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ORIGINAL ARTICLE

Patient referral alone is not an effective strategy to capture partners of patients with sexually transmitted infections in low-resource settings: a case-control study

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Abstract
Aim Partner notification (PN) is a key public health intervention aimed at preventing re-infection and controlling the spread of STIs. However, only limited research has been conducted to investigate factors associated with PN in Ethiopia.
Subject and methods A nested case-control study was undertaken within a cohort of individuals being treated for STIs in public health facilities in Ethiopia. Hierarchical binary logistic regression was used to identify socio-demographic, behavioral and psychosocial factors associated with PN.
Results A total of 250 patients on STI treatment who notified their partners (cases) were compared with 185 patients who did not notify their partners (controls). STI patients were less likely to notify their partner if they were single [AOR = 0.33, 95% CI: (0.15–0.73)], in a casual partnership [adjusted odds ratio (AOR) = 0.33, 95% CI: (0.15–73)], not knowledgeable about a partner's sexual behavior [AOR = 0.43, 95% CI: (0.24–0.77)], had poor knowledge of risky sexual behavior [AOR = 0.23, 95% CI: (0.12–0.43)] and had no intention of notifying partners [AOR = 0.19, 95% CI: (0.10–0.36)]. The odds of PN were higher among highly educated respondents [AOR = 5.16; 95% CI: (1.83–14.54)].
Conclusion Capturing STI cases through patient referral partner notification is less likely to be successful among patients who are single and in a casual relationship.

Keywords Partner notification · Sexually transmitted infections · Patient referral · Index case

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Background

Partner notification (PN) is regarded as an essential component in the management of sexually transmitted infections (STIs). It involves notification of a partner and offering diagnostic tests and provision of care (Ferreira et al. 2013). PN is aimed at reaching and treating undiagnosed sexual partners, which is vital to reducing the risk of reinfection in the index patient and continued transmission of STIs to other partners (Boonstra et al. 2003). However, partner notification is rarely fully implemented in low-income countries (WHO 2006).

The success rate of PN for STIs is reported differently and often related to variations in social, behavioral and cultural contexts. In Africa, particularly the sub-Saharan region, partner notification is considered as a missed opportunity in the control of STIs. PN was 5%, 25%, 20.6% and 23% in Swaziland, Uganda, Kenya and Ethiopia, respectively (Nuwaha et al. 2001; Wakasiaka et al. 2003; Lech 2003; Moges et al. 2013). Exceptionally, PN was found to be high in Botswana, accounting for 90% of cases (Tafuma et al. 2014).

Evidence underlines that PN is affected by diverse social and behavioral factors. According to one Kenyan study, PN was less likely among index cases who had multiple partners with a low educational level, who were male, rural residents,

had a low income and were consumers of commercial sex (Wakasiaka et al. 2003; Agyarko-Poku et al. 2013). In Zimbabwe, married participants reported a higher proportion of PN compared to single ones (Moyo et al. 2002). In Gonder, Ethiopia, male index cases and respondents in the age group of 15–29 years were more likely to notify their partners (Moges et al. 2013). In contrast, both married women and men who did not engage in commercial sex and used condoms were more likely to inform their partners (Wang et al. 2007). It is also suggested that violence, male dominance and stigma highly influence PN for STIs. Inconsistency between genders was reported in predicting PN (Moyo et al. 2002; Warszawski and Meyer 2002). Behavioral factors such as partnership type, anticipated ongoing sexual activity and knowledge of STIs have also shown a significant relationship with PN for STIs (Thurman et al. 2008). Psychosocial factors, such as intention and social norms associated with fear of stigma and loss of relationship, influence decisions to notify partners (Schwartz et al. 2006; Alam et al. 2010a). Such concerns vary by disease and partner type as well as previous STI experience (Clark et al. 2007; Temple-Smith et al. 2010).

There are two main types of partner notification approach. Provider referral is when a trained health professional contacts sexual partners for the index case. Patient referral is when the index case informs partners themselves (Alam et al. 2010b). Of these two options, the World Health Organization (WHO) has recommend patient-oriented PN for developing countries, and the Ethiopian Federal Ministry of Health reported patient referral as the most widely used approach similar to other low-resource countries because of its low cost and practicability (WHO 2006; EFMOH 2015).

Ethiopia is currently using patient referral PN approach similar to other low-resource countries. However, to our knowledge little is known about the success of patient referral PN in clinical practice in Ethiopia. Thus, this study aimed to investigate the factors associated with the patient referral PN approach for STIs in Ethiopia.

Methods

Study design, population and sampling

An unmatched case-control study was undertaken within a cohort of syndromically diagnosed STI cases in 27 public health facilities in the Tigray region, Ethiopia, from January–June 2015. The health facilities were selected based on their monthly case load of STI patients (average of 5 and above) taken from the Health Management Information System (HMIS) of the Regional Health Bureau reported during 2013/2014.

All patients who attended the selected health facilities for STIs and fulfilled the inclusion criteria for participation in the study were recruited and interviewed consecutively in this longitudinal study. The inclusion criteria included patients presenting with one of the syndromes and who reported having had sexual intercourse within 3 months prior to the study. The patient referral method was used for PN as it was routinely practiced in all health facilities of the study area. For this study, cases were all those who had reportedly notified partners at the follow-up visit, and controls were those who returned for follow-up but did not notify their partners. The status of those who did not return for follow-up was not investigated because of the design of the study (Fig. 1).

Data collection tools and techniques

A questionnaire was initially developed based on the review of the related literature. Then, a pilot test was conducted in the selected health facilities to check the applicability and acceptability of the study procedure and the data collection tool prior to use in the actual study. The questionnaire was prepared in English, translated into Tigrigna (the local language) and then translated back to English to check for consistency. The data collection procedure and the context and content of the tool were modified based on the pilot study. To maintain the quality of data, we recruited nurses from each participating health facility, and 3 days training was given regarding the objective of the study, the need for the patient's consent, interview technique, recording and confidentiality issues. Data were collected from January–June 2015 from 27 public health facilities. Data collection was closely supervised by the principal investigator. To overcome the sensitive nature of STI, same sex data collectors were recruited except in a few health facilities where there was a shortage of female staff. A record review was done to validate index cases who self-reported having notified their partners and returned for follow-up within 3 months.

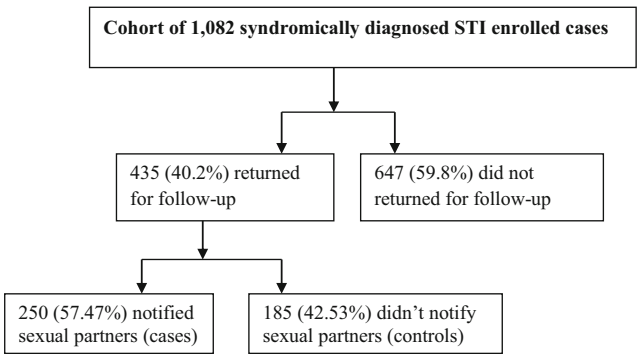

Fig. 1 Algorithm for selection of cases and controls to assess factors affecting PN for STIs, North Ethiopia, 2015

Measurement

Dependent variable

In this study, PN was determined by self-reporting index cases. A single item question was used to measure partner notification for each index patient who returned for follow-up by asking "Did you notify your partner about your STI diagnosis?" If the response was "yes," patients were classified as "cases" and coded as "1;" if the response was "no," patients were classified as "controls" and coded as "0."

Independent variables

The independent variables were grouped into three blocks: socio-demographic variables (gender, age, marital status, educational status and residence); behavioral variables (type of partnership, number of partners within the last 3 months, new partner change, knowledge of partner's sexual behavior, knowledge of STI transmission, knowledge of STI symptoms, knowledge of STI risk behavior, knowledge of STI prevention, knowledge of STI complications); psychosocial variables (intention, self-efficacy, perceived social norms, outcome belief). Psychosocial constructs were adopted from a previous study (Alam et al. 2010b), modified to local context and checked for internal consistency. The main constructs are defined below.

Intention to notify partner

A single question was asked to index cases: "How likely are you to notify/refer your sexual partner to the health facility within the next week?" The responses ranged from very unlikely (1) to very likely (4). Replies were dichotomized into "unwilling to notify," coded as "0," by merging those who answered with very unlikely or unlikely, and "willing to notify," coded as "1", by merging those who answered with very likely or likely.

Notification self-efficacy

Notification self-efficacy was measured using three questions: (1) How confident do you feel about disclosing the STI diagnosis to your partner? (2) How confident do you feel about discussing STI treatment with your partner? (3) How confident do you feel about checking whether your partner has been treated? Individual item responses were coded as very unlikely (1) to very likely (4). Those who scored above the mean for the three items together were classified as having high self-efficacy and coded as "1," and those who scored below the mean were classified as having low self-efficacy and coded as "0." Internal consistency for the test items was checked, and the Cronbach's alpha was found to be 0.94.

Perceived social norms (PSNs)

PSNs were also measured using three items: (1) The opinion of peers should be respected when referring sexual partners to health facilities (HF). (2) The opinion of people important to you should be respected when referring sexual partners to HF. (3) The opinion of people respected in the community should be valued when referring sexual partners to HF. The response for each item had four scales in a range from strongly disagree (1) to strongly agree (4). Those who scored above the mean were classified as having higher PSN and coded as "1," and those who scored below the mean were classified as having low PSN and coded as "0" (Cronbach's alpha = 0.90).

Outcome beliefs

Measurement was done using a method adopted from a previous study (Alam et al. 2010b) and categorized as positive and negative outcome beliefs, with a Cronbach's alpha of 0.93 and 0.87, respectively.

Statistical analysis

Hierarchical binary logistic regression was used for analysis. As the independent variables are inter-related, separate binary logistic regressions were fitted to examine the net effect on partner notification. A p-value ≤ 0.25 was used to screen variables in univariable logistic regression. The condensed hierarchical binary logistic model was built on three models: model 1, adjusted for socio-demographic variables only (gender, age, education, marital status); model 2, adjusted for behavioral variables (partnership, number of partners and new partners within the last 3 months, knowledge of partner's sexual behavior and knowledge of STI risk behaviors) in addition to socio-demographic variables; model 3, adjusted for all confounding variables including psychosocial variables (intention, self-efficacy, perceived social norms, outcome belief). A p-value ≤ 0.05 was considered significant in the final model. Stata software version 12 was used for analyses.

Ethical approval

The Research Ethics and Review Committee of the College of Health Science of Mekelle University, Ethiopia, has approved this study. Permission was also obtained from the Regional Health Bureau and from each of the health facilities selected. Informed consent was sought from each participant before the interview commenced. Interviews were held in a private room, and the information collected was recorded anonymously using the patient's coded ID to ensure confidentiality. Patients were also informed that they had the right to withdraw from the study at any time.

Results

In this study, we compared 250 patients who reported notifying their partner with 185 patients who returned for follow-up but did not notify their partners. Among those interviewed at baseline, 647 (59.8%) patients did not return for follow-up and were excluded from further analysis because of the study design.

Characteristics of respondents: Socio-demographic, behavioral and psychosocial factors

Among socio-demographic variables, a significant difference was seen (p-value ≤ 0.25) between cases and controls with regard to age, educational status, marital status and gender (Table 1). Of the behavior-related factors, a significant difference (p-value ≤ 0.25) between cases and controls was observed in type of partnership, multiple sexual partners, new partner, knowledge of partner's sexual behavior and risky sexual behavior (Table 2). A significant difference (p-value ≤ 0.25) between cases and controls was noted with regard to perceived risks of reinfection, intention, negative outcome belief and stigma (Table 3).

Multivariable hierarchical logistic regression analysis

The hierarchical binary logistic regression model was fitted to assess the relative effect of successive models (socio-demographic, behavioral and psychosocial factors) on PN as presented in the condensed model in Table 4. Accordingly, the following variables were significantly associated (p-value ≤ 0.05) with PN in each model: model 1, marital status and education; model 2, marital status, education, partnership type, knowledge of partners' sexual behavior and knowledge of risky sexual behavior; model 3, intention to notify partners and the factors identified as significant predictors in model 2. The odds of being single were lower in cases than controls (AOR = 0.33, 95% CI: 0.15–0.73). The odds of having an educational level of primary and above relative to illiterates were higher for cases than controls: primary [AOR = 2.43, 95% CI: (1.03–5.71)], high school [AOR = 2.74, 95% CI: (1.10–6.59)] and college and above [AOR = 5.16, 95% CI: (1.83–14.54)]. Relative to controls, cases had lower odds of casual partnership [AOR = 0.30, 95% CI: (0.14–0.64)], poor knowledge of partner's sexual behavior [AOR = 0.43, 95% CI: (0.24–0.77)], poor knowledge of risky sexual behavior [AOR = 0.23, 95% CI: (0.12–0.43)] and unwillingness to notify partners [AOR = 0.19, 95% CI: (0.10–0.36)].

Reasons for not notifying sexual partners

Among those who returned for follow-up, a substantial number [n = 185 (42.5%)] did not notify their partners for possible exposure to STIs. The most common reason for not notifying partners reported by casual partners was the inability to locate partners. Embarrassment, fear of violence and rejection were often reported by regular partners.

Table 1 Univariate analysis of patients' socio-demographic characteristics regarding PN for STIs, North Ethiopia, 2015

Characteristic	Cases = 250 n (%)	Controls = 185 n (%)	COR	p-value
Gender				
Male	74 (29.6)	102 (55.1)	1.00	
Female	176 (70.4)	83 (44.9)	2.92 (1.96–4.35)	0.000*
Age				
< 25 years	113 (45.2)	105 (56.7)	1.00	
≥ 25 years	137 (54.8)	80 (43.3)	1.59 (1.08–2.33)	0.017*
Education				
Illiterate	37 (14.8)	33 (17.8)	1.00	
Primary	72 (28.8)	64 (34.6)	1.00 (0.56–1.78)	0.991
Secondary	80 (32.0)	69 (37.3)	1.03 (0.58–1.82)	0.908
College or higher	61 (24.4)	19 (10.3)	2.86 (1.42–5.74)	0.003*
Marital status				
Married	180 (72.0)	39 (21.0)	1.00	
Single	70 (28.0)	146 (79.0)	0.10 (0.07–0.16)	0.000*
Residence				
Urban	187 (74.8)	132 (71.4)	1.00	
Rural	63 (25.2)	53 (28.6)	0.84 (0.55–1.29)	0.440

COR crude odds ratio

*P-value < 0.25

Table 2 Univariate analysis of patients sexual risk behavior regarding PN for STIs, North Ethiopia, 2015

Variable	Cases n (%)	Controls n (%)	COR	p-value
Type of partnership				
Regular	207 (82.8)	49 (26.5)	1.00	
Casual	43 (17.2)	136 (73.5)	0.07 (0.05–0.12)	0.000*
Number of sexual partners in last 3 months				
One	228 (91.2)	144 (77.8)	1.00	
Two or more	22 (8.8)	41 (22.2)	0.34 (0.19–0.59)	0.000*
New partner within last 3 months				
Yes	33 (13.2)	56 (30.3)	1.00	
No	217 (86.8)	129 (69.7)	2.85 (1.76–4.62)	0.000*
Knowledge of partner's sexual behavior				
Yes	193 (77.2)	68 (36.7)	1.00	
No	57 (22.8)	117 (63.3)	0.17 (0.11–0.26)	0.000*
Knowledge of STI transmission				
Good	114 (45.6)	81 (43.8)	1.00	
Poor	136 (54.4)	104 (56.2)	0.92 (0.63–1.36)	0.707
Knowledge of STI symptoms				
Good	136 (54.4)	103 (55.7)	1.00	
Poor	114 (45.6)	82 (54.3)	1.05 (0.72–1.54)	0.792
Knowledge of STI risk behavior				
Good	123 (49.2)	35 (18.9)	1.00	
Poor	127 (50.8)	150 (81.1)	0.24 (0.15–0.37)	0.000*
Knowledge of STI complications				
Good	101 (40.4)	59 (31.9)	1.00	
Poor	149 (59.6)	126 (68.1)	0.69 (0.46–1.03)	0.069*
Knowledge of STI prevention				
Good	153 (61.2)	121 (65.4)	1.00	
Poor	97 (38.8)	64 (34.6)	1.19 (0.81–1.78)	0.369

PN partner notification, *COR* crude odds ratio

*p-value < 0.25

Table 3 Univariate analysis of psychosocial factors regarding PN for STIs, North Ethiopia, 2015

Variable	Cases n (%)	Controls n (%)	COR	p-value
Risk perception of reinfection				
No risk	15 (6.0)	21 (11.4)	1.00	
Low risk	20 (8.0)	34 (18.4)	0.82 (0.35–1.95)	0.659
High risk	215 (86.0)	130 (70.2)	2.32 (1.15–4.65)	0.018*
Intention to notify partner				
Likely to notify	207 (82.8)	60 (32.4)	1.00	
Unlikely to notify	43 (11.2)	125 (67.6)	0.10 (0.06–0.16)	0.000*
Notification self-efficacy				
High self-efficacy	104 (41.6)	64 (34.6)	1.00	
Low self-efficacy	146 (58.4)	121 (65.4)	0.74 (0.50–1.10)	0.138*
Positive outcome belief				
Yes	113 (45.2)	80 (43.2)	1.00	
No	137 (54.8)	105 (56.8)	0.92 (0.63–1.35)	0.685
Negative outcome belie				
Yes	101 (40.4)	99 (53.5)	1.00	
No	149 (59.6)	86 (46.5)	1.70 (1.15–2.49)	0.007*
Perceived stigma of PN				
High	84 (33.6)	87 (47.0)	1.00	
Low	166 (66.4)	98 (53.0)	1.75 (1.18–2.59)	0.005*

COR crude odds ratio

*p-value < 0.25

Timing of PN

Among the index cases who notified partners, the majority reported PN on the day of diagnosis (41.20%) followed by on the 2nd day (18%); notification declined with time (Fig. 2).

Discussion

PN is a multifaceted decision-making process that challenges individuals when informing sexual partners. Hence, identifying the factors that affect the notification process is important to enhance STI prevention and control efforts. After adjusting for potential confounders, this study found being in a non-marital sexual relationship, not knowing about a partner's sexual behavior, poor knowledge of risky sexual behavior and not having the intention to notify were associated with not complying with the partner notification request.

Married individuals were more likely to notify partners compared to singles in this study. Marriage has a high social value that probably encourages couples to share feelings and health concerns with their partner (Moyo et al. 2002; Gursahaney et al. 2011). In contrast to this finding, a study conducted in Ghana showed that married individuals were more reluctant to notify their partners (Agyarko-Poku et al. 2013). Misunderstanding, distrust, fear of divorce, embarrassment and being perceived as the source of infection were reported as reasons for being reluctant to notify intimate partners (Moyo et al. 2002). This implies that PN is a complex process that needs a comprehensive approach to address all cases, regardless of marital status.

The educational status of STI patients is known to be an important factor for PN; rates are poor among patients with a low level of education compared to those with medium or higher levels (Warszawski and Meyer 2002). This may suggest that highly educated individuals have a better understanding of the benefits and risks of PN. It could also be explained by the fact that highly educated individuals are better informed about STIs; knowledge of STIs may be used to convince a partner (Norbu et al. 2013), although knowledge does not always translate into behavior change. Furthermore, fear of

Table 4 Multivariable hierarchical logistic regression analysis of socio-demographic, behavioral and psychosocial factors on PN for STIs, North Ethiopia, 2015

Variable	COR	AOR		
		Model 1	Model 2	Model 3
Sex				
Male	1.00	1.00	1.00	1.00
Female	2.92 (1.96–4.35)	1.77 (1.10–2.85)*	1.62 (0.92–2.848)	1.23 (0.67–2.26)
Age				
< 25 years	1.00	1.00	1.00	1.00
≥ 25 years	1.59 (1.08–2.33)	1.18 (0.72–1.96)	1.19 (0.67–2.11)	0.96 (0.52–1.78)
Marital status				
Married	1.00	1.00	1.00	1.00
Single	0.10 (0.07–0.16)	0.10 (0.05–0.15)*	0.34 (0.16–0.72)*	0.33 (0.15–0.73)*
Education				
Illiterate	1.00	1.00	1.00	1.00
Primary	1.00 (0.56–1.78)	2.53 (1.22–5.23)*	2.76 (1.22–6.23)*	2.43 (1.03–5.71)*
High school	1.03 (0.58–1.82)	3.94 (1.82–8.53)*	3.23 (1.35–7.72)*	2.74 (1.10–6.59)*
College+	2.86 (1.42–5.74)	8.61 (3.58–0.68)*	6.72 (2.52–8.04)*	5.16 (1.83–4.54)*
Partnership				
Regular	1.00		1.00	1.00
Casual	0.07 (0.05–0.12)		0.23 (0.11–0.47)*	0.30 (0.14–0.64)*
No. of partners within last 3 months				
One	1.00		1.00	1.00
Two or more	0.34 (0.19–0.59)		0.94 (0.39–2.28)	1.19 (0.45–3.13)
New partner(s) within last 3 months				
Yes	1.00		1.00	1.00
No	2.85 (1.76–4.62)		1.23 (0.56–2.70)	1.40 (0.59–3.28)
Knowledge of partner's sexual behavior				
Yes	1.00		1.00	1.00
No	0.17 (0.11–0.26)		0.30 (0.17–0.52)*	0.43 (0.24–0.77)*
Knowledge of STI risk behavior				
Good	1.00		1.00	1.00
Poor	0.24 (0.15–0.37)		0.24 (0.14–0.43)*	0.23 (0.12–0.43)*
Knowledge of STI complications				
Good	1.00		1.00	1.00
Poor	0.69 (0.46–1.03)		0.98 (0.56–1.69)	0.98 (0.55–1.77)
Intention to notify partner				
Willing	1.00			1.00
Unwilling	0.10 (0.06–0.16)			0.19 (0.10–0.36)*
Notification self-efficacy				
High	1.00			1.00
Low	0.74 (0.50–1.10)			2.05 (0.98–4.28)
Negative outcome belief				
Yes	1.00			1.00
No	0.74 (0.50–1.10)			1.37 (0.77–2.44)
Risk perception to reinfection				
No risk	1.00			1.00
Low risk	0.82 (0.35–1.95)			0.63 (0.17–2.25)
High risk	2.32 (1.15–4.65)			1.22 (0.43–3.47)
Perceived stigma of partner notification				
High	1.00			1.00
Low	1.75 (1.18–2.59)			1.42 (0.79–2.54)

Model 1: adjusted for socio-demographic variables

Model 2: adjusted for socio-demographic and behavioral variables

Model 3: adjusted for socio-demographic, behavioral and psychosocial variables

COR crude odds ratio, *AOR* adjusted odds ratio, *STI* sexually transmitted infection

*Significant at $p < 0.05$

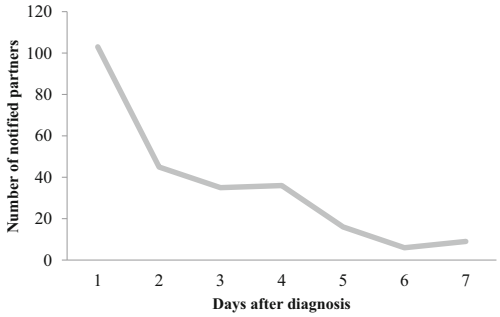

Fig. 2 Time index cases notified their partners for possible exposure of STIs, North Ethiopia, 2015

partner reaction and economic dependency influences PN negatively (Wang et al. 2012). This highlights the need for index cases with low educational status to receive due emphasis during the education and counseling sessions of STI case management.

The low likelihood of PN among index cases who do not know about the sexual behavior of partners often indicates casual or one-time partnerships. Individuals experiencing such types of partnership may have short contact times and low concern about their partner's health. Knowledge of a partner's sexual behavior is important for taking preventive measures (Cottrell et al. 2005). Where there is a lack of knowledge about a partner's sexual behavior among index cases, there is a possibility of reinfection and subsequent complications (Niccolai et al. 2005).

Negative associations have been reported between the level of STI knowledge and risk behavior (Norbu et al. 2013) as shown by the relationship between poor knowledge of risky sexual behavior and less likelihood of partner notification. Being unaware of the subsequent risks and low perceived benefit of PN among index cases with poor knowledge of risky sexual behavior may contribute to the low likelihood of PN. This implies that index cases could be exposed to risk of reinfection, thus endangering the health of their partners. Despite the importance of knowledge of sexual behavior, some studies overlooked knowledge related to partners' sexual behavior and risky sexual behavior that can, however, significantly affect PN (Clark et al. 2007; Gursahaney et al. 2011).

Intention to notify sexual partners was the only predictor of PN among psychosocial constructs in this study. The odds of notifying sexual partners about an STI diagnosis were higher for cases compared to controls, which is consistent with studies conducted in Uganda (Nuwaha et al. 2000) and Bangladesh (Alam et al. 2010b). Although not statistically significant in this study, stigma and self-efficacy have been found to be significant predictors of PN among psychosocial factors in a previous study (Alam et al. 2010b). Our result might be confounded by uncontrolled variables since analysis was done only for psychosocial factors.

The time after which index cases notify their partners may vary because of the length of the follow-up time. However, about 60% of index cases notified partners in the first 2 days of follow-up time in this study. In a similar context, the Centers for Disease Control (CDC) highlighted that PN usually occurs within 2–3 working days, unless there is an indication of potential partner violence (CDC 2008). A recent study also recommended a short notification period (Tafuma et al. 2014), which is advantageous in preventing reinfection and subsequent complications. Given this, counseling and educating index cases on potential barriers may encourage early notification.

This study has some limitations. First, case-control studies are not able to establish temporal relationships. Second, our results may not be generalizable to the overall population because only public health facilities were included in the study although substantial numbers of patients also seek care in private health facilities because of STI-associated stigma. Social desirability bias can never be excluded, particularly in index cases with regular partners.

Our study also has important strengths; however, some patient cards were not available. We used a record review to validate patient self-reporting of PN, unlike previous studies (Bell and Potterat 2011; Buchsbaum et al. 2014). All domains of socio-demographic, behavioral and psychosocial variables were considered at one time during analysis, unlike previous studies, to control confounders. The other strength of this study was the inclusiveness of all cases seeking care for STIs, irrespective of gender, age, marital status and residence.

Conclusion

This study shows that PN is unlikely among singles and patients with casual partners. Consideration of PN approaches other than the routine practice of patient referral is needed to address individual patient preferences.

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Authors' contributions The study was designed by MT, YB, AW and WT. MT was responsible for data collection, analysis and drafting the manuscript. YB revised the study design and the manuscript. AW supervised data collection and analysis, revised the manuscript and contributed to interpretation of the analysis. WT participated in the analysis and interpretation of the data, as well as revising the manuscript. All authors have read and approved the final manuscript.

Compliance with ethical standards

Conflict of interests The authors declare that they have no competing interests.

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