ORIGINALES

HIV vulnerability index in homeless persons
Índice de vulnerabilidad al VIH en población habitante de calle

*Berbesi Fernández, Dedsy **Segura Cardona, Ángela *** Cardona Arango, Doris ****Caicedo Velasquez, Beatriz

* RN, PhD Epidemiology and Biostatistics. Professor, School of Medicine. E-mail: **dberbesi@ces.edu.co** **Statistician. PhD Epidemiology. Professor, School of Medicine. *** Administrator. PhD Demography. Professor, School of Medicine. ****PhD Human Geography. Professor, School of Medicine. CES University. Medellín-Colombia.

ABSTRACT

Purpose: While there is evidence that social vulnerabilities tend to co-occur with HIV, few studies have measured HIV vulnerability. To date, there is no consensus in the literature regarding how to measure or operationalize HIV vulnerability. Therefore, the purpose of this study was to determine an HIV vulnerability index in homeless persons in the city of Medellín, Colombia.

Material and methods: This cross-sectional study included 338 homeless persons in the city of Medellín, Colombia, and time-location sampling was used. During the construction of the index, an exploratory factor analysis, and a confirmatory factor analysis (CFA) were performed.

Results: Four factors accounting for 50,49% of the variance were identified. The population with high HIV vulnerability had a five-fold greater risk of being infected with HIV. This association was adjusted for socio-demographic variables including age, gender, civil status, and education level.

Conclusions. We propose an HIV vulnerability index that is defined as the reduced ability to anticipate (knowledge and erroneous beliefs), resist (sexual practices and drug use), and recover (social support and rejection), which limits the ability to access HIV prevention, attention, and support services.

Keywords: HIV; Vulnerable Populations; Social Conditions; Homeless Persons

RESUMEN

Objetivo. Se reconoce que las vulnerabilidades sociales tienden a ocurrir con el VIH, pero pocos estudios han tratado de medir la vulnerabilidad al VIH y no se logra identificar en la literatura la

unificación frente al concepto y la manera de operativizarlo. El objetivo de esta investigación fue determinar un índice de vulnerabilidad, y su relación con la infección por VIH en población habitante de calle de la ciudad de Medellín

Material y método. Se realizó un estudio descriptivo transversal con 338 habitantes de calle de Medellín utilizando el muestreo de tiempo y lugar. En la construcción del índice se realizó un análisis factorial de tipo exploratorio y un análisis factorial confirmatorio.

Resultados. Se identificaron cuatro factores que explicaron el 50,49% de la varianza. Se encontró que la población con alta vulnerabilidad al VIH tenía cinco veces el riesgo de tener VIH, esta asociación fue ajustada por variables sociodemográficas de edad, sexo, estado civil y nivel de escolaridad.

Conclusiones. Se propone un índice de vulnerabilidad al VIH, el cual se definió como la reducción de la capacidad de anticiparse (conocimientos y creencias erróneas), resistirse (prácticas sexuales y consumo de drogas) y recuperarse (apoyo social y rechazo). Lo cual limita la capacidad para acceder a servicios de prevención, atención, y apoyo al VIH.

Palabras clave: VIH; Poblaciones Vulnerables; Condiciones Sociales; Personas sin hogar (Términos DeCs)

INTRODUCTION

Human immunodeficiency virus (HIV) remains a major global public health issue. It is estimated that HIV has been the cause of death of around thirty six million people, and, in the year 2012, it was estimated that thirty five million people were infected with HIV [1]. In Colombia, the HIV epidemic affects, in first place, the younger population in the age range of 15 to 34 years, with 56,5% of the cases notified by HIV/AIDS and death. In second place, the adult population older than 45 years of age accounts for 15,2% of the reported HIV cases [2].

The initial and fast propagation of the HIV/AIDS epidemic occurred independently of socioeconomic and demographic status, since it progressed simultaneously in both developed and developing countries. However, the similarities in this pattern were lost once developed countries were able to more efficiently contain the spread of the disease, while developing countries continue to suffer its devastating and severe effects [3].

Initial analysis of the HIV/AIDS epidemic stemmed from a biologic approach, focused on individual behavior and describing specific at-risk populations [4,5]. Following these criteria, surveys on individual behavior constituted the basis to identify what would be classified as a risk factor [6,7]. In order to understand the behavior of the HIV/AIDS epidemic, it was subsequently understood that, in addition to the individual behavior, life context played a fundamental role [8,9], and risk factors were configured as social problems and were referred to as "risk behaviors". However, due to the lack of a broad understanding of the social and cultural context of the population at risk for HIV infection, the scope of this approach was limited [3].

In recent years, models including previously ignored elements have analyzed specific populations to understand HIV beyond individual conditions, and taking into account the social and cultural context, which may increase risk of infection [10]. Since then, groups vulnerable to HIV/AIDS were defined as those formed by individuals that engaged in risky behaviors, or that they did not protect themselves properly [11]. As the disease propagated, however, vulnerable groups were defined by their ability to protect themselves from risky behaviors, and that ability is tightly related to social,

cultural, and demographic conditions [12]. In other words, HIV infection was recognized as a source of social vulnerability, which had greater consequences in those groups facing disadvantages [13].

While there is evidence that social vulnerabilities tend to co-occur with HIV, few studies have measured HIV vulnerability. To date, there is no consensus in the literature regarding how to measure or operationalize HIV vulnerability [14]. In this study, we propose an HIV vulnerability index in homeless persons, based on the individual and social components described by Ayres and colleagues [15]. Within the individual dimension are included beliefs, knowledge, and attitudes; while the social dimension includes social networks, use of drugs, rejection, discrimination, and social support [15]. Additionally, categories described in the AVEO (*Activos, Vulnerabilidad social y Estructura de Oportunidades*) model, which proposes to broaden the perspective on the poverty issue [16]. In this way, vulnerability is defined as the interrelation between two levels: the structure of opportunities (prior knowledge, drug use, and social support), and the assets (negotiation skills and not engaging in risky behaviors). Therefore, we designed and validated an HIV vulnerability index for homeless persons that may contribute to the identification, prevention, and control of this epidemic.

This manuscript is part of a doctoral thesis where this concept was designed and the HIV prevalence in the homeless population was established [17].

MATERIALS AND METHODS

A cross-sectional study was performed by conducting a survey on a population sample of 338 homeless persons who lived in Medellín (Colombia) during the first semester of 2014. Our survey was designed and based on thorough literature review, and analysis of previous studies measuring HIV vulnerability [15,18–20], based on which we selected index indicators, and identified the study's constructs (content).

We used a direct survey method, and the instrument consisted of a questionnaire comprising demographic and social questions for homeless persons, as well as an HIV test, for which informed consent was obtained. An experienced HIV and STD counselor conducted the interview. The questionnaire was applied to homeless persons using time-location sampling (TLS), which is used to gather information on hard-to-reach populations.

To calculate the sample size, we used the following estimates: 1) a population of 3.381 homeless persons as reported by the 2009 census of Medellín [21], 2) a 7.8% proportion of HIV infection in homeless persons [22], 3) a 1,5% design effect, and 4) a precision of 4%. The Institutional Ethics Committee of CES University, Medellín, Colombia (Minute No. 55, 2013), approved this study.

During the construction of the index, we conducted an exploratory factor analysis, using principal component analysis with varimax rotation. The qualitative variables were previously transformed by the optimal quantification method, and Cronbach's alpha was calculated for each of the identified factors.

HIV vulnerability index: HIV vulnerability index interpretation was performed as described by Grisales [23,24]. The index was typified in a way that the range of possible values was from a minimum of X=0 to a maximum of X=100, and with a higher score

meaning a greater HIV vulnerability index. Typification was performed knowing the lowest (Z min) and greatest (Zmax) component value.

In addition, a confirmatory factor analysis (CFA) was performed, in which construct's factor weight, standardized estimates, and goodness-of-fit were analyzed using maximum likelihood estimation. The main goal of the CFA was the grouping of categories according to the variability that each variable shared with the other variables [25].

Finally, a multivariate binary logistic analysis model was performed using as a dependent variable HIV status (to have or not to have HIV infection) in order to identify the strength of association to the HIV vulnerability index, and was adjusted by socio-demographic variables. These analyses were performed using SPSS 21.0 software, licensed to CES University.

RESULTS

Demographic characteristics

A total of 338 homeless persons were surveyed on the street. Their age ranged from 18 to 65 years old, with an average of 40,0 ± 11,4 years. Half of them (50%) were 41 years or older, and 75% of the participants was 50 years old or younger. The highest level of education among participants was elementary school, suggesting that this population mostly had a basic level of education. The most frequent marital status was single (241 of 338; 71,3%,), followed by separated or divorced (16,3%), domestic partners (8,6%), and married (2,7%). Regarding gender, women were seven-fold more likely to be in a domestic partnership than men, while men were predominantly single, separated or divorced. HIV prevalence was 8,15% (CI 95% 3,92 - 12,37).

Survey and indicator construction

During survey development, we analyzed the following 45 indicators: 1) 19 items from previous studies [26, 27] that were used to reliably score HIV knowledge (Cronbach's alpha = 0.94), and adequate psychometric properties measured by exploratory factor analysis; 2) risky sexual behavior variables, previously studied in homeless persons [22]; 3) scale on drug use frequency, applied on the Drug abuse Surveillance System (VESPA: *Vigilancia epidemiológica del abuso de sustancias psicoactivas*), and 4) Social networks that support homeless persons, as well as rejection and discrimination towards homeless persons were also analyzed (table 1).

Table 1. Exploratory factor analysis. Construction of HIV vulnerability index

Variables	Knowledge, beliefs and attitudes	Drug use	Social network and rejection	Sexual risk behavior
HIV is transmitted by: (Erroneous knowledge)				
Having unprotected sex	0.92			
Blood transfusion	0.88			
Using someone else's needles	0.88			
Having only one partner	0.83			
Not using used needles	0.82			

Abstaining from sexual intercourse	0.81			
Always using a condom	0.77			
From infected mother to child	0.73			
Having oral sex	0.60			
Removing the condom	0.56			
Breast feeding	0.56			
There is HIV reinfection	0.55			
HIV is transmitted by: (erroneous beliefs)				
Shaking hands or hugging	0.85			
Using public toilets	0.74			
Sharing silverware	0.73			
Kissing a person infected with HIV	0.71			
Sharing a meal	0.67			
Mosquito bites	0.51			
You think that a person with HIV (attitude towards HIV)				
May be infected with HIV and look good	0.73			
Frequency of drug use				
Mushroom use		0.77		
Popper use		0.75		
"Cacao sabanero" use		0.73		
"Ruedas" use		0.71		
Cocaine use		0.54		
Inhaled drug use		0.47		
Marihuana use		0.39		
Rejection				
You have been mistreated at health care services			0.46	
You have been despised, rejected or offended			0.44	
You have suffered abuse or mistreatment because you are homeless			0.42	
Received support				
You have someone else's support			0.8	
You have support in case of being mistreated			0.83	
You have support in case of having HIV			0.83	
Condom use				
Use of condom during oral sex				0.66
Use of condom during penetrative sex				0.64
Use of condom during vaginal sex				0.6

Index description

Four factors explaining variance were identified: 1) "*knowledge, beliefs, and attitudes about HIV*", 2) *"Drug use",* 3) *"Rejection, discrimination, and lack of social networks"*, and 4 "Risky behavior" which explained the variance in 29,9%, 8,6%, 6,6%, and 5,3%,

respectively (Table 1). Data were analyzed by Kaiser-Meyer-Olkin (KMO) test, which is a measure of the variance among variables that indicates adequate sampling when returning a value close to 1. KMO test on our data resulted in a value of 0,91, indicating that there is an adequate relationship among the study variables. Furthermore, Bartlett's Test of Sphericity –which checks for applicability of PCA on the studied variables - was statistically significant (P< 0,00). The four factors explained 50,49% of the HIV vulnerability construct variance.

Internal consistency

Our HIV vulnerability index showed an adequate internal consistency, as evidenced by a Cronbach's alpha of 0,86. This was further evidenced by sub-scale Cronbach's alpha of 0,95 for knowledge, beliefs, and attitudes about HIV factor; of 0,75 for drug use factor; and of 0,6 each for risky behaviors, and social networks factors.
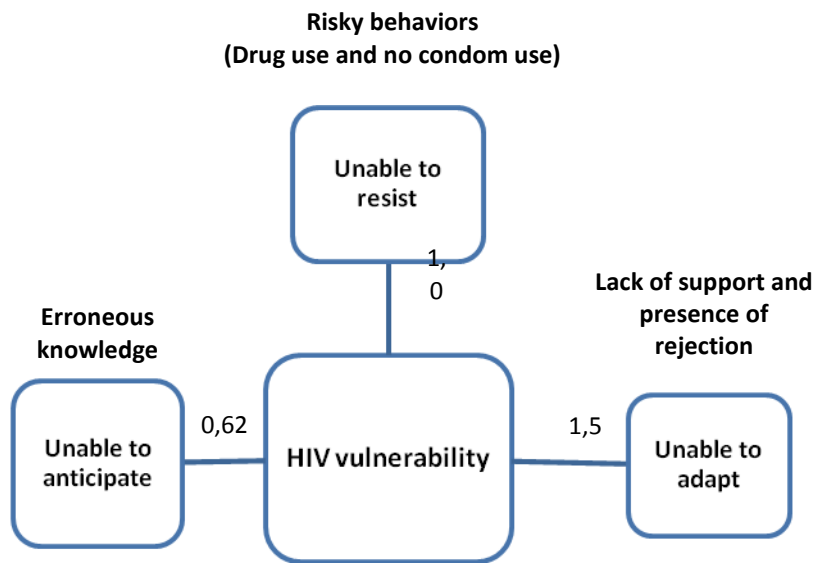
HIV vulnerability concept

Once we had constructed the vulnerability index, and performed a thorough literature review, a new proposal was designed based what had been reported for vulnerability and environment [28], which considers that vulnerability results when relationships between living beings and physical environment threatens the stability that guarantees the ability to *anticipate, resist, and adapt*, or evolve with natural phenomena.

The three categories –ability to anticipate, resist, and adapt- were used and adapted to the observed variables included in our vulnerability index. HIV knowledge and erroneous beliefs variables, which had been previously described as HIV prevention, were designated as anticipating the infection. Drug use and no condom use items were grouped, and the latent variable was described as resisting. Finally, lack of social support, being rejected and discriminated, constituted the ability to adapt to HIV infection category.

In order to better understand the reality and observed phenomena in our study, the new theoretical model, shown in Figure 1, was subjected to PCA analysis, and provided statistical measures to show the extent to which our sample data supported the proposed HIV vulnerability index (Figure 1). PCA model was statistically significant, and met the specific measurements requirements. The model was specified by using as endogenous variables the observed variables, and, as exogenous variables the item errors, and as the latent variables the three proposed factors (anticipate, resist, and adapt).

Figure 1. CFA model for HIV vulnerability concept

**Risky behaviors
(Drug use and no condom use)**

Unable to resist

1,0

Erroneous knowledge

Lack of support and presence of rejection

Unable to anticipate   0,62   **HIV vulnerability**   1,5   **Unable to adapt**

	X^2	Df	X^2/ df	p value	CFI	RMSEA
Model 1	**53,645**	**34**	**1,58**	**0,017**	**0,969**	**0,04**

In order to determine whether the proposed model satisfactorily fit our data, the Comparative Fit Index (CFI) was calculated and a value greater than 0,90 was obtained, indicating a good fit of the proposed model (CFI range 0-1). Similarly, the Root Mean Square Error of Approximation (RMSEA) was examined and yielded a value ≤0,05 (the lower the value, the better the fit), further confirming the good fit of the model.

In summary, the proposed model exhibits a good fit and presents admissible levels of data adjustment. Additionally, all of the tested parameters were statistically significant. Therefore, in the present study the HIV vulnerability index is defined as the reduced ability to adapt (lack of the required knowledge to protect oneself and erroneous beliefs), resist (risky sexual behavior and drug use), and recover (lack of social support, rejection and stigmatization that disfavor certain populations) limiting their ability to access HIV prevention, attention, and support services (Figure 2).

Figure 2. Model for HIV vulnerability
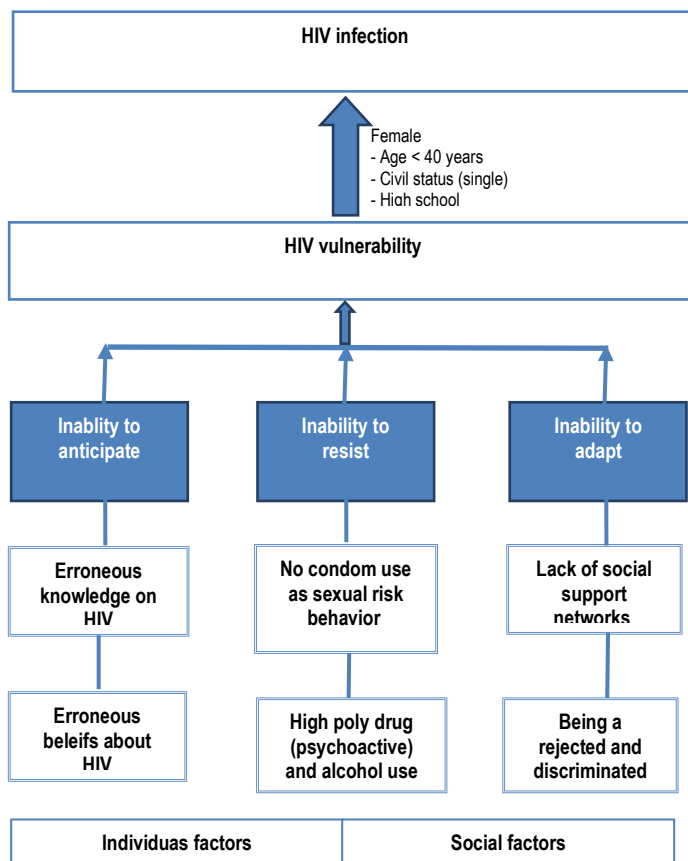
HIV vulnerability index scoring

Initially, three categories were considered for HIV vulnerability analysis (low, medium and high). However, a very low proportion was obtained for the "low" category, thus we proceeded to merge the low and medium category. The low-medium category (60,1%) category was then compared to the high (39,9%) HIV vulnerability category, being the latter designated as reference category.

Association between HIV and HIV vulnerability

In order to adjust for risk of having HIV with the created HIV vulnerability variable, a multivariate logistic regression analysis was performed. The population with high HIV vulnerability had a five-fold greater risk of being infected with HIV (RPaj=4,51 [1,28-15,79]). This association was adjusted for sociodemographic variables including age, gender, civil status, and education level (Table 2).

Table 2. HIV infection and HIV vulnerability (Modelo ajustaded for socio-demographic variables)

Variable	RP crude	CI 95%	RP adjusted	CI 95%	p value
Vulnerability					
High	3,2	1,05-9,78	4,51	1,28-15,79	0,01
Low-Medium	1	-	1	-	
Gender					
Female	2,98	0,98-8,95	2,24	0,59-8,48	0,19
Male	1	-	1	-	
Age					
≤ 40 years	2,02	0,66-6,17	1,26	0,36-4,30	0,71
> 40 years	1	-	1	-	
Civil status					
Single	5,13	1,55-16,99	6,73	1,54-29,35	0,01
Other	1	-	1	-	
Education level					
High school	2,79	0,96-8,13	3,99	1,16-13,66	0,02
Elementary	1	-	1	-	

DISCUSSION

While there is evidence that HIV infection tends to co-occur with social vulnerabilities [29], few studies have measured or explained the way in which vulnerability patterns contribute to risk of infection. Thus, in this study, we have designed, validated, and proposed an HIV vulnerability index for homeless persons. This index integrates previously described components including: appropriate knowledge, erroneous beliefs, and attitudes about HIV, social network support, rejection and discrimination, drug use frequency, and condom use; which may facilitate the guiding of actions in difficult contexts, such as that experienced by homeless persons.

In Colombia, the homeless population is not prioritized as being at risk of HIV infection. However, this study has identified a prevalence of HIV infection of 8,1% among this population [17], which, due to the concentrated nature of the HIV/AIDS epidemic in Colombia [30], require the identification of risky behaviors that may allow the determination of the contribution of such groups to the current and future HIV epidemic profile [31].

In Mexico, a study based on degree of vulnerability explored the Rogers model [32], and compared personal resources and environmental support to quantify vulnerability.

This identified the study population as being very sensitive. The comparison of the risk approach and the one proposed here showed important differences, however it did not allow ascertaining which one was better. Regarding the research carried out in Medellín, variables for social support, appropriate knowledge to prevent HIV infection were also included.

In Chile, a vulnerability scale was proposed for health care workers, and was constituted by four dimensions: knowledge of intrinsic vulnerability, knowledge of extrinsic vulnerability, experience of vulnerability, and perception of patient's vulnerability [33]. In our model for homeless persons, knowledge on HIV prevention was used as one of the components to determine whether it was associated to engaging or not in risky behaviors, and significant differences were found especially in regards to erroneous beliefs about HIV transmission, which may increase rejection of people with HIV due to the lack of understanding of how HIV is transmitted.

Using the conduct model, a study suggested that social vulnerability may be reduced if homeless persons are able to find a permanent home, improve their mental health, and abstain from drug abuse [20]. The two latter categories were used in the proposed HIV social vulnerability model, and are highly associated to presence of HIV infection.

The amplified model for vulnerable populations incorporates traditional factors described in the Andersen model [34, 35], and includes specific vulnerabilities common to homeless persons, such as drug abuse, mental illness, and barriers to health care access. These three components are similar to those observed in our exploratory analysis in which the three determinant factors were drug abuse, perception of disease –including mental health-, and as a third factor lack of social and family support, which was described by others in the context of HIV vulnerability [11, 36, 37].

The vulnerability of a population to HIV stems from social processes, and the underlying causes may be directly related to the final outcome, HIV transmission. Based on disaster theory, a model proposed that vulnerability to risk is determined by three factors: 1) the population's ability to recover, or the ability of people to resist and recover, 2) population health and availability of health care services, and 3) population preparedness. The latter refers to the social values and beliefs that determine what should be considered as a risk, and, in turn, what protection measures should be taken. In addition, this model observed that populations with greater HIV prevalence are those in which social inequality persists, and the helpless are victimized [38]. Those three factors were analyzed in the model we propose for homeless persons in Medellín, and found a high internal consistency, indicating a relationship between variables.

The study by Higgins and colleagues [39] suggested that the use of the term "vulnerability" marks the transition from an individual approach to HIV risky behaviors towards an approach that goes beyond individual control. Similarly, our current study identified an index that includes risky behaviors and social factors as lack of social support, rejection and discrimination, which limit the decision-making ability.

According to UNAIDS, the underlying factors of vulnerability may reduce the ability of individuals and the community to avoid risk of HIV, which may be beyond the control of individuals. These underlying factors are, among others, lack of knowledge and skills to protect oneself and others; accessibility, quality, and coverage of health care services; and social factors such as violation of human rights, or certain social and

cultural norms [40]. With this definition as a starting point, we initiated the analysis of HIV vulnerability presented in this study, and were motivated to pursue a systematic review on the subject [14], which, altogether, generated an HIV vulnerability concept that is intended to be applied to other populations.

On another hand, Ayres et al. [ref] defined vulnerability as the different degree and nature of susceptibility of individuals and communities to infection or illness, which depend on their situation relative to the integrated group of social and individual aspects that place them in relation to the problem and to the resources to face it [41, 42]. This author specifies that the three components of HIV vulnerability are individual, social, and pragmatic factors, even though the latter is seldom analyzed in studies using this model [18, 43, 44]. In other words, while it is recognized that pragmatic factors may influence HIV vulnerability, its measurement is complex, and in the case of the present study, identification of contextual variables related to the proposed index was not possible, since the study population was highly concentrated in some areas and in one township.

The interpretation of HIV vulnerability has been focused towards the understanding of the complex network of social factors that are constantly interacting with HIV risky behaviors. A key issue in the HIV literature is the relationship between social disadvantages and AIDS vulnerability [45], which should be matter of additional studies in order to guide public health actions.

This study presents limitations that, while they may generate restrictions to the observed results, they do not invalidate them. Among the limitations of this study are: data were generated from a self-reported survey on sexual practices and drug use, which may lead to inaccuracies and thus depends on the participant's honesty. Due to the nature of the study design, it is not possible to assess cause and effect associations between HIV infection and HIV vulnerability. In cross-sectional studies, event and exposure data are measured simultaneously, and TLS is a non-probabilistic sampling method, which must meet specific criteria for the sample to be representative[46].

REFERENCES

1.   Organización Mundial de la salud. Situación de la epidemia mundial de VIH. 2010 [Internet]. 2010. Recuperado a partir de: http://www.unaids.org/
2.   Ministerio de Salud y Proteccion Social. Informe mundial de avances en la lucha contra el Sida. Colombia 2012 [Internet]. 2012. Recuperado a partir de: http://www.unaids.org/en/dataanalysis/knowyourresponse/countryprogressreports/201 2countries/
3.   Ministerio de Protección Social. Vulnerabilidad a la infección por VIH. Ministerio de Proteccion Social; 2008.
4.   Curran JW. The epidemiology and prevention of the acquired immunodeficiency syndrome. Ann Intern Med. noviembre de 1985;103(5):657-62.
5.   Matuszak DL, Kotval I, Garg R, Patel J, Israel E, Glasser D. Prevalence of risk behaviors and HIV infection in Maryland STD clinics. Md Med J Baltim Md 1985. diciembre de 1989;38(12):1019-26.
6.   Scala E, Luzi G, Aiuti F. [The correct use of the condom reduces the risk of HIV infection]. Immunol Clin. diciembre de 1989;8(4):201-13.
7.   Kraft P, Rise J, Grønnesby JK. Prediction of sexual behaviour in a group of young Norwegian adults. NIPH Ann. diciembre de 1989;12(2):27-44.

8.   Kalichman SC, Catz S, Ramachandran B. Barriers to HIV/AIDS treatment and treatment adherence among African-American adults with disadvantaged education. J Natl Med Assoc. agosto de 1999;91(8):439-46.

9.   Cargill VA, Stone VE. HIV/AIDS: a minority health issue. Med Clin North Am. julio de 2005;89(4):895-912.

10.   Meyer DEE, Mello DF de, Valadão MM, Ayres JR de CM. «Você aprende. A gente ensina?»: interrogando relações entre educação e saúde desde a perspectiva da vulnerabilidade. Cad Saúde Pública. junio de 2006;22(6):1335-42.

11.   Amirkhanian YA. Review of HIV vulnerability and condom use in central and eastern Europe. Sex Health. marzo de 2012;9(1):34-43.

12.   Figueiredo R, Ayres JRCM. [Community based intervention and reduction of women's vulnerability to STD/AIDS in Brazil]. Rev Saúde Pública. agosto de 2002;36(4 Suppl):96-107.

13.   Mawar N, Saha S, Pandit A, Mahajan U. The third phase of HIV pandemic: social consequences of HIV/AIDS stigma & discrimination & future needs. Indian J Med Res. diciembre de 2005;122(6):471-84.

14.   Berbesi-Fernandez DYB, Cardona ÁS. Vulnerabilidad al VIH: Revisión sistemática. Investig ANDINA. 1 de abril de 2014;16(28):964-77.

15.   Ayres JR de CM, Paiva V, França I Jr, Gravato N, Lacerda R, Della Negra M, et al. Vulnerability, human rights, and comprehensive health care needs of young people living with HIV/AIDS. Am J Public Health. junio de 2006;96(6):1001-6.

16.   Katzman R. Notas sobre la medición de la vulnerabilidad social. Documentos de Trabajo de IPES [Internet]. [citado 5 de mayo de 2013]. Recuperado a partir de: http://www.eclac.cl/deype/mecovi/docs/taller5/24.pdf

17.   Berbesi D, Segura-Cardona A, Caicedo B, Cardona-Arango D. Prevalencia y factores asociados al VIH en habitante de calle de la ciudad de Medellín Colombia. Fac Nac Salud Pública. 15 de mayo de 2015;33(2):200-5.

18.   Urzúa R, Zuñiga P. Vulnerabilidad al VIH en mujeres en riesgo social. Rev Saúde Pública [Internet]. 2008;1. Recuperado a partir de: http://www.scielosp.org/pdf/rsp/2008nahead/6903.pdf

19.   Ministerio de la Proteccion Social. Republica de Colombia. Vulnerabilidad a la infección por VIH en personas en situación de calle en la ciudades de Bucaramanga y Barranquilla. 2011.

20.   Oliveira JF de, Paiva MS. Vulnerabilidade de mulheres usuárias de drogas ao HIV/AIDS em uma perspectiva de gênero. Esc Anna Nery. diciembre de 2007;11(4):625-31.

21.   Alcaldia de Medellin. - Ciudadanos - Bienestar Social - Información Secretarías - Secretaría de Inclusión Social y Familia [Internet]. 2014 [citado 19 de julio de 2013]. Recuperado a partir de: http://www.medellin.gov.co/irj/portal/ciudadanos?NavigationTarget=navurl://c5d04e891 6d98b82a2c697e214ce9c61

22.   Berbesi D, Agudelo A, Segura C, Montoya L. VIH en habitantes de calle de Medellín. Rev Fac Nac Salud Publica. 2012;30:310-5.

23.   Reducción de Datos: Análisis de Componentes Principales y Factorial. [Internet]. [citado 16 de noviembre de 2014]. Recuperado a partir de: http://web.ua.es/es/lpa/docencia/practicas-analisis-exploratorio-de-datos-con-spss/practica-5-analisis-multivariante-con-spss-reduccion-de-datos-analisis-de-componentes-principales-y-factorial.html

24.   Berbesi-Fernandez D, Montoya-Vélez, Segura-Cardona. Uso del condón y conocimientos sobre prevención del VIH entre los inyectadores de drogas de dos ciudades colombianas. Adicciones. 2013;25(4):321-6.

25. Segura-Cardona Á, Berbesí-Fernández D, Cardona-Arango D, Ordóñez-Molina J. Construcción preliminar de un cuestionario sobre conocimientos en VIH/SIDA en excombatientes de Colombia. Rev Peru Med Exp Salud Publica. julio de 2011;28(3):503-7.

26. Artiles López DM, Sangabriel AS. Construyendo la vulnerabilidad:: Un riesgo para todos. Arquit Urban. agosto de 2012;33(2):68-78.

27. USAID. Conocimiento de VIH/SIDA, Otras ETS y Formas de Prevención [Internet]. 2010. Recuperado a partir de: http://www.measuredhs.com/

28. Organizacion Mundial de la Salud, ONUSIDA. Guías sobre la vigilancia del VIH de segunda generacíon [Internet]. 2000. Recuperado a partir de: http://cedoc.cies.edu.ni/general/2nd_Generation%20%28D%29/Surveillance%20Guid elines/2nd%20Generation%20Surveillance/2nd%20gen%20Spa.pdf

29. Ministerio de la Proteccion Social. Republica de Colombia. Plan Nacional de respuesta ante el VIH y el SIDA. Colombia 2008 - 2011. 2008.

30. Rogers AC. Vulnerability, health and health care. J Adv Nurs. 1 de julio de 1997;26(1):65-72.

31. Cabieses B, Ferrer L, Tunstall H, Norr K. The relationship between knowledge of HIV, self-perceived vulnerability and sexual risk behavior among community clinic workers in Chile. Rev Salud Publica. 12(5):777-89.

32. Andersen RM. A behavioral model of families' use of health services. 1968;(25):xi + 111 pp.

33. Andersen RM. National Health Surveys and the Behavioral Model of Health Services Use: Med Care. julio de 2008;46(7):647-53.

34. Arcos E, Muñoz LA, Sánchez X, Vollrath A, Latorre C, Bonatti C, et al. Vulnerabilidad social en mujeres embarazadas de una comuna de la Región Metropolitana. Rev Médica Chile. junio de 2011;139(6):739-47.

35. DeFur PL, Evans GW, Cohen Hubal EA, Kyle AD, Morello-Frosch RA, Williams DR. Vulnerability as a function of individual and group resources in cumulative risk assessment. Environ Health Perspect. mayo de 2007;115(5):817-24.

36. Tsasis Peter, Nirupama N. Vulnerability and risk perception in the management of HIV/AIDS: Public priorities in a global pandemic. Risk Manag Heal Policy. 2008;1:7-14.

37. Higgins JA, Hoffman S, Dworkin SL. Rethinking gender, heterosexual men, and women's vulnerability to HIV/AIDS. Am J Public Health. marzo de 2010;100(3):435-45.

38. ONUSIDA. Orientaciones terminológicas de ONUSIDA [Internet]. 2012. Recuperado a partir de: http://www.unaids.org/en/media/unaids/contentassets/documents/unaidspublication/20 11/JC2118_terminology-guidelines_es.pdf

39. Ayres JR de CM, França Júnior I, Calazans GJ, Filho S, César H. O conceito de vulnerabilidade e as práticas de saúde: novas perspectivas e desafios [Internet]. FIOCRUZ; 2003 [citado 1 de octubre de 2014]. Recuperado a partir de: http://bases.bireme.br/cgi-bin/wxislind.exe/iah/online/?IsisScript=iah/iah.xis&src=google&base=LILACS&lang=p&nextAction=lnk&exprSearch=350313&indexSearch=ID

40. Ayres JR de CM, Júnior F, França I, Calazans GJ, Filho S, César H. Vulnerabilidade e prevençäo em tempos de Aids [Internet]. Editora 34; 1999 [citado 1 de octubre de 2014]. Recuperado a partir de: http://bases.bireme.br/cgi-bin/wxislind.exe/iah/online/?IsisScript=iah/iah.xis&src=google&base=LILACS&lang=p&nextAction=lnk&exprSearch=242122&indexSearch=ID

41. Sousa PKR de, Miranda KCL, Franco AC. Vulnerabilidade: análise do conceito na prática clínica do enfermeiro em ambulatório de HIV/AIDS. Rev Bras Enferm. abril de 2011;64(2):381-4.

42. Silva TMR da, Alvarenga MRM, Oliveira MA de C. Evaluation of the vulnerability of families assisted in Primary Care in Brazil. Rev Lat Am Enfermagem. octubre de 2012;20(5):935-43.

43. German D, Latkin CA. Social stability and HIV risk behavior: evaluating the role of accumulated vulnerability. AIDS Behav. enero de 2012;16(1):168-78.

44. Sabin KM, Johnston LG. Epidemiological challenges to the assessment of HIV burdens among key populations: respondent-driven sampling, time-location sampling and demographic and health surveys. Curr Opin HIV AIDS. marzo de 2014;9(2):101-6.

ISSN 1695-6141