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Risky sexual behaviour and PrEP acceptance for Human Immunodeficiency Virus Prevention: a study amongst the general population at Badung Market Denpasar

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ABSTRACT

Introduction: Human Immunodeficiency Virus (HIV) is a virus that weakens the body's immune system and causes multisystemic disease. HIV infection results in significant morbidity and mortality for those affected. Furthermore, individuals with HIV must take medication for life to control the disease. Therefore, HIV prevention is paramount. Pre-exposure prophylaxis (PrEP) is an HIV prevention intervention using antiretroviral medication. Beyond key populations, other general populations are at risk due to unsafe sexual behaviour, namely market traders and housewives, who are also vulnerable to HIV infection.

Methods: This study employed a purely qualitative design to examine risky sexual behaviour and PrEP acceptance for HIV prevention amongst at-risk general populations at Badung Market, Denpasar City. The research involved 25 informants comprising traders, trader coordinators, market unit heads, primary health centres, and the Denpasar City Health Office. The study utilised thematic data analysis.

Results: The prevalence of multipartner sexual behaviour amongst Badung Market traders, both married and unmarried, was notable. This behaviour significantly increases the risk of sexually transmitted infection (STI) and HIV transmission, particularly when combined with inconsistent condom use. Interview analysis revealed that over 90% of trader informants had never heard of PrEP before this research interview. There was high acceptance of the mobile PrEP service model at Badung Market due to ease of access. Simultaneous implementation of Level 1 – Predisposing: Changing Knowledge, Attitudes, and Perceptions; Level 2 – Enabling: Facilitating Access; and Level 3 – Reinforcing: Creating Social Support is predicted to increase PrEP uptake, ensure adherence, and ultimately reduce HIV incidence in the market trader population.

Conclusion: The Badung Market trader population is at high risk of HIV due to multipartner sexual behaviour and inconsistent condom use. Despite minimal knowledge about PrEP, they demonstrate good acceptance of mobile PrEP services. Prevention programmes must focus on education and integrated access improvement to achieve effective HIV incidence reduction.

Keywords: Risky Sexual Behaviour, PrEP Acceptance, HIV Prevention, Badung Market.
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INTRODUCTION

Human Immunodeficiency Virus (HIV) is a virus that weakens the body's immune system and causes a multisystemic disease called Acquired Immune Deficiency Syndrome (AIDS). The first case of HIV was reported in Los Angeles, United States, in 1981.[1] Since the beginning of the epidemic, an estimated 85.6 million people have been infected with HIV, and 40.4 million have died from HIV. Globally, approximately 39 million people were living with HIV at the end of 2022. The prevalence of adults aged 15–49 years worldwide living with HIV is estimated at 0.7%. HIV prevalence is higher in low- and middle-income countries than in developed nations. In 2022, there were 630,000 HIV-related deaths and 1.3 million new HIV cases.[2]

HIV infection causes significant morbidity and mortality for those affected. Furthermore, individuals with HIV must take medication for life to control the disease. Therefore, HIV prevention is paramount. In 2015, the World Health Organization (WHO) recommended Pre-Exposure Prophylaxis (PrEP) as an additional prevention option for people at high risk of HIV infection who are

still HIV-negative.[3] PrEP has been shown to be 99% effective in preventing HIV transmission from sexual contact and 74% effective from injection drug use. PrEP medication has also been proven safe for human consumption based on clinical trials.[4,5] According to Minister of Health Regulation Number 23 of 2022 concerning the control of HIV, AIDS, and STIs, Article 18 states that ARV prophylaxis is provided to people at risk of HIV, both those already exposed to HIV and those not yet exposed.[6]

Bali Province is the province with the sixth-highest number of HIV cases and fifth-highest AIDS cases based on data and reports from the Indonesian Ministry of Health from 2010 to March 2023. 27.114 people were living with HIV, and 11.779 AIDS cases were found in Bali Province from 1987 to March 2023.[7] The number of HIV-AIDS cases reported to the Bali Provincial Health Office continued to increase yearly from 2016 to 2022. In 2020, there were 7.189 HIV cases in Bali Province. HIV cases in Bali Province were dominated by males at 68.16% and the 25-49 age group at 67.67%. Approximately 40% of these cases were reported by the Denpasar City Health Office, whilst 60% came from 8 districts in Bali. The number of female cases was lower than male cases, but the increase pattern was similar to that of male cases.[8]

Pre-exposure prophylaxis or PrEP is an HIV prevention intervention using antiretroviral (ARV) medication. PrEP should not replace or compete with effective and established HIV prevention interventions such as comprehensive condom programmes for sex workers and men who have sex with men or injection drug users. Currently, many people who would benefit most from PrEP are within key population groups who may face legal and social barriers to accessing health services.[9]

Beyond key populations, other general populations are at risk due to unsafe sexual behaviour, namely market traders and housewives, who are also vulnerable to STIs and HIV-AIDS infection, according to a study conducted by Pradnyawati at Badung Market, Denpasar City.[10] One place in Bali with high social interaction is the market. In Bali Province's capital, Denpasar, there is Badung Market, which is the largest traditional market and the economic centre of Denpasar City and its surroundings, operating 24 hours. Badung Market is located on Gajah Mada Street, the main thoroughfare that serves as the shopping centre of Bali Province's capital. Badung Market has transformed into a space for social interaction between locals and migrants. Most traders at Badung Market have low education levels and are far from their partners due to their busy schedule, earning money to support their families. Additionally, most traders come from outside Denpasar, whilst their families remain outside Denpasar. Low education and separation from partners are risk factors for risky sexual relationships, such as multiple partners and unprotected sex. This creates an HIV risk for female traders at Badung Market.

METHODS

Study design

This study employed a purely qualitative design to examine risky sexual behaviour and PrEP acceptance for HIV prevention amongst at-risk general populations at Badung Market, Denpasar City. In the qualitative research, in-depth interviews were conducted with traders, market stakeholders, and trader coordinators using the PRECEDE model and Health Belief Model behavioural theory. The objectives of this qualitative research were to explore the context of sexual behaviour and HIV risk amongst Badung Market traders, including risky behaviour patterns, risk perceptions, and factors influencing behaviour. Also, analyse barriers to and facilitators of PrEP uptake amongst market traders using the Health Belief Model (HBM) framework, evaluate acceptance of the mobile PrEP service model, including operational preferences (timing, location, service format) and prerequisites for successful implementation, and integrate qualitative findings with the HBM and PRECEDE theoretical frameworks, presenting cross-theme synthesis and implications for intervention design.

The interviews were conducted by a faculty member from the Faculty of Medicine and Health Sciences, Warmadewa University, who is currently pursuing a doctoral degree in Public Health with a focus on reproductive health and HIV prevention. The interviewer, Dr. Luh Gede Pradnyawati, M.Kes, is a medical doctor and serves as the Head of the Department of Public Health and Preventive Medicine. She is a female researcher with extensive experience in qualitative interviewing, having received formal training in 2014 at Yayasan Kerti Praja. She has been actively involved in reproductive health and HIV prevention research since 2014, including long-term engagement with the Badung Market community. Participants were aware of her dual role as both a doctor and researcher. The interviewer maintained reflexivity by acknowledging her position, prior familiarity with the setting, and potential biases related to her professional background, ensuring a neutral stance during data collection.

Data collection procedures

The research involved 25 informants comprising traders, trader coordinators, market unit heads, primary health centres, and the Denpasar City Health Office. Trader informants were recruited from each block (east block, middle block, west block) and during different trading times (morning, afternoon, evening, and dawn traders, both male and female) at Badung Market. After all preparations were complete, researchers conducted in-depth interviews with informants who met the criteria, with a duration of 60-90 minutes per informant.

Participants were approached through direct face-to-face engagement and invited to participate in an in-depth interview conducted in a private, comfortable room within the Badung Market area. The interviews were undertaken strictly in a one-on-one setting, without the presence of any third parties to ensure confidentiality and comfort. There's no dropout participants. The interview guide was developed explicitly for the market setting, community-based in nature, and grounded in the Health Belief Model and PRECEDE framework. Interviews were conducted once per participant (no repeat interviews), and all interviews were audio-recorded with consent. Field notes

were systematically taken during and after each interview to capture contextual observations. The duration of each interview was approximately 1 hour and 30 minutes per informant.

Data analysis

This study employed thematic analysis. The first stage involved compiling transcripts from the in-depth interviews. Next, coding was performed. Coding is the process of breaking down data into smaller, meaningful units. Subsequently, categories were created from these smaller units. Interview transcripts were re-read for recoding. After recoding, information categories were created by grouping similar information from the coding, and each category was analysed based on research themes. All transcripts were organised and analysed using NVivo version 20 qualitative data management software to facilitate systematic coding and theme development. Finally, interpretation of the information was conducted, creating detailed analytical descriptions of participants' feelings, opinions, and perceptions contained within the themes.

RESULTS

Characteristics of the study subjects

This qualitative study involved 25 informants selected purposively to represent various perspectives regarding the development of a mobile PrEP service model at Badung Market. Informants consisted of 18 traders, trading assistants, trading labourers, and market staff who constituted the target population for the intervention, as well as 7 key stakeholders, including market management, primary health centre staff, and the health office, who play roles in implementing health programmes in the market environment (Table 1).

Stakeholder involvement from various levels (market management, primary health centres, and health office) in this study is essential for understanding health system and market management perspectives regarding feasibility, barriers, and support required for mobile PrEP service implementation in Table 2.

Table 1. Demographic characteristics of trader, assistant, and market staff informants (n=18).

Characteristics	n	%
Informant Category		
At-risk Trader/Assistant/Labourer	9	50.0
Non-at-risk Trader	5	27.8
Trader Coordinator	4	22.2
Gender		
Male	8	44.4
Female	10	55.6
Age Group		
20-29 years	5	27.8
30-39 years	9	50.0
40-49 years	4	22.2
Mean age (SD)	33.4 (7.2) years	
Age range	22-45 years	
Education Level		
Primary School	3	16.7
Junior Secondary School	4	22.2
Senior Secondary School	7	38.9
Undergraduate Degree	4	22.2
Region of Origin		
Within Denpasar City	4	22.2
Outside Denpasar City (Bali)	12	66.7
Outside Bali Province	2	11.1
Employment Position		
Owner/Trader	11	61.1
Trading Assistant	3	16.7
Trading Labourer	1	5.6
Market Staff	2	11.1
Trader Coordinator	4	22.2

Note: Some informants had dual roles (e.g., trader and coordinator simultaneously).

Table 2. Stakeholder informants (n=7).

No.	Category	Institution/Position
1	Market Management	Head of Human Resources of Perumda Pasar Sewakadarma
2	Market Management	Head of Badung Market Unit
3	Market Management	Head of Kumbasari Market Unit
4	Primary Health Centre	Denpasar Barat 2 Primary Health Centre
5	Primary Health Centre	Denpasar Utara 1 Primary Health Centre
6	Primary Health Centre	Denpasar Utara 3 Primary Health Centre
7	Health Office	Denpasar City Health Office

Sexual behaviour and HIV risk amongst market traders, including multipartner patterns, inconsistent condom use, and STI history

Most informants reporting risky behaviour revealed they had their first sexual experience at a relatively young age, between 16 and 20 years, before marriage or in a dating context. Young sexual debut age is one indicator of vulnerability to risky sexual behaviour later in life, due to a lack of knowledge about reproductive health and STI/HIV prevention at that age.

> *"The first time I had sex was at age 16. At that time, I had just finished junior high school. This girl was my neighbour." (NDM, 25 years, vegetable trading assistant, male)*

Informants reporting risky behaviour revealed they remained sexually active with varying frequency, depending on opportunities and context. Some unmarried informants reported having sexual intercourse with girlfriends when opportunities arose to meet, whilst married informants reported varying frequency of sexual intercourse with legal partners, often hindered by work-related fatigue.

> *"With my girlfriend, there was once a month ago when I went home to Blitar. How many times in a month? About 5 times." (NDM, 25 years, male, trading assistant)*

However, interestingly, whilst some informants reported rarely having sexual intercourse with legal partners due to fatigue, they remained engaged in sexual relations with other partners outside marriage. This indicates that fatigue is not the sole factor influencing sexual activity, but emotional factors and opportunities also drive risky behaviour.

> *"Rarely do I have sex because my husband likes to play around with women. So, I'm not bothered either." (NKP, Trading Assistant, 30 years, Female)*

The most significant finding from this study is the prevalence of multipartner behaviour amongst Badung Market traders, both married and unmarried. Of the 9 informants reporting risky behaviour, most revealed having more than one sexual partner, either simultaneously or alternately, within a specific time period. This behaviour significantly increases STI and HIV transmission risk, particularly when combined with inconsistent condom use.

> *"But I have another partner… and I had sex 3 days ago. Hehehe." (NDM, 25 years, male, trading assistant – admitted having a girlfriend in Blitar and another partner in Denpasar)*

The trader coordinator informant with in-depth knowledge of social dynamics in the market confirmed that infidelity and multi-partner behaviour are relatively common phenomena in the market environment, although conducted discreetly.

> *"Many here who are married have affairs. In my opinion, [PrEP] is beneficial, especially at the market where there are indeed issues of infidelity amongst traders." (F, 32 years, trader coordinator, female)*

Confirmation from various informants indicates that the issue of infidelity is not merely an assumption or stigma, but a social reality acknowledged by traders themselves. Interview analysis revealed this pattern.

Reasons and Motivations for Multi-partner Behaviour

Interview analysis revealed several primary reasons:

1. Emotional Needs and Communication
   "…but at home she's busy with the children. My communication with my wife isn't excellent. Sometimes my wife nags for no reason. I don't feel comfortable at home. When we argue, my mother usually intervenes…" (IWJP, Trader, 34 years, Male)

2. Physical Attraction
   "How shall I put it… I've already fallen for her… She's pretty… good body…" (DP, Trader, 26 years, Male)

3. Occupational Monotony
   "…my job is security, just sitting at the security post, sometimes walking around checking the situation at the market. Sometimes it's boring, what to do. Tedious too. So, I chat online. Meet girls on social media. Basically, so that I'm not bored at work." (IKYD, Security, 22 years, male)

4. Childlessness (Social Pressure)
   "…my wife is a hotel employee, has to work shifts. Sometimes morning, afternoon, evening. So, we rarely meet. I don't have children yet. Been married 3 years…" (IDGPA, Trader, 29 years, male)

5. Economic Opportunity (Transactional)
   "This third one is married. I don't really like her, actually. But she's wealthy, she often gives me money after we have sex…" (IPA, Trader, 36 years, male)

Analysis of causes of risky behaviour indicates that multi-partner phenomena are multifactorial, involving psychological (emotional needs, boredom), social (permissive norms, opportunity), biological (physical attraction), and economic (transactional) factors. These findings are consistent with the PRECEDE Model – Predisposing Factors, where attitudes, values, and beliefs influence health behaviour.

Knowledge and perceptions about PrEP reveal very low awareness, critical misconceptions, and strong stigma

Limited Knowledge Among Traders

Interview analysis revealed that over 90% of trader informants had never heard of PrEP before this research interview. When asked whether they were familiar with the term "PrEP", "Pre-Exposure Prophylaxis", or the concept of "medication to prevent HIV", the most common response showed confusion and complete unfamiliarity with the idea.

"What's that… I've never heard of it… Is it a pill?" (NDM, 25 years, vegetable trading assistant, male)
"Never heard of it." (NKP, 30 years, trading assistant, female)

Implementation Gap at Health System Level

More significantly, the knowledge gap about PrEP exists not only amongst traders but is also reflected in limited PrEP implementation for the general population. Whilst Health Office informants demonstrated awareness of PrEP availability, they acknowledged implementation remains very limited:

"PrEP services are available, facilitated by the health office and Ministry of Health. There is a PrEP budget for at-risk populations." (YA, Field officer, 29 years, female)

Misconception 1: PrEP for People Already Infected with HIV

The most critical misconception that emerged is confusion between PrEP (prophylaxis for healthy people) and ART (treatment for people living with HIV). Several informants perceived PrEP as a medication for people already infected with HIV:

"PrEP is an ARV medication given to someone not infected with HIV, before being exposed to HIV." (GAKSW, Programme Manager, 54 years, Female)

Whilst technically correct, this statement reflects conceptual ambiguity common in the field, because use of the term ARV is often associated with therapy for people already HIV-positive, this reinforces public misunderstanding that PrEP users are infected individuals.

Misconception 2: PrEP Supports Risky Behaviour

A second misconception that emerged, particularly from stakeholder informants, is the concern that PrEP would encourage risky sexual behaviour because users feel protected from HIV:

"But if there's such medication, it's easy for them… They can change partners more often… More freedom to experiment…" (DNMF, Trader, 31 years, Female)

Misconception 3: PrEP Only for Key Populations

The third and most significant misconception is the association of PrEP with key populations such as commercial sex workers or men who have sex with men:

"Currently there is no PrEP programme for the general public, only for certain population groups (MSM, transgender, injecting drug users, partners of people living with HIV)." (LGWK, Midwife, 37 years, Female)

Barriers to and facilitators of PrEP uptake using HBM and PRECEDE frameworks, identifying fear of side effects and stigma as significant barriers, and authority support and peer support as the strongest facilitators

Fear of Side Effects as Dominant Barrier: More Than Medical Concerns

When traders were asked about their concerns regarding PrEP, the most frequent and most substantial response was fear of side effects. However, in-depth analysis revealed this fear is not merely a rational medical concern but reflects deeper psychological complexities about traders' relationship with medication, the body, and risk.

"In my opinion, I'm worried about side effects. It must be strong medication. I'm afraid of getting sick, not being able to work." (NNA, Trader, 43 years, female)

Authority Support as Legitimisation and Destigmatisation

One of the most consistent and strong findings is that support from authorities (government, market management, health office) can be a potent facilitator for PrEP uptake:

"Hmm… I'm still hesitant about taking it… Because the medication is still new… haven't seen the evidence… But if it's officially a government programme, I'm willing." (NWR, Trader, 45 years, Female)

Acceptance of the mobile PrEP service model, revealing very high support from traders with specific operational preferences

High Acceptance Due to Ease of Access

Almost all trader informants demonstrated firm support for the mobile PrEP service concept, with the primary reason being ease of access that overcomes barriers of busy schedules and distance.

"That's excellent… Traders don't have to go far for treatment… there's a clinic inside the market… Traders find it easy to check their health…" (NKP, Trading assistant, 30 years, female)

Analysis revealed strong support patterns for the mobile clinic model. The consistency of these findings across various informants indicates that mobile services have high acceptability amongst market traders.

Perceived Benefits of Mobile Clinic

Informants could identify various specific benefits of mobile clinic services, not only for PrEP but also for general health services.

"Something like this is good… Having a clinic inside the market… This kind of service is excellent and beneficial…" (NKP, Trading assistant, 30 years, female)

These findings indicate that traders not only passively accept mobile services but can see the value and relevance of such services for their health needs. This is important because it shows acceptance is not merely due to "no other choice", but because of genuine appreciation for a service model that suits their context.

Table 3. Synthesis of health belief model constructs.

HBM Construct	Status	Primary Findings	Intervention Implications
Perceived susceptibility	Very low	Traders do not perceive themselves at risk of HIV infection despite multipartner behaviour; they consider HIV only affects "specific populations" (CSW, MSM), resulting in psychological distancing.	Highest priority: strengthen risk awareness through self-risk assessment, individual counselling, and reframing that anyone with an unfaithful partner is at risk of HIV exposure
Perceived severity	High	HIV is perceived as a fatal disease with severe social stigma; the fear of the disease is already elevated	Education must emphasise that HIV is preventable; high severity should be channelled into motivation for PrEP protection.
Perceived benefits	Ambiguous	PrEP benefits are acknowledged for "others" but not for oneself; clinical and psychological benefits emerge following education.	Contextualise personal benefits using testimonial narratives and peer support.
Perceived barriers	Very high	Fear of side effects (most frequently cited), social stigma, perception of not requiring it due to feeling healthy, and scepticism towards new medication	Education on PrEP safety, social proof from early adopters, and confidential service design
Cues to action	Absent	Minimal exposure to PrEP information; no proactive HIV testing programme; absence of personal triggers	Create triggers through visual campaigns, routine sensitisation, mobile services, and authority endorsement.
Self-efficacy	Low	Lacking confidence in adhering to the PrEP regimen, feeling unready to commence.	Enhance self-confidence through education, peer support, and health worker accompaniment.

Advantages of Mobile Service Model: Multi-Dimensional Analysis

Close Access and Non-Disruptive to Trading

Mobile services eliminate geographical barriers as the clinic is placed within the market. Traders do not have to leave their stalls or incur transportation costs to reach the primary health centre. This convenience is crucial for traders who depend on daily income and cannot leave their goods for too long.

> *"Very good in my opinion, so it's close to us. Traders are busy. So before going home, we can stop by the clinic first… the only drawback might be feeling embarrassed about coming to the clinic. If possible, it should be kept confidential that there will be PrEP medication services." (KD – trading labourer, 45 years)*

Integration of qualitative findings with HBM and PRECEDE theoretical frameworks, presenting cross-theme synthesis and implications for intervention design

Synthesis of Health Belief Model Constructs

Table 3 summarises cross-theme findings according to HBM constructs. The status of each construct is based on market traders' perceptions and interpreted within the HBM framework. The "Implications" column depicts relevant intervention approaches.

The Severity Paradox vs. Susceptibility

Cross-theme analysis reveals a fundamental paradox: market traders view HIV as a deadly disease (high severity) but do not feel vulnerable (low susceptibility). In HBM literature, perceived susceptibility proves to be a stronger predictor of preventive behaviour than perceived severity. Early meta-analyses found that perceived barriers are the strongest predictor of preventive behaviour, whilst perceived severity is the weakest; perceived susceptibility and perceived benefits lie in between. The situation of market traders aligns with these findings: high fear of HIV does not translate into action because they do not feel personally threatened.

This paradox creates cognitive dissonance: to reconcile fear of HIV with the belief that one is not at risk, traders engage in psychological distancing, positioning HIV as someone else's problem. This condition hinders information-seeking and PrEP acceptance. Intervention focus must raise perceived susceptibility through personalised risk assessment, so that high severity can become motivation to act rather than to avoid.

Interaction of Benefits and Barriers

Findings indicate that barriers dominate benefits. Even after traders learn about PrEP's clinical benefits, fear of side effects and social stigma still block the

Table 4. Synthesis of PRECEDE factors: multi-level barriers.

Level	Factor	Status	Primary Findings	Intervention
Predisposing	Knowledge	Very low	>90% of traders have never heard of PrEP; limited HIV knowledge, with many misconceptions	Comprehensive multi-channel education; self-risk assessment sessions
	Attitudes	Ambiguous	Positive attitude towards PrEP but "not for me"; fatalism towards HIV	Reframing through risk contextualisation and testimonials
	Perceptions	Paradoxical	High perceived severity but low susceptibility; ambiguous benefits, high barriers	Increase risk awareness; reduce misconceptions.
Enabling	Service access	Limited	PrEP is only targeted at key populations; traders' busy schedules hinder access.	Mobile services at market; policy advocacy
	Resources	Limited	A PrEP budget exists, but for key populations, the mobile service budget is unavailable.	Specific budget allocation: mobile service pilot project
	Skills	Lacking	Traders lack self-assessment skills; health workers need capacity building.	Training for health workers and trader education
Reinforcing	Social support	Absent	No peers using PrEP yet; powerful stigma	Formation of support groups; peer champions
	Authority support	Potentially strong	Traders are willing to follow if recommended by the government and market management.	Involvement of health authorities and market management in campaigns
	Reinforcement	Negative	Stigma used as punishment; information spreads quickly in the market	Destigmatisation through integrated services and anonymisation

adoption possibility. HBM meta-analysis confirms that perceived barriers are often the strongest predictor of preventive behaviour. Therefore, intervention must focus on barrier reduction (e.g., education about PrEP safety, use of pilot cases, and services with high confidentiality) alongside increasing personal benefits.

Absence of Cues to Action

Amongst market traders, there are almost no cues to action that trigger PrEP information-seeking. According to HBM, cues to action serve as necessary triggers to activate motivation. However, if perceived susceptibility is low, a single trigger may not be effective. Therefore, campaigns must be designed to increase risk perception whilst simultaneously providing action triggers such as outreach services and government/market management support.

Synthesis of PRECEDE Factors: Multi-Level Barriers

The PRECEDE model emphasises that health behaviour is influenced by three categories of factors: predisposing (knowledge, attitudes, beliefs), enabling (resource availability and access), and reinforcing (social and institutional support). Recent empirical reviews in epidemic prevention contexts confirm that predisposing attitudes such as perceived vulnerability drive preventive action; reinforcing factors such as institutional support maintain long-term adherence; and enabling factors such as service access and training facilitate translation of intention into practice. The following table summarises PRECEDE factors identified from qualitative research and their status amongst market traders in Table 4.

Multi-Level Interaction

Qualitative findings indicate that barriers at one level reinforce barriers at other levels, creating a cycle of obstacles. For instance, low knowledge (predisposing) reduces perceived susceptibility, so traders do not feel the need to seek PrEP; limited-service access (enabling) makes PrEP difficult to obtain even when motivation exists; and absence of social proof (reinforcing) strengthens stigma and reduces motivation. PRECEDE learning documents emphasise that this model combines individual-level, community, media, and grassroots movement theories so that intervention can proceed at various levels simultaneously. PROCEED was added to highlight the importance of environmental and policy factors in health determinants. Therefore, single interventions targeting only individual knowledge will not succeed without

environmental (service access) and social (peer/authority support) backing.

Integration Model: From Theory to Practice

Based on HBM and PRECEDE synthesis, an integrative model for developing mobile PrEP services amongst market traders can be formulated as follows: Level 1 – predisposing: changing knowledge, attitudes, and perceptions, such as: input: Comprehensive multi-channel education, self-risk assessment, individual counselling, testimonials, also process: Address misconceptions, increase perceived susceptibility, emphasise PrEP benefits, and reduce fear of side effects, and output: Increased risk awareness, personal benefits understood, psychological barriers reduced, and self-efficacy increased. Level 2 – enabling: facilitating access, such as: Input: Mobile services at market, policy advocacy, budget allocation, staff training, also process: Provide easily accessible, safe, and private services; integration with other health services; removal of restrictive requirements, and output: PrEP access available and accepted, practical and policy barriers reduced. Level 3 – reinforcing: creating social support, such as: input: peer support, authority support, destigmatisation, public communication campaigns, also process: Build social proof through champions, shift negative reinforcement to positive, equate PrEP narrative as a general protection choice, and output: Strong social support, reduced stigma, PrEP uptake becomes a social norm.

DISCUSSION

Analysis of sexual behaviour amongst Badung Market traders reveals a finding that challenges conventional assumptions about HIV risk distribution: 50% of interviewed traders reported high-risk sexual behaviour—a prevalence comparable to or even exceeding some HIV key populations. However, market traders are not included in the key population category in conventional classification and therefore are not targeted by existing HIV prevention programmes. This reveals a blind spot in the HIV prevention paradigm that focuses only on epidemiologically defined key populations, whilst ignoring general populations in specific social contexts who are equally at risk but remain invisible.

What makes this finding more concerning is that risky behaviour at Badung Market is not an individual anomaly but a structural phenomenon facilitated by the market's social ecosystem itself. Traditional markets, with high proximity dynamics, unstructured leisure time, and gender imbalance, create conditions conducive to multipartner behaviour. Furthermore, this risky behaviour is normalised within specific sub-groups, creating an environment where health risks are not perceived as risks but as part of daily life.

This aligns with research conducted by Pradnyawati in 2019 at Badung Market, Denpasar City. As many as 22% of respondents admitted that they had sexual intercourse with more than one partner over the last year, with 41% of them using a condom during their last sexual intercourse. In-depth interviews revealed that the basis of their sexual intercourse was mutual interest and desire. Only one respondent admitted economic reasons for sexual intercourse. Condoms were rarely used because of the low-risk perception of sexual intercourse. Prevention programmes targeting low-risk groups are required to reduce the burden of disease from STIs, including HIV.[10]

Regarding risks and potential STI and HIV incidents amongst women from general populations, research on women's vulnerability to STI and HIV transmission was conducted at three service locations in Denpasar, one of which was at the YRS Reproductive Health Clinic in Badung Market. This qualitative research used the in-depth interview method with a semi-structured interview guide on 21 informants, consisting of female informants, male informants, counsellors, and health service providers. The results of this research indicate that risky behaviour causing women's vulnerability to STI and HIV transmission is partner sexual behaviour with more than one partner, low bargaining position in condom negotiation, prostitution, and forced sexual intercourse.[11]

Interview analysis revealed that over 90% of trader informants had never heard of PrEP before this research interview. When asked whether they were familiar with the term "PrEP", "Pre-Exposure Prophylaxis", or the concept of "medication to prevent HIV", the most common response showed confusion and complete unfamiliarity with the idea.

The Indonesian government, since 2021, has launched a project to distribute PrEP free of charge to key populations in 7 provinces. During 2022, the PrEP programme was implemented in 21 districts/cities in 10 provinces as a limited trial for MSM and sex worker populations. Unfortunately, PrEP implementation still has low adherence rates; of 2,794 MSM and sex worker clients who started, only 14 people remained in the programme at month twelve. PrEP coverage is also still low, only 19% in the MSM population and 12% in the sex worker population.[7]

PrEP can be prescribed to individuals who have HIV-positive sexual partners, engage in anal or vaginal sex within 6 months without condoms, have been diagnosed with a sexually transmitted infection (STI) in the past 6 months, are injection drug users, or use needles. Currently, there are two types of medication approved for PrEP—Truvada® (emtricitabine/tenofovir disoproxil fumarate) for all people at risk of contracting HIV through sexual intercourse or injection drug use, as well as Descovy® (emtricitabine/tenofovir alafenamide) for men and transgender women who are sexually active and at risk of contracting HIV.[12,13]

Pre-exposure prophylaxis is intended for people who engage in high-risk sexual behaviour and do not use condoms consistently. PrEP use is widely promoted in MSM communities, including MSM who wish to practise safer sex in sexual relationships with casual partners, where it is challenging to share HIV and STI status with such sexual partners. The use of PrEP as prevention has been working well, as seen in hook-up application messages (personal communication by users) displaying PrEP use status.[14,15]

PrEP has proven to be a safe and highly effective HIV prevention method for MSM, people who inject drugs (PWID), and heterosexual men and women. PrEP allows implementation as an HIV transmission prevention intervention for

people at high risk of HIV infection during regular use. Moreover, oral medication still feels more private than other HIV prevention methods.[16] According to the latest WHO data, based on research by Eisingerich in 2012, PrEP is more likely to be used for key populations at risk of HIV infection. If affordable treatment access were made available, this drug could be successful in suppressing HIV prevalence.[17] Pradnyawati's 2020 research, which conducted in-depth interviews with 10 MSM in Denpasar City, showed that the PrEP method is one way to avoid HIV.[18]

The latest WHO data shows that long-acting injectable Lenacapavir (LEN) as PrEP is highly effective in preventing HIV transmission in women. This is a significant breakthrough in HIV prevention. Complete results of the PURPOSE 1 trial, presented at the 25th International AIDS Conference, demonstrate the safety and efficacy of the long-acting injectable antiretroviral drug LEN for PrEP in HIV-negative cisgender women. LEN is an HIV-1 capsid inhibitor administered via subcutaneous injection twice yearly for HIV prevention. LEN has the potential to increase further the reach of effective and acceptable prevention options for women, addressing challenges, including those associated with effective oral tablet use and growing acceptance and use of prevention.[19]

"On-demand" PrEP is a dosing strategy where someone takes oral PrEP only around the time of sexual activity (taken before sexual intercourse) and is based on the ability to plan sexual activity. A randomised, double-blind, placebo-controlled trial in France and Canada amongst MSM evaluated a double-dose protocol (2 tablets taken together) of oral TDF-FTC (or placebo) between two and 24 hours before sexual activity and then single TDF-FTC tablets at 24 hours and 48 hours after the first dose with continued daily dosing if exposure continues. Participants randomised to active TDF-FTC showed an 86% reduction in HIV infection incidence compared with those randomised to placebo. Notably, the average number of doses was 15 tablets per month, approaching the 4 doses per week known to provide high-level rectal protection during daily dosing attempts. Post-hoc subgroup analysis showed that on-demand PrEP remained effective in participants with less frequent sexual activity. Current guidelines for on-demand dosing remain contradictory, and pharmacokinetic data offer conflicting predictions about on-demand dosing efficacy due to a lack of clarity regarding optimal pharmacokinetic correlates for HIV protection.[20,21]

Analysis of PrEP acceptance amongst Badung Market traders reveals a complex paradox: on one hand, there is recognition of PrEP's potential benefits when explained; on the other hand, there is strong resistance to personal adoption. This paradox is not merely a matter of "knowing but unwilling", but reflects dynamic interaction amongst various psychological, social, and structural factors that mutually reinforce one another.

However, in implementation, there are several barriers to PrEP use in society, including still low PrEP use even though this programme has been promoted by the government as HIV prevention.[22] Additionally, awareness of PrEP use remains low, incorrect information about PrEP eligibility still circulates in society, concerns about PrEP side effects, PrEP costs, stigma about consuming PrEP, and medical distrust towards PrEP use.[23] Inadequate adherence to consuming PrEP can cause decreased PrEP efficacy.[24]

This aligns with research findings showing that PrEP acceptance cannot be understood as a linear spectrum from "rejecting" to "accepting" but is more appropriately understood as a force field where barriers and facilitators continuously interact, creating a precarious condition. Traders may demonstrate openness to PrEP in one moment, yet immediately retreat when faced with questions about whether they themselves would use it. This instability reveals that psychosocial barriers are more dominant than informational barriers—the problem is not that traders don't know about PrEP (because indeed the majority don't know yet), but that when they do know, other barriers immediately emerge to block adoption.

Simultaneous implementation at all three levels—Level 1—Predisposing: Changing Knowledge, Attitudes, and Perceptions; Level 2 – Enabling: Facilitating Access; and Level 3 – Reinforcing: Creating Social Support—is predicted to increase PrEP uptake, ensure adherence, and ultimately reduce HIV incidence in the market trader population. This multi-level approach aligns with PRECEDE-PROCEED principles that combine interventions at individual, environmental, and policy levels. By addressing the cycle of barriers comprehensively, this model offers a theory- and data-based strategic plan for PrEP intervention in Indonesian traditional markets.

CONCLUSION

Multi-partner sexual behaviour among Badung Market traders—both married and unmarried—remains a significant concern. Among the nine informants reporting risky practices, most engaged in simultaneous or sequential multiple partnerships, elevating the risk of STI and HIV transmission, especially with inconsistent condom use. More than 90% of informants had never heard of PrEP before the interview, yet showed strong acceptance of a mobile PrEP service due to its accessibility. Implementing Level 1 (predisposing), Level 2 (enabling), and Level 3 (reinforcing) interventions simultaneously is expected to strengthen PrEP uptake, adherence, and overall HIV prevention. This multi-level strategy aligns with PRECEDE-PROCEED principles and provides a practical, evidence-based framework for PrEP implementation in traditional market settings.

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AUTHORS CONTRIBUTION

All authors contributed substantially to the completion of this study. L.G.P. conceptualised the study, developed the research framework, and coordinated the overall study design together with P.P.J. Data collection and processing were carried out by L.G.P., N.K.S., and L.S.A. The analysis and interpretation of the qualitative data were conducted collaboratively by L.G.P. and N.K.S. L.G.P., P.P.J., N.K.S., and L.S.A. performed the literature search. All authors were

actively involved in drafting, reviewing, and finalising the manuscript, with L.G.P., P.P.J., N.K.S., and L.S.A. contributing to the writing and critical revision of all sections. All authors approved the final version of the manuscript.

CONFLICT OF INTEREST

All the authors declare that there are no conflicts of interest.

ETHICAL CONSIDERATION

This study received ethical approval under reference number 1967/UN14.2.2.VII.14/LT/2025, issued on July 27th, 2025, by the Research Ethics Committee. All participants provided informed consent prior to data collection, and confidentiality was maintained throughout the study in accordance with established ethical standards.

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