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## HIV Transmission Worry predicts discrimination intentions among nursing students and ward staff in India

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### Abstract

Health facility stigma impedes HIV care and treatment. Worry of contracting HIV while caring for people living with HIV is a key driver of health facility stigma, however evidence for this relationship is largely cross-sectional. This study evaluates this relationship longitudinally amongst nursing students and ward staff in India.

Worry of contracting HIV and other known predictors of intent to discriminate were collected at baseline and 6 months in 916 nursing students and 747 ward staff. Using fixed effects regression models, we assessed the effect of key predictors on intent to discriminate over a 6-month period.

Worry of contracting HIV predicted intent to discriminate for nursing students and ward staff in care situations with low and high-risk for bodily fluid exposure, confirming prior cross-sectional study results and underscoring the importance of addressing worry of contracting HIV as part of health facility HIV stigma-reduction interventions.

### Keywords

HIV; stigma; discrimination; nurses; ward staff; people living with HIV

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Declaration of Interest Statement

No potential conflict of interest was reported by the authors.

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## Introduction

HIV stigma remains a key challenge in India and globally to the HIV response, undermining prevention, as well as each step along the treatment cascade (1,2). The importance of tackling stigma to achieve the global 90–90–90 targets for knowledge of HIV status among people living with HIV (HIV testing) (3–5), linkage to care and adherence (being on treatment) (6–9) and viral load suppression (10) is underscored by the recent global push by the Global Partnership for Action to Eliminate All Forms of HIV-related Stigma and Discrimination (11). Health facilities are a critical and viable place to start responding to stigma as they serve as the gateway to HIV treatment and often also to prevention (12). In addition, health workers are often looked up to in their families and communities as keepers of medical knowledge and so can be key influencers or modelers of non-stigmatizing behavior for others to follow (13–15). Recognizing the importance of addressing stigma, UNAIDS launched a specific campaign to eliminate all forms of stigma and discrimination in the health system in 2017 (16).

The ubiquitous presence and negative consequences of HIV stigma in health facilities across the globe have been established (17–20), though specific comparisons across countries are hindered by the paucity of national-level, standardized data collection on the different types of stigma. In India, studies have documented a range of stigma manifestations in health facilities, including differential care for people living with HIV (PLWH), breaches of confidentiality, making PLWH pay for the costs of infection control supplies and use of double gloves with PLWH, but not others (21–24). In 2017, over two million people were living with HIV in India, which has the third largest HIV epidemic in the world. Seventy-nine percent of PLWH in India are aware of their HIV status and of those who know they are living with HIV, 56% were on treatment (25), well short of the 90–90–90 targets. Stigma has been identified as a key barrier to testing, linkage to care and adherence in India (1,7,26,27), as is reflected in the Indian AIDS Control Programme strategy where elimination of stigma and discrimination is a key focus (1). Several actionable or modifiable drivers of stigma in health facilities have been identified including worry of contracting HIV from the provision of care to PLWH (instrumental stigma), lack of awareness of stigma and its consequences, prejudicial attitudes toward PLWH or social groups commonly thought to be living with and/or at high risk of HIV (symbolic stigma) and the institutional environment (structural stigma) (12,22). Interventions to address stigma among health care professionals in health facilities have tended to focus on one or more of these drivers (28), most commonly including a primary or sole focus on instrumental stigma through decreasing transmission misconceptions and increasing standard precautions knowledge (29–33).

The extant studies in India and elsewhere that have examined the association between some of these drivers and stigmatizing or discriminatory behavior among health care workers have been cross-sectional in nature and thus it is difficult to impute causality based on their results. Establishing causality between these drivers and HIV stigma is important both to establish the direction of the relationship and to strengthen the evidence of whether and how to intervene to address stigma. Therefore, the objective of this paper is to examine whether the associations identified in earlier cross-sectional data between known predictors and stigmatizing behavior were maintained when examining longitudinal data collected six

months apart among nursing students and ward staff in India. Specifically, we examined whether a change in instrumental stigma, standard precautions knowledge, standard precautions importance, HIV transmission misconceptions, HIV transmission knowledge, perceived community stigma norms, blame and contact with PLWH predicts change in intent to discriminate in health care settings when providing care for PLWH.

## Methods

### Study design/Participants/Sampling

Participants included in the analysis are drawn from the control arm (delayed intervention arm) of a cluster randomized controlled trial of an HIV stigma-reduction intervention (34,35) among nursing students and hospital ward staff. The parent study was carried out in 12 government (7 treatment, 5 control), 23 private for-profit (12 treatment, 11 control) and 13 private not-for-profit institutions (8 treatment, 5 control) across four cities in India: Bangalore, Delhi, Mangalore and Mysore. This analysis is restricted to participants in the control arm because of the question under examination—does a change in instrumental stigma or knowledge of standard precautions predict intention to discriminate against people living with HIV—which necessitates a sample that has not been exposed to a stigma-reduction intervention. Control arm participants were offered the stigma reduction intervention after the 12-month follow-up assessment. For this analysis, we used data from the 916 nursing students and 747 ward staff who were assigned to the control arm of the trial and who completed both baseline (September 2014 and March-2018) and six-month follow up assessments.

To be eligible, participants had to be 18 years or older, be enrolled as a second- or third-year nursing student at one of the collaborating institutions or had worked as a ward staff for at least a year. All eligible nursing students and ward staff were invited to participate. Nursing students from the second or third year were selected because they had experienced clinical rotations by this point in their studies with increased patient contact and had been trained on standard precautions. Hospital ward staff -- a category of non-clinical health facility staff who assist with a range of 'housekeeping' and patient care duties on the wards -- were a target for the intervention because of their daily contact with patients through tasks like transporting patients or samples, helping with patients' personal hygiene and assisting with ambulating, turning or positioning patients. Interviews were conducted on tablets in the participants' preferred language. Participants were reimbursed the equivalent of about three US dollars for their time. The study was approved by the ethics committee of St. John's National Academy of Health Sciences in Bangalore and the Committee on Human Research at the University of California, San Francisco. More details on methods (34,35) are previously published.

### Measures

Data were collected via an interviewer-administered tablet-based assessment (35) that took approximately 45 minutes. Stigma drivers and outcome measures are based on our previous work in India (7,22,36,37) and details of further validation in the current trial study population are presented elsewhere(38).

**Demographic and other variables**—Participants were asked to provide their age, gender, city of residence, monthly household income, marital status and religion. Ward staff were also asked for their highest achieved level of education. Nursing students' highest level of education was known since they were enrolled in a nursing program at the time of participation.

**Stigma drivers and intervention targets**—In addition to these standard demographic characteristics, we also measured several other variables that have been shown to be drivers of intent to discriminate in India: instrumental stigma, standard precaution knowledge and importance, blame, perceived community stigma norms, professional contact with PLWH and HIV transmission knowledge and misconceptions (22).

**Blame:** Blame was measured with four items that asked respondents for their level of agreement to statements that people who acquired HIV through sex, drugs, a blood transfusion or their spouse 'got what they deserved.' Responses were measured by the extent to which participants agreed to a 4-point Likert scale (1–4; strongly disagree, disagree, agree, strongly agree) and averaged. Cronbach's alpha was 0.63.

**Perceived stigma norms:** Perceived stigma norms among colleagues assessed respondents' perceptions of the extent that their respective colleagues (nurses for nursing student participants, ward staff for ward staff participants) would not want to engage in five potential routine contact situations with people living with HIV outside the work environment: having a person living with HIV hold their young child, having a person living with HIV feed their young child, share dishes or glasses with a person living with HIV, have a person living with HIV cook for them, or visit the homes of people living with HIV. The responses were assessed on a 4-point scale (0–3: none, very few, some, most) and averaged. This was included as a driver because all these norms are related to worry of contracting HIV in situations where HIV is not transmissible, and the perception of what others do may influence own behavior, it was also found to be associated with intent to discriminate in our previous work(22). Cronbach's alpha was 0.77.

**Contact with people living with HIV:** This item assesses the number of people living with HIV that the respondent has interacted with in a professional situation. This was dichotomized into those who had contact with between 0–9 versus more than 9 people living with HIV.

**HIV Transmission worry at work (Instrumental Stigma):** The adapted instrumental stigma measure is based on the work of Herek (39–41), global health facility stigma measurement and intervention work (23,30,42–45) as well as our previous research with health care providers in India (22). This item was assessed by averaging nine items for nurses and seven items for ward staff asking how worried participants were about contracting HIV while performing care tasks at work with patients living with HIV. This included situations with high risk for bodily fluid exposure (e.g. wound cleaning) and situations that involved low risk (e.g. taking blood pressure). These items were statements assessing worry and requiring a response for how worried the respondent was: very worried =1, somewhat worried=2, a little worried=3 and not at all worried=4. Scoring was reversed in analysis,

such that a greater score indicated greater worry. Cronbach's alpha was 0.83 (nursing students) and 0.91 (ward staff).

**Standard Precautions Knowledge:** This item assessed knowledge of standard precautions or universal infection control practices. This item was assessed by asking participants if nine different measures were standard precautions, every correct answer was scored 1 and wrong answers scored 0. The number of correct items was summed, with higher scores on a scale of 0–9 indicating better knowledge of standard precautions.

**Standard Precautions Importance:** This item assessed participants' sense of how important it was that they used standard precautions specifically with patients either suspected of or having infections in general, or specific infections such as Dengue, HIV, and Tuberculosis. For each of the 5 items, participants were asked to report the importance for using standard precautions as 1= "very Important", 2= "somewhat important" 3= "not very important" or 4= "not at all important". Participants were dichotomized into those who reported the use of standard precautions to be "very Important" for all five conditions, and those who chose any response other than "very important" on the five items.

**HIV Transmission Misconceptions:** Seven items assess whether participants mistakenly believed that HIV could be transmitted in various forms of casual social contact. The number of incorrect responses was summed resulting in an index of 0–7. A higher score reflects greater level of misconceptions.

**HIV Transmission Knowledge:** This construct was assessed through 11 items asking participants if they thought HIV could be transmitted by different kinds of exposures – e.g. direct exposure to bodily fluids, or activities such as unprotected sex with a person living with HIV. This was modeled as a numerical variable of the number of correct answers (index of 0–11), with higher scores reflecting better knowledge.

**Outcome Variable: Intent to discriminate—**To assess intent to discriminate in professional settings, respondents were presented with hypothetical situations related to care for a patient living with HIV and asked what they would do: refuse or try to get someone else to do the task; do it, but in such a way that they would avoid touching the patient as much as possible; do it, but with extra precautions, such as double gloves, or anything else beyond what routine precautions are for this task, or; do it as they would with any other patient. For this analysis, response options were dichotomized as stigmatizing (refusing or performing the task only while avoiding contact or with unnecessary precautions) versus non-stigmatizing (performing the task as they would with any other patient). Then the items for high risk and low risk of contact with bodily fluids were summed into indexes for both nurses and ward staff to assess intention to discriminate against people living with HIV in low risk situations (index range: nurse, 0–5; ward staff, 0–4) and intention to discriminate against people living with HIV in high risk situations (index range: nurse, 0–4; ward staff, 0–3). For each of the 4 indices, a higher score indicated greater intention to discriminate.

## Analysis

Baseline participant characteristics stratified by nursing student versus ward staff, were presented as means with standard deviations for continuous variables, and as proportions for categorical variables.

We estimated the changes in intent to discriminate in professional settings attributable to changes in worrying to care for a person living with HIV (instrumental stigma) over a 6-month period. Fixed-effects regression models were used to study the longitudinal change in computed scores for intent to discriminate in professional settings resulting from change in worry to care for a person living with HIV (instrumental stigma). We conducted fixed-effects regression analyses to isolate individual effects because there may be unmeasured, time-invariant characteristics that may be correlated with the measured variables in the model, and fixed-effects models cannot be biased because of omitted or unmeasured time-invariant characteristics (46). The fixed-effects model assumes that time-invariant characteristics of individuals are not products of random variation but are correlated to other explanatory variables(46). Accordingly, a Hausman test showed that the error terms were correlated with the explanatory variables ( $p < 0.001$  for nursing students; and  $p = 0.01$  for ward staff), favoring a fixed-effects model.

We regressed intent to discriminate onto worry about caring for people living with HIV, along with additional historically important predictors (explanatory variables) of intent to discriminate (22) such as standard precautions knowledge and blame of people living with HIV, perceived community stigma norms, and frequency of professional contact with people living with HIV as independent variables – controlling for these historical predictors in the model served to avoid spurious effects between instrumental stigma and intent to discriminate while also providing estimates of their independent associations with intent to discriminate. This analysis was stratified by participant type (nursing students, ward staff) and conducted separately for intent to discriminate in high-risk settings (high risk of bodily fluid exposure) and intent to discriminate in low-risk settings (no to low risk of bodily fluid exposure). We accounted for clustering (autocorrelation) at the hospital level in our analysis by estimating cluster robust standard errors for all models. All analyses were conducted in STATA version 15.

## Results

### Demographic Characteristics

The baseline study participant characteristics are presented in Table 1. As shown, nursing students were overwhelmingly female (97%), compared to roughly two thirds of ward staff (67%). Pluralities of both groups were residents in Bangalore (42% and 38% respectively). Nursing students were on average younger than ward staff, mean age (SD) of 20.4 (1.5) vs. 39.9 (9.3) respectively and more often single (99% vs. 11% respectively).

### Losses to Follow Up

Overall, 262 participants (out of 1925 enrolled at baseline) were lost to follow up. Baseline intent to discriminate was not greater in participants lost to follow up compared to



participants who made the six-month visit, although ward staff (vs. nursing students), city of location (Delhi), male sex and Hindu religion (vs. Christian, Sikh, Buddhist or Muslim) were associated with higher rates of losses to follow up.

### Longitudinal Predictors of Intent to Discriminate in Professional Settings

Table 2 shows results from the fixed-effects regression model for intent to discriminate, showing that worry of contracting HIV in the workplace when caring for people living with HIV is associated with intent to discriminate; this was true in both high- and low-risk for bodily fluid exposure situations for nursing students ( $\beta=0.18$ ,  $p\text{-value}=0.005$ ; and  $\beta=0.66$ ,  $p\text{-value}<0.001$  respectively) and ward staff ( $\beta=0.11$ ,  $p\text{-value}=0.02$ ; and  $\beta=0.24$ ,  $p\text{-value}<0.001$  respectively). Beyond these findings, two other results were significant. Endorsing the importance of standard precaution use for all patients was associated with higher intent to discriminate in both high-and low- risk fluid exposure situations with nurses ( $\beta=0.09$ ,  $p\text{-value}=0.05$ ; and  $\beta=0.16$ ,  $p\text{-value}=0.04$  respectively). Having higher standard precautions knowledge was associated with lower intent to discriminate for ward staff in low risk situations ( $\beta=-0.14$ ,  $p\text{-value}=0.02$ ).

### Discussion

The need to address health facility stigma is underscored both by global calls for action (2,11), as well as evidence of the prevalence and negative consequences of health facility stigma (17,19–22). Understanding what drives stigmatizing and discriminatory behavior in health facilities is a necessary first step in designing effective stigma-reduction intervention responses. The association between HIV transmission worry in routine care interactions with people living with HIV and stigmatizing avoidance or discriminatory behaviors has been documented in multiple studies as one of the key drivers of stigma in health facilities (12,22,29,30,47), though largely based on cross-sectional data and thus causality has not been confirmed. This is one of the first studies to provide the opportunity to examine this relationship, as well as that of other predictors identified in cross-sectional data, longitudinally across a period of six months amongst a sample of nursing students and ward staff who were not receiving any stigma-reduction intervention. Establishing causality is important to strengthen the evidence for addressing these drivers for just as it is plausible that worry causes people to treat others differently, it is also plausible that due to discriminatory behaviors, people may worry less. For example, a person may worry less because they are treating PLWH differently (e.g. using double gloves) or health workers who hold discriminatory attitudes and engage in discriminatory behaviors may look for logical ways to explain and defend that belief and practices. This may make them more likely to attend to and remember any piece of evidence that suggests PLWH are infectious, while ignoring evidence that points to the contrary. As a result, those who stigmatize may come to see providing care for PLWH as more of a risk of HIV acquisition than it actually is and thus have more worry. As Khadilkar SV and Khadilkar SS(48) note, confirmation bias can affect the kind of decisions that providers are making in regard to their patients' care.

The results, after adjusting for several other known predictors of intent to discriminate, confirm a relationship between HIV transmission worry and intent to discriminate for both



nursing students and ward staff, whether in care situations of low or higher risk of exposure to body fluids. There was also one counter intuitive finding which was that endorsing the importance of standard precaution use for all patients, which is the desired practice, was associated with higher intent to discriminate in both low and high risk fluid exposure situations for nursing students. That fear of contracting HIV persists, even with correct knowledge about the application of standard precautions, underscores the persistence and strength of this fear in driving intent to discriminate.

These results add to and strengthen the evidence pointing to the importance of addressing worry of HIV transmission as a key element of any health facility stigma-reduction intervention. That the same relationship of worry predicting intent to discriminate holds for both nursing students and ward staff underscores the need to intervene on stigma with all levels of health workers who have patient contact, whether they provide clinical care or not. This finding resonates with recommendations from HIV health facility stigma-reduction intervention studies in Ghana (49,50), Tanzania (47) and Viet Nam (29), as well as across stigmatized conditions (51). The continuing existence of worry of contracting HIV during delivery of care, even when no viable transmission route exists, amongst health workers across the globe points to a major gap in the initial (formation) education of health workers, as well as in their continuing in-service training.

The upside to this finding is that it provides a clear path forward for tackling one key driver of stigmatizing behavior in health facilities. There is a growing body of tools and approaches for doing so, with intervention studies in health facilities demonstrating that the stigma driver of worry of contracting HIV while providing care to people living with HIV can be successfully addressed. Health facility stigma-reduction interventions in China (30,52), Viet Nam (29), Ghana (50,53), Tanzania (47), Thailand (54) and India (38) have successfully reduced HIV transmission worries as a driver of HIV stigma in health facilities. Key elements of these interventions included participatory training with staff that included identifying and addressing worry of contracting HIV while providing care for PLWH, strengthening knowledge of proper use and the benefits of standard infection control measures in preventing HIV transmission, as well as ensuring adequate and appropriate infection control supplies were available. Several training tools to support these interventions are available online (55–57). Globally, and in India, the importance of addressing stigma in health facilities to strengthen access and retention in HIV services is clear. As demonstrated by these intervention studies, addressing stigma in health facilities, in particular the driver of HIV transmission worry, is feasible.

## Conclusion

Achieving a world without AIDS will need to include more concerted and scaled efforts to address HIV stigma to ensure that all people living with HIV can know their status, access treatment, remain in care and reach viral suppression. A key driver of HIV stigma in health facilities--and beyond--is continued worry of contracting HIV in situations with no or low risk. To be effective, stigma-reduction interventions will need to include addressing worry of HIV transmission as a core pillar of their efforts. In the health system, this will require strengthening both in-service and pre-service training on routes of HIV transmission, known

risk of transmission from exposure to specific body fluids as well as building confidence in the efficacy of standard precautions to protect against HIV transmission.

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## References

- Ekstrand ML, Bharat S, Srinivasan K. HIV stigma is a barrier to achieving 90–90–90 in India. Vol. 5, The Lancet HIV. 2018 p. e543–5. [PubMed: 30319116]
- UNAIDS. Global Agenda for Zero Discrimination in health-care settings. [Internet]. 2017 Available from: <https://www.unaids.org/en/resources/documents/2017/2017-agenda-zero-discrimination-health-care>
- Musheke M, Ntalasha H, Gari S, Mckenzie O, Bond V, Martin-Hilber A, et al. A systematic review of qualitative findings on factors enabling and deterring uptake of HIV testing in Sub-Saharan Africa [Internet]. BMC Public Health BioMed Central; 3 11, 2013 p. 220 Available from: <http://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-13-220>
- Young SD, Bendavid E. The relationship between HIV testing, stigma, and health service usage. AIDS Care - Psychol Socio-Medical Asp AIDS/HIV. 2010 3;22(3):373–80.
- Ha JH, Van Lith LM, Mallalieu EC, Chidassica J, Pinho MD, Devos P, et al. Gendered relationship between HIV stigma and HIV testing among men and women in Mozambique: A cross-sectional study to inform a stigma reduction and male-targeted HIV testing intervention. BMJ Open. 2019 10 1;9(10).
- Dlamini PS, Wantland D, Makoe LN, Chirwa M, Kohi TW, Greeff M, et al. HIV stigma and missed medications in HIV-positive people in five African countries. AIDS Patient Care STDS [Internet]. 2009 5 [cited 2019 Jan 25];23(5):377–87. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/19327098> [PubMed: 19327098]
- Steward WT, Bharat S, Ramakrishna J, Heylen E, Ekstrand ML. Stigma is associated with delays in seeking care among HIV-infected people in India. J Int Assoc Provid AIDS Care [Internet]. 2013 3 26 [cited 2019 Jan 25];12(2):103–9. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/22282878> [PubMed: 22282878]
- Sweeney SM, Venable PA. The Association of HIV-Related Stigma to HIV Medication Adherence: A Systematic Review and Synthesis of the Literature. AIDS Behav [Internet]. 2016 1 25 [cited 2019 Jan 25];20(1):29–50. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/26303196> [PubMed: 26303196]
- Katz IT, Ryu AE, Onuegbu AG, Psaros C, Weiser SD, Bangsberg DR, et al. Impact of HIV-related stigma on treatment adherence: systematic review and meta-synthesis. J Int AIDS Soc. 2013 11 13;16(3 Suppl 2):18640. [PubMed: 24242258]
- Kemp CG, Lipira L, Huh D, Nevin PE, Turan JM, Simoni JM, et al. HIV stigma and viral load among African-American women receiving treatment for HIV. AIDS. 2019;33(9):1511–9. [PubMed: 31259767]
- UNAIDS. Global Partnership for Action to Eliminate All Forms of HIV-Related Stigma and Discrimination [Internet]. Geneva; 2018 Available from: <https://www.unaids.org/en/resources/documents/2018/global-partnership-hiv-stigma-discrimination>

12. Nyblade L, Stangl A, Weiss E, Ashburn K. Combating HIV stigma in health care settings: What works? [Internet]. *Journal of the International AIDS Society Wiley-Blackwell*; 8 6, 2009 p. 15 Available from: <http://www.ncbi.nlm.nih.gov/pubmed/19660113>
13. He Q, Du X, Xu H, Fan L, Maimaitijiang R, Wu Y, et al. Intention to initiate antiretroviral therapy (ART) among people living with HIV in China under the scaling-up of ART: The role of healthcare workers' recommendations. *BMC Health Serv Res* 2019 12 16;19(1):314. [PubMed: 31096967]
14. Grant M, Wilford A, Haskins L, Phakathi S, Mntambo N, Horwood CM. Trust of community health workers influences the acceptance of community-based maternal and child health services. *African J Prim Heal Care Fam Med* 2017 5 29;9(1):e1–8.
15. Kok MC, Ormel H, Broerse JEW, Kane S, Namakhoma I, Otiso L, et al. Optimising the benefits of community health workers' unique position between communities and the health sector: A comparative analysis of factors shaping relationships in four countries. *Glob Public Health*. 2017 11 2;12(11):1404–32. [PubMed: 27133127]
16. UNAIDS. Global Partnership for Action to Eliminate All Forms of HIV-Related Stigma and Discrimination [Internet]. Geneva; 2018 Available from: <https://www.unaids.org/en/resources/documents/2018/global-partnership-hiv-stigma-discrimination>
17. Kinsler JJ, Wong MD, Sayles JN, Davis C, Cunningham WE. The effect of perceived stigma from a health care provider on access to care among a low-income HIV-positive population. *AIDS Patient Care STDS*. 2007;
18. Feyissa GT, Abebe L, Girma E, Woldie M. Stigma and discrimination against people living with HIV by healthcare providers, Southwest Ethiopia. *BMC Public Health* [Internet]. 2012 7 13 [cited 2020 Mar 23];12(1):522 Available from: <http://www.ncbi.nlm.nih.gov/pubmed/22794201> [PubMed: 22794201]
19. Manganye BS, Maluleke TX, Lebeso RT. Professional nurses' views regarding stigma and discrimination in the care of HIV and AIDS patients in rural hospitals of the Limpopo province, South Africa. *African J AIDS Res* 2013;12(1):33–40.
20. Rahmati Najarkolaei F, Niknami S, Aminshokravi F, Bazargan M, Ahmadi F, Hadjizadeh E, et al. Experiences of stigma in healthcare settings among adults living with HIV in the Islamic Republic of Iran. *J Int AIDS Soc*. 2010;13(1):27. [PubMed: 20649967]
21. Ekstrand ML, Bharat S, Ramakrishna J, Heylen E. Blame, Symbolic Stigma and HIV Misconceptions are Associated with Support for Coercive Measures in Urban India. *AIDS Behav*. 2011;16(3):700–10.
22. 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 11 13;16(3 Suppl 2):18717. [PubMed: 24242265]
23. Mahendra VS, Gilborn L, Bharat S, Mudoi RJ, Gupta I, George B, et al. Understanding and measuring AIDS-related stigma in health care settings: A developing country perspective. *Sahara J* 2007 8;4(2):616–25. [PubMed: 18071613]
24. Kurien M, Thomas K, Ahuja RC, Patel A, Shyla PR, Wig N, et al. Screening for HIV infection by health professionals in India. *Natl Med J India* [Internet]. [cited 2020 Mar 23];20(2):59–66. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/17802983>
25. AVERT. HIV and AIDS in India [Internet]. [cited 2020 Apr 23]. Available from: <https://www.avert.org/professionals/hiv-around-world/asia-pacific/india>
26. Ekstrand ML, Heylen E, Mazur A, Steward WT, Carpenter C, Yadav K, et al. The Role of HIV Stigma in ART Adherence and Quality of Life Among Rural Women Living with HIV in India. *AIDS Behav*. 2018 12 1;22(12):3859–68. [PubMed: 29789984]
27. Heylen E, Panicker ST, Chandy S, Steward WT, Ekstrand ML. Food Insecurity and Its Relation to Psychological Well-Being Among South Indian People Living with HIV. *AIDS Behav*. 2015 8 6;19(8):1548–58. [PubMed: 25488171]
28. Nyblade L, Mbuya-Brown R. Breaking Down Barriers to Care: Reducing Stigma and Discrimination in Health Facilities In ICAP Grand Rounds Webinar; 2019.

29. Pulerwitz J, Oanh KTH, Akinwolemiwa D, Ashburn K, Nyblade L. Improving Hospital-Based Quality of Care by Reducing HIV-Related Stigma: Evaluation Results from Vietnam. *AIDS Behav.* 2014;19(2):246–56.
30. Li L, Wu Z, Liang L-J, Lin C, Guan J, Jia M, et al. Reducing HIV-Related Stigma in Health Care Settings: A Randomized Controlled Trial in China. *Am J Public Health.* 2013;103(2):286–92. [PubMed: 23237175]
31. Pisal H, Sutar S, Sastry J, Kapadia-Kundu N, Joshi A, Joshi M, et al. Nurses' Health Education Program in India Increases HIV Knowledge and Reduces Fear. *J Assoc Nurses AIDS Care.* 2007;18(6):32–43.
32. Uys L, Chirwa M, Kohi T, Greeff M, Naidoo J, Makoae L, et al. Evaluation of a Health Setting-Based Stigma Intervention in Five African Countries. *AIDS Patient Care STDS.* 2009;23(12):1059–66. [PubMed: 20025515]
33. Yiu JW, Mak WWSS, Ho WS, Chui YY. Effectiveness of a knowledge-contact program in improving nursing students' attitudes and emotional competence in serving people living with HIV/AIDS. *Soc Sci Med* [Internet]. 2010 7 [cited 2019 Oct 23];71(1):38–44. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/20430503> [PubMed: 20430503]
34. Nyblade L, Srinivasan K, Mazur A, Raj T, Patil DS, Devadass D, et al. HIV Stigma Reduction for Health Facility Staff: Development of a Blended- Learning Intervention. *Front Public Heal.* 2018 6 21;6:165.
35. Radhakrishna K, Dass D, Raj T, Rakesh D, Kishore R, Srinivasan K, et al. Development of a Novel Tablet-based Approach to Reduce HIV Stigma among Healthcare Staff in India. *Perspect Heal Inf Manag.* 2017 3 1;14(Spring).
36. Steward WT, Herek GM, Ramakrishna J, Bharat S, Chandy S, Wrubel J, et al. HIV-related stigma: Adapting a theoretical framework for use in India. *Soc Sci Med* 2008 10;67(8):1225–35. [PubMed: 18599171]
37. Steward WT, Chandy S, Singh G, Panicker ST, Osmand TA, Heylen E, et al. Depression is not an inevitable outcome of disclosure avoidance: HIV stigma and mental health in a cohort of HIV-infected individuals from Southern India. *Psychol Heal Med.* 2011 1;16(1):74–85.
38. Ekstrand ML, Raj T, Heylen E, Nyblade L, Devdass D, Pereira M, et al. Reducing HIV stigma among healthcare providers in India using a partly tablet-administered intervention: the DriSti trial. *AIDS Care.* 2020;32(Supplement 2):14–22. [PubMed: 32151146]
39. Herek GM. Confronting sexual stigma and prejudice: Theory and practice. *J Soc Issues.* 2007 12;63(4):905–25.
40. Herek GM. Thinking about AIDS and stigma: a psychologist's perspective. *J Law, Med Ethics* 2002;30(4):594–607. [PubMed: 12561266]
41. Herek GM. AIDS and Stigma. *Am Behav Sci.* 1997;42:1102–12.
42. Nyblade L, Jain A, Benkirane M, Li L, Lohiniva A-LL, McLean R, et al. A brief, standardized tool for measuring HIV-related stigma among health facility staff: results of field testing in China, Dominica, Egypt, Kenya, Puerto Rico and St. Christopher & Nevis. *J Int AIDS Soc.* 2013 11 13;16(3 Suppl 2):18718. [PubMed: 24242266]
43. Pulerwitz J, Oanh KTHK, Akinwolemiwa D, Ashburn K, Nyblade L Improving Hospital-Based Quality of Care by Reducing HIV-Related Stigma: Evaluation Results from Vietnam. *AIDS Behav.* 2015;19(2):246–56. [PubMed: 25382350]
44. Nyblade L, MacQuarrie K, Phillip F et al. Measuring HIV stigma: Results of a field test in Tanzania. Washington, DC; 2005.
45. Srithanaviboonchai K, Stockton M, Pudpong N, Chariyalertsak S, Prakongsai P, Chariyalertsak C, et al. Building the evidence base for stigma and discrimination-reduction programming in Thailand: development of tools to measure healthcare stigma and discrimination. *BMC Public Health.* 2017 12 11;17(1):245. [PubMed: 28284184]
46. S. L., Jürges H, R.G. W. Causal inference from observational data. *Community Denistry Oral Epidemiol.* 2016;44(5):409–15.
47. Nyblade L, Mbuya-Brown R, Sabasaba AN, Ezekiel M, Kiwia P, Stewart C, et al. Understanding and Responding to Stigma and Discrimination in Health Facilities in Tanzania [Internet]. 2018

- [cited 2019 Jan 25]. Available from: [http://www.healthpolicyplus.com/ns/pubs/10267-10481\\_TanzaniaStigmat.pdf](http://www.healthpolicyplus.com/ns/pubs/10267-10481_TanzaniaStigmat.pdf)
48. S.V. K, Khadilkar S. Bias in clinical practice. *J Obs Gynaecol India*. 2020;70(1):1–5.
  49. Nyblade L, Mbuya-Brown R, Ezekiel MJ, Addo NA, Sabasaba AN, Atuahene K, et al. *A Total Facility Approach to Reducing HIV Stigma in Health Facilities: Results and Lessons learned*. Washington DC; 2019.
  50. Nyblade L, Akwei N, Atuahene K, Alsoufi N, Gyamera E, Jacinthe S, et al. Results from a difference-in-differences evaluation of health facility HIV and key population stigma-reduction interventions in Ghana. *JIAS* (In Press. 2020);
  51. Nyblade L, Stockton MA, Giger K, Bond V, Ekstrand ML, Lean RM, et al. Stigma in health facilities: Why it matters and how we can change it. *BMC Med* 2019 2 15;17(1):1–15. [PubMed: 30651111]
  52. Li L, Liang LJ, Lin C, Wu Z. Addressing HIV stigma in protected medical settings. *AIDS Care - Psychol Socio-Medical Asp AIDS/HIV*. 2015 12 2;27(12):1439–42.
  53. Nyblade L, Addo N, Atuahene K, Alsoufi N, Gyamera E, Jacinthe S, et al. Evaluation results of health facility HIV stigma-reduction interventions in Ghana. 2019.
  54. Siraprasasiri T, Srithanaviboonchai K, Chantacharas P, Ongwandee S, Khemngern P, Benjarattanaporn P, et al. Integration and scale-up of HIV-related stigma measurement and reduction towards ending AIDS: the experience of Thailand. Under Rev. 2019;
  55. Kidd R, Clay S, Stockton M, Nyblade L. Facilitator’s training guide for a stigma-free health facility. [Internet]. Washington, DC: Health Policy Project, Futures Group; 2015 Available from: [http://www.healthpolicyproject.com/pubs/281\\_SDTrainingGuide.pdf](http://www.healthpolicyproject.com/pubs/281_SDTrainingGuide.pdf).
  56. Clay S, Chonta M, Chiiya C, Stewart C, Nyblade L. *Towards Stigma-Free Health Facilities in Ghana: Guide for Trainers* [Internet]. Washington, DC; 2017 [cited 2020 Feb 11]. Available from: [http://www.healthpolicyplus.com/ns/pubs/10255-10465\\_GhanaSDFacilitatorsGuide.pdf](http://www.healthpolicyplus.com/ns/pubs/10255-10465_GhanaSDFacilitatorsGuide.pdf)
  57. Nyblade L, Stewart C, Kiwia P, Manyama W, Mbuya-Brown R, Bowsky S. *Towards Stigma-Free Health Facilities in Tanzania: Guide for Trainers*. [Internet]. Washington, DC; 2019 [cited 2019 Oct 23]. Available from: [http://www.healthpolicyplus.com/ns/pubs/10238-10428\\_TZStigmaFreeFacilitiesTrainerGuide.pdf](http://www.healthpolicyplus.com/ns/pubs/10238-10428_TZStigmaFreeFacilitiesTrainerGuide.pdf)

**Table 1.**

Participant Characteristics at Baseline, N=1925

|  | Nursing Students (n=1002) n (%) | Ward Attendants (n=923) n (%) |
|--|---------------------------------|-------------------------------|
| Demographic Factors                      |                                 |                               |
| Age, mean (SD)                           | 20.4 (1.5)                      | 39.9 (9.3)                    |
| Sex                                      |                                 |                               |
| Female                                   | 968 (96.6)                      | 623 (67.5)                    |
| Male                                     | 34 (3.4)                        | 300 (32.5)                    |
| City of Residence                        |                                 |                               |
| Bangalore                                | 419 (41.8)                      | 351 (38.0)                    |
| Delhi                                    | 114 (11.4)                      | 154 (16.7)                    |
| Mangalore                                | 265 (26.5)                      | 239 (25.9)                    |
| Mysore                                   | 204 (20.4)                      | 179 (19.4)                    |
| Monthly Household Income (Indian Rupees) |                                 |                               |
| <= 5000                                  | 64 (6.4)                        | 52 (5.6)                      |
| 5,001–10,000                             | 242 (24.2)                      | 301 (32.6)                    |
| 10,001 – 15,000                          | 196 (19.6)                      | 214 (23.2)                    |
| 15,001 –20,000                           | 179 (17.9)                      | 138 (15.0)                    |
| >20,000                                  | 321 (32.0)                      | 218 (23.6)                    |
| Marital Status                           |                                 |                               |
| Single, Never Married                    | 997 (99.5)                      | 99 (10.7)                     |
| Ever Married (previously + currently)    | 5 (0.5)                         | 824 (89.3)                    |
| Religion                                 |                                 |                               |
| Hindu                                    | 338 (33.7)                      | 765 (82.9)                    |
| Muslim, Sikh or Buddhist                 | 82 (8.2)                        | 26 (2.8)                      |
| Christian                                | 582 (58.1)                      | 132 (14.3)                    |
| Losses to Follow Up                      | 86 (8.6)                        | 176 (19.1)                    |

**Table 2.**

Longitudinal Analyses of Association Between HIV transmission worry, Other Key Predictors, and Intent to Discriminate against people living with HIV in Professional Settings among Nursing students and Ward Staff

|   | Nursing Students (n=916) |               |                     |                   | Ward Staff (n=747)     |              |                        |               |
|---|--------------------------|---------------|---------------------|-------------------|------------------------|--------------|------------------------|---------------|
|   | Higher risk situations   |               | Low risk situations |                   | Higher risk situations |              | Low risk Cv situations |               |
|   | $\beta$ (SE)             | p- value      | $\beta$ (SE)        | p- value          | $\beta$ (SE)           | p- value     | $\beta$ (SE)           | p- value      |
| <i>Worry of contracting HIV when providing care</i> | 0.18 (0.05)              | <b>0.005*</b> | 0.66 (0.10)         | <b>&lt;0.001*</b> | 0.11 (0.04)            | <b>0.02*</b> | 0.24 (0.06)            | <b>0.001*</b> |
| <i>Standard Precautions Knowledge</i>               | -0.04 (0.02)             | 0.07          | -0.04 (0.05)        | 0.40              | 0.08 (0.05)            | 0.15         | -0.14 (0.08)           | <b>0.02*</b>  |
| <i>Standard precaution importance</i>               | 0.09 (0.04)              | <b>0.05*</b>  | 0.16 (0.09)         | 0.04              | 0.04 (0.06)            | 0.60         | 0.01 (0.10)            | 0.93          |
| <i>HIV Transmission Misconceptions</i>              | 0.02 (0.01)              | 0.12          | 0.05 (0.03)         | 0.19              | 0.03 (0.02)            | 0.16         | 0.06 (0.03)            | 0.15          |
| <i>HIV Transmission Knowledge</i>                   | 0.02 (0.03)              | 0.70          | -0.06 (0.06)        | 0.25              | -0.03 (0.04)           | 0.42         | -0.04 (0.06)           | 0.56          |
| <i>Perceived Community Stigma Norms</i>             | 0.05 (0.03)              | 0.22          | 0.07 (0.07)         | 0.37              | -0.01 (0.03)           | 0.82         | 0.01 (0.05)            | 0.75          |
| <i>Blame</i>  | 0.01 (0.04)              | 0.90 (        | -0.08 (0.07)        |                   | 0.01 (0.04)            | 0.87         | -0.01 (0.05)           | 0.76          |
| <i>Contact with People living with HIV</i>          | 0.09 (0.05)              | 0.07          | 0.23 (0.12)         | 0.09              | 0.02 (0.06)            | 0.57         | 0.09 (0.10)            | 0.47          |

-  $\beta$ 3: Regression coefficient; SE: Cluster Robust Standard Errors

- Worry of providing care for people living with HIV is measured by averaging 9 items for nurses and 7 items for ward staff. These items are statements assessing fear and requiring a response for how worried respondent is - very worried =1, Somewhat worried=2, A little worried=3 and Not at all worried=4. The scorings were reversed to make interpretation more intuitive.

- Low and higher risk refer to risk of exposure to body fluids in different care giving situations