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HIV/AIDS and the social determinants of health: a time series study

HIV/AIDS e os determinantes sociais da saúde: estudo de série temporal

VIH/SIDA y los determinantes sociales de la salud: estudio de serie temporal

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ABSTRACT

Objective: To analyze the time trend, spatial distribution, and the cases of human immunodeficiency virus/acquired immunodeficiency syndrome cases with social determinants of health. **Methods:** Ecological and analytical study, carried out based on the cases of human immunodeficiency virus/acquired immunodeficiency syndrome notified in a state in the Brazilian Midwest, from 2009 to 2018. The study used descriptive analysis, polynomial regression, and geospatial analysis. **Results:** In 10 years, there were 9,157 notifications, growing each year. There was a growing trend for both sexes ($p<0.001$, $r^2=0.94$). The City Human Development Index was related to the higher number of cases (city of notification, $p=0.01$; and city where the person lives, $p=0.02$). The highest concentration was in cities that house health macro-regions. **Conclusion:** Social determinants have a relationship with the time trend and the spatial distribution of cases and can direct strategies for prevention and care. **Descriptors:** Acquired Immunodeficiency Syndrome; HIV; Social Determinants of Health; Nursing; Chronic Disease.

RESUMO

Objetivo: Analisar a tendência temporal, a distribuição espacial e a relação dos casos de vírus da imunodeficiência humana/síndrome da imunodeficiência adquirida com os determinantes sociais da saúde. **Métodos:** Estudo ecológico, analítico, realizado com base nos casos de vírus da imunodeficiência humana/síndrome da imunodeficiência adquirida notificados em um estado da Região Centro-Oeste brasileira, no período 2009-2018. Utilizou-se a análise descritiva, regressão polinomial e geoespacialização. **Resultados:** Em dez anos, foram registradas 9.157 notificações, com aumento progressivo anual. A tendência total apresentou-se crescente em ambos os sexos ($p<0,001$, $r^2=0,94$). O Índice de Desenvolvimento Humano Municipal esteve relacionado ao maior número de casos (município de notificação, $p=0,01$; e município de residência, $p=0,02$), e a maior concentração ocorreu nas cidades-sede das macrorregionais de saúde. **Conclusão:** Determinantes sociais apresentam relação com a tendência temporal e distribuição espacial dos casos e podem direcionar estratégias de prevenção e cuidado. **Descritores:** Síndrome da Imunodeficiência Adquirida; HIV; Determinantes Sociais da Saúde; Enfermagem; Doença Crônica.

RESUMEN

Objetivo: Analizar la tendencia temporal, distribución espacial y relación de los casos de virus de la inmunodeficiencia humana/síndrome de la inmunodeficiencia adquirida con los determinantes sociales de la salud. **Métodos:** Estudio ecológico, analítico, realizado basado en los casos de virus de la inmunodeficiencia humana/síndrome de la inmunodeficiencia adquirida notificados en un estado de la Región Centro-Oeste brasileña, en el período 2009-2018. Utilizado el análisis descriptivo, regresión polinomial y geoespacialización. **Resultados:** En diez años, fueron registradas 9.157 notificaciones, con aumento progresivo anual. La tendencia total presentada creciente en ambos los sexos ($p<0,001$, $r^2=0,94$). El Índice de Desarrollo Humano Municipal estuvo relacionado al mayor número de casos (municipio de notificación, $p=0,01$; y municipio de residencia, $p=0,02$), y la mayor concentración ocurrió en las ciudades-sede de las macrorregionales de salud. **Conclusión:** Determinantes sociales presentan relación con la tendencia temporal y distribución espacial de los casos y pueden dirigir estrategias de prevención y cuidado.
Descriptores: Síndrome de Inmunodeficiencia Adquirida; VIH; Determinantes Sociales de la Salud; Enfermería; Enfermedad Crónica.

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INTRODUCTION

Although, throughout the years, mortality due to AIDS has shown a discrete reduction, in some Brazilian regions it is still seen as a neglected disease[1]. This is because social determinants of health (SDH), represented by several factors, such as context of life, individual behavior, environmental, social, and economic aspects, may influence the susceptibility to health issues[2].

It should be noted that the increase in the life expectancy of people with HIV/AIDS (PWHIV) shows the need for intersectoral strategies to deal with this chronic condition. Inequality in the access to education, for instance is an important factor in the search for health and prevention information and in the adherence to the use of condoms[3]. The same is true for drug treatments, due to difficulties understanding the therapy and to the need for follow up[4]. In this regard, the markers of inequality are often systematized and may be the target of intervention[5].

Simultaneously, the inequality in the access to health services may also interfere in the way individuals access technologies of assistance, which is reflected in their predisposition to factors that determine health and disease[6]. Concerning this issue, the model of Dahlgren and Whitehead is a mechanism elaborated in distinct levels, which are inseparable from the health factors of each individual. This model shows the social aspects involving socioeconomic, cultural, and environmental conditions, which are called macro-determinants; life conditions, which are intermediate determinants; and social networks, community, and lifestyles, which are called proximal determinants[7].

In this regard, the identification of SDHs and their inclusion in the planning of care favor the operationalization of the principles and directives of the Single Health System (SUS). It should be noted that inequality and negative SDH generate in individuals that are up to five times more likely to present risky behavior[8], although all social groups are susceptible to the disease[9].

As a result, it is paramount to analyze the influence of SDH on chronic conditions, such as AIDS, as the inequality around the globe indicates how urgent it is to include modifiable determinants that can receive interventions from intersectoral public policies(10). Furthermore, the identification and exploration of these determinants may also direct reflections and operational changes in the process of work of the teams in the different points of the Health Care Network[11].

Considering the above, our research question is: Do SHD have a relation with the time trend and the space distribution of HIV/AIDS cases in the state of Mato Grosso do Sul?

OBJECTIVES

To analyze the time trend, the spatial distribution, and the cases of HIV/AIDS cases with social determinants of health in the state of Mato Grosso do Sul.

METHODS

Ethical aspects

The study respected the national and international ethical norms for researches with human beings and was approved by the Research Ethics Committee from the Universidade Federal de Mato Grosso do Sul. All ethical precepts for researches with human beings, based on Resolutions 466/2012 and 580/2018 from the National Council of Health, were respected.

Design, sample, and criteria of inclusion and exclusion

Epidemiological, qualitative study with an ecological, descriptive, and analytical design, using data from the system of HIV/AIDS notification in the state of Mato Grosso do Sul (MS), from 2009 to 2018. This time frame was selected so it starts five years before 2014, when notifying HIV diagnoses became mandatory, and ends five years after this date. The state of Mato Grosso do Sul, in turn, was selected due to the lack of studies with specific information on the Midwest of the country, coupled with the fact that 19.54% of the cases notified in the country in 2017 originated from this state[12].

Data collection took place in December 2019, using a spreadsheet provided by the MS State Health Secretariat, with all information recorded in HIV/AIDS notification forms, except names. Those who notified their case within the state were selected. The study resorted to the STROBE, from the EQUATOR network, used for analyses of observational epidemiology studies.

Exclusion criteria included repeated notifications, which were considered only once and verified through the crossing of date of birth, sex, race, and identification code in each notification. It should be said that, to carry out the study, we requested from the State Health Secretariat access to the full database, which is unavailable to the public and includes individualized information and names.

The variables analyzed were: age, sex, educational level, ethnicity/color, how the infection took place, year of notification, and case progress. Later, the gross incidence coefficient was calculated, and the number of HIV/AIDS cases per year was divided by the population of the state. Regarding their age group, 11.1% were from 21 to 30 years old, 25.9% from 31 to 40, 14.8% from 41 to 50, 7.4% from 51 to 60, and 40.7% were 61 years old or older[12]. The ages were also group every 15 years, to make the analysis possible, due to the fact that this is the distribution of the database.

Study protocol, result analysis, and statistics

After data was recorded in Excel®, it was exported into the software Statistical Package for the Social Sciences® (SPSS®), version 23. For the time trend analysis, the polynomial regression model was used, considering the "incidence coefficient" as the dependent variable (Y) and the "year" as the independent variable (X). They were grouped according with sex and age group. Following the principles of polynomial regression for a correct execution and interpretation, the incidence coefficient was smoothed using a moving average focused on three consecutive incidence rates. The variable "year" was centralized, and the year 2013.5 was defined as the midpoint. To identify the function that better expressed the relation between variables, dispersion diagrams were used, which led to the selection of the order of the polynomial that represents the model.

The polynomial was chosen according with adjusted simple and quadratic linear regression models. The best model was considered to be the one with the highest statistical significance,

highest measure of precision ([R^2] coefficient of determination) and residuals, with no bias. When two models were similar for the same variable from a statistical standpoint, the simplest one was selected, in accordance with Occam's razor. All analysis carried out considered a significance level of p=0.05.

Variables that measure social inequality, from the 2010 census, were also used. They were: Human Development Index (HDI), sanitation, and GINI index (measure of income distribution inequality, where 0 is complete equality and 1 complete inequality)[13]. Based on this information, the analysis of normality was carried out according with regression residuals, using Kolmogorov-Smirnov's test; later, they were transformed into the log_{10} form to calculate Pearson's correlation coefficient.

To find the places that, potentially, concentrated the highest number of cases, the cases went through a spatial analysis in the software Quantum Geographic Information System (QGIS), version 2.18. The coefficient of incidence of each city was calculated per 100 thousand people, according with 2020 estimations from the Brazilian Institute of Geography and Statistics (IBGE). The incidence was categorized in quartiles. The map was generated through metric interpolation, with the application of the code of the city of notification. The shapefile used is made available by the IBGE. Finally, results were discussed under the light of the Dahlgren and Whitehead model[7].

RESULTS

Throughout the 10 years analyzed, 9,158 HIV/AIDS notifications were recorded. One of them was duplicated and, therefore, excluded. The incidence coefficient was approximately 374 per 100 thousand people, and the state capital had the highest number of cases (n= 4,569, 49.9%).

Regarding the profile of the population studied, most were male (n = 5,842, 63.8%), from 20 to 49 years old (n = 7,262, 79.3%), white (n = 3,882, 42.4%) or brown (n = 3,800, 41.5%), with at most eight years of schooling (n = 4,011, 43.8%). In most cases the infection was acquired through sex (n = 8,049, 87.9%). Regarding the progress of the cases, there were 1,137 (12.4%) deaths from AIDS and 125 (1.4%) from other causes.

Table 1 shows that only males from 10 to 14 years old presented a stable trend in regard to notified cases, with a mean coefficient lower than that of females. Furthermore, males from 20 to 34 years old had the highest mean coefficient in the period analyzed (β_0), with an yearly increase in incidence (β_1) of 0.97 and a coefficient of determination of (r^2) 0.94. The quadratic term was not significant and, therefore, was excluded from the model.

Table 2 shows the positive correlation (r=0.30, p = 0.01) between the incidence coefficient of HIV/AIDS and the IDH, considering the city where the notification was carried out and where the participant lives (r = 0.34, p < 0.02).

The analysis of the relation between the city that received the notification and the city where the person lived showed that the notification of 2,131 (23.3%) individuals was carried out in a different city than that where they reside. A similar trend was found for the treatment, since 2,723 (29.7%) of individuals carry out their treatments in a city other than where they live. In both cases, there was a progressive increase starting in 2014.

Table 1 - Trend analysis of the rates of notifications of human immunodeficiency virus/acquired immunodeficiency syndrome cases in the state of Mato Grosso do Sul, according with sex and age group, Brazil, 2009-2018 (N = 9,157)

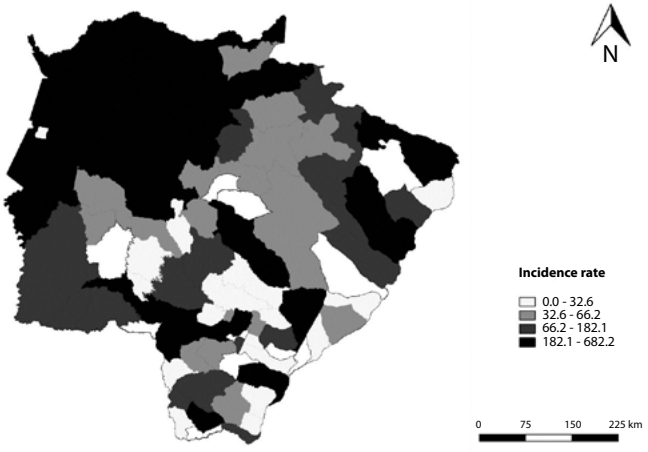
Age	Sex	β_0	β_1	*p* value	R^{2*}	Trend
10 to 14	M	0.50	0.66	0.071	0.66	Stable
	F	1.54	0.92	0.001	0.83	Growing
15 to 19	M	18.80	0.97	< 0.001	0.95	Growing
	F	15.30	0.95	0.001	0.88	Growing
20 to 34	M	85.34	0.97	< 0.001	0.94	Growing
	F	47.10	0.88	0.004	0.74	Growing
35 to 49	M	76.62	0.98	< 0.001	0.95	Growing
	F	54.22	0.96	< 0.001	0.92	Growing
50 to 64	M	48.51	0.94	< 0.001	0.88	Growing
	F	35.19	0.97	< 0.001	0.93	Growing
65 or more	M	14.42	0.97	< 0.001	0.94	Growing
	F	11.37	0.93	< 0.001	0.85	Growing
Total	M	55.10	0.97	< 0.001	0.94	Growing
	F	31.10	0.97	< 0.001	0.94	Growing

Source: State Health Secretariat of Mato Grosso do Sul, 2019.
**R^2: Coefficient of determination. M: Male. F: Female.*

Table 2 - Correlation between the coefficient of incidence of the human immunodeficiency virus/acquired immunodeficiency syndrome and the GINI index (measure of income distribution inequality, where 0 is complete equality and 1 complete inequality)(13), the City Human Development Index, the Sanitation rates per city of notification and residence, Mato Grosso do Sul, Brazil, 2009-2018 (n = 79)

	r*/n±	*p* value
City of the notification		
GINI	+0.011/67	0.92
CHDI	+0.303/67	**0.01**
Sanitation rate	-0.039/68	0.75
City of residence		
GINI	+0.149/78	0.19
CHDI	+0.342/78	**0.02**
Sanitation rate	+0.051/79	0.66

Source: State Health Secretariat of Mato Grosso do Sul, 2019; IBGE, 2010.
**r: Pearson's correlation coefficient; ±N: Number of cities with information.*



Source: State Health Secretariat of Mato Grosso do Sul, 2019; IBGE, 2020.
Figure 1 - Coefficient of incidence of the human immunodeficiency virus/acquired immunodeficiency syndrome per 100 thousand people according with city of residence, Mato Grosso do Sul-Brazil, 2009-2018

Regarding geospatial analysis (Image 1), there were more cases in the cities that are considered the center of macro-regions, which are: Corumbá, Campo Grande, Dourados, and Três Lagoas.

DISCUSSION

The growing HIV/AIDS time trend justifies efforts to develop preventive actions that consider the influence of multiple factors, such as individual behavior, incidence in the population, biological aspects, regional and economic characteristics, and social determinants of health[14].

According to the Dahlgren and Whitehead, when the proximal determinants (individual characteristics not controlled for — sex, age, and hereditary factors) are recognized early, they can direct strategic actions of early screening or even prevention[7,15].

Moreover, life habits and risky health behavior compromise the wellbeing and may be connected to SDHs. From this perspective, it is necessary to consider micro- and macro-determinants to subsidize the transformations are necessary in individual conducts, for the benefit of the population[7].

Regarding the age group, the highest mean coefficients of infection in this study were found in young adults, corroborating the findings from other Brazilian regions[16-17]. Furthermore, the growing time trend of this chronic condition in both sexes highlights that, in addition to preventive actions, it is necessary to operationalize strategic actions in public policies for pharmacological and non-pharmacological treatments to be accessible, allowing the patient not only to survive, but to survive with quality of life[18].

The greatest mean coefficients from 20 to 49 years old, in both sexes, may have been influenced by the fact that this age group is the target of most public policy strategic actions, such as the active screening of their serological state and the screening of available treatment[19]. This may be explained by the level of cohesion of the community and of the social network of these individuals, mentioned by the Dahlgren and Whitehead model as important agents to influence a group in society[5]. However, one must also consider that this age group is the one with the most active sexual life, in addition to being more prone to risky behavior[19].

This type of behavior may also take place in adolescence, often due to attitudes related to the need to be accepted in social groups. This leads the individual to expose themselves to the risk of contracting sexually transmitted infections (STIs) or to unplanned pregnancies[20]. In this regard, it stands out that the age group from 10 to 14 years was the only one whose mean coefficient was higher among female than among makes, in addition to presenting an annual increment closer to the adult population, which may be related to more frequent risky behavior in this population. As a result, it is necessary to invest in actions for health education, seeking alternative methods for each target audience (youth, adults, and elderly), understanding the reality of each group, their educational level, and their understanding of the topic[21].

It should be highlighted that socioeconomic, environmental, and cultural mediators influence and redefine other variables. The findings of this study showed that part of the PWHIV (43%) have eight years of schooling or less, which may influence their access to health services, as well as that to knowledge and to the viability of health-related information. A study carried out in Canada indicated that individuals with higher educational levels adhere better to actions to prevent HIV/AIDS[22]. Therefore, the educational system has an enormous capacity to generate change, especially in regard to the adoption of some types of behavior. However, it is commonly less used than it could be for actions to promote health in general and to reduce social inequality[23].

The growing trend of positive acceleration of cases in the state for the population above 50 years old is an important factor to be considered in the planning of actions to deal with the disease. This population, in general, does not search for health services to prevent against STIs, not to mention that the approach in the different places of the network is targeted at other, more common chronic diseases[24].

It is important to highlight that this is true not only for this Brazilian state, since countries in Sub-Saharan Africa, for example, have more elders than people from 15 to 49 years old with HIV/AIDS. Their situation is often made worse by the fact that they do not know about their diagnostic and have a low educational level[25]. Therefore, the development of actions and strategies targeted at this public, such as screenings and active SIT search, could collaborate with the diagnostic and the knowledge of the current panorama of infection in this population group.

In regard to macro-determinants, the structural conditions of poverty, such as the lack of sanitation, of access to health services, income, education, civil rights, in addition to the insufficient offer of essential services[26] are also factors that can influence the adoption of risky behavior, increasing the propensity to infection. A study carried out in European countries found that an increase in the Gross Domestic Product contributed to reduce the prevalence of HIV in the population, since it allowed for effective investments in public policies for prevention and control[27].

The findings of this study showed that the CHDI had a positive correlation with the city where the notification was made ($r = 0.303$; $p = 0.01$) and where the person lived ($r = 0.342$; $p = 0.02$), which may be related to the economic characteristics of this region. However, other social indicators, such as sanitation rates, showed no correlation. An ecological study in the state of Piauí found that sanitation conditions have a significant role in the determination of HIV infections and in the disease and mortality by AIDS[28]. It should also be considered that the conformation of assistance networks, especially that of the reference services of the state at hand, is focused on health macro-regions[29].

Income inequality, according with the GINI index, was not found to be a protective or risk factor for the incidence of the infection, both considering the cities of notification and the cities of residence ($r = 0.011$, $p = 0.92$; and $r = 0.149$, $p = 0.19$, respectively). Consequently, this may also be related to the access to income distribution programs and to the active search of individuals for health services[6]. However, an ecological study carried out in Piauí found that the percentage of people in houses vulnerable to poverty influences the incidence of AIDS. This led authors to consider the need to explore the relationship between income distribution and the differences in the levels of health and disease in the population[30].

Furthermore, it should be highlighted that, although the CHDI of the state of Mato Grosso do Sul is considered to be high, income distribution is median[13], and the cases are distributed in a heterogeneous fashion throughout the regions, which may affect

how the system deals with existing demands. This is explained by the fact that cities that are the center of the health macro-regions have better health care infrastructure, which may lead to a greater demand due to the fact that users from minor cities also seek them. Sometimes, these central cities are recognized as a reference for all actions of care related to specific diseases[29], including the filling in of notification forms. The reality of smaller cities also mean that the stigma and the need to restart life seeking work and treatment force these individuals to migrate for urban centers seeking for better conditions of life[31-32].

Therefore, actions to strengthen Primary Health Care and decentralize care started to be implemented in 2012 with the introduction of the HIV and syphilis fast exam in Primary Health Care Units, followed by their effective application, in 2014, when the HIV diagnostic testes was included in the list of diseases with mandatory notification[31-32]. We believe that these actions collaborated to increase notifications and to provide better knowledge about the current setting of infections in this period, as this study showed.

It is worth highlighting that the development of programs to prevent against SITs is not sufficient when the health sector is the sole responsible for them. This is due to the fact that the disease is influenced by social and economic factors, by level/degree of access to education, basic conditions of life and regional characteristics related to the organization of services[14], among others. This is why intersectoral policies are also necessary.

Study limitations

This study has limitations due to the lack of information in some cities, in regard to the CHDI, the GINI index, and the sanitation rates, not to mention difficulties regarding the completion of the notification forms. Nonetheless, the results found were important, since studies with secondary databases allow for an expressive time trend analysis with a higher number of cases.

Contributions to the fields of Nursing, Health or Public Policy

The results above show the need for reflecting and investing for the organization and distribution of health services by managers, in addition to the planning of actions that consider social inequalities and access to health, all of which will be pertinent for the advancing and perfecting of nursing care.

CONCLUSION

Social determinants have a relationship with the time trend and the spatial distribution of cases and can direct strategies for prevention and care.

In the state of Mato Grosso do Sul, social determinants were related with the time trend and with the spatial distribution of HIV/AIDS cases notified from 2009 to 2019. Data indicates that, except for males from 10-14 years old, there is a growing trend for cases of the disease, with a positive correlation with CHDI (variable that measures social inequality) and a higher concentration in the central cities of the macro-regions of health.

Although no relation was found between cases and other indicators, such as income inequality and sanitation rates, the results of this study may subsidize reflections and raise awareness about the importance of investing in the organization and distribution of state health services by the managers, in addition to planning actions that take into account social differences and access to health.

Knowing the profile of a specific disease in the population and the changes that take place through time, as well as the factors associated with these changes, should subsidize the implementation of actions and strategies to face the disease. In summation, we believe that the results of this study can raise the awareness of managers and professionals about the importance of these issues; guide the implementation of preventive actions, such as the carrying out of tests to determine the serological state of specific groups; and encourage new studies that discuss social health determinations and infectious diseases.

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REFERENCES

1. Guimarães MDC, Carneiro M, Abreu DMX, França EB. Mortalidade por HIV/Aids no Brasil, 2000-2015: motivos para preocupação? Rev Bras Epidemiol. 2017;20(1):182–90. https://doi.org/10.1590/1980-5497201700050015
2. Silva CM , Jorge AS, Dalbosco K, Peder LD, Horvath JD, Teixeira JJV, et al. Perfil epidemiológico dos pacientes com HIV em um centro de referência no sul do Brasil: características de dez anos. Rev Epidemiol Control Infecção. 2017;7(4):227–233. https://doi.org/10.17058/reci.v7i4.9150
3. Fontes MB, Crivelaro RC, Scartezini AM, Lima DD, Garcia ADA, Fujioka RT. Determinant factors of knowledge, attitudes and practices regarding STD/AIDS and viral hepatitis among youths aged 18 to 29 years in Brazil. Ciênc Saúde Colet. 2017;22(4):1343–52. https://doi.org/10.1590/1413-81232017224.12852015
4. Pires PN, Marega A, Creagh JM. Adesão à terapia antirretroviral em pacientes infetados pelo VIH nos cuidados de saúde primários em Nampula, Mozambique. Rev Port Med Geral Fam. 2017;33:30–40. https://doi.org/10.32385/rpmgf.v33i1.12021
5. Whitehead M. The concepts and principles of equity and health[Internet]. Geneva: WHO. 2000 [cited 2021 Apr 4]. Available from: https://www.euro.who.int/__data/assets/pdf_file/0010/74737/E89383.pdf

6. Barreto ML. Health inequalities: Health inequalities: a global perspective. Ciênc Saúde Colet 2017;22(7):2097–108. https://doi.org/10.1590/1413-81232017227.02742017

7. Dahlgren G, Whitehead M. Policies and Strategies to promote social equity in health[Internet]. Stockholm: Institute for Future Studies; 1991 [cited 2021 Apr 13]. Available from: https://core.ac.uk/download/pdf/6472456.pdf

8. Jesus M, Williams DR. The Care and Prevention in the United States Demonstration Project: a call for more focus on the social determinants of HIV/AIDS. Public Health Rep. 2018;133(Suppl 2):28-33. https://doi.org/10.1177%2F0033354918801353

9. Hoyos-Hernández PA, Mazo JPS, Pineda LTO, Gallego ALV, Ceballos MG, Muñoz TO. Social representations associated with hiv/aids in colombian university students. Saude Soc. 2019;28(2):227–38. https://doi.org/10.1590/S0104-12902019180586

10. Miranda WD, Paes-Sousa R, Silveira F. Epidemiologia, população e determinantes sociais e ambientes da saúde. Textos para discussão nº40[Internet]. Rio de Janeiro: Fundação Oswaldo Cruz. 2020 [cited 2021 Apr 15] 32p. Available from: https://saudeamanha.fiocruz.br/wp-content/uploads/2020/12/SaudeAmanha_TD47_WanessaMiranda_etal.pdf

11. Paiva SS, Pedrosa N Lima, Galvão MTG. Análise espacial da AIDS e os determinantes sociais de saúde. Rev Bras Epidemiol. 2019;22. https://doi.org/10.1590/1980-549720190032

12. Ministério da Saúde (BR). Departamento de Vigilância Prevenção e Controle das Infecções Sexualmente Transmissíveis do HIV/Aids e das Hepatites Virais. Boletim Epidemiologico HIV Aids 2017. HIV Aids Bol Epidemiológico. 2018; 72 p.

13. Instituo Brasileiro de Geografia e Estatística (IBGE). Censo 2010: resultados [Internet]. 2016 [cited 2019 Aug 22]. Available from: https://censo2010.ibge.gov.br/resultados.html

14. Gibson C, Grande K, Schumann C, Gasiorowicz M. Census Tract Poverty and Racial Disparities in HIV Rates in Milwaukee County, Wisconsin, 2009–2014. AIDS Behav. 2018;22(9):2994–3002. https://doi.org/10.1007/s10461-018-2064-y

15. Atrash HK. Health disparities: challenges, opportunities, and what you can do about it. J Hum Growth Dev. 2018;28(3):223–31. https://doi.org/10.7322/jhgd.152156

16. Dantas CC, Dantas FC, Monteiro BAC, Leite LJ. Perfil epidemiológico dos pacientes com HIV atendidos em um centro de saúde da região litorânea do estado de Rio de Janeiro, Brasil, 2010- 2011. ACM Arq Catarin Med [Internet]. 2017 [cited 2020 Jun 2];46(2):22–33. Available from: http://www.acm.org.br/acm/seer/index.php/arquivos/article/view/250/137

17. Guerrero AFH, Santos LE, Oliveira RG, Sales PDS, Guerrero JCH. Perfil sociodemográfico e epidemiológico preliminar de pessoas vivendo com HIV/AIDS no município de Coari, Amazonas, Brasil, no período de 2005 a 2016. Rev Saúde Pública (Paraná). 2019;2(1):103–12. https://doi.org/10.32811/25954482-2019v2n1p103

18. Bekele T, Globerman J, Watson J, Hwang SW, Hambly K, Koornstra J, et al. Elevated mortality and associated social determinants of health in a community-based sample of people living with hiv in ontariocanada: Findings from the positive spaces, healthy places (pshp) study. AIDS Behav. 2018;22(7):2214-23. https://doi.org/10.1007/s10461-018-2040-6

19. Cunha CC. Configurações e reconfigurações do movimento de jovens vivendo com HIV/AIDS no Brasil: Identidades e prevenções em jogo. Sex, Salud Soc (Rio J.). 2018;(29):294–312. https://doi.org/10.1590/1984-6487.sess.2018.29.14.a

20. Maranhão TA, Gomes KRO, Oliveira DC, Moita Neto JM. Repercussão da iniciação sexual na vida sexual e reprodutiva de jovens de capital do Nordeste brasileiro. Ciênc Saúde Colet. 2017;22(12):4083–94. https://doi.org/10.1590/1413-812320172212.16232015

21. Clarke RD, Fernandez SB, Hospital M, Morris SL, Howard M, Wagner EF, et al. Getting their feet in the door: communication cues to action for HIV testing and condom use behaviors among hispanic/latinx college students. J Prim Prev. 2021;42:331–341. https://doi.org/10.1007/s10935-020-00610-3

22. Patterson S, Carter A, Nicholson V, Webster K, Ding E, Kestler M, et al. Condom less sex among virally suppressed women with HIV with regular HIV-serodiscordant sexual partners in the era of treatment as prevention. J Acquir Immune Defic Syndr. 2017;76(4):372-81. https://doi.org/10.1097/QAI.0000000000001528

23. Dahlgren G, Whitehead M. European strategies for tackling social inequities in health: levelling up Part 2 [Internet]. Copenhagen, WHO Regional Office for Europe (Studies on social and economic determinants of population health). 2007 [cited 2021 Apr 23];3:149p. Available from: https://www.euro.who.int/__data/assets/pdf_file/0010/74737/E89383.pdf

24. Sousa AFL, Queiroz AAFLN, Fronteira I, Lapão L, Mendes IAC, Brignol S. HIV Testing among middle-aged and older men who have sex with men (MSM): a blind spot? Am J Mens Health. 2019;13(4). https://doi.org/10.1177/1557988319863542

25. Matlho K, Randell M, Lebelonyane R, Kefas J, Driscoll T, Negin J. HIV prevalence and related behaviours of older people in Botswana-secondary analysis of the Botswana AIDS Impact Survey (BAIS) IV. Afr J AIDS Res. 2019;18(1):18–26. https://doi.org/10.2989/16085906.2018.1552162

26. Oliveira SV, Puchale CL, Gonçalves LC, Marin SR. Analysis of the fuzzy index of multidimensional poverty in urban populations: a case study in Santa Maria (RS). Rev CEPE. 2018;47:81–99. https://doi.org/10.17058/cepe.v0i0.11608

27. Reeves A, Steele S, Stuckler D, McKee M, Amato-Gauci A, Semenza J. Gender violence, poverty and HIV infection risk among persons engaged in the sex industry: cross-national analysis of the political economy of sex markets in 30 European and Central Asian countries. HIV med. 2017;18(10):748–55. https://doi.org/10.1111/hiv.12520

28. Sousa Paiva S, Pedrosa NL, Galvão MTG. Spatial analysis of AIDS and the social determinants of health. Rev Bras Epidemiol. 2019;22. https://doi.org/10.1590/1980-549720190032

29. Souza CDF, Medronho RA, Santos FGB, Magalhães MAFM, Luna CF. Spatial modeling of leprosy in the state of Bahia, Brazil, (2001-2015) and social determinants of health. Cien Saude Colet. 2020; 25(8): 2915-26. https://doi.org/10.1590/1413-81232020258.21522018

30. Souza HP, Oliveira WTGH, Santos JPCS, Toledo JP, Ferreira IPS, Esashika SNGN, et al. Doencas infecciosas e parasitarias no Brasil de 2010 a 2017: aspectos para vigilancia em saude. Rev Panam Salud Pública. 2020;44. https://doi.org/10.26633/RPSP.2020.10

31. Zambenedetti G, Azevedo R, Silva N. Descentralização da atenção em HIV-Aids para a atenção básica: tensões e potencialidades. Physis: Rev Saúde Coletiva. 2016;26(03). https://doi.org/10.1590/S0103-73312016000300005

32. Melo EA, Maksud I, Agostini R. Cuidado, HIV/Aids e atenção primária no Brasil: desafio para a atenção no Sistema Único de Saúde? Rev Panam Salud Pública. 2018;42. https://doi.org/10.26633/RPSP.2018.151