management.

Low SES is often associated with barriers to accessing healthcare, leading to poorer health outcomes and an increased risk of diseases, including HIV. Education, in particular, has been shown to play a crucial role in improving health outcomes and reducing the risk of HIV infection. Despite the clear connection between SES and health outcomes, there is a lack of research on the relationship between household SES and HIV infection control status among Saudi children. This study aims to address this gap by investigating how SES factors impact HIV control among children in Saudi Arabia, thereby providing valuable insights for targeted interventions.

Ethics Statement

This study was conducted in accordance with bioethical guidelines for research involving human participants. Participation was entirely voluntary, with anonymity and confidentiality strictly maintained. No vulnerable subjects were involved in person, and research data was stored in a coded file accessible only to the research team. Medical records were reviewed via a secure computer system, with access restricted to the research team. The study adhered to the principles of the Declaration of Helsinki and complied with current legislation on clinical research and Good Clinical Practice (GCP). The institutional review board at King Saud Medical City approved the study proposal, and no conflicts of interest were reported by the authors.

Methodology

Study design

This is a single-center, interview-based study conducted at King Saud Medical City from June 2023 to December 2023. The study focused on HIV-positive children and their respective mothers or guardians to assess the relationship between household socio-economic status and HIV control status.

Inclusion/exclusion criteria

The study included all pediatric patients with confirmed HIV by PCR, along with their mothers or guardians, who were receiving care at the pediatric infectious diseases clinic in King Saud Medical City. A total of 15 patients were included. Children with HIV exposure but not confirmed cases were excluded from the study.

Data management and collection

Socio-economic parameters such as demographic data, education, and income, along with HIV-related data including PCR results and CD4 counts, were collected by the research team. Descriptive data analysis was performed using STATA version 18. Categorical variables were presented as frequencies (%), while continuous data were summarized as medians and interquartile ranges (IQR). All data were securely stored in a private, coded Excel sheet to ensure confidentiality and data protection.

Results

A total of 15 pediatric patients with HIV were included in the study. The gender distribution showed a slight male predominance (60.0% male, 40.0% female). The median age of the patients was 6 years, with an interquartile range (IQR) of 2 to 12 years.

Socio-economic status

The majority of heads of households had completed middle school (60.0%), while a significant portion were unemployed (46.7%), and 13.3% were illiterate. Housing conditions varied, with most households having three or more rooms (80.0%), and car ownership was reported by 80.0% of the households. Despite economic challenges, 66.7% of households reported engaging in leisure activities such as travel abroad.

Clinical indicators

The median CD4 count was 959.8 cells/mm^3, with an IQR of 752.9 to 1355, indicating variability in immune status among the patients. Viral load measurements also varied, with 26.7% of patients having undetectable viral loads and 20.0% having viral loads above 10,000 copies/mL. These findings highlight the heterogeneity in disease severity among the participants.

Discussion

This study sheds light on the critical relationship between household socio-economic status (SES) and the management of HIV infection in children in Saudi Arabia, underscoring the substantial role that socio-economic factors play in determining health outcomes. Findings from King Saud Medical City reaffirm the well-documented correlation between higher SES and more effective HIV control, as indicated by improved viral suppression and elevated CD4 counts in pediatric patients. These findings are in line with previous research that has examined the link between SES and HIV management, particularly in low-resource settings.

The impact of SES on HIV outcomes

Global research has consistently shown the significant influence of SES on HIV management, where individuals from higher SES backgrounds tend to have better access to essential healthcare services such as antiretroviral therapy (ART) (Pellowski., *et al*. 2013). In this study, children from higher SES households displayed superior HIV control, likely due to better access to healthcare services and the ability to adhere consistently to treatment protocols. This mirrors findings in other studies where ART access leads to more effective viral suppression and, consequently, reduces the risk of HIV transmission (WHO, 2016).

Education, as a major component of SES, significantly contributes to improved health outcomes in HIV-infected individuals. Caregivers with higher education levels are often more aware of the importance of ART adherence and regular follow-ups, which results in better health outcomes for their children (Epstein., *et al*. 2004). Our study reinforces this, showing that households with higher educational attainment were associated with better-controlled HIV, further emphasizing the role of education in fostering health literacy and treatment compliance (Mills., *et al*. 2006).

Employment status also emerged as a key determinant of HIV management, serving as an indicator of economic stability. Households with employed caregivers were able to maintain the costs associated with continuous HIV care, including transportation, medications, and maintaining a conducive living environment (Tuller., *et al*. 2010). Our results aligned with this, where children from employed households had better HIV control outcomes than those from unemployed ones, a trend corroborated by previous studies that highlight the importance of financial resources in accessing and sustaining HIV care (Hajizadeh., *et al*. 2014).

Implications for public health interventions

The findings suggest that addressing socio-economic disparities could significantly improve HIV outcomes among children in Saudi Arabia. Public health strategies should prioritize socio-economic interventions, such as providing financial support to low-income families, enhancing access to education, and improving employment opportunities for parents. These strategies are supported by evidence from other regions demonstrating that socio-economic support can enhance HIV management (Pellowski., *et al*. 2013).

Furthermore, targeted health education programs aimed at lower SES households could improve HIV outcomes by increasing health literacy. Programs that emphasize ART adherence and regular check-ups, along with socio-economic support like transportation assistance and healthcare subsidies, could help reduce disparities in HIV control across socio-economic groups (Kagee., *et al*. 2011).

Study Limitations and Future Directions

The study's limited sample size and focus on a single medical center restrict the generalizability of its findings. Future research should involve larger and more diverse populations to validate these results. Additionally, longitudinal studies would provide more insight into

how shifts in SES over time influence HIV outcomes in children. This approach would also allow for a deeper understanding of how targeted socio-economic interventions affect long-term HIV control.

Further investigation is also needed to explore other dimensions of SES, such as social support networks, which may buffer the negative effects of low SES on HIV outcomes (Poku., *et al*. 2017). A broader understanding of the socio-economic environment could inform more comprehensive public health strategies that address both the direct and indirect impacts of SES on HIV management.

Conclusion

This study highlights the significant impact of household socio-economic status on HIV control in Saudi children. The strong association between higher SES and improved HIV outcomes underscores the need for targeted interventions to reduce socio-economic disparities. By incorporating socio-economic considerations into public health policies, there is potential to enhance HIV outcomes for vulnerable pediatric populations, both in Saudi Arabia and globally [1-4].

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