Archives of Public Health

RESEARCH

Open Access

Multilevel factors associated with HIV-related stigma among women living with HIV in Guangdong Province, China: a social-ecological model-informed study

Yufan Xie[1†], Shuang Gao[2†], Qian Wang[3†], Min Cai[2], Shuaixin Feng[1], Zhaoqian Huang[1], Ying Huang[1], Yeting Hong[1], Xiaoxia Tan[1], Jinbin Li[1], Li Yuan[2], Fenghua Liu[2*†] and Hongbo Jiang[1*†]

Abstract

Background HIV-related stigma continues to hinder optimal HIV care, and its determinants should be understood at multiple levels. Based on the social-ecological model, this study aimed to explore factors associated with HIV-related stigma among women living with HIV in Guangdong Province, China.

Methods A cross-sectional study was conducted from July to August 2022 to recruit newly reported women living with HIV with a history of pregnancy or current pregnancy in 2021 in 21 cities in Guangdong Province. HIV-related stigma was assessed using an abbreviated Chinese version of Berger's HIV Stigma Scale. Univariate and multivariable hierarchical regression analyses based on the social-ecological model were conducted to explore factors associated with HIV-related stigma and its four dimensions (personalized stigma, disclosure concerns, negative self-image and concerns about public attitudes) at the community/hospital, interpersonal, and individual levels.

Results A moderate level of HIV-related stigma was found among the 360 participants included, with a mean score of 45.26. Multivariable hierarchical regression analysis showed that at the community/hospital-level, individuals were more likely to experience high levels of HIV-related stigma if they had experienced the discriminatory behaviors from health care workers (*aOR* = 2.34, 95%*CI*: 1.48–3.70) and if they rated serostatus disclosure services as less helpful (*aOR* = 0.69, 95%*CI*: 0.48–0.98). At the interpersonal-level, individuals with an HIV-positive partner (*aOR* = 1.71, 95%*CI*: 1.01–2.90) were more likely to experience high levels of HIV-related stigma than those with an HIV-negative or unknown partner. Individuals with high resilience (*aOR* = 0.22, 95%*CI*: 0.13–0.35) had lower levels of HIV-related stigma at the individual-level. In addition, ever experiencing discriminatory behaviors from health care workers, thinking serostatus disclosure services helpful, having ever seen publicity about personal interest protection services

†Yufan Xie, Shuang Gao and Qian Wang these authors have contributed equally to the work as first authors.

†Fenghua Liu and Hongbo Jiang these authors have contributed equally to the work as corresponding authors.

*Correspondence:
Fenghua Liu
liushine2006@163.com
Hongbo Jiang
hongbojiang3@163.com
Full list of author information is available at the end of the article

and complaint channels for people living with HIV(PLHIV), knowing about care and support services for PLHIV from social organizations at the community/hospital-level, partner notification and support at the interpersonal-level, and violations of personal interests, resilience at the individual-level were also associated with different dimensions of HIV-related stigma.

Conclusions HIV-related stigma was moderate among women living with HIV. The social-ecological model can facilitate a better understanding of factors associated with HIV-related stigma. Multilevel intervention strategies need to be tailored to reduce HIV-related stigma.

Keywords HIV-related stigma, Women living with HIV, Multilevel factors, Social-ecological model

Text box 1. Contributions to the literature

- There is limited evidence to explore factors associated with HIV-related stigma among women living with HIV (WLHIV) informed by the social-ecological model.
- HIV-related stigma among WLHIV was moderate.
- Different factors at the community/hospital-level, interpersonal-level, and individual-level were found to be associated with overall and different dimensions of HIV-related stigma among WLHIV.
- The social-ecological model can facilitate a better understanding of the factors associated with HIV-related stigma among WLHIV.
- Multilevel intervention strategies need to be tailored to reduce HIV-related stigma among WLHIV.

Background

The Joint United Nations Programme on HIV/AIDS (UNAIDS) has proposed to achieve the 95–95-95 AIDS prevention targets (95% of people who are living with HIV to know their HIV status, 95% of people who know that they are living with HIV to be on antiretroviral treatment, and 95% of people who are on treatment to be virally suppressed) by 2030 [1]. On the basis of the three targets, it has been proposed to add a fourth target related to HIV testing and treatment: to enable people living with HIV (PLHIV) to have a good health-related quality of life (HRQoL) [2, 3]. Among the various factors affecting HRQoL among PLHIV, HIV-related stigma has been identified as an important issue [3]. The UNAIDS has also emphasized that the elimination of all forms of HIV-related stigma and discrimination is fundamental to achieving the Sustainable Development Goals and targets by 2030. Thus, the Global Partnership for Action to Eliminate all Forms of HIV-Related Stigma and Discrimination (Global Partnership) was launched in 2018 to catalyze and accelerate the elimination of HIV-related stigma and discrimination [4].

Stigma is described by Goffman [5] as "an attribute that is deeply discrediting, that reduces that bearer from a whole person to a tainted, discounted one". Previous studies have shown that stigma has a detrimental effect on HIV testing, serostatus disclosure, care seeking, and the HIV care continuum [6–8]. In addition, HIV-related stigma has been associated with depression, anxiety and other poorer mental health outcomes [8, 9]. However, there are gender differences in the experience of HIV-related stigma [10]. The stereotypes that AIDS is a "prostitutes or women's disease" may deepen discrimination and stigma against women [11]. Compared with men, women living with HIV (WLHIV) are more likely to experience HIV-related stigma in the family and community, and are more negatively affected by it [10, 12]. Furthermore, routine HIV testing in antenatal services may inadvertently increase the risk of HIV-related stigma among WLHIV [13]. As a result, pregnant WLHIV are particularly vulnerable to intersectional stigma [14]. A review of the evidence showed that HIV-related stigma has a negative impact on uptake of and adherence to the prevention of mother-to child transmission (MTCT) services, which may affect rates of infant HIV infection [15]. Thus, there is a need to identify the factors associated with HIV-related stigma in order to reduce HIV-related stigma, which will contribute to improving the individual health of WLHIV and enabling them to have good HRQoL. Developing effective interventions to HIV-related stigma and discrimination can also contribute to achieving the 95–95-95 targets and the goal of eliminating MTCT of HIV.

In recent years, some studies have explored the determinants and effective interventions of HIV-related stigma among WLHIV [12]. However, because of the multiple sources of HIV-related stigma, it is important to comprehensively explore its determinants and interventions on multiple levels [16]. Social-ecological models divide factors that influence health into individual, interpersonal, institutional, community, and policy levels, emphasizing that multiple dimensions work together to influence individual behavior and health [17, 18]. Social-ecological models have been applied to HIV high-risk behaviors in previous studies, and the results also point to the importance of considering a multilevel approach [19]. However, little was known about the application of the social-ecological model to understanding the multilevel factors associated with HIV-related stigma among

PLHIV, particularly among WLHIV with a history of pregnancy or current pregnancy.

Therefore, we conducted this cross-sectional study to explore the multilevel factors associated with HIV-related stigma among women living with HIV using the social-ecological model.

Methods

Study setting and participants

A cross-sectional study was conducted in 21 cities of Guangdong Province, China between July and August 2022 to recruit women living with HIV using a non-probability sampling method with the following inclusion criteria: 18 years of age or older, newly diagnosed and reported WLHIV with a history of pregnancy or current pregnancy in Guangdong Province in 2021, able to understand the study objectives and procedures and provide written informed consent. Individuals with untreated severe mental illness were not eligible for the study. After signing written informed consent, they were invited to complete a questionnaire. This study was approved by the Ethical Review Committee for Biomedical Research, School of Public Health, Guangdong Pharmaceutical University (No. 2022–02).

Measurements

A self-designed electronic questionnaire was used to collect data on socio-demographic, HIV-related characteristics, antenatal care and delivery experiences, family support, resilience and HIV-related stigma.

HIV-related stigma was assessed using an abbreviated Chinese version of the Berger HIV Stigma Scale (BHSS) [20], which has 18 items and 4 domains: personalized stigma (7 items), disclosure concerns (3 items), negative self-image (4 items), and concerns about public attitudes toward PLHIV (4 items). The items were scored on a 4-point scale from 1 to 4, with higher composite scores indicating higher levels of HIV-related stigma (Cronbach's $\alpha = 0.968$). The median score for HIV-related stigma was 47 (IQR: 36 to 54); scores > 47 high levels of HIV-related stigma.

Socio-demographic characteristics included age, ethnicity, education, marital status, employment and health insurance. The other variables were categorized into three levels in accordance with the social-ecological model.

Community-level variables included relevant policy advocacy ("Have you ever seen the publicity about personal interest protection services and complaint channels for PLHIV?") and awareness of personal interest protection services among pregnant women living with HIV ("Do you know how to complain for unprotected personal interests of PLHIV?" and "Do you know about care and support services for PLHIV from social organizations?"). We collected information on the institution where the participants had their last prenatal examination or delivery and asked them to describe their antenatal care and delivery experiences at the hospital including discriminatory behavior and serostatus disclosure by health care workers. Two questions ("Please rate your satisfaction with the serostatus disclosure services" and "May I ask if the serostatus disclosure services would be helpful to you") were used to assess the satisfaction and helpfulness of the serostatus disclosure service, with responses ranging from 1 (very dissatisfied/not helpful) to 5 (very satisfied/helpful). The higher the score, the more satisfied/helpful the participants were with the serostatus disclosure services.

Interpersonal-level variables included partner's HIV serostatus and support from partner/parents/other family members. Participants were asked whether their partner/parents/other family members knew their HIV serostatus. Those who answered "yes" were asked to rate the level of support they received from their partner/parents/other family members on a scale of 1–4, with higher scores indicating greater perceived family support.

Individual-level variables included information on the transmission route of HIV, history of adverse pregnancy outcomes, history of HIV self-testing, awareness of personal interests of WLHIV, violations of personal interests, and resilience. There were 6-item questions on the personal interests of WLHIV, including free counseling and testing for HIV, voluntary childbirth and termination of pregnancy, informed consent, avoidance of discrimination, and protection of privacy. A sum score was built by adding together the number of correct answers for every single question, with higher scores indicating high awareness of the personal interests of WLHIV. Violations of personal interests were measured by asking the participants about their experiences after becoming infected with HIV in terms of the personal interests of WLHIV. Each interest violated was coded 1, and each interest protected was coded 0, with higher composite scores indicating more personal interests were violated. Resilience was measured using the 11-item PLHIV Resilience Scale [21]. Items were scored from -1 to 1, and a composite score was calculated by taking the mean of all items and multiplying by 10 [21]. The range of the final composite score is -10 to 10 (Cronbach's $\alpha = 0.944$), with scores ≥ 0 indicating high resilience.

Statistical analysis

Mean and standard deviation (SD) for normally distributed variables and median and interquartile range (IQR) for non-normally distributed variables were used to summarize the characteristics of the participants.

Univariate non-conditional logistic regression analyses were performed to explore the association between HIV-related stigma and socio-demographic and multilevel factors among WLHIV. Multivariable hierarchical regression analysis was then performed based on the social-ecological model [22]. To include more potentially important variables in the model, the variables associated with HIV-related stigma at a significance level of $P<0.20$ were included in the multivariate logistic regression [23, 24]. Logistic regression models were first fitted for socio-demographic characteristics. The community-level factors associated with HIV-related stigma ($P<0.20$) were included in the model alongside the significant socio-demographic variables ($P<0.05$). Then, the interpersonal-level variables associated with HIV-related stigma ($P<0.20$) were in the model alongside the socio-demographic and community-level variables ($P<0.05$). Similarly, the individual-level variables were added to the model alongside the socio-demographic, community-level and interpersonal-level variables, which remained at $P<0.05$. Age and marital status were retained in the models as these covariates may be important factors in HIV-related stigma according to the results of previous meta-analyses [25, 26]. All models were fitted using backward selection and odds ratios (*ORs*) and 95% confidence intervals (*CIs*) were reported. A significance level of 0.05 was applied. Data analyses were performed using SPSS 23.0.

Results

A total of 362 newly diagnosed and reported WLHIV with a history of pregnancy or current pregnancy in 2021 completed the questionnaire, 360 of whom (99.4%) met the eligibility criteria and were included in the study. Figure 1 provides an overview of the factors of HIV-related stigma in this study at each level. Of the 360 WLHIV with a history of pregnancy or current pregnancy, the mean score of HIV-related stigma was 45.26 ± 13.60, the median score for HIV-related stigma was 47 (IQR: 36 to 54); 185 (51.4%) women were in the low HIV-related stigma group (score ≤ 47) and 175 (48.6%) were in the high HIV-related stigma group (score > 47). The median age of participants was 32 years (IQR: 28 to 36), ranging from 18 to 54 years, and 53.3% were employed. The majority were Han Chinese (87.2%), married (78.9%), and had health insurance (76.4%). Almost half of the participants (49.2%) had a middle school education (Table 1).

Approximately half (48.6%) of the participants had seen publicity about personal interest protection services and complaint channels for PLHIV. More than half of the participants were aware of the complaint for unprotected personal interests of PLHIV (63.9%), and the care and support services for PLHIV provided by social organizations (52.2%). More than half (54.7%) of the participants had their last prenatal examination/delivery at the Women and Children's hospital. Most of the participants had their last prenatal examination/delivery in public

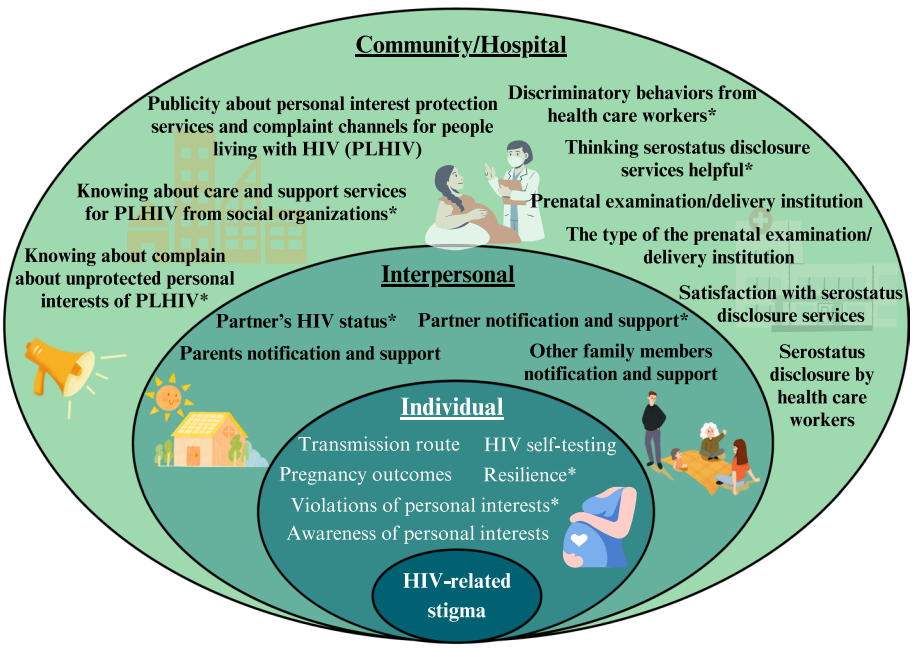

Fig. 1 Hierarchical conceptual model of HIV-related stigma among women living with HIV based on the social-ecological model in Guangdong Province, China. *$P<0.05$

Table 1 Univariate logistic regression analyses on factors associated with HIV-related stigma among women living with HIV in Guangdong Province, China, July 2022-August 2022 ($N=360$)

	N (%)/*M* (*IQR*)	HIV-related stigma		*OR* (95%*CI*)	*P*
		Low	High		
Socio-demographic characteristics					
Age (years old)					
< 32	170 (47.2)	88 (51.8)	82 (48.2)	1.00	
≥ 32	190 (52.8)	97 (51.1)	93 (48.9)	1.03 (0.68–1.56)	0.893
Ethnicity					
Han	314 (87.2)	161 (51.3)	153 (48.7)	1.00	
Other	46 (12.8)	24 (51.4)	22 (47.8)	0.97 (0.52–1.79)	0.909
Education					
Primary school or below	47 (13.1)	24 (51.1)	23 (48.9)	1.00	
Middle school	177 (49.2)	95 (53.7)	82 (46.3)	0.90 (0.47–1.71)	0.750
High school	67 (18.6)	36 (53.7)	31 (46.3)	0.90 (0.43–1.90)	0.779
College or above	69 (19.2)	30 (43.5)	39 (56.5)	1.36 (0.65–2.86)	0.422
Marital status					
Unmarried	54 (15.0)	31 (57.4)	23 (42.6)	1.00	
Married	284 (78.9)	146 (51.4)	138 (48.6)	1.27 (0.71–2.29)	0.419
Divorced/widowed	22 (6.1)	8 (36.4)	14 (63.6)	2.36 (0.85–6.56)	0.100
Employment					
No	168 (46.7)	89 (53.0)	79 (47.0)	1.00	
Yes	192 (53.3)	96 (50.0)	96 (50.0)	1.13 (0.74–1.71)	0.573
Health insurance					
No	85 (23.6)	40 (47.1)	45 (52.9)	1.00	
Yes	275 (76.4)	145 (52.7)	130 (47.3)	0.80 (0.49–1.30)	0.361
Community/hospital level					
Have you ever seen publicity about personal interest protection services and complaint channels for PLHIV?					
No	185 (51.4)	85 (45.9)	100 (54.1)	1.00	
Yes	175 (48.6)	100 (57.1)	75 (42.9)	0.64 (0.42–0.97)	0.034
Knowing about complaining about unprotected personal interests of PLHIV					
No	130 (36.1)	63 (48.5)	67 (51.5)	1.00	
Yes	230 (63.9)	122 (53.0)	108 (47.0)	0.83 (0.54–1.28)	0.404
Knowing about care and support services for PLHIV from social organizations					
No	172 (47.8)	76 (44.2)	96 (55.8)	1.00	
Yes	188 (52.2)	109 (58.0)	79 (42.0)	0.57 (0.38–0.87)	0.009
Discriminatory behaviors from health care workers					
No	233 (64.7)	138 (59.2)	95 (40.8)	1.00	
Yes	127 (35.3)	47 (37.0)	80 (63.0)	2.47 (1.58–3.86)	< 0.001
Institution for the last prenatal examination or delivery					
Women and Children's Hospital	197 (54.7)	101 (51.3)	96 (48.7)	1.00	
Others	163 (45.3)	84 (51.5)	79 (48.5)	0.99 (0.65–1.50)	0.960
Type of the institution for the last prenatal examination or delivery					
Public	318 (88.3)	162 (50.9)	156 (49.1)	1.00	
Private	42 (11.7)	23 (54.8)	19 (45.2)	0.86 (0.45–1.64)	0.642
Serostatus disclosure by health care workers					
Incomplete	238 (66.1)	115 (48.3)	123 (51.7)	1.00	
Complete	122 (33.9)	70 (57.4)	52 (42.6)	0.70 (0.45–1.08)	0.104
Satisfaction with serostatus disclosure services	5.0 (4.0–5.0)	5.0 (4.0–5.0)	5.0 (4.0–5.0)	0.76 (0.59–0.97)	0.030
Thinking serostatus disclosure services helpful	5.0 (5.0–5.0)	5.0 (5.0–5.0)	5.0 (4.0–5.0)	0.63 (0.44–0.88)	0.007

Table 1 (continued)

	N (%)/*M* (*IQR*)	HIV-related stigma		*OR* (95%*CI*)	*P*
		Low	High		
Interpersonal level					
Partner's HIV status					
Negative/other	280 (77.8)	151 (53.9)	129 (46.1)	1.00	
Positive	80 (22.2)	34 (42.5)	46 (57.5)	1.58 (0.96–2.62)	0.072
Partner notification and support	4.0 (3.0–4.0)	4.0 (3.0–4.0)	4.0 (2.0–4.0)	0.93 (0.81–1.08)	0.345
Parents notification and support	0.0 (0.0–4.0)	0.0 (0.0–4.0)	0.0 (0.0–4.0)	1.07 (0.96–1.20)	0.239
Other family members notification and support	0.0 (0.0–0.8)	0.0 (0.0–0.0)	0.0 (0.0–1.0)	1.02 (0.88–1.18)	0.783
Individual level					
Transmission route					
Sex	152 (42.2)	81 (53.3)	71 (46.7)	1.00	
other	208 (57.8)	104 (50.0)	104 (50.0)	1.14 (0.75–1.73)	0.537
History of adverse pregnancy outcomes					
No	301 (83.6)	160 (53.2)	141 (46.8)	1.00	
Yes	59 (16.4)	25 (42.4)	34 (57.6)	1.54 (0.88–2.71)	0.131
History of HIV self-testing					
No	339 (94.2)	174 (51.3)	165 (48.7)	1.00	
Yes	21 (5.8)	11 (52.4)	10 (47.6)	0.96 (0.40–2.32)	0.925
Awareness of the personal interests of WLHIV	5.0 (3.0–6.0)	5.0 (4.0–6.0)	5.0 (3.0–6.0)	0.86 (0.76–0.98)	0.022
Violations of personal interests	1.0 (0.0–2.0)	1.0 (0.0–2.0)	1.0 (0.0–2.0)	1.20 (1.00–1.44)	0.050
Resilience					
Low (< 0)	138 (38.3)	39 (28.3)	99 (71.7)	1.00	
High (≥ 0)	222 (61.7)	146 (65.8)	76 (34.2)	0.21 (0.13–0.33)	< 0.001

[*] *M (IQR)* Median (interquartile range), *PLHIV* People living with HIV, *WLHIV* Women living with HIV, *OR (95%CI)* Odds ratio (95% confidence interval)

institutions (88.3%), had not experienced discriminatory behaviors from health care workers (64.7%), adverse pregnancy history (83.6%), or HIV self-testing (94.2%). About two-thirds (66.1%) of participants reported an incomplete serostatus disclosure by health care workers. More than three-quarters (77.8%) of the women reported that their partner's HIV serostatus was negative or unknown. Approximately half (42.2%) of the participants reported having contracted HIV through sexual contact. The proportion of individuals with high resilience was 61.7%. The scores for satisfaction with the serostatus disclosure service, helpfulness of the serostatus disclosure services, support from partner, support from parents, support from other family members, awareness of personal interests, and violations of interests were shown in Table 1.

Univariate logistic regression results showed that having ever seen publicity about personal interest protection services and complaint channels for PLHIV, knowing about care and support services for PLHIV from social organizations, being satisfied with serostatus disclosure services, thinking serostatus disclosure services helpful, being more awareness of the personal interests of WLHIV, and high resilience were associated with low levels of HIV-related stigma; having experienced the discriminatory behaviors from health care workers was associated with high levels of HIV-related stigma (all $P < 0.05$). After adjusting for variables based on the social-ecological model, multivariable hierarchical regression analysis showed that at the community/hospital-level, individuals were more likely to experience high levels of HIV-related stigma with had experienced the discriminatory behaviors from health care workers (*aOR* = 2.34, 95%*CI*: 1.48–3.70) and lower scores of thinking serostatus disclosure services helpful (*aOR* = 0.69, 95%*CI*: 0.48–0.98). At the interpersonal-level, individuals with an HIV-positive partner (*aOR* = 1.71, 95%*CI*: 1.02–2.90) were more likely to experience high levels of HIV-related stigma than those with an HIV-negative or unknown partner. Individuals with high resilience (*aOR* = 0.22, 95%*CI*: 0.13–0.35) had lower levels of HIV-related stigma at the individual-levels (Table 2).

For different dimensions of HIV-related stigma, lower levels of personalized stigma were significantly correlated with having ever seen publicity about personal interest protection services and complaint channels for PLHIV (*aOR* = 0.56, 95%*CI*: 0.36–0.86), higher scores of thinking serostatus disclosure services helpful (*aOR* = 0.71,

Table 2 Hierarchical analysis on multilevel factors associated with HIV-related stigma among women living with HIV in Guangdong Province, China, July 2022-August 2022 (*N* = 360)

Characteristics	HIV-related stigma		Personalized stigma		Disclosure concerns		Negative self-image		Concern with public attitudes	
	OR (95%CI)	*P*	*OR (95%CI)*	*P*	*OR (95%CI)*	*P*	*OR (95%CI)*	*P*	*OR (95%CI)*	*P*
Community/hospital level										
Have you ever seen publicity about personal interest protection services and complaint channels for PLHIV?										
No			1.00							
Yes			0.56 (0.36–0.86)	0.009						
Knowing about care and support services for PLHIV from social organizations										
No					1.00		1.00		1.00	
Yes					0.51 (0.29–0.88)	0.016	0.48 (0.30–0.77)	0.002	0.61 (0.38–0.97)	0.037
Discriminatory behaviors from health care workers										
No	1.00				1.00		1.00		1.00	
Yes	2.34 (1.48–3.70)	< 0.001			3.03 (1.76–5.19)	< 0.001	2.52 (1.58–4.02)	< 0.001	1.79 (1.12–2.84)	0.014
Thinking serostatus disclosure services helpful	0.69 (0.48–0.98)	0.036	0.71 (0.51–1.00)	0.047						
Interpersonal level										
Partner's HIV status										
Negative/other	1.00									
Positive	1.71 (1.01–2.90)	0.045								
Partner notification and support									0.82 (0.70–0.96)	0.011
Individual level										
Violations of personal interests			1.27 (1.04–1.56)	0.020						
Resilience										
Low (< 0)	1.00		1.00				1.00		1.00	
High (≥ 0)	0.22 (0.13–0.35)	< 0.001	0.36 (0.23–0.56)	< 0.001			0.29 (0.18–0.46)	< 0.001	0.31 (0.19–0.49)	< 0.001

* *PLHIV* People living with HIV, *OR (95%CI)* Odds ratio (95% confidence interval)

95%*CI*: 0.51–1.00), less violations of personal interests (*aOR* = 1.27, 95%*CI*: 1.04–1.56), and high resilience (*aOR* = 0.36, 95%*CI*: 0.23–0.56). Individuals who were aware of care and support services for PLHIV from social organizations were more likely to have low levels of disclosure concerns (*aOR* = 0.51, 95%*CI*: 0.29–0.88), negative self-image (*aOR* = 0.48, 95%*CI*: 0.30–0.77), concern with public attitudes (*aOR* = 0.61, 95%*CI*: 0.38–0.97). Individuals who experienced the discriminatory behaviors from health care workers were more likely to have higher levels of disclosure concerns (*aOR* = 3.03, 95%*CI*: 1.76–5.19), negative self-image (*aOR* = 2.52, 95%*CI*: 1.58–4.02), concern with public attitudes (*aOR* = 1.79, 95%*CI*: 1.12–2.84). Individuals who received higher support from their partner (*aOR* = 0.82, 95%*CI*: 0.70–0.96) were more likely to have lower disclosure concerns. Individuals with high resilience had lower levels of negative self-image (*aOR* = 0.29, 95%*CI*: 0.18–0.46) and concern with public attitudes (*aOR* = 0.31, 95%*CI*: 0.19–0.49) (Table 2).

Discussion

This was one of the few studies conducted in China to investigate the factors associated with HIV-related stigma among women living with HIV with a history of pregnancy or current pregnancy. WLHIV with a history of pregnancy or current pregnancy in Guangdong province perceived HIV-related stigma at a moderate level, with a mean score of 45.26 in this study, which was lower than the score among PLHIV from an outpatient infectious disease clinic in Taiwan Province in 2021 [22]. Our results showed that HIV-related stigma was influenced by factors at multiple levels, and the factors associated with different dimensions of HIV-related stigma varied. Discriminatory behaviors and HIV serostatus disclosure services from health care workers, publicity for personal interest protection services and complaint channels for PLHIV, care and support services for PLHIV from social organizations, partner's HIV status and their support, individual resilience and violations of personal interests were associated with HIV-related stigma and different dimensions of HIV-related stigma.

At the community/hospital level, stigma and discrimination in healthcare settings has been identified as one of the most important sources of stigma for PLHIV [27]. In this study, more than one-third of participants reported experiencing discriminatory behaviors from health care workers. Some previous studies have also shown that stigma and discrimination against PLHIV are prevalent in healthcare settings [27, 28], suggesting that efforts still need to be made to eliminate stigma and discrimination in healthcare settings, such as implementing laws and relevant regulations against HIV discrimination, establishing a specialized mechanism to ensure the safety of health care workers and reduce their concerns about providing services to PLHIV; raising HIV awareness among health care workers and changing their attitudes towards PLHIV through training and education, providing positive attitudes, confidentiality, and respectful care to patients [29–31]. In addition, high levels of HIV-related stigma may be associated with insufficient or inaccurate knowledge about HIV/AIDS [32]. PLHIV could gain HIV-related knowledge through the serostatus disclosure and counseling services provided by health care providers. A previous study conducted in Vietnam reported that the stigma among PLHIV decreased after receiving HIV counseling [33]. In this study, we also found that individuals were more likely to experience low levels of HIV-related stigma with greater perceived usefulness of serostatus disclosure services. Compared with other PLHIV, WLHIV with a history of pregnancy or current pregnancy may face concerns about and lack of knowledge about MTCT of HIV and postpartum feeding [34, 35]. Therefore, training of health care workers in serostatus disclosure services in health care settings should be further strengthened to provide targeted information for PLHIV with different characteristics to improve the usefulness of services. Integrating HIV services with other maternal and child health services can also help improve efficiency and reduce HIV-related stigma for WLHIV [31].

At the interpersonal level, HIV-related stigma among WLHIV in this study was associated with the HIV serostatus of their partners. On one hand, some traditional ideas have predisposed women as the source of HIV transmission [11, 12], which may mislead women with an HIV-positive partner to believe that they have caused their partners' infection, leading them to experience higher levels of HIV-related stigma than those with an HIV-negative or unknown partner. On the other hand, experiences of poverty and resource insecurity tend to increase HIV-related stigma among PLHIV [36]. Some PLHIV reported that their income had been reduced because of external stigma and discrimination [11, 37], which was more likely among HIV-concordant couples. Therefore, more efforts should be made to establish accurate HIV-related knowledge through publicity and education, and to strengthen interventions against HIV-related stigma in HIV-concordant couples to reduce their HIV-related stigma.

At the individual level, higher resilience was associated with lower HIV-related stigma, which is similar to findings from previous studies [38–40], but the causal relationship between the two is not clear. Resilience among PLHIV has been defined as an individual's ability to make positive adjustments to living with HIV, similar to psychosocial wellbeing in several studies [38]. Individuals

with high resilience may accept their serostatus more quickly and mitigate the negative effects of HIV-related stigma [39–41]. Thus, more efforts should be made to improve individual resilience to mitigate HIV-related stigma and its negative effects. A meta-analysis of resilience interventions showed that resilience training based on mindfulness or cognitive behavioral therapy was able to improve individual resilience [42]. Social support and group identity have important effects on the resilience among PLHIV [43]. Psychological activity interventions in groups and HIV peer-led courses can be effective improving the resilience among PLHIV, and may be more effective when there are peer leaders or train-the-trainers [44, 45].

The HIV stigma scale consists of four dimensions, with different dimensions reflecting different types and causes of stigma. Personalized stigma addressed the respondent's experiences of social rejection and discrimination, disclosure concerns related to the individuals' need for confidentiality, negative self-image measured personal evaluation and feelings of shame and guilt, concern with public attitudes addressed the individual's expectation or perception of the attitudes of others [46]. In this study, we also found the following factors contributing to different dimensions of stigma, including having ever seen publicity about personal interest protection services and complaint channels for PLHIV, knowing about care and support services for PLHIV from social organizations, partner notification and support, and violations of personal interests, although they did not correlate with the overall HIV-related stigma.

At the community/hospital level, having ever seen publicity about personal interest protection services and complaint channels for PLHIV was associated with lower levels of the personalized stigma. Publicizing positive messages about HIV/AIDS in the mass media could provide accurate knowledge and improve people's attitudes towards PLHIV [47], which may help WLHIV to experience less stigma and discrimination. In addition, publicizing personal interest protections and complaint channels could improve awareness of relevant laws. Individuals living in contexts with a greater awareness of legal protections for PLHIV against discrimination had higher resilience, which has been found to have a strong inverse relationship with HIV-related stigma [38, 39]. Compared with men living with HIV, WLHIV face higher levels of discrimination and rejection from society and family, and experience constant fear, anxiety, depression, and helplessness [12]. Support group was one of the best interventions against stigma and discrimination for women living with HIV, providing a supportive and safe environment to disclose their HIV status and reduce their negative emotions [12, 48]. WLHIV with a history of pregnancy or current pregnancy who know the care and support services for PLHIV from social organizations were more likely to experience low levels of disclosure concerns, negative self-image, and concern with public attitudes dimensions compared to those who didn't know. Participants who are aware of care and support services are more likely to seek and receive the care and support services. Therefore, there is a need to increase publicity about HIV-related knowledge and legal protection, to conduct various types of supportive group activities, and to increase awareness and participation in care and support services for PLHIV in order to create a supportive community environment for PLHIV.

At the interpersonal level, disclosure of HIV serostatus to partners and receiving support from them were associated with concern with public attitudes dimension among WLHIV with a history of pregnancy or current pregnancy. Disclosure of HIV serostatus could help them to relieve tension and anxiety caused by concealment, and is also a prerequisite for receiving support from others [49, 50]. Support from others is crucial for PLHIV as it reflects positive attitudes from others, which can help them cope with stigma, social rejection, and public ridicule [51, 52]. PLHIV have been encouraged to disclose their status to their partners, but most women living with HIV were reluctant to disclose their serostatus because of concerns with abandonment, domestic violence, stigma and discrimination, and emotional abuse, especially from partners [35, 49, 50]. One study reported that PLHIV disclosing their HIV status to trusted people in a supportive community setting could reduce their HIV-related stigma [49], suggesting a safe environment to disclose their HIV serostatus, especially for women. It is also very important to conduct publicity and education for the partners of WLHIV, so that they can correctly understand HIV and provide more care and support to WLHIV.

At the individual level, our study shows a link between the violations of personal interests and personalized stigma. As previously found, violations of personal interests such as domestic violence, and uninformed HIV testing can lead to high levels of stigma for pregnant women living with HIV [35, 53], suggesting that protection of personal interests of WLHIV should be further strengthened. And where women's personal interests have been violated, remedial action should be taken in a timely manner [54]. The associations between resilience and the dimensions of personalized stigma, negative self-image and concern with public attitudes further highlighted the importance of improving the resilience in order to reduce the HIV-related stigma among WLHIV.

Our study has several limitations. First, as with any cross-sectional study, we cannot make causal inferences between the associated factors and HIV-related

stigma among pregnant women living with HIV. Second, there may be reporting bias due to some sensitive information involved in our study. However, our electronic questionnaire was self-administered and anonymous, which may reduce the impact of reporting bias. Third, the recruitment of participants from all 21 cities in Guangdong Province may reduce the impact of the selection bias caused by non-probability sampling methods. Nevertheless, this study only included WLHIV from Guangdong Province, which may limit the broader applicability of the conclusions.

Conclusions

HIV-related stigma among WLHIV in Guangdong was moderate. Using the social-ecological model as a conceptual framework, we identified factors at the community/hospital, interpersonal, and individual levels associated with HIV-related stigma and its four dimensions, which can help us better understand HIV-related stigma and tailor integrated multilevel interventions to address HIV-related stigma among WLHIV. There is still a need to eliminate stigma and discrimination in health care settings and expand the publicity about HIV-related knowledge and legal protection. Developing supportive group activities, increasing partner support for WLHIV, improving individual resilience and protecting the personal interests of WLHIV to reduce the HIV-related stigma among WLHIV, ultimately contributing to the achievement of the 95–95-95 targets and the goal of eliminating MTCT of HIV.

Abbreviations

PLHIV	People Living with HIV
UNAIDS	The Joint United Nations Programme on HIV/AIDS
HRQoL	Health-Related Quality of Life
WLHIV	Women Living with HIV
MTCT	Mother-To-Child Transmission
BHSS	Berger HIV Stigma Scale
SD	Standard Deviation
IQR	Interquartile Range
OR	Odds Ratio
CI	Confidence Interval

Acknowledgements

The authors thank all staff members at municipal and district Women and Children Hospital for data collection.

Authors' contributions

HJ designed the research study. MC, SF, ZH, YH, YTH, XT, JL, and LY contributed to acquisition of data. YX analyzed and interpreted the data. YX drafted the manuscript. HJ, SG, QW, and FL revised the manuscript critically for important intellectual content. All the authors reviewed and approved the manuscript.

Funding

This work was supported by the Department of Education of Guangdong Province (2022KTSCX060) and the National Natural Science Foundation of China (81703282).

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due to privacy or ethical restrictions but are available from the corresponding author on reasonable request.

Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

This study was approved by the Ethical Review Committee for Biomedical Research, School of Public Health, Guangdong Pharmaceutical University (No. 2022–02).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

[1]Department of Epidemiology and Biostatistics, School of Public Health, Guangdong Pharmaceutical University, Haizhu District, No. 283 Jianghai Road, Guangzhou 510310, China. [2]Guangdong Women and Children Hospital, Guangzhou 511400, China. [3]Department of Women Healthcare, Center for Women and Children Health, Chinese Center for Disease Control and Prevention, Beijing 100050, China.

Received: 24 January 2024 Accepted: 27 August 2024
Published online: 18 September 2024

References

1. UNAIDS. Confronting inequalities: Lessons for pandemic responses from 40 years of AIDS. Global AIDS update 2021. 2021. https://www.unaids.org/en/resources/documents/2021/2021-global-aids-update. Accessed 8 Nov 2023.
2. Lazarus JV, Safreed-Harmon K, Barton SE, Costagliola D, Dedes N, Del Amo VJ, et al. Beyond viral suppression of HIV - the new quality of life frontier. BMC Med. 2016;14:94.
3. Andersson GZ, Reinius M, Eriksson LE, Svedhem V, Esfahani FM, Deuba K, et al. Stigma reduction interventions in people living with HIV to improve health-related quality of life. Lancet HIV. 2020;7:e129–40.
4. UNAIDS. Global Partnership for Action to Eliminate All Forms of HIV-Related Stigma and Discrimination. 2023. https://www.unaids.org/sites/default/files/media_asset/global-partnership-hiv-stigma-discrimination_en.pdf. Accessed 8 Nov 2023.
5. Goffman E. Stigma; notes on the management of spoiled identity. New York: Touchstone; 1963.
6. Kalichman SC, Shkembi B, Wanyenze RK, Naigino R, Bateganya MH, Menzies NA, et al. Perceived HIV stigma and HIV testing among men and women in rural Uganda: a population-based study. Lancet HIV. 2020;7:e817–24.
7. Poteat TC, van der Merwe LLA. Stigma reduction is key to improving the HIV care continuum. Lancet HIV. 2022;9:e144–5.
8. Rueda S, Mitra S, Chen S, Gogolishvili D, Globerman J, Chambers L, et al. Examining the associations between HIV-related stigma and health outcomes in people living with HIV/AIDS: a series of meta-analyses. BMJ Open. 2016;6: e011453.
9. Turan B, Budhwani H, Fazeli PL, Browning WR, Raper JL, Mugavero MJ, et al. How does stigma affect people living with HIV? The mediating roles of internalized and anticipated HIV stigma in the effects of perceived community stigma on health and psychosocial outcomes. AIDS Behav. 2017;21:283–91.
10. Asiedu GB, Myers-Bowman KS. Gender differences in the experiences of HIV/AIDS-related stigma: a qualitative study in Ghana. Health Care Women Int. 2014;35:703–27.

11. de Bruyn M. Women and AIDS in developing countries. Soc Sci Med. 1992;34:249–62.
12. Paudel V, Baral KP. Women living with HIV/AIDS (WLHA), battling stigma, discrimination and denial and the role of support groups as a coping strategy: a review of literature. Reprod Health. 2015;12:53.
13. Yang LH, Poku OB, Misra S, Mehta HT, Rampa S, Eisenberg MM, et al. Stigma, structural vulnerability, and "what matters most" among women living with HIV in Botswana, 2017. Am J Public Health. 2021;111:1309–17.
14. Yang LH, Eschliman EL, Mehta H, Misra S, Poku OB, Entaile P, et al. A pilot pragmatic trial of a "what matters most"-based intervention targeting intersectional stigma related to being pregnant and living with HIV in Botswana. AIDS Res Ther. 2022;19:26.
15. Turan JM, Nyblade L. HIV-related stigma as a barrier to achievement of global PMTCT and maternal health goals: a review of the evidence. AIDS Behav. 2013;17(7):2528–39.
16. Placek CD, Nishimura H, Hudanick N, Stephens D, Madhivanan P. Reframing HIV stigma and fear : considerations from social-ecological and evolutionary theories of reproduction. Hum Nat. 2019;30:1–22.
17. McLeroy KR, Bibeau D, Steckler A, Glanz K. An ecological perspective on health promotion programs. Health Educ Q. 1988;15:351–77.
18. Stokols D. Translating social ecological theory into guidelines for community health promotion. Am J Health Promot. 1996;10:282–98.
19. Kerrigan D, Moreno L, Rosario S, Gomez B, Jerez H, Barrington C, et al. Environmental-structural interventions to reduce HIV/STI risk among female sex workers in the Dominican Republic. Am J Public Health. 2006;96:120–5.
20. Yu CH, Huang CY, Lee YT, Cheng SF. Development of an 18-item abbreviated Chinese version of Berger's HIV Stigma Scale. Int J Nurs Pract. 2019;25: e12708.
21. Gottert A, Friedland B, Geibel S, Nyblade L, Baral SD, Kentutsi S, et al. The People Living with HIV (PLHIV) resilience scale: development and validation in three countries in the context of the PLHIV stigma index. AIDS Behav. 2019;23(Suppl 2):172–82.
22. Victora CG, Huttly SR, Fuchs SC, Olinto MT. The role of conceptual frameworks in epidemiological analysis: a hierarchical approach. Int J Epidemiol. 1997;26:224–7.
23. Venancio SI, Teixeira JA, de Bortoli MC, Bernal RTI. Factors associated with early childhood development in municipalities of Ceará, Brazil: a hierarchical model of contexts, environments, and nurturing care domains in a cross-sectional study. Lancet Reg Health Am. 2021;5:100139.
24. Lima YMM, Martins FA, Ramalho AA. Factors associated with overweight and obesity in adults from Rio Branco, acre in the Western Brazilian Amazon. Nutrients. 2022;14(5):1079.
25. Logie C, Gadalla TM. Meta-analysis of health and demographic correlates of stigma towards people living with HIV. AIDS Care. 2009;21(6):742–53.
26. Armoon B, Higgs P, Fleury MJ, Bayat AH, Moghaddam LF, Bayani A, et al. Socio-demographic, clinical and service use determinants associated with HIV related stigma among people living with HIV/AIDS: a systematic review and meta-analysis. BMC Health Serv Res. 2021;21(1):1004.
27. Ekstrand ML, Ramakrishna J, Bharat S, Heylen E. Prevalence and drivers of HIV stigma among health providers in urban India: implications for interventions. J Int AIDS Soc. 2013;16(3 Suppl 2):18717.
28. Vaughan E, Power M, Sixsmith J. Experiences of stigma in healthcare settings by people living with HIV in Ireland: a qualitative study. AIDS Care. 2020;32:1162–7.
29. Feyissa GT, Abebe L, Girma E, Woldie M. Stigma and discrimination against people living with HIV by healthcare providers. Southwest Ethiopia BMC Public Health. 2012;12:522.
30. Dong X, Yang J, Peng L, Pang M, Zhang J, Zhang Z, et al. HIV-related stigma and discrimination amongst healthcare providers in Guangzhou. China BMC Public Health. 2018;18:738.
31. Hodgson I, Plummer ML, Konopka SN, Colvin CJ, Jonas E, Albertini J, et al. A systematic review of individual and contextual factors affecting ART initiation, adherence, and retention for HIV-infected pregnant and postpartum women. PLoS ONE. 2014;9(11): e111421.
32. Letshwenyo-Maruatona SB, Madisa M, Boitshwarelo T, George-Kefilwe B, Kingori C, Ice G, et al. Association between HIV/AIDS knowledge and stigma towards people living with HIV/AIDS in Botswana. Afr J AIDS Res. 2019;18:58–64.
33. Tran BX, Than PQT, Tran TT, Nguyen CT, Latkin CA. Changing sources of stigma against patients with HIV/AIDS in the rapid expansion of antiretroviral treatment services in Vietnam. Biomed Res Int. 2019;2019:4208638.
34. Oshosen M, Knettel BA, Knippler E, Relf M, Mmbaga BT, Watt MH. "She Just Told Me Not To Cry": a qualitative study of experiences of HIV testing and counseling (HTC) among pregnant women living with HIV in Tanzania. AIDS Behav. 2021;25:104–12.
35. Alhassan Y, Twimukye A, Malaba T, Myer L, Waitt C, Lamorde M, et al. "I fear my partner will abandon me": the intersection of late initiation of antenatal care in pregnancy and poor ART adherence among women living with HIV in South Africa and Uganda. BMC Pregnancy Childbirth. 2022;22:566.
36. Logie CH, Sokolovic N, Kazemi M, Islam S, Frank P, Gormley R, et al. Does resource insecurity drive HIV-related stigma? Associations between food and housing insecurity with HIV-related stigma in cohort of women living with HIV in Canada. J Int AIDS Soc. 2022;25(Suppl 1): e25913.
37. Hampson ME, Watt BD, Hicks RE. Impacts of stigma and discrimination in the workplace on people living with psychosis. BMC Psychiatry. 2020;20:288.
38. Gottert A, McClair TL, Pulerwitz J, Friedland BA, and the PLHIV Stigma Index 2.0 Study Group in Cambodia, the Dominican Republic and Uganda. What shapes resilience among people living with HIV? A multicountry analysis of data from the PLHIV Stigma Index 2.0. AIDS. 2020;34 Suppl 1:S19–31.
39. Turan B, Budhwani H, Yigit I, Ofotokun I, Konkle-Parker DJ, Cohen MH, et al. Resilience and optimism as moderators of the negative effects of stigma on women living with HIV. AIDS Patient Care STDS. 2022;36:474–82.
40. Earnshaw VA, Bogart LM, Dovidio JF, Williams DR. Stigma and racial/ethnic HIV disparities: moving toward resilience. Am Psychol. 2013;68:225–36.
41. Zhang L, Li X, Qiao S, Zhou Y, Shen Z, Tang Z, et al. The mediating role of individual resilience resources in stigma-health relationship among people living with HIV in Guangxi. China AIDS Care. 2015;27:1317–25.
42. Joyce S, Shand F, Tighe J, Laurent SJ, Bryant RA, Harvey SB. Road to resilience: a systematic review and meta-analysis of resilience training programmes and interventions. BMJ Open. 2018;8(6): e017858.
43. Dulin AJ, Dale SK, Earnshaw VA, Fava JL, Mugavero MJ, Napravnik S, et al. Resilience and HIV: a review of the definition and study of resilience. AIDS Care. 2018;30(sup5):S6–17.
44. Yu X, Lau JT, Mak WW, Cheng Y, Lv Y, Zhang J. A pilot theory-based intervention to improve resilience, psychosocial well-being, and quality of life among people living with HIV in rural China. J Sex Marital Ther. 2014;40(1):1–16.
45. Hosaka KRJ, Mmbaga BT, Gallis JA, Dow DE. Feasibility and acceptability of a peer youth led curriculum to improve HIV knowledge in Northern Tanzania: resilience and intervention experience from the perspective of peer leaders. BMC Public Health. 2021;21(1):1925.
46. Berger BE, Ferrans CE, Lashley FR. Measuring stigma in people with HIV: psychometric assessment of the HIV stigma scale. Res Nurs Health. 2001;24:518–29.
47. Fakolade R, Adebayo SB, Anyanti J, Ankomah A. The impact of exposure to mass media campaigns and social support on levels and trends of HIV-related stigma and discrimination in Nigeria: tools for enhancing effective HIV prevention programmes. J Biosoc Sci. 2010;42:395–407.
48. Simpson N, Kydd A, Phiri M, Mbewe M, Sigande L, Gachie T, et al. Insaka: mobile phone support groups for adolescent pregnant women living with HIV. BMC Pregnancy Childbirth. 2021;21:663.
49. Maman S, van Rooyen H, Groves AK. HIV status disclosure to families for social support in South Africa (NIMH Project Accept/HPTN 043). AIDS Care. 2014;26:226–32.
50. Medley A, Garcia-Moreno C, McGill S, Maman S. Rates, barriers and outcomes of HIV serostatus disclosure among women in developing countries: implications for prevention of mother-to-child transmission programmes. Bull World Health Organ. 2004;82:299–307.
51. Jolle J, Kabunga A, Okello TO, Kadito EO, Aloka J, Otiti G, et al. HIV-related stigma experiences and coping strategies among pregnant women in rural Uganda: a qualitative descriptive study. PLoS ONE. 2022;17: e0272931.
52. Chambers LA, Rueda S, Baker DN, Wilson MG, Deutsch R, Raeifar E, et al. Stigma, HIV and health: a qualitative synthesis. BMC Public Health. 2015;15:848.

53. Najmah, Andajani S, Davies SG. Perceptions of and barriers to HIV testing of women in Indonesia. Sex Reprod Health Matters. 2020;28:1848003.
54. Loutfy M, Khosla R, Narasimhan M. Advancing the sexual and reproductive health and human rights of women living with HIV. J Int AIDS Soc. 2015;18(Suppl 5):20760.

Publisher's Note