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Selective Disclosure of HIV Status in Egocentric Support Networks of People Living with HIV/AIDS

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Abstract

The objective of this study was to investigate HIV disclosure activities in social support networks of people living with HIV/AIDS (PLWHAs). An egocentric network study was conducted in Nanning, China. A sample of 147 PLWHAs (egos) nominated 922 network members (alters) who would provide egos with social support. All egos disclosed their HIV status to at least one alter in their support networks and 26.5 % disclosed to all alters. Among network alters, 95.7 % of spouse alters, 59.9 % of other family member alters, and 29.7 % of friend alters were aware of egos' HIV status. PLWHA egos were more likely to disclose their HIV status to their spouse and other family members, frequently-contacted alters, and alters who provided more social support. In addition, older egos and unmarried egos were more likely to disclose their HIV status. The findings indicate that network-based HIV intervention programs should take into consideration selective disclosure in social networks.

Keywords

HIV; Disclosure; Egocentric support network; China

Introduction

Disclosure of HIV infection status is an essential approach for HIV prevention and control in the absence of an efficacious vaccine. Previous studies have shown that HIV status disclosure is associated with engagement in safer sex practices [1, 2], increased access to social support [3, 4], and stronger access and adherence to antiretroviral treatment (ART) [5, 6]. In contrast, concealment of HIV status may lead to risky sexual behavior [7], impede access to social support [4], and poor adherence to ART [8]. Moreover, HIV disclosure has been found to be associated with a lower level of social support and violence due to HIV related stigma and discrimination [9, 10]. Although previous research has investigated the pattern of disclosure and its beneficial and negative consequences, few studies have examined the potential determinants of HIV disclosure through the lens of social support networks. HIV disclosure commonly takes place among social network peers, especially

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among those who provide people living with HIV/AIDS (PLWHAs) with social support. Understanding how these factors at the ego, alter, and network levels influence the decision to disclose may have public health implications [11].

The social network approach is an appropriate measure to examine HIV disclosure because it generates rich information relating to whom PLWHAs disclose their HIV status and how social network factors influence these decisions. An egocentric social network design is preferable for obtaining sensitive information from stigmatized and marginalized populations because data are collected from one person (ego) as opposed to the entire social network. Social networks are defined as individuals linked to a focal person by a particular behavior or interaction [12]. A single egocentric support network includes an index person (ego) and his/her network members (alters) who provide social support to egos [13]. Social networks are conceptualized as comprising network relations, network structures, and network functions [14]. Network relations refer to the type of network ties (e.g., kin, friends, coworkers, villagers, sex partners, or needle sharers) and the frequency of interaction with these alters. Network structure characteristics such as network size describe the scale of a network. As a central component of social networks, network functions include social support that influences network members' adoption or maintenance of behaviors [15].

Previous studies have reported an association between network relations and HIV disclosure. A study in the US found that HIV infected women were more likely to disclose their HIV status to their spouse/romantic partners than to other relationships [16]. Another study conducted among injection drug users indicated that 93 % of HIV-infected husbands revealed their HIV status to their wives compared to 45 % of opposite-sex friends [11]. It seems that social roles of relationships in social networks may determine to whom PLWHAs are willing to disclose their HIV status. Social support may be positively associated with HIV disclosure. Latkin and colleagues found that men who had sex with men were more likely to disclose their HIV status to network members who provided emotional support (OR = 1.9) [17]. Similarly, Simoni and colleagues reported a positive relationship between HIV disclosure and social support among African American women [4]. In addition, relationship quality between ego and alters, such as trust or contact frequency, may also be associated with the likelihood of HIV disclosure [17].

HIV disclosure is a social and psychological process [18, 19]; thus it is not only determined by factors at the intrapersonal level, but largely influenced by factors at the interpersonal level or the social network level. The social network approach for studying HIV disclosure may be particularly useful in the Chinese collectivist culture which emphasizes interdependence within personal social networks and harmony in social environments [20]. While the decision to disclose is voluntary and PLWHAs have the freedom to bring family members to places of HIV care and treatment, Chinese people may be encouraged to selectively disclose their HIV status to their partners, friends, family members, or health practitioners [21, 22]. However, few studies have used the social network approach to investigate HIV disclosure and its potential determinants in China.

The objectives of this study were to describe the pattern of HIV disclosure within social support networks and to examine how ego, alter, and network factors influence PLWHAs' decision to disclose HIV status in their support networks.

Methods

Study Site and Participants

An egocentric social support network study was conducted in Nanning, the capital of the Guangxi province in China. In this region, the major HIV transmission modes are injection drug use and heterosexual contacts. In Guangxi, the estimated number of PLWHAs was the second highest among 31 provinces in China [23]. By the end of 2011, the total reported HIV/AIDS cases were 75,716 including 47,233 HIV infected cases and 28,483 AIDS cases in Guangxi province [24].

A two-stage sampling approach was used to recruit eligible subjects [25]. Eligibility criteria included PLWHAs who were at least 18 years old and able to participate in a face-to-face interview. In the first stage, we purposefully selected three study sites that provided HIV care and treatment services for the majority of PLWHAs in the city of Nanning: an infectious disease hospital that was designated to provide care and treatment for PLWHAs, a methadone maintenance treatment (MMT) clinic run by the Nanning Center for Disease and Control, and a health-care center run by PLWHA volunteers. In the second stage, all eligible subjects were invited to participate in the study during the study period. HIV status was confirmed by the surveillance data provided by the Nanning Center for Disease Control and Prevention. The planned sample size of 170 eligible subjects was determined by: (1) the expected proportion of PLWHAs who disclosed their status, (2) the expected study participation acceptance rate, and (3) the level of funding. Twenty-three subjects were excluded due to participation refusal ($n = 20$) or having incomplete or missing data ($n = 3$), resulting in a final sample size of 147 HIV positive participants (including 110 from the infectious disease hospital, 30 from the MMT clinic, and 7 from the health-care center). Informed consent was obtained prior to receiving a face-to-face interview. This study protocol was approved by the Institutional Review Board of Virginia Commonwealth University and the Guangxi Center for Disease Control and Prevention.

Measurements

Network Instrument—The Chinese Social Network Questionnaire (CSNQ) was used to measure social network components of egos [14, 26]. We designed, used, and assessed the CSNQ in our previous studies among MSM [14], drug users [26], and PLWHAs [27]. Modifications to the CSNQ were made to meet the needs of this target population. The social network section in the CSNQ was adapted from the Norbeck Social Support Questionnaire (NSSQ) [28, 29]. The NSSQ is designed to measure multiple dimensions of social support within a social network. The validity and reliability have been demonstrated in different populations [30].

Questionnaires were administered as face-to-face, anonymous interviews in a private room. All interviewers received training in obtaining rapport from subjects, asking sensitive

questions, and keeping confidentiality of participant information prior to the start of the study.

Alters were nominated by egos through six name generator questions. Egos were asked to provide nicknames of alters who would provide six types of social support from the following questions: (1) ‘‘Who would you ask to borrow 100 RMB Chinese Yuan (equivalent to $15 US)?’’; (2) ‘‘If you are confined to bed for 2–3 weeks, who would you prefer to ask to take care of you?’’; (3) ‘‘If you had problems regarding family and/or personal affairs or health concerns, who would you prefer to ask for help and advice?’’; (4) ‘‘Who usually agrees with you or supports your actions or thoughts?’’; (5) ‘‘Who makes you feel respected or admired?’’; and (6) ‘‘To whom would you discuss personal or private issues?’’; Egos were asked to nominate as many alters as possible who would be currently available to provide social support to the egos. After egos enlisted supporting alters, they were asked to provide alters’ social demographics and information about social network factors (e.g., network size, relation types, trust in alters, ego-alter contact frequency).

Network Relations—The measures of network relations from the CSNQ included (1) egos’ relationship with alters; (2) trust in alters; and (3) frequency of contacts. Relationships between egos and alters were categorized into: spouse, friends, family members (other than spouse), and others. The level of egos’ trust in alters was assessed by the CSNQ question, ‘‘To what extent do you trust each of the alters?’’ with a response set of ‘‘do not trust at all (0), do not trust (1), do not trust very much (2), does not matter (3), trust a little (4), trust (5), trust very much (6)’’. Frequency of ego-alter contacts was categorized into the following categories: no contact (0), more than one time in 6 months but less than once a month (1), once a month (2), more than once per month (3), more than once per week (4), and once per day (5).

Network Support—Social support was measured by asking each ego to rate the possibility that the egos would obtain support from alters in the six types of social support. The six-level response set for each support question included: not possible at all (0), not sure (1), somewhat possible (2), possible (3), quite possible (4), and quite sure (5). The level of support that egos’ would receive from alters was calculated by summing the scores of the six support questions (possible range from 0 to 30).

HIV Disclosure—HIV status disclosure was assessed by asking PLWHA egos, ‘‘To whom on your alter list has your HIV status been disclosed?’’. This question was asked for each alter on egos’ network list. Alters who knew egos’ HIV status were classified as ‘disclosed alters’, while alters who were unaware of ego’s HIV status were referred to as ‘non-disclosed alters’.

Statistical Analysis

In bivariate analyses, Wilcoxon rank-sum tests, Chi square tests and Fisher’s exact tests were used to describe the distributions of social demographic variables and network variables between disclosed alters and non-disclosed alters. To investigate whether egos’ own characteristics influence their decision to disclose their HIV status, a Poisson regression

analysis was performed to investigate the potential relationships between the dependent variable (the number of alters to whom an ego disclosed HIV status) and the independent variables including egos' socio-demographics, recruitment site, and length of time since HIV diagnosis (in years). In order to adjust for the influence of the network size on the number of disclosed alters (i.e., a larger network size usually led to more alters who knew the egos' HIV status), network size was treated as an ''offset'' in this Poisson regression model, adjusting for bias incurred by different sizes of social network among egos [31]. To examine the potential roles of social network components and characteristics of both egos and alters on HIV disclosure, Generalized Estimating Equation (GEE) models were used to explore the associations between HIV disclosure and factors at the ego, alter, and network levels. As observations within an egocentric network are highly dependent, traditional regression models (linear or logistic regression models) that assume independent observations cannot be used. GEE models adjust for the dependent observations within an ego's network. Specifically, the dependent variable was alters' awareness of their ego's HIV status (coded dichotomously as disclosed alters vs. non-disclosed alters). The independent variables were social network factors (i.e., relationship, trust in alters, contact frequency, social support, and network size) as well as social demographic variables of both egos and alters. To investigate their interrelationships, a hierarchical combination of candidate variables was considered for model building [32]. Because there is no likelihood estimation for GEE models, quasi-likelihood information criterion (QIC) and QICu were used as the model selection criteria. The smaller the values of the QIC and QICu, the better the model is [33]. Data analyses were performed using SAS 9.2 (SAS Institute Inc., Cary, NC).

Results

Social Demographics of Egos and Alters

In this study, 147 egos nominated a total of 940 alters who would provide social support to egos. Eighteen alters were excluded because their education information was missing, leading to 922 alters. Table 1 presents social demographic characteristics of the egos and their alters. One hundred and three HIV positive egos (70.1 %) in the sample were married, and 11 married egos did not nominate their spouse as supporting alters. The majority of egos were male (70.1 %). The mean age of the egos was 40.8 years old. Among alters, 55.1 % were males and 82.2 % were married. Ten alters (1.1 %) were younger than 18 years old and were ego's children. The majority of egos (76.9 %) and alters (69.1 %) received a middle-school education or less.

Egos' network size ranged from 2 to 15 with a median of 6 alters. The majority of networks had 4–8 alters (77.6 %; 114/147). The breakdown of network size was as follows: 5.4 % had less than 4 alters, 15.0 % had 4 alters, 24.5 % had 5 alters, 15.0 % had 6 alters, 11.6 % had 7 alters, 11.6 % had 8 alters, and 17.0 % had more than 8 alters in their network.

Patterns of HIV Disclosure

All HIV positive egos (n = 147) reported having disclosed their HIV status to at least one alter in their social support network. Thirty-nine egos (26.5 %) disclosed to all alters in their support networks (Fig. 1). As shown in Table 2, egos' HIV status was disclosed to 95.7 % of

spouse alters (88/92), 59.9 % of other family member alters (339/566), 29.7 % of friend alters (58/195), and 13.0 % of other relationships, such as neighbors, co-workers, or teachers (9/69).

Relations Between HIV Disclosure and Social Network Factors

In the bivariate analysis of social network factors and HIV disclosure among alters, the distributions of following variables significantly differed between disclosed alters and non-disclosed alters: relation type, egos' trust in alters, ego-alter contact frequency, and the level of social support (Table 2). Compared to non-disclosed alters, disclosed alters were more likely to be egos' spouse, to be trusted by egos, to frequently contact egos, and to provide egos with a higher level of social support.

Poisson regression analysis was performed to examine the relationships between HIV status disclosure and egos' own socio-demographics, recruitment site, and length of time since diagnosis. The results indicated that unmarried egos or older egos were more likely to disclose their HIV status to more network alters (Table 3).

GEE modeling analyses indicated that disclosure of HIV status was significantly associated with social network components and egos' social demographics, but not significantly associated with alters' social demographics (Table 4). Model 1 examined the associations between disclosure and network components. HIV positive egos were less likely to disclose their HIV positive status to friends (OR = 0.03; 95 % CI: 0.01–0.12), other family members (OR = 0.08; 95 % CI: 0.02–0.35), and other relationships (OR = 0.03; 95 % CI: 0.00–0.15), compared to spouse alters. Egos were more likely to disclose it to their frequently-contacted alters (OR = 1.32; 95 % CI: 1.11–1.57) and to alters who could provide a higher level of social support (OR = 1.09; 95 % CI: 1.03–1.16). Network size was negatively associated with HIV status disclosure (OR = 0.87; 95 % CI: 0.75–1.00).

Model 2 included network components, recruitment setting, and years since HIV diagnosis. The associations with respect to network components were similar to those in model l, except that network size was no longer significantly associated with disclosure. Egos recruited from the MMT clinic and health-care center were more likely to disclose their HIV status than egos from the infectious disease hospital (OR = 3.51; 95 % CI: 1.55–7.95).

In model 3, egos and alters' socio-demographic variables were added to model 2. The results remained consistent with those in model 2. Specifically, HIV positive egos were less likely to disclose their HIV status to friends (OR = 0.02; 95 % CI: 0.01–0.07), other family members (OR = 0.08; 95 % CI: 0.03–0.26), and other relationships (OR = 0.03; 95 % CI: 0.01–0.12), compared to spouse alters. Egos were more likely to disclose their HIV status to their frequently-contacted alters (OR = 1.30; 95 % CI: 1.08–1.58) and to alters who could provide a higher level of social support (OR = 1.10; 95 % CI: 1.03–1.18). In addition, older and unmarried egos were more likely to disclose their HIV status to their alters. Again, HIV disclosure was not significantly associated with network size.

Discussion

The results of this egocentric support network study demonstrate that HIV-infected egos selectively disclosed their HIV status to network alters who provided social support. The study revealed that the decision to disclose HIV status to social network alters was associated with network relations and network support, but not with network size. To our knowledge, this is the first study to examine the pattern and possible determinants of HIV disclosure within PLWHAs' social support networks in China.

All egos disclosed their HIV status to at least one alter. However, only 26.5 % disclosed to all network members, lower than that reported in a social network study of African American MSM (39.7 %) [17]. The difference may be attributed to differences in social norms regarding HIV disclosure and different study populations. The results showed that network size was not associated with HIV disclosure, which may indicate that egos strategically disclosed their HIV status to some key alters only, regardless of the number of alters in their networks. For example, they might disclose their HIV status to spouses or family members but not others. The process of strategic disclosure may be complicated as it involves a thoughtful consideration of everyone in their network who may accept his/her HIV status, provide social support, keep privacy, and avoid unexpected secondary disclosure.

HIV positive egos were more likely to disclose their HIV status to their spouses and other family members, but less likely to friends and other relationships, which is consistent with the findings from other studies [5, 16, 34]. For example, a study of people living with HIV in Thailand reported that 72.5 % of HIV infected individuals disclosed their HIV status to family members, but only 2.5 % disclosed to others outside their families [34]. Similar findings were observed in a previous study of HIV disclosure in rural China [5]. This difference in disclosure between spousal/family relationships and other relationships may be explained by the social role of spouses and families. The social role of spousal relation is distinct from the role of other network relationships as it embodies expectations of trust and shared responsibility (including social support), as well as spousal and family support [16, 19]. HIV stigma may also influence the selection of disclosure as spouse or other family members are less likely to stigmatize their HIV-infected family members, compared to outsiders [21, 25]. The high degree of HIV disclosure to spouses and other family members may facilitate family-based HIV interventions to prevent forward HIV transmission from one partner to the other.

According to the findings of this study, HIV infected individuals were much less likely to disclose their HIV status to friends and other peers in their social networks, possibly to avoid stigma, discrimination, or protection of their family indignity. Dictated by the Chinese collectivist culture, not only are PLWHA stigmatized by others, but their family members are also stigmatized as well [25]. In order to maintain their family indignity, HIV-infected egos may selectively and carefully disclose their status to those who will continue to provide social support. As indicated by the findings, HIV positive egos were more likely to disclose their HIV status to their frequently-contacted peers. Thus, prior to seeking help and advice, Chinese HIV positive egos may seriously consider all of their network members and only

disclose their HIV status to those who will protect confidentiality of their HIV status and provide necessary support in an accessible manner.

Social network support was positively associated with HIV disclosure. This finding is consistent with a set of previous studies [3, 4]. For example, Kalichman et al. [3] examined HIV status disclosure in familial and friendship relations and found greater perceived social support to be associated with greater HIV disclosure. Moreover, in a study among white, Latino and black study populations, the decision to disclose HIV status was heavily influenced by those who allegedly provided social support [35]. When individuals are infected with HIV, they face panic, stress, hopelessness, stigma, and economic burden. Seeking social support to cope with this new challenge is the primary motivator to disclose HIV status. Social support has a positive effect on assisting HIV positive individuals to cope with HIV-related stress, adhere to ART, and restore quality of life and well-being [6, 36]. In order to receive adequate support, they need to disclose their HIV status, discuss strategies to deal with the infection, and seek support from network peers. Social support from network peers can help buffer the depressive effects of HIV-related stress for both HIV-infected individuals and their family members [37]. After contemplating the advantages (e.g., obtain support) and disadvantages (e.g., experience stigma) of disclosing their HIV status, they may decide to tell their status to peers who will provide social support. This positive association between social support and HIV disclosure was consistent with previous studies in China [21, 38]. In China, family is an important resource that can provide its members with social support, and help PLWHAs determine whom they should disclose HIV status to [21]. Different from the individualist culture, family is the basic and center unit of social organization in the collectivism culture. Family members are expected to provide social support to members who are in need [39].

Some social demographic variables of egos were also associated with HIV status disclosure. Compared to married egos, unmarried ones were more likely to disclose their HIV status to network members. Unlike other studies that found no association or a negative association with age [17, 40], we found that egos' age was positively associated with HIV status disclosure. One explanation is that older PLWHAs need more social support from their peers than younger PLWHAs. The other explanation is stigma. Older PLWHAs may perceive less stigma than younger PLWHAs, however, the possible correlation between age and HIV status disclosure requires further study. HIV disclosure was not associated with alters' social demographic variables (age, gender, marital status, and education). That is, egos may carefully select alters to disclose their status based upon their close relationship and quality of relationship (social support and frequently contacts), not based on alters' social demographic characteristics.

In addition, we found that egos recruited from the MMT clinic and health-care center were more likely to disclose their HIV status than those from the infectious disease hospital. This is because the MMT clinics and health-care centers offered HIV/AIDS intervention activities including counseling, encouragement to change risk behaviors, and help to seek social support and treatment. Therefore, these PLWHAs may better understand the importance of disclosure and have more tools to effectively communicate their HIV status

disclosure and ask for social support than HIV positive egos recruited from the infectious disease hospital.

The number of years since the diagnosis of HIV was not associated with HIV disclosure, which was not consistent with previous studies. A study of HIV disclosure in IDU's social network found that HIV positive IDUs who had been infected longer had more opportunity to disclose HIV status [11]. In our study, the majority of HIV infected egos were diagnosed with HIV within 3 years (89 %). The association may not be seen among PLWHAs with a relatively short duration since HIV diagnosis.

Despite the strength in using social network data for the investigation of HIV disclosure, there are several limitations to this study. First, this study was conducted under a cross-sectional study design and the results can only be interpreted as association rather than causation. Second, information regarding social network components was self-reported and recall bias may have occurred. Third, multicollinearity may have occurred at the modeling stage. For example, the significant association between egos' trust in alters and disclosure presented in bivariate analysis disappeared in the GEE models. We found that egos' trust in alters was highly correlated with social support (Pearson's correlation coefficient = 0.55, $P < 0.01$). Fourth, the components of social support networks may have been changed after egos were diagnosed with HIV and after they disclosed their HIV status to peers. Fifth, because it is difficult to recruit PLWHAs at the community level, we used the two-stage sampling approach to recruit study subjects from the three sites. Potential selection bias may have occurred, as the study population might not be representative of PLWHAs in other areas, limiting the generalizability of the findings. Future large-scale studies are necessary to confirm the findings reported here.

Nevertheless, this study contexts to the social network environment that enables HIV disclosure. In order to improve the treatment-as-prevention strategy, intervention programs that target HIV disclosure as well as increase social support within social networks of egos should be developed and culturally tested. As HIV-infected individuals are more likely to disclose their HIV status to their family members and to alters who provide social support, HIV interventions that improve well-being and quality of life among PLWHAs and reduce HIV transmission should be developed and implemented at both the family and social network level.

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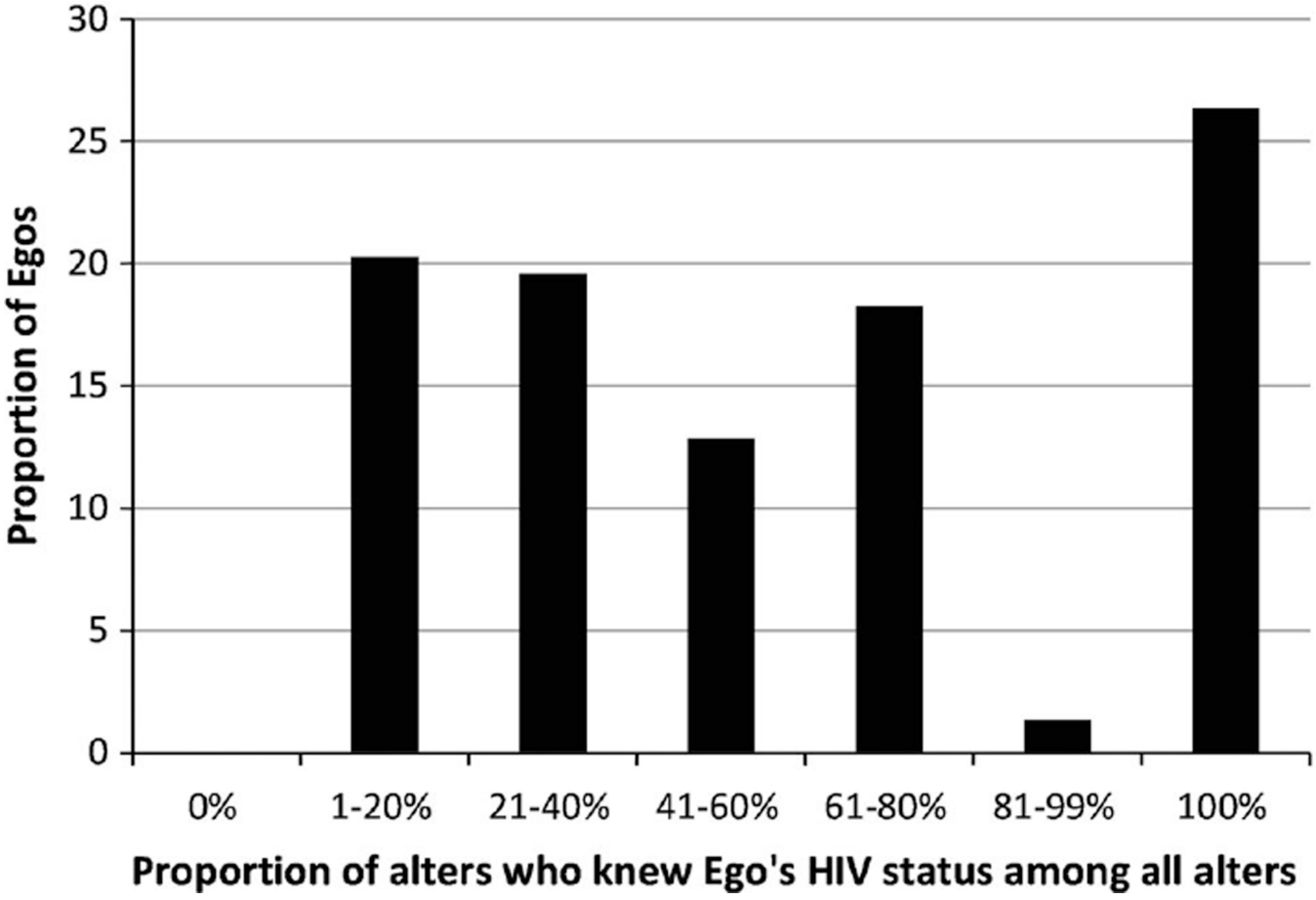

Fig. 1.
Percentage of social network alters who were aware of ego's HIV status

Table 1

Descriptive statistics of HIV positive participants (egos) and their network members (alters)

	HIV positive egos		Network alters	
	No.	%	No.	%
Gender				
Male	103	70.1	508	55.1
Female	44	29.9	414	44.9
Age (years)				
<18	0	0.0	10	1.1
18–25	5	3.4	77	8.4
26–35	47	32.0	289	31.4
36–45	55	37.4	224	24.3
> 45	40	27.2	322	34.9
Marital status				
Married	103	70.1	758	82.2
Unmarried	44	29.9	164	17.8
Education				
Primary school or less	38	25.9	166	18.0
Middle school	75	51.0	471	51.1
High school	28	19.1	195	21.2
College and above	6	4.1	90	9.8

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Table 2

Bivariate analysis of social network components and HIV status disclosure among disclosed and non-disclosed alters

	Total alters		Disclosed alters		Non-disclosed alters		*P* value
	N **(or median)**	**IQR**	***N*** **(or median)**	**% (or IQR)**	***N*** **(or median)**	**% (or IQR)**	
Overall	922		494	53.6	428	46.4	
Network relation							
Relationship							<0.01
Spouse	92		88	95.7	4	4.4	
Other family members[a]	566		339	59.9	227	40.1	
Friends	195		58	29.7	137	70.3	
Other relationships[b]	69		9	13.0	60	87.0	
Egos' trust in alters	5	[5–6]	6	[5–6]	5	[5–6]	<0.01
Contact frequency	4	[3–5]	4	[3–5]	3	[3–4]	<0.01
Network function							
Social network support	25	[20–27]	26	[22–29]	23	[18–26]	<0.01
Family members' gender							0.07
Male	328		224	68.3	104	31.7	
Female	330		203	61.5	127	38.5	
Alters' socio-demographics							
Age (years)							0.10
<18	10		5	50.0	5	50.0	
18–25	77		36	46.8	41	53.3	
26–35	289		140	48.4	149	51.6	
36–45	224		130	58.0	94	42.0	
> 45	322		183	56.8	139	43.2	
Education							0.32
Primary school or less	166		94	56.6	72	43.4	
Middle school	471		254	53.9	217	46.1	
High school	195		94	48.2	101	51.8	
College and above	90		52	57.8	38	42.2	

	Total alters		Disclosed alters		Non-disclosed alters		*P* value
	N **(or median)**	**IQR**	***N*** **(or median)**	**% (or IQR)**	***N*** **(or median)**	**% (or IQR)**	
Gender							<0.01
Male	508		245	48.2	263	51.8	
Female	414		249	60.1	165	39.9	
Marital status							0.17
Married	758		414	54.6	344	45.4	
Unmarried	164		80	48.8	84	51.2	

[a] Other family members except spouse

[b] Neighbor, co-worker, leader, teacher, classmate, doctor and other relationships

Table 3

Poisson regression analysis of HIV status disclosure by egos' own socio-demographics, recruitment site, and years since HIV diagnosis

	exp(β)[a]	95 % CI
Age (years)	1.02**	1.01–1.03
Gender		
Male	Reference	
Female	1.02	0.83–1.25
Education		
Illiteracy or primary school	Reference	
Middle school or above	0.91	0.73–1.12
Marital status		
Married	Reference	
Unmarried	1.29*	1.03–1.62
Recruitment site		
Infectious disease hospital	Reference	
MTT and health center	1.22	0.97–1.54
Years since HIV diagnosis	1.04	0.99–1.09

[a] exp(β) was computed by exponentiating the estimated regression coefficient from the Poisson regression analysis

* $P \leq 0.05$

** $P \leq 0.01$

Table 4

GEE regression analysis of the association between HIV disclosure and social network components and ego/alter characteristics

	Model 1[a]		Model 2[b]		Model 3[c]	
	OR	**95 % CI**	**OR**	**95 % CI**	**OR**	**95 % CI**
Network relation						
Relation (Reference: spouse)						
Friends	0.03**	0.01–0.12	0.02**	0.01–0.09	0.02**	0.01–0.07
Other family members[d]	0.08**	0.02–0.35	0.09**	0.02–0.32	0.08**	0.03–0.26
Other relationships[e]	0.03**	0.00–0.15	0.03**	0.01–0.14	0.03**	0.01–0.12
Ego's trust in alters	1.21	0.84–1.74	1.22	0.84–1.76	1.26	0.86–1.86
Contact frequency	1.32**	1.11–1.57	1.30**	1.09–1.55	1.30**	1.08–1.58
Network function						
Social network support	1.09**	1.03–1.16	1.10**	1.03–1.17	1.10**	1.03–1.18
Network structure						
Network size	0.87*	0.75–1.00	0.91	0.79–1.04	0.92	0.79–1.07
Years since HIV diagnosis			0.99	0.84–1.16	1.00	0.84–1.19
Recruitment site (MMT and health center vs. Infectious disease hospital)			3.51**	1.55–7.95	2.89*	1.27–6.59
Ego's Sociodemographics						
Age (years)					1.04**	1.02–1.08
Gender (female vs. male)					1.15	0.65–2.03
Education (middle school or above vs. illiteracy or primary school)					0.86	0.42–1.75
Marital status (unmarried vs. married)					2.39**	1.33–4.27
Alter's sociodemographics						
Age (>35 vs. ≤35 years old)					0.87	0.55–1.37
Gender (female vs. male)					0.93	0.70–1.23
Education (middle school or above vs. illiteracy or primary school)					1.29	0.74–2.26
Marital status (unmarried vs. married)					0.95	0.56–1.61

Model 1: QIC = 1060.6; QICu = 1033.4
Model 2: QIC = 1043.7; QICu = 1009.2
Model 3: QIC = 1031.8; QICu = 982.1

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* $P \leq 0.05$

** $P \leq 0.01$

[a] Network components only

[b] Network components, recruitment setting, and number of years since HIV diagnosis

[c] Network components, recruitment setting, number of years since HIV diagnosis, and ego/alter demographics

[d] Other family members, not including spouse

[e] Neighbor, co-worker, leader, teacher, classmate, doctor and other relationships