

Emotional, physical and financial burdens of stigma against people living with HIV/AIDS in China

Chen Zhang^a, Xiaoming Li^b, Yu Liu^a, Shan Qiao^b, Liying Zhang^c, Yuejiao Zhou^d, Zhiyong Shen^d and Zhengzhu Tang^d

^aVanderbilt Institute of Global Health, Vanderbilt University, Nashville, TN, USA; ^bArnold School of Public Health, University of South Carolina, Columbia, SC, USA; ^cDepartment of Pediatrics, Wayne State University, Detroit, MI, USA; ^dGuangxi Center for Disease Control and Prevention, Nanning, People's Republic of China

ABSTRACT

Numerous researches have shown pernicious effects of stigma against people living with HIV/AIDS (PLWHA). However, no available studies have reported these negative effects including emotional, physical to financial burdens to PLWHA. In the current study, we aim to explore different types of stigma (e.g., perceived, internalized and enacted) and the relevant consequences among PLWHA in China. A cross-sectional study was conducted from 2012 to 2013 in the Guangxi Autonomous Region in China. The validated Berger HIV Stigma Scale was used to measure various types of stigma. We employed a series of linear, logistic and polytomous regression models to assess the association between stigma and different consequences while accounting for potential confounders for each specific model. Of the total sample, 2987 PLWHA provided valid responses with 63% being male and having an average age of 42.9 years. Perceived, internalized and enacted HIV stigma were prevalent among participants, and resulted in various burdens with different magnitudes in their life contexts. Specially, PLWHA who reported higher perceived and internalized stigma were more likely to be imposed on emotional and physical burdens ($p < .05$). People who reported higher enacted stigma had heavier financial burden compared to their peers ($p < .05$). Our findings revealed that devastating consequences of HIV-related stigma in China. The prevalent stigmatizing attitudes have pushed PLWHA to the fringes of society and affected them at multiple aspects in their life context. We call for tailored efforts to overcome stigma and discrimination against PLWHA.

ARTICLE HISTORY

Received 3 September 2015
Accepted 20 January 2016

KEYWORDS

HIV-related stigma; PLWHA; various burdens; China

Introduction

As of 2014, the number of people living with HIV/AIDS (PLWHA) has increased from 29.8 million in 2001 to 35 million worldwide (WHO, 2015). The mounting number is a consequence of continuous transmission and advanced antiretroviral therapies (Deeks, Lewin, & Havlir, 2013). Although HIV has transferred from a fatal to a manageable chronic disease, PLWHA have encountered many challenges including mental health disorders (Kidia et al., 2015), poverty (Kidia et al., 2015), involuntary privacy disclosure (Remien & Mellins, 2007), lack of adherence to treatment (Remien & Mellins, 2007), stigma and discrimination (Qiao et al., 2015) in their daily lives.

Among these well-identified challenges, stigma is the most frequently mentioned and devastating one faced by PLWHA (Kalichman et al., 2009). The universally occurring stigmatizing attitudes have led to various negative consequences including avoidance of health care,

suboptimal engagement in antiretroviral treatment, psychological distress and financial disadvantages (Rao, Angell, Lam, & Corrigan, 2008). Researchers have identified a few mechanisms on how stigma leads to various sequelae. First, stigma may lead to psychological consequences as PLWHA are suffering prejudiced and discriminatory attitudes that act as constant stressors to burden their mental health (Rao, Angell, et al., 2008). Second, stigma may prevent PLWHA from actively seeking healthcare because of possible stigmatizing attitudes from health professionals, which further deteriorate their health conditions (Famoroti, Fernandes, & Chima, 2013). Third, the prevalent stigma may constrain PLWHA from employment opportunities, which further disempower them from meeting their financial needs (Rao, Angell, et al., 2008).

Some published studies among PLWHA treated stigma as a single domain (Laryea & Gien, 1993). However, stigma could be manifested in multiple domains. To better design

CONTACT Chen Zhang  chen.zhang.1@vanderbilt.edu

© 2016 The Author(s). Published by Taylor & Francis.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

and implement tailored stigma reduction or mitigation interventions among PLWHA, three domains of stigma should be differentiated and considered, including perceived, internalized and enacted stigma (Berger, Ferrans, & Lashley, 2001). Perceived stigma is defined as awareness of discriminatory and prejudicial attitudes from people around (Phillips, Moneyham, & Tavakoli, 2011). Individuals who experienced perceived stigma were more likely to report greater depression (Wolitski, Pals, Kidder, Courtenay-Quirk, & Holtgrave, 2009), lower satisfaction with life (Greeff et al., 2010) and poorer quality of life (Abboud, Nouredine, Huijter, DeJong, & Mokhbat, 2010). Internalized stigma is a negative belief toward themselves after incorporating negative views from others who hold stigmatizing attitudes toward PLWHA (Phillips et al., 2011). People with internalized stigma even had poorer quality of life and greater depression problems compared to their peers who only suffer perceived stigma (Phillips et al., 2011). Enacted stigma refers to their experience regarding others' discriminatory behaviors based upon their sero-status (Phillips et al., 2011). Existing studies have demonstrated that enacted stigma decreased HIV voluntary disclosure (Wolitski et al., 2009), delayed HIV-related care-seeking and constrained employment opportunities (Kennedy et al., 2013).

In China, a total number of 780,000 PLWHA were estimated by the year 2013 (UNAIDS, 2013). PLWHA have been often blamed for their immoral behaviors or evil sins, and the contraction of HIV is deemed as a punishment for their misconducts (Cao et al., 2010). PLWHA in China are generally experiencing an even higher degree of stigma compared to their Western peers as China has a more conservative social environment (Rao, Pryor, Gaddist, & Mayer, 2008; Thi et al., 2008).

Although stigma against PLWHA has been studied for decades, specific domains of stigma are ambiguous in existing literatures (Sayles et al., 2008; Wolitski et al., 2009). Furthermore, no available literature examined various burdens of stigma among this vulnerable group (Varni, Miller, McCuin, & Solomon, 2012). Therefore, in the current study, we aim to explore specific domains of stigma (e.g., perceived, internalized and enacted) and their related sequelae among PLWHA in China.

Method

Study design and procedure

Data in the current study were derived from a cross-sectional study conducted from 2012 to 2013 in the Guangxi Autonomous Region (Guangxi) in China. Detailed study procedure was documented elsewhere (Qiao et al., 2015). Briefly, using a pre-established sample scheme in the

protocol, we selected the top 12 sites including two cities and 10 counties which had the largest cumulative cases. Approximately 10% cases were randomly selected from the sampling pool. Among the 3002 recruited patients, 2987 of them completed the survey and were included in the current analysis.

Among participants, about 20% completed the questionnaire on their own. For the rest of the participants, they were assisted by local Centers for Disease Control and Prevention (CDC) staff and healthcare workers who had received intensive training on interviewing skills and research ethics with PLHIV prior to the field work. The Institutional Review Boards at Wayne State University in the USA and Guangxi CDC in China reviewed and approved the research protocol.

Measurements

Background information

Participants were asked to provide information regarding their gender, age (years), years of school (years), ethnicity, religion, marital status, place or original residence (urban vs. rural). They were further asked if they were ever infected with other sexually transmitted diseases (yes vs. no), and the route of infection. In addition, several psychological scales were modified and utilized in the survey, including assessments of self-esteem ($\alpha = 0.94$), resilience ($\alpha = 0.96$), social support ($\alpha = 0.98$) and coping skills ($\alpha = 0.93$). These assessment scales have been validated in previous studies conducted in Chinese settings (Qian et al., 2007; Qiao et al., 2015).

HIV stigma

The validated Berger HIV Stigma Scale (Berger et al., 2001) was used to measure three types of stigma: perceived, internalized and enacted. Each stigma item was measured by a 4-point Likert-type scale (e.g., strongly disagree, disagree, agree, strongly agree) with a higher values indicating a greater agreement with the statement. Perceived stigma was measured by a few questions related to awareness of societal norms and prejudicial actions toward PLWHA (e.g., "most people consider PLWHA filthy"). A total of six items with a score ranged from 6 to 24 measured the perceived stigma with a Cronbach's $\alpha = 0.905$. Internalized stigma was evaluated by their negative feelings about oneself because of contracting HIV (e.g., I feel guilty because I have HIV). Eight items with a score ranged from 7 to 32 measured the internalized stigma with a Cronbach's $\alpha = 0.915$. Enacted stigma was measured by questions regarding discriminatory experience that the PLWHA have encountered (e.g., I will lose my job if my sero-status is known by others). A study conducted in a PLWHA community has validated

the Berger HIV Stigma Scale in China (Qiao et al., 2015). In the current study, two items with a Cronbach's α of 0.627 (ranged from 1 to 6) were used in the current study. The overall Cronbach's α was 0.927 for the 16-item stigma scale in the current study.

Emotional burden

Emotional burden of HIV stigma was assessed using their smoking status, alcohol use, drug use, depression and anxiety. Smoking status, alcohol drinking and illegal drug use were measured by each single question "have you ever used cigarettes, alcohol and drugs in the past six months?" Depression was measured by the short version of Center for Epidemiological Studies Depression Scale (CESD-10) with a Cronbach's α of 0.76. The CESD-10 was validated in the Chinese population (Qiao et al., 2015; Radloff, 1977), and a higher score indicated a severe depression problem. Anxiety was measured by the Zung Self-Rating Anxiety Scale (SAS) (Sun, Wu, Qu, Lu, & Wang, 2014; Zung, 1971). The SAS has been validated in China and its Cronbach's α was 0.91.

Physical burden

Physical burden of HIV stigma was evaluated based on their most recently available CD4 counts (counts/ml) and viral loads (copies/ml), and physical activity in the past month. Based upon the distribution of the CD4 cell counts per cubic millimeter (ml) of blood, we categorized the CD4 counts into low (<250 counts/ml), medium (251–500 counts/ml) and high (>500 counts/ml) groups. For the viral load, three groups were categorized into three groups including low (1–49 copies/ml), medium (50–1,000 copies/ml) and high (>1000 copies/ml). The lower the viral load, the better physical the condition is. In addition, physical activities in the past month were measured by six items asking participants to what extent (e.g., affected a lot, affected a little, not affected at all) the disease affected their daily activities (e.g., showing, walking for a mile, climbing stairs and running). We summed the assigned scores with a higher score indicating a better physical activity capacity. The Cronbach's α of the physical activity scale was as high as 0.92 in the current study.

Financial burden

Financial burden of HIV stigma was assessed using monthly household income in the currency of China (<999, 1000–1999, 2000–2999, 3000 and above RMB/month, 6.2 yuan = 1 USD at the time of the survey), employment status (not work at all, part-time job and full-time job), and balance between income and expenditure (not enough, barely enough and enough).

Analytical procedure

To obtain the best estimate of the exposure–outcome relationship, we used an explanatory modeling strategy by setting three domains of stigma (e.g., perceived, internalized and enacted) as exposure variables, and the different consequences as outcome variables (e.g., emotional, physical and financial burdens). We employed a series of linear, logistic and polytomous regression models to assess the association between stigma and different outcomes while accounting for potential confounders for each specific model. For each specific model, we first used the directed acyclic graphs (DAGs) as well as a prior knowledge to choose potential confounders (Rothman, Greenland, & Lash, 2008). Second, we employed the 10% change-in-estimate as a criterion to select confounders in each final model. We reported adjusted coefficients (β) and its 95% confidence interval (CI) if the outcome variables are continuous, and adjusted odds ratio (aOR) and its 95% CI if the outcome variables are categorical. All analyses were conducted using the STATA package (Version 12, College Station, TX).

Results

General description

In the current sample, the mean score of perceived, internalized and enacted stigma was 15.53 (SD = 3.53), 18.49 (SD = 4.35) and 2.09 (SD = 0.45), respectively (Table 1). Among participants, half of them reported smoking, 42.75% reported alcohol use and 19.25% had illicit drug use behaviors in their lifetime. Their depression and anxiety scores were 7.78 (SD = 4.89) and 31.08 (SD = 8.87), respectively. In the current sample, 34.65% of them fell in the low CD4 counts group ranging from 1 to 250 counts per ml, 42.22% were in the medium group with 251–500 counts per ml and 18.92% were in the high group with more than 500 counts per ml. For the group of viral load, 40.84% of them were in the low viral load group (1–49 copies/ml), 9.64% of them were in the medium group with viral load ranged between 50 and 1000 copies/ml and 4.52% of them fell in the high viral load group (>1000 copies/ml). Almost half of them had monthly household income less than 1000 RMB, had no job or just part-time job and could not make both ends meet financially.

Multivariable analyses

Tables 2–4 revealed the association between stigma and emotional, physical and financial burden after controlling for different sets of confounders for each specific

Table 1. Descriptive analyses on key variables among HIV positive people ($n = 2987$).

	Strata of categorical data	%, (n/N) for categorical data
Exposure variable		
Perceived stigma (mean, sd, range)		15.53 (3.53), 6–24
Internalized stigma (mean, sd, range)		18.49 (4.35), 7–32
Enacted stigma (mean, sd, range)		2.09 (0.45), 1–6
Outcome		
<i>Emotional burden</i>		
Smoking (% (n/N))	Yes	51.32% (1533/2987)
Alcohol use % (% (n/N))	Yes	42.75% (1277/2987)
Drug use (% (n/N))	Yes	19.25% (575/2987)
Depression (mean, sd, range)		7.78 (4.89), 0–30
Anxiety (mean, sd, range)		31.08 (8.87), 3–80
<i>Physical burden</i>		
CD4 group (% (n/N))	Low (1–250)	34.65% (1035/2987)
	Medium (251–500)	42.22% (1261/2987)
	High (>500)	18.92 (565/2987)
Viral load group (% (n/N))	Low (1–49copies/ml)	40.84% (1220/2987)
	Medium (50–1000 copies/ml)	9.64% (288/2987)
	High (>1000 copies/ml)	4.52% (135/2987)
Fitness scale (mean, sd, range)		11.44 (2.97), 5–15
<i>Financial burden</i>		
Income (yuan/m) (% (n/N))	<1000	52.63% (1572/2987)
	1000–1999	29.13% (870/2987)
	2000–2999	11.18% (334/2987)
	>=3000	6.09% (182/2987)
Employment status (% (n/N))	No work	26.78% (800/2987)
	Part-time	33.21% (992/2987)
	Full time	39.57% (1182/2987)
Meet expense balance (% (n/N))	More than Enough	10.55% (315/2987)
	Barely enough	39.50% (1180/2987)
	Not enough	49.75% (1486/2987)
Covariates		
Years of school (mean, sd, range)		6.97 (3.00), 0–18
Age (mean, sd, range)		42.94 (12.83), 18–88
Self-esteem score (mean, sd, range)		3.31 (0.72), 1–5
Resilience score (mean, sd, range)		3.19 (0.84), 1–5
Coping skill score (mean, sd, range)		2.53 (0.65), 1–5
No ART adherence score		0.49 (0.78), 0–4
Gender (% (n/N))	Male	62.81% (1876/2987)
	Female	37.19% (1111/2987)
Ethnicity (% (n/N))	Han	70.61 (2109/2987)
	Zhuang	25.88% (773/2987)
	Others	3.35% (100/2987)
Religious (% (n/N))	Atheist	91.4% (2703/2987)
	Buddhism	7.67% (229/2987)
	Others	0.94% (28/2987)
Residence (% (n/N))	Urban	19.79% (591/2987)
	Rural	80.05% (2391/2987)
Marital status (% (n/N))	Never married	32.74% (978/2987)
	Ever married	64.91% (1939/2987)
Co-infection (% (n/N))	Ever	15.60% (466/2987)
	Never	69.87% (2087/2987)
Route of infection (% (n/N))	Sex with stable partners	28.52% (852/2987)
	Sex with casual partners	15.67% (468/2987)
	Sex with commercial partners	21.49% (642/2987)
	Blood products	1.00% (30/2987)
	Sharing needles	15.77% (471/2987)
	Others	0.80% (24/2987)
	Don't know	16.30% (487/2987)

Note: ART, antiretroviral therapy.

model. As shown in Table 2, perceived, internalized and enacted stigma all increased the likelihood of suffering depression and anxiety ($p < .05$). Perceived and internalized stigma marginally decreased the chance of using alcohol (aOR = 0.98, 95CI% = 0.95, 1.00 for perceived; aOR = 0.98, 95CI% = 0.96, 1.00 for internalized stigma, respectively).

Table 3 revealed that stigma significantly affected PLWHA's physical health. Comparing to people who had lower perceived or internalized stigma, those with higher stigma score were more likely to report higher level of viral load ($\beta = 1.05$, 95% CI = 1.00, 1.09 for perceived stigma; $\beta = 1.05$, 95% CI = 1.02, 1.09 for internalized stigma). Meanwhile, all three types of stigma reduced PLWHA's daily physical activity capacity significantly after controlling confounders in all models ($\beta = -0.13$, 95% CI = -0.17 , -0.09 for perceived stigma; $\beta = -0.14$, 95% CI = -0.17 , -0.11 for internalized stigma; and $\beta = -0.12$, 95% CI = -0.15 , -0.09 for enacted stigma, respectively).

Compared with PLWHA with lower perceived or enacted stigma, those with higher stigma score were more likely to report lower monthly household income. Similarly, people with higher internalized or enacted stigma were less likely to have a full-time job. Perceived and enacted stigma made PLWHA less likely to make both ends meet. Specifically, our data revealed that one unit increase in the enacted stigma will result in 37% less likely to make a medium-high income (aOR = 0.63, 95% CI = 0.42, 0.95), 93% and 57% are more likely to report no work or a part-time job (aOR = 1.93, 95% CI = 1.48, 2.52 for no work; aOR = 1.57, 95% CI = 1.20, 2.04 for part-time work), 32% and 24% were less likely to report enough or barely enough to meet the their financial needs (aOR = 0.68, 95% CI = 0.47, 0.99 for enough; aOR = 0.76, 95% CI = 0.62, 0.93 for barely enough) (Table 4).

Discussion

Our findings revealed concerning consequences caused by HIV-related stigma among PLWHA in China. The prevalent stigmatizing attitudes have pushed PLWHA to the fringes of society and exerted negative effects on many aspects in their life context.

By assessing associations between emotional burden and stigma, we found depression and anxiety were more sensitive to stigma that PLWHA encountered. All three domains of stigma increased the likelihood of developing depression and anxiety problems among this population. On the other hand, we did not observe significant impacts of various types of stigma on behavioral outcomes (e.g., smoking and drug use). Perhaps

Table 2. The association between perceived, internalized and enacted stigma and its emotional burden.

	Model 1: emotional burden				
	Depression (β , 95% CI)	Anxiety (β , 95% CI)	Smoking (aOR, 95% CI)	Alcohol use (aOR, 95% CI)	Drug (aOR, 95% CI)
Perceived stigma	0.20 (0.15, 0.25)**** ^{11a}	0.17(0.08, 0.26)**** ^{11b}	0.98 (0.96, 1.01) ^{11c}	0.98 (0.95, 1.00)* ^{11d}	1.03 (0.99, 1.07) ^{11e}
Internalized stigma	0.29(0.25, 0.32)**** ^{12a}	0.51 (0.45, 0.58)**** ^{12b}	1.01 (0.99, 1.03) ^{12c}	0.98 (0.96, 1.00)* ^{12d}	1.01 (0.97, 1.04) ^{12e}
Enacted stigma	2.23 (1.86, 2.61)**** ^{13a}	5.02 (4.34, 5.70)**** ^{13b}	1.33 (1.03, 1.71)* ^{13c}	0.99 (0.82,1.20) ^{13d}	1.03 (0.79, 1.35) ^{13e}

Notes: Confounders controlled by each model. Model 1: Emotional burden. Model 11a. self-esteem, resilience, and co-infection ; Model 11b. self-esteem, resilience, and co-infection ; Model 11c. Religious, marital status, self-esteem, coping skills, co-infection, route of infection; Model 11d. Years of school, resilience, co-infection, route of infection; Model 11e. Self-esteem, resilience, route of infection. Model 12a. self-esteem, resilience; Model 12b. self-esteem, resilience; Model 12c. ethnicity, religious, self-esteem, coping skills, co-infection, employment; Model 12d. religious, residence, year of school, resilience, co-infection, route of infection; Model 12e. religious, self-esteem, coping skills, co-infection. Model 13a. none; Model 13b. none; Model 13c. gender, employment status, route of infection; Model 13d. gender, religious, income, year of school, age, disclosure, co-infection, route of infection; Model 13e. gender, employment status, route of infection.

* $p < .05$.

** $p < .01$.

**** $p < .001$.

**** $p < .0001$.

behavioral changes are more distal consequences than emotional changes as the result of stigmatizing experience. We found that alcohol use was negatively associated with stigma, which is contradictory to studies conducted in other settings (Beer & Skarbinski, 2014; Yaya et al., 2014). There are some potential explanations. First, alcohol use may not be a sensitive indicator for stigma against PLWHA as alcohol drinking is very common for social purposes among general populations in Chinese settings (Li et al., 2011). Second, PLWHA may use some other coping strategies rather than alcohol use. Third, as PLWHA who are on antiretroviral therapy (ART) were advised to moderately use alcohol to avoid side effects of the medication (Schneider, Chersich, Neuman, &

Parry, 2012), the reverse association may be confounded by ART regimes.

The evaluation between stigma and physical burden revealed that PLWHA with higher stigma were more likely to have higher viral loads compared to their peers who encountered less degree of stigma. Perhaps people experienced more stigma were less likely to seek for healthcare, less adherent to ART treatment, more reluctant to manage the HIV in a positive way (Parsons, Bond, & Nixon, 2015; Steward, Bharat, Ramakrishna, Heylen, & Ekstrand, 2013), or experience more constraints of physical activities in their daily lives. On the other hand, the relationship between stigma and CD4 may be more complicated than a

Table 3. The association between perceived, internalized and enacted stigma and its physical burden.

	Model 2: physical burden				
	CD4 counts		Daily physical activity capacity		
	aOR, 95% CI	Viral Loads	β , 95% CI		
Perceived stigma	<250 counts	1.00 (ref) ^{21a}	Low (1-49 copies/ml)	1.00 (ref) ^{21b}	
	250–500 counts vs. <250 counts	1.00 (0.97, 1.03)	Medium (50–1000 copies/ml) vs. low	1.05 (1.00, 1.09)*	–0.13 (–0.17, –0.09)**** ^{21c}
	>500 counts vs. <250 counts	1.01(0.97, 1.05)	High (>1000 copies/ml) vs. low	0.97 (0.92,1.03)	
Internalized stigma	<250 counts	1.00 (ref) ^{22a}	Low (1–49 copies/ml)	1.00 (ref) ^{22b}	–0.14 (–0.17, –0.11)**** ^{22c}
	250–500 counts vs. <250 counts	1.02 (1.00, 1.05)	Medium (50–1000 copies/ml) vs. low	1.05(1.02, 1.09)****	
	>500 counts vs. <250 counts	1.01(0.98,1.04)	High (>1000 copies/ml) vs. low	1.01 (0 .97, 1.07)	
Enacted stigma	<250 counts	1.00 (ref) ^{23a}	Low (1–49 copies/ml)	1.00 (ref) ^{23b}	–0.12 (–0.15, –0.09)**** ^{23c}
	250–500 counts vs. <250 counts	1.21 (0.99, 1.48)	Medium (50–1000 copies/ml) vs. low	0.75 (0.51, 1.11)	
	>500 counts vs. <250 counts	1.25 (1.00, 1.57)	High (>1000 copies/ml) vs. low	0.91(0.60,1.39)	

Notes: Confounders controlled by each model. Model 2. Physical burden. Model21a–b: gender, ethnicity, religious, residence, employment status, marital status, income, year of school, age, no adherence to ART, ART treatment; Model21c: : gender, ethnicity, religious, residence, employment status, marital status, income, year of school, age. Model22a–b: gender, ethnicity, religious, residence, employment status, marital status, income, year of school, age, no adherence to ART, ART treatment; Mode22c: : gender, ethnicity, religious, residence, employment status, marital status, income, year of school, age. Model 23a: ART treatment, no adherence to ART, marital status, employment status; Model 23b: ART treatment, no adherence to ART; Model 23c: employment status.

* $p < .05$.

** $p < .01$.

**** $p < .001$.

**** $p < .0001$.

Table 4. The association between perceived, internalized and enacted stigma and its financial burden.

	Model 3: financial burden					
	Income		Employment		Balance between income and expenditure	
	aOR, 95% CI		aOR, 95% CI		aOR, 95% CI	
Perceived stigma	Low	1.00 (ref) ^{31a}	Full time	1.00 (ref) ^{31b}	Not enough	1.00 (ref) ^{31c}
	Median vs. low	1.00 (0.97, 1.02)	No work vs. full time	0.99 (0.96, 1.01)	Enough vs. not enough	0.96(0.93, 0.99)*
	Median high vs. low	0.96 (0.93, 0.99)*	Part time vs. full time	1.01(0.98, 1.04)	Barely enough vs. not enough	0.98(0.96, 1.01)
	High vs. low	1.02 (0.97, 1.07)				
Internalized stigma	Low	1.00 (ref) ^{32a}	Full time	1.00 (ref) ^{32b}	Not enough	1.00 (ref) ^{32c}
	Median vs. low	0.99 (0.97, 1.01)	No work vs. full time	1.02 (1.00, 1.05)*	Enough vs. not enough	0.97 (0.94, 1.00)
	Median high vs. low	0.98 (0.95, 1.01)	Part time vs. full time	1.04 (1.02, 1.07)****	Barely enough vs. not enough	0.98 (0.96, 1.00)
	High vs. low	1.04 (1.00, 1.08)				
Enacted stigma	Low	1.00 (ref) ^{33a}	Full time	1.00 (ref) ^{33b}	Not enough	1.00 (ref) ^{33c}
	Median vs. low	0.83 (0.67, 1.03)	No work vs. full time	1.93 (1.48, 2.52)****	Enough vs. not enough	0.68 (0.47, 0.99)*
	Median high vs. low	0.63 (0.42, 0.95)*	Part time vs. full time	1.57 (1.20, 2.04)****	Barely enough vs. not enough	0.76 (0.62, 0.93)**
	High vs. low	0.86(0.59, 1.27)				

Notes: Confounders controlled by each model. Model 3. Financial burden. Mode31a–c: gender, ethnicity, religious, residence, marital status, year of school, age, co-infection, social support. Mode32a–c: gender, ethnicity, residence, marital status, year of school, age, co-infection, social support. Mode33a–c: gender, ethnicity, religious, residence, marital status, year of school, age, co-infection, social support.

* $p < .05$.

** $p < .01$.

**** $p < .001$.

**** $p < .0001$.

simple relationship. CD4 counts may be pre-determined by some other more proximal factors, such as environmental, immunological and genetic factors rather than stigmatizing experience itself (Mair et al., 2008).

Our findings revealed that enacted stigma was most likely to affect the financial status of PLWHA. The higher degree of enacted stigma constrained PLWHA's capacity to make a higher income, obtain a full-time job or meet the financial needs at their households. Enacted stigma is a discriminatory experience that the PLWHA have encountered in social contexts where they belong to (Phillips et al., 2011). PLWHA may be more likely to be discriminated by their co-workers due to their sero-status, which further suppressed their limited working opportunities. With the advent of available ART regime, HIV has been transformed from a fatal illness to a long-term chronic condition with a normal life expectancy for PLWHA over the past decade. An intervention that aims to help PLWHA pursue a normal life path by targeting on physical, psychological and contextual barriers is urgently desired.

The current study is the first one to examine the various sequelae of stigma among PLWHA in China. The large sample size provided a sufficient power in the current study. In addition, we identified the association-specific confounders by employing the DAG. Using the 10% change-in-estimate, a specific set of confounders were selected. The rigorous procedure warrants the validity and reliability our estimates. On the other hand, a

few caveats need to keep in mind while interpreting findings in the current study. First, due to the nature of cross-sectional study, we cannot make any casual inference between the exposure and outcome variables. Second, as all participants in the current study were recruited from rural areas in Guangxi of China, findings might not be generalizable to other areas of China. Third, due to limited space in the survey, data on some important factors that may contribute to the negative consequences of HIV stigma were not collected. Fourth, due to different data collection routes (self-administered vs. interviewer-assisted), responses may suffer information biases.

Despite these limitations, findings in our study shed light on implementing scalable stigma-reduction campaigns in China. An ecological and multilateral framework that involves stakeholders at multiple levels can be developed to address this persistent and even progressing epidemic. At the individual level, training for adaptively coping strategies and disease management skills is the key for success (Rodger et al., 2010). In addition, workshops that address their psychological well-being are also an essential component to fight against the HIV stigma. The empowerment procedure can help PLWHA to appropriately manage their disease both physically and psychologically. We need to design intervention activities that fit to family settings. At the institutional level, such as hospitals, schools, working places, leaders of these institutions need to encourage their staff to provide a non-judgmental and respectful

environment for PLWHA. As enacted stigma is the major contributor to PLWHA's financial difficulties, an intervention targeting enacted stigma may help them with financial survival. At the social level, health professionals can promote the anti-stigma norms through community-based programs and work through non-government organizations. Both top-bottom (e.g., orchestrated by traditional power structures) and grass-root (e.g., driven by a community's politics) strategies can be implemented to address the issue of stigma against PLWHA. Finally, at the policy-level, policy-makers should launch law and policy reforms to prohibit discrimination against PLWHA.

In conclusion, we call for multilateral-multilevel efforts to overcome stigma and discrimination against PLWHA. An effective strategy to cope with stigma will not only enhance the psychological, physical and financial status of the PLWHA, but serve as an essential component in curbing the concomitant public health burdens stemming from the ever-growing HIV epidemic in China.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

The study was supported by the National Institute of Child and Human Development [#R01HD074221]. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute of Child and Human Development.

References

- Aboud, S., Nouredine, S., Huijter, H. A., DeJong, J., & Mokhbat, J. (2010). Quality of life in people living with HIV/AIDS in Lebanon. *AIDS Care*, 22(6), 687–696. doi:10.1080/09540120903334658
- Beer, L., & Skarbinski, J. (2014). Adherence to antiretroviral therapy among HIV-infected adults in the United States. *AIDS Education and Prevention*, 26(6), 521–537. doi:10.1521/aeap.2014.26.6.521
- Berger, B. E., Ferrans, C. E., & Lashley, F. R. (2001). Measuring stigma in people with HIV: Psychometric assessment of the HIV stigma scale. *Research in Nursing & Health*, 24(6), 518–529.
- Cao, H., He, N., Jiang, Q., Yang, M., Liu, Z., Gao, M., ... Detels, R. (2010). Stigma against HIV-infected persons among migrant women living in Shanghai, China. *AIDS Education and Prevention*, 22(5), 445–454. doi:10.1521/aeap.2010.22.5.445
- Deeks, S. G., Lewin, S. R., & Havlir, D. V. (2013). The end of AIDS: HIV infection as a chronic disease. *The Lancet*, 382 (9903), 1525–1533. doi:10.1016/s0140-6736(13)61809-7
- Famoroti, T. O., Fernandes, L., & Chima, S. C. (2013). Stigmatization of people living with HIV/AIDS by health-care workers at a tertiary hospital in KwaZulu-Natal, South Africa: A cross-sectional descriptive study. *BMC Med Ethics*, 14(Suppl. 1), S6. doi:10.1186/1472-6939-14-s1-s6
- Greeff, M., Uys, L. R., Wantland, D., Makoae, L., Chirwa, M., Dlamini, P., ... Holzemer, W. L. (2010). Perceived HIV stigma and life satisfaction among persons living with HIV infection in five African countries: A longitudinal study. *International Journal of Nursing Studies*, 47(4), 475–486. doi:10.1016/j.ijnurstu.2009.09.008
- Kalichman, S. C., Simbayi, L. C., Cloete, A., Mthembu, P. P., Mkhonta, R. N., & Ginindza, T. (2009). Measuring AIDS stigmas in people living with HIV/AIDS: The internalized AIDS-related stigma scale. *AIDS Care*, 21(1), 87–93. doi:10.1080/09540120802032627
- Kennedy, C. E., Baral, S. D., Fielding-Miller, R., Adams, D., Dlodlu, P., Sithole, B., ... Kerrigan, D. (2013). "They are human beings, they are Swazi": Intersecting stigmas and the positive health, dignity and prevention needs of HIV-positive men who have sex with men in Swaziland. *Journal of the International AIDS Society*, 16(Suppl. 3), 18749. doi:10.7448/ias.16.4.18749
- Kidia, K., Machando, D., Bere, T., Macpherson, K., Nyamayaro, P., Potter, L., ... Abas, M. (2015). "I was thinking too much": Experiences of HIV-positive adults with common mental disorders and poor adherence to antiretroviral therapy in Zimbabwe. *Tropical Medicine & International Health*, 20(7), 903–913. doi:10.1111/tmi.12502
- Laryea, M., & Gien, L. (1993). The impact of HIV-positive diagnosis on the individual, part 1: Stigma, rejection, and loneliness. *Clinical Nursing Research*, 2(3), 245–263
- Li, Y., Jiang, Y., Zhang, M., Yin, P., Wu, F., & Zhao, W. (2011). Drinking behaviour among men and women in China: The 2007 China chronic disease and risk factor surveillance. *Addiction*, 106(11), 1946–1956. doi:10.1111/j.1360-0443.2011.03514.x
- Mair, C., Hawes, S. E., Agne, H. D., Sow, P. S., N'Doye, I., Manhart, L. E., ... Kiviat, N. B. (2008). Factors associated with CD4 lymphocyte counts in HIV-negative Senegalese individuals. *Clinical & Experimental Immunology*, 151(3), 432–440. doi:10.1111/j.1365-2249.2007.03573.x
- Parsons, J. A., Bond, V. A., & Nixon, S. A. (2015). "Are we not human?" Stories of stigma, disability and HIV from Lusaka, Zambia and their implications for access to health services. *PLoS One*, 10(6), e0127392. doi:10.1371/journal.pone.0127392
- Phillips, K. D., Moneyham, L., & Tavakoli, A. (2011). Development of an instrument to measure internalized stigma in those with HIV/AIDS. *Issues in Mental Health Nursing*, 32(6), 359–366. doi:10.3109/01612840.2011.575533
- Qian, H. Z., Wang, N., Dong, S., Chen, H., Zhang, Y., Chamot, E., ... Shao, Y. (2007). Association of misconceptions about HIV transmission and discriminatory attitudes in rural China. *AIDS Care*, 19(10), 1283–1287. doi:10.1080/09540120701402814
- Qiao, S., Li, X., Zhou, Y., Shen, Z., Tang, Z., & Stanton, B. (2015). Factors influencing the decision-making of parental HIV disclosure: A socio-ecological approach. *AIDS*, 29

- (Suppl. 1), S25–S34. doi:10.1097/qad.0000000000000670
- Radloff, L. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1, 385–401.
- Rao, D., Angell, B., Lam, C., & Corrigan, P. (2008). Stigma in the workplace: Employer attitudes about people with HIV in Beijing, Hong Kong, and Chicago. *Social Science & Medicine*, 67(10), 1541–1549. doi:10.1016/j.socscimed.2008.07.024
- Rao, D., Pryor, J. B., Gaddist, B. W., & Mayer, R. (2008). Stigma, secrecy, and discrimination: Ethnic/racial differences in the concerns of people living with HIV/AIDS. *AIDS and Behavior*, 12(2), 265–271. doi:10.1007/s10461-007-9268-x
- Remien, R. H., & Mellins, C. A. (2007). Long-term psychosocial challenges for people living with HIV: Let's not forget the individual in our global response to the pandemic. *AIDS*, 21(Suppl. 5), S55–63. doi:10.1097/01.aids.0000298104.02356.b3
- Rodger, A. J., Brecker, N., Bhagani, S., Fernandez, T., Johnson, M., Tookman, A., & Bartley, A. (2010). Attitudes and barriers to employment in HIV-positive patients. *Occupational Medicine*, 60(6), 423–429. doi:10.1093/occmed/kqq077
- Rothman, K., Greenland, S., & Lash, T. (2008). *Modern epidemiology*. Philadelphia, PA: Lippincott, Williams & Wilkins.
- Sayles, J. N., Hays, R. D., Sarkisian, C. A., Mahajan, A. P., Spritzer, K. L., & Cunningham, W. E. (2008). Development and psychometric assessment of a multidimensional measure of internalized HIV stigma in a sample of HIV-positive adults. *AIDS and Behavior*, 12(5), 748–758. doi:10.1007/s10461-008-9375-3
- Schneider, M., Chersich, M., Neuman, M., & Parry, C. (2012). Alcohol consumption and HIV/AIDS: The neglected interface. *Addiction*, 107(8), 1369–1371. doi:10.1111/j.1360-0443.2012.03824.x
- Steward, W. T., Bharat, S., Ramakrishna, J., Heylen, E., & Ekstrand, M. L. (2013). Stigma is associated with delays in seeking care among HIV-infected people in India. *Journal of the International Association of Providers of AIDS Care (JIAPAC)*, 12(2), 103–109. doi:10.1177/1545109711432315
- Sun, W., Wu, M., Qu, P., Lu, C., & Wang, L. (2014). Psychological well-being of people living with HIV/AIDS under the new epidemic characteristics in China and the risk factors: A population-based study. *International Journal of Infectious Diseases*, 28, 147–152. doi:10.1016/j.ijid.2014.07.010
- Thi, M. D., Brickley, D. B., Vinh, D. T., Colby, D. J., Sohn, A. H., Trung, N. Q., ... Mandel, J. S. (2008). A qualitative study of stigma and discrimination against people living with HIV in Ho Chi Minh City, Vietnam. *AIDS and Behavior*, 12 (Suppl. 4), 63–70. doi:10.1007/s10461-008-9374-4
- UNAIDS. (2013). *HIV in Asia and the Pacific UNAIDS report 2013*. Joint United Nations Programmes on HIV/AIDS. Retrieved from http://www.unaids.org/sites/default/files/media_asset/2013_HIV-Asia-Pacific_en_0.pdf
- Varni, S. E., Miller, C. T., McQuin, T., & Solomon, S. E. (2012). Disengagement and engagement coping with HIV/AIDS stigma and psychological well-being of people with HIV/AIDS. *Journal of Social and Clinical Psychology*, 31(2), 123–150.
- WHO. (2015). *Global Health Observatory (GHO) data_HIV/AIDS*. Retrieved from <http://www.who.int/gho/hiv/en/>
- Wolitski, R. J., Pals, S. L., Kidder, D. P., Courtenay-Quirk, C., & Holtgrave, D. R. (2009). The effects of HIV stigma on health, disclosure of HIV status, and risk behavior of homeless and unstably housed persons living with HIV. *AIDS and Behavior*, 13(6), 1222–1232. doi:10.1007/s10461-008-9455-4
- Yaya, I., Landoh, D. E., Saka, B., Patchali, P. M., Wasswa, P., Aboubakari, A. S., ... Pitche, P. (2014). Predictors of adherence to antiretroviral therapy among people living with HIV and AIDS at the regional hospital of Sokode, Togo. *BMC Public Health*, 14, 1308. doi:10.1186/1471-2458-14-1308
- Zung, W. W. (1971). A rating instrument for anxiety disorders. *Psychosomatics*, 12(6), 371–379. doi:10.1016/s0033-3182(71)71479-0