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Understanding the dynamics of chemsex among men who have sex with men, male sex workers and transgender women in Dhaka, Bangladesh: a multiphase sequential mixed-method research protocol

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ABSTRACT

Introduction Chemsex is defined as drug use to enhance sexual pleasure. Global literature illustrated the pervasiveness of chemsex among men who have sex with men (MSM) and transgender women (*hijra*) for prolonging anal intercourse, reducing pain and intensifying pleasure, oftentimes without condoms. Global literature highlighted the association between chemsex and unsafe sexual behaviours. These circumstances warrant targeted chemsex research to explore the chemsex situation. The study aims to explore the overall dynamics of chemsex among MSM, male sex workers (MSW) and *hijra* in Dhaka, Bangladesh and formulate culturally relevant, context-specific, gender-sensitive and evidence-based recommendations for chemsex interventions.

Methods and analysis This will be a sequential, exploratory, mixed-methods study. Data will be collected at four drop-in centres in Dhaka in three phases. To explore issues related to chemsex, the formative phase (phase 1) will generate evidence on the overall dynamics of chemsex through a literature review and qualitative interviews. Qualitative data will be manually analysed using thematic analysis. In phase 2, a cross-sectional survey will be conducted among 458 MSM, male sex workers and *hijra* to measure the prevalence, reasons and sexual risk behaviour associated with chemsex. In phase 3, qualitative interviews will be conducted with the participants involved in chemsex, service providers and relevant stakeholders to add qualitative depth to survey responses. In this phase, service provision will also be investigated for people engaging in chemsex. Moreover, based on the findings of phases 1 and 2, and qualitative interviews of phase 3, a preliminary chemsex intervention model will be developed through a series of intervention design workshops.

Ethics and dissemination Ethical approval has been attained from the Ethical Review Committee of icddr,b. Informed consent will be obtained from the participants, and confidentiality will be maintained during data collection and storage. Findings will be disseminated via several platforms including dissemination seminars, scientific articles and study report.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This study will use a sequential, exploratory, mixed-methods design consisting of qualitative and quantitative strands occurring throughout chronological phases.
⇒ In this design, the subsequent strands will build on the previous strand.
⇒ The methods, results and discussion will be separately described, and then the results from each stage will be integrated via triangulation.
⇒ The qualitative component will follow non-probabilistic purposive sampling which may incur selection bias.
⇒ The study will be undertaken among the participants enlisted in four service delivery points (drop-in centres) of Dhaka city only; thus, it may not be possible to generalise the findings for all men who have sex with men, male sex workers and *hijra*.

INTRODUCTION

An introduction to chemsex and it's burden

Literature defined chemsex as drug use before and during sexual encounters to initiate, prolong and enhance sexual pleasure.[1] The United Nations Office on Drugs and Crime (UNODC) revealed that chemsex often involves drugs such as methamphetamine, mephedrone and gamma hydroxybutyrate (GHB)/gamma butyrolactone (GBL) during sex.[2] Other sexualised drugs including alcohol, cocaine, ketamine, poppers, Viagra, etc., though sometimes used, are typically excluded from this definition due to distinct effects driving the phenomenon.[3 4] Some global literature, including a systematic review, coins chemsex as a socially constructed concept which is a subset of sexualised drug use.[1] These drugs have been associated with

certain sexual behaviours, sometimes elicited by cocaine and ketamine in London's cultural context. Therefore, the assumption about the emerging popularity of new drugs can be made considering the nature and history of chemsex and the availability of drugs. This underscores the need for a comprehensive chemsex definition that accounts for these complexities.[1 5]

Studies from several countries including the UK, Brazil and Portugal showed that 17%–38.9% of men who have sex with men (MSM) engaged in chemsex, predominantly methamphetamine.[1 6] In the UK and France, sexualised drug use and chemsex among MSM ranged from 4% to 41% and 20.8%, respectively.[3 7] A qualitative scoping review in the Asia region revealed that sexualised drug use was 3.6%–91.2% among MSM.[8] In Asia, the chemsex prevalence among MSM ranges from 3.1% to 30.8%.[9] However, there is no similar epidemiological data in Bangladesh. Local research indicates methamphetamine (Yaba) use among MSM (including male sex workers: MSW) and *hijra*. Recent HIV surveillance findings depict 1.7% (n=2476) of MSM/MSW and 5.2% (n=1172) of *hijra* reported amphetamine use within the past 6 months.[10]

Underlying reasons for chemsex

The literature revealed numerous reasons for chemsex in Bangladesh and other settings including Thailand, China, UK, Malaysia, etc. MSM, MSW and *hijra* populations used methamphetamine, a common chemsex drug, to enhance and embellish sexual experiences (ie, initiate, enhance and prolong sex).[11 12] A Malaysian qualitative study noted that participants took methamphetamine to boost sexual performance, pleasure and sense of 'exploration and adventurism'.[13] Similar themes resonated among MSM, MSW and *hijra* in Bangladesh.[11 12] Although global literature deliberated on reasons for chemsex, there is scant evidence about gender-related contexts of chemsex, especially in the Asia-Pacific region, where these populations are particularly stigmatised.

Effect of chemsex on sexual risk behaviours

Chemsex engendered various harmful effects on sexual behaviour, elevating HIV/STI transmission potential. It contributes to unprotected anal sex, violent/coercive sex and group sex due to drug-induced disinhibition and hypersexuality.[14] Through intensifying sexual urges, methamphetamine deters condom use. Research has established links between chemsex and group sex, as well as inconsistent condom use.[15]

A systematic review reported the rates of unprotected anal sex ranging from 30% to 38% among MSM engaging in chemsex,[1] corroborated by studies in Australia and the UK.[14 16] Chemsex also perpetuates the diversification of sexual experiences influenced by pornographic media.[12] Global research reflected that chemsex predisposed MSM towards violent and coercive sexual behaviours, even occasional rape. For example, a recent Dutch study revealed common occurrences of non-consensual sex and sexual assault associated with drug use.[17] Similarly, a qualitative study in Bangladesh indicated that participants often sexually coerced partners, which entailed emotional blackmail or threats.[18]

Therefore, chemsex among MSM is associated with higher STI/HIV infection rates.[19] In a Hong Kong study, MSM diagnosed with STIs within the past year were five times more likely to participate in chemsex.[20] Similarly, in China, self-reported syphilis and herpes infections among MSM engaged in chemsex were twice as likely than non-users.[21] Despite extensive research on sexual implications of chemsex among these population, further evidence is warranted on the effects of chemsex within a gender-responsive framework.

Effect of chemsex on mental health

The global evidence depicted the association between chemsex and mental health symptoms,[22 23] including depression, anxiety and psychosis,[24] which originated from prejudice, discrimination and stigma.[25–28] A German Chemsex Survey among MSM revealed that somatisation, depression and anxiety scored significantly higher among chemsex users.[29] There is also limited evidence in Malaysia and Indonesia about the relationship between chemsex and mental health concerns.[30 31]

Global and regional evidence has underlined the multifaceted effects of chemsex including mental health, risky sexual behaviours and elevated HIV/STI risks. Yet, there is no research on the primary prevention of chemsex among MSM, particularly in Bangladesh. Moreover, given the increasing HIV/STI burden among this population, targeted chemsex research that transcends a specific dimension of methamphetamine use is essential. Moreover, these research initiatives are yet to be operationalised into actionable programmes. Thus, this study could bridge these gaps by exploring the overall scenario of chemsex, its underlying contexts and associated perceptions (including sexualised drug use) and propose recommendations for addressing the harms associated with chemsex (including sexual health harms (unprotected anal sex, violent or coercive sex, group sex, etc.) and mental health harms (depression, anxiety and psychotic symptoms)).

This will be the first study specifically targeting chemsex among MSM, MSW and *hijra* in Bangladesh. This study can recommend pathways to address chemsex-related harms by devising a culturally relevant, gender-sensitive, context-specific and evidence-based chemsex intervention. This would help optimise the existing sexual and reproductive health and rights (SRHR) intervention by integrating chemsex within a comprehensive intervention package. This proposed integrated intervention model carries crucial policy implications for governmental and non-governmental organisations working with these populations, ultimately empowering them to reduce their engagement in risky sexual behaviours. Existing chemsex literature is predominantly focused on HIV/STI aspects, thus often overlooking gendered complexities (eg, masculinity and femininity in MSM relationships).

Therefore, research is warranted to explore chemsex, particularly through a gendered lens.

RESEARCH OBJECTIVES

Primary objective

To explore the overall dynamics of chemsex among MSM, MSW and transgender women (*hijra*) in Dhaka, Bangladesh, and to formulate culturally relevant, context-specific, gender-sensitive and evidence-based recommendations for chemsex interventions.

Secondary objectives

1. To determine the types and frequencies of using sexualised drugs
2. To find out the reasons for engaging in chemsex, and to determine the association between chemsex and various types of sexual behaviours
3. To understand sexual behaviours through the framework of gender and rights under the influence of sexualised drugs
4. To understand the diverse impacts (ie, sexual and physical health and psychological well-being) of chemsex on users and their sexual partners
5. To investigate the nature and types of services that are currently available for MSM, MSW and *hijra* who are engaged in chemsex
6. To develop culturally relevant, context-specific, gender-sensitive and evidence-based recommendations for chemsex interventions in Bangladesh

METHODS AND ANALYSIS

Study location

The study will be conducted at four drop-in centres (DICs) in Dhaka city. For a better representation of MSM, MSW and *hijra*, we will divide Dhaka city into four regions, where one DIC will be selected from each region.

The DIC, at its essence, forms the central component of HIV prevention intervention for key populations such as MSM, MSW and *hijra*, providing them with diverse HIV prevention services like condom and lubricant distribution, behaviour change communication, STI management and HIV testing. These DICs are distinct from the mainstream healthcare infrastructure in the sense that they operate as community-based entities funded by donors and governed by non-government organisations (NGOs). To ensure easy access and convenience for MSM, MSW and *hijra*, the DICs are strategically positioned in catchment areas well known to these specific population groups.

Study period

The study duration is expected to be 14 months after receiving approval from the Research Review Committee (RRC) and Ethical Review Committee (ERC) which is expected to be completed by March 2024. The Gantt chart is given in table 1.

Research design

This will be a sequential, exploratory, mixed-methods study. This design will consist of qualitative and quantitative strands occurring in chronological phases, where subsequent strands will build on the previous strand. The research questions are interlinked and will evolve throughout the study phases.[32 33] The study will be conducted at four DICs for MSM, MSW and *hijra* in Dhaka city, managed by International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) and operated by an NGO named *Bandhu*, following three phases with an initial preparatory phase (including staff training).

Preparatory phase: training of the research team members

The research team will undergo comprehensive training on the research project for 7–10 days about the research methods, HIV and AIDS, sexualised drug use and chemsex in Bangladesh, diversity of KPs in Bangladesh, current HIV intervention modalities, risk behaviours related to chemsex, gender issues and research ethics. The research team members will be responsible for collecting qualitative and quantitative data, transcribing interviews, modifying the interview and focus group discussion (FGD) guidelines (as required), and coding and analysing qualitative data. Along with the research team, the principal investigator (PI) and co-investigators (Co-Is), experienced in qualitative research will conduct qualitative interviews, and guide and supervise the qualitative data analysis and report writing. Moreover, one of the Co-Is, who is an experienced statistician, will guide and supervise the quantitative data collection and analysis.

Phase 1: formative phase (literature review and qualitative method)

In this phase, we will gather information on the overall dynamics of chemsex through reviewing published global, regional and local literatures, documents, guidelines. Qualitative methods will be used to explore individuals' lived experiences and perspectives through phenomenology.[34] It is useful as a valuable theoretical instrument to facilitate a profound and introspective investigation and enables the extraction of subtle significance from participants' experiences concerning the intricate and multifaceted aspects of chemsex contexts.[35 36] This phase will enrich our understanding of chemsex and associated sexual behaviours via the framework of gender and rights, and aid the quantitative survey for eliciting appropriate variables/issues and appropriate language, thus developing a context-specific semistructured quantitative survey questionnaire to validate and enhance the generalisability of the results in a large sample.

The qualitative inquiry will consist of 15–20 in-depth interviews (IDIs) and 2–3 FGDs with MSM, MSW and *hijra* who practice chemsex and 10–15 key informant interviews (KIIs) with DIC service providers, experienced researchers, academicians, programme personnel working with these populations, policymakers, sexologists, gender specialist and other relevant stakeholders. While IDIs will elicit lived experiences and perspectives,

Table 1 Gantt chart

Activities	2023											2024		
	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Preparatory activities														
Recruitment														
Training of staff														
Phase 1: formative phase (literature review and qualitative method)														
Field testing and finalisation of data collection tools														
Comprehensive literature review														
Data collection including transcription (qualitative)														
Data analysis (qualitative)														
Draft report writing for phase 1														
Phase 2: quantitative cross-sectional survey														
Orientation of staff on quantitative questionnaire														
Field testing														
Data collection (quantitative)														
Data entry and analysis (quantitative)														
Draft report writing for phase 2														
Phase 3: explanatory phase for the formation of interventions														
Qualitative data collection and analysis														
Intervention design workshop														
Validation workshop														
Formulation of interventions														
Final report and dissemination														

FGDs will elicit group dynamics on chemsex which reflect their normative behavioural discussions contested among and within the group. This will help to triangulate data explored from IDIs.

We also plan to apply gender and rights analytical lenses through various phases. For example, during qualitative interviews, we will attempt to explore their understanding about their masculine and feminine roles and responsibilities and how this translates to their sexual relationships and practices, as well as the contexts of these behaviours. Moreover, in a previous qualitative study conducted among MSM and *hijra* in Bangladesh on methamphetamine use, there was an indication that the use of methamphetamine resulted in violent sexual behaviour, thus violating the rights of this community.[18] This indication of violence and violations ignited a hypothesis about whether there are gendered dimensions among the participants and its role in the engagement of or as a consequence of chemsex practice. Therefore, a wide exploration is needed to unfold the layers of gender perspectives that prevail in the community. In this context, we plan to explore drug-induced coercive sex, and violence resulting from the increased expression of masculine power, along with other gendered issues in the study.

Study population

For qualitative interviews, the following study participants will be recruited purposively:

1. *For IDIs and FGDs*: MSM, MSW and *hijra* who practice chemsex. Operational definitions for the study population are explained in table 2, which are used for providing HIV prevention services to these population groups.[37]
2. *For KIIs*:
   a. DIC service providers (ie, DIC manager, outreach supervisor, peer educator and medical assistant)
   b. Experienced researchers, academicians, and programme managers working with these populations
   c. Relevant policymakers, sexologists, gender specialist, and other stakeholders.

Sample size and sampling

We will adopt maximum variation sampling for 15–20 IDIs[38] to identify cross-cutting issues and discrepancies among diverse sociodemographic groups.[39] As we aim to elicit in-depth knowledge from information-rich participants, we plan to primarily apply intensity sampling for approximately 10–15 key-informant interviews.[38] As FGDs will be conducted with homogeneous groups of MSM, MSW and *hijra* who practice chemsex, we plan to conduct 2–3 FGDs on homogeneous groups of MSM, MSW and *hijra* where the population groups will not be mixed in the same FGD. The sample size will also be contingent on the points of data redundancy and saturation.

Table 2 Definitions of the study population[12 37 50–52]

Population	Operational definitions
Men who have sex with men (MSM)	'Males who have had sex with males within the last 1 year regardless of whether or not they have sex with women or have a personal or social gay or bisexual identity, but do not sell sex'
Male sex workers (MSW)	'Male who sell sex to other males in exchange of money or gifts in the last 3 months'
Hijra	'Those who identify themselves as belonging to a traditional *hijra* subculture and who maintain the guru-chela *hijra* hierarchy'
Masculine MSM (panthi)	'The name *panthi* is given by the *kothi* where the *panthi* play insertive role during anal intercourse with their sexual partner *kothi* and *hijra*. Often cases *panthi* are married and face difficulties in maintaining dual relationship with their wife and *hijra* or *kothi* sex partner'
Feminine MSM (kothi)	'*kothi* are feminine men who play the role of women in their sexual, emotional and social relationships with other men. *Kothi* usually prefers receptive role in insertive anal intercourse and some dress up and behave like girls as well. Due to their feminine behaviour, they are often subject to various forms of harassment and discrimination in society'

Data collection and management

Field testing of interview, FGD guidelines

All the interview guidelines will be field-tested and fine-tuned to facilitate valid data collection. In addition, considering the flexible qualitative design, emerging findings will be incorporated into the guidelines.

Data collection and management procedure

Digital voice recorders will be used to record IDIs, KIIs and FGDs. However, if some informants feel uncomfortable being recorded, hand notes will be taken and elaborated at the earliest possible time. During FGDs, along with a digital recorder, one of the team members will be assigned to take hand-notes. After each IDI, KII and FGD, the recordings will be transcribed and field notes will be incorporated. Qualitative data collection and analysis will occur until the point of saturation of data is reached.[40]

Data analysis

All qualitative interviews and FGDs will be conducted in Bengali and recorded digitally if the informant provides consent. Verbatim data transcription will be done in Bengali by trained researchers along with the ongoing

data collection concurrently. They will also take field notes, review them and attach their subjective interpretations of the field situation and the informant with each transcribed data set. Although the interviews and FGDs will be conducted in Bengali, it is assumed that local patterns of pronunciation or local dialect will influence it. Therefore, as the first step, every effort will be made to carefully listen to the recorded data, explore and clarify the meanings of the complex terminologies and metaphors.

After transcribing the recorded interviews verbatim, the team will repeatedly read the interview and FGD transcripts to familiarise themselves with the data. Thereafter, data will be manually analysed using a thematic analysis approach. Specifically, we plan to follow the six steps of thematic analysis conceptualised by Braun and Clarke.[41] Initial codes will be generated and relevant data will be gathered as per each code. A joint coding framework will be followed.[42] Based on these codes, the research team will identify some key themes related to the underlying contexts and complexities of chemsex which are pertinent with the study objectives. Based on this, the research team will develop a thematic matrix in Bengali initially, and will be translated into English for further qualitative analysis. Each theme will be labelled in this matrix and its scope will be defined.[41] Interviewers will maintain a personal field diary, as suggested by many qualitative researchers[43 44] to write their thoughts and concerns. The field notes will be analysed using the same thematic analysis conventions. So, in a nutshell, Bengali language will be used for data collection, data transcription and data coding. The data analysis and report writing will be done in English.

Data collection and analysis will be integrated, as they are ongoing and reflexive processes.[40 45] This will help to identify data saturation points. Decision trails will be made throughout the data analysis process to ensure the scientific rigour of the qualitative aspects. Any discrepancies in decisions made by the team members will be resolved by consulting the PI and eventually reaching a consensus. Other approaches used for ensuring scientific rigour include peer debriefing by exchanging perspectives and interpretations of the data among the team members; and conducting member-checking sessions where the study participants provide their feedback on the researchers' interpretations of their emic perspectives.[46] Most importantly, various forms of triangulation will be applied through adopting a variety of methods, data collection approaches, investigators, theoretical applications and analytical approaches.[38] During analysis, atypical or diverse data will not be ignored. Rather, these data will be further explored, analysed and presented as research findings according to the context.

During the data analysis, with the other emerging themes, the gender-related complexities of chemsex will also be considered such as sexuality issues among masculine and feminine MSM, the gendered contexts of drug use, gender-based violence on the pretext of drug use, etc. These gendered complexities will be embedded within the qualitative analysis. Some of the themes and subthemes derived from the data will be focused on the gendered complexities of chemsex. For example, if any data emerge about masculine pride during chemsex, gender-based pride would be marked as a theme. Based on the thematic analysis, a report will be developed in English for submission to the donors.

Data will be stored on a daily basis on a password-protected computer for an unlimited period as per the principles of the Institutional Review Board (IRB) and the data archival policy of the organisation.

Phase 2: quantitative cross-sectional survey

Phase 1 findings will guide the development of a semi-structured quantitative survey questionnaire. The cross-sectional survey will be conducted among 458 MSM, MSW and *hijra* of four DICs of Dhaka city to provide information about a representative estimate of the prevalence, reasons and sexual risk behaviours (including perceived masculine and feminine sexuality and related gender-scripts which influence sexual behaviours) associated with chemsex among this group.

Inclusion criteria

1. MSM, MSW and *hijra* who are aged between 18 years and 70 years, and enlisted in the participant list of the selected DICs
2. Provide verbal consent

Exclusion criteria

1. MSM, MSW and *hijra* who are not enlisted in service list of DIC
2. Are not in the physical or mental condition to respond to interviews
3. Have not given their consent to participate

Sample size and sampling

Sample size

The sample size at first was calculated as 229 following a standard sample size formula-1[47] with 95% CI (ie, n1). Then, the calculated sample size was adjusted for 5% due to exclusion during the data cleaning because of lack of consistency and design effect of 2.0, that resulted as 482 (ie, n2). Finally, the sample size was adjusted for finite population correction (FPC)[48] using formula-2, (ie, n3=458). In the initial calculation of sample size (n1), we used weighted average of the prevalence of methamphetamine use among MSM, MSW and *hijra* from the data of HIV surveillance 2015 conducted in Dhaka, that is, 10.7%[49]

$$n_1 = DE\frac{z^2_{1-\frac{\alpha}{2}}}{d^2}pq \quad (1)$$

In equation 1:

n_1=calculated sample size,

p= Percentage values of the indicators from the literature review =10.7%,

q= 1−p,

$Z_{1-\alpha/2}$=The Z-score corresponding to the desired level of significance=1.96 (at the 95% CI)

d=desired level of precision=4%,

DE=design effect=2.0,

$$n_3 = \frac{n_2}{1+\frac{n_2}{N}} \quad (2)$$

In the above equation 2:

n_3=calculated sample size after FPC.

N=total number of gender and sexually diverse population groups enlisted in Jatrabari, Darus Salam, Uttara and Badda DICs in Dhaka city=4500 (source: Programme data from Jatrabari, Darus Salam, Uttara and Badda DICs, January–March, 2022).

Sampling

At first, the target sample size 458 will be proportionately distributed among MSM/MSW/*hijra* enlisted at four DICs as per table 3. Thereafter, in order to ensure the representativeness of KPs in each DIC, respondents will be further proportionately distributed according to the enlisted number of MSM, MSW and *hijra* in the mother list. This process will be implemented just before data collection is started. Finally, the respondents will be selected randomly from the mother list to be included in the study.

Data collection and management

The survey questionnaire will be field-tested and fine-tuned to facilitate valid data collection. All interviews will be conducted in Bengali.

Data analysis

Before data entry, the consistencies of all responses to questions in the filled-out questionnaires will be checked. A list of responses to open-ended questions will be prepared and a numeric code will be assigned. Data will be further cleaned using Excel before conducting the data analysis. Categorical variables will be described in terms of the percentage points and numeric variables by mean (if normally distributed) and median (if not normally distributed). Interquartile range (IQR) will be reported for median values and standard deviation (SD) for mean values. All descriptive analysis will be carried out to show the results of the outcome variables for each of the target population groups (MSM, MSW and *hijra*). All sorts of variables will be used to identify the factors associated with chemsex, such as sociodemographics, sexual risk behaviours and other related variables. At first, bivariate analysis adopting univariate logistic regression will be carried out to find out the association of chemsex and with other variables. Variables that will be significant at least at 10% in the bivariate analysis will be selected for multivariate analysis. Before doing multivariate analysis, multicollinearity will also be checked among the significant variables from the bivariate analysis. The results from multivariate logistic regression analysis will be expressed in terms of odds ratio (OR) along with 95% confidence interval (CI) and p-values. Data will be entered using Epi-Info for Windows (V.3.5.1) and analysed using SPSS (V.20).

Table 3 Proportionate sampling of respondents (MSM+MSW+*hijra*) in each DIC

Name of DIC	Proportionate sample size of (MSM+MSW+*hijra*)
Jatrabari	150
Uttara	81
Darussalam	109
Badda	119
Total	458 (n3)

DIC, drop-in centre; MSM, men who have sex with men; MSW, male sex workers.

Phase 3: explanatory phase for formulating interventions

Explanatory phase

After phases 1 and 2, some quantitative values and issues may warrant further explanation. Therefore, in this phase, an explanatory sequential design will be applied where the qualitative method will be used after the quantitative phase (phase 2) to explain the initial quantitative results.[32 33] Therefore, 5–10 IDIs will be conducted with the participants who are involved in chemsex; and 5–10 KIIs will be taken with service providers and stakeholders knowledgeable about chemsex to add qualitative depth to survey responses, explore possible explanations and examine service provisions regarding chemsex. KIIs will help to generate an overall understanding of the standard service delivery package through analysing various beliefs and perspectives. Therefore, we may go back to the potential participants of phase 1 if available. The sample size calculation and sampling, and data collection will follow the same strategy as described in phase 1.

Data analysis

Like phase 1, similar qualitative data analysis approaches will be followed. For instance, after transcribing the interviews, the research team will be convened to read the initial set of transcripts and generate a preliminary set of codes. Based on that, the research team, including the authors, will formulate a thematic matrix. As the objectives of phase 3 are different from phase 1, the codes will be different in this phase, in terms of mainly being focused on chemsex service provisions, beliefs and perspectives about chemsex, etc. After conducting the qualitative data analysis, the themes and subthemes will be inputted into the report accordingly.

Intervention formulation

Based on phase 1 and 2 findings, and the explanatory phase, a preliminary chemsex intervention model will be developed through four intervention design workshops involving various experts and stakeholders (including representatives from MSM, MSW and transgender

community), policymakers, researchers, programmers, clinicians (including psychiatrists, Skin and Venereal disease specialists), sexologists, gender specialists, clinical psychologists, etc. We will arrange the workshops with various small homogeneous stakeholder groups to disseminate the findings and propose areas warranting intervention. Then, we will obtain stakeholder recommendations to facilitate a culturally relevant, context-specific, gender-sensitive and evidence-based intervention design. Eventually, we will conduct one validation workshop with all the stakeholders to present the final intervention model to reach a consensus and finalise it.

As the findings of each subsequent stage builds on the previous stage, the methods, results and discussion will be separately described, and then the results from each stage will be integrated via triangulation. The summary of methods is given in table 4.

Data triangulation

This sequential, exploratory and mixed-methods study has three phases, and these three phases are interconnected. The triangulation will be held within the phases and between the phases. The overall triangulation plan is explained in table 5.

Outcome variable(s)

a. Types of sexualised drug use.
b. Frequencies of sexualised drug use.
c. Prevalence of chemsex
d. Reasons for engaging in chemsex
e. Sexual risk behaviour (including perceived masculine and feminine sexuality and related gender-scripts which influence and construct sexual behaviours) associated with chemsex

Statement on positionality and reflexivity

To ensure diverse positionality and representation, our team will comprise community representatives (ie, gay, MSM and *hijra*) including a research guide, and investigators who are not community members but have an active attachment and involvement in research with the key population for over 20 years. Therefore, they already have a strong rapport with the community. Our research project is built on a trans-disciplinary approach, bringing together experts from various academic backgrounds including anthropology, psychology, sociology, statistics, biomedical and public health. We do not disclose the drug-using behaviour of any team member due to ethical considerations. However, we will ensure a non-judgemental attitude towards any drug or chemsex users.

To ensure the reflexivity, the team members will implement the reflexivity approach in every phase of research process from the data collection to data analysis. This will enable us to thoroughly review our own biases and ensure the reliability of our findings. The research team members will maintain reflexivity before and after interviewing, transcription, coding, analysis and interpretation, considering the contextual aspects. Furthermore, the team members will collaboratively involve in critical discussion on reflexive notes, team debriefing, team member's personal, interpersonal, methodological and contextual issues related to the research at specific intervals with the presence of the investigators. This process will minimise the researcher's bias and robust the research process.

Patient and public involvement

MSM, MSW and *hijra*, enlisted under the four selected DICs, will be discussed through debriefing sessions, prior to the initiation of the study, about the possible outcome variables from each objective. Although they are not planned to be directly engaged in the study design, they will be involved throughout the data collection and analysis stages. Before data collection, the participants will initially be oriented about the study and we plan to employ their help for facilitating access to participants considering the hidden nature of these communities. Throughout the data collection phase, we shall take their help in further recruitment of the participants including hard-to-reach participants. To design a culturally relevant, context-specific, gender-sensitive and evidence-based chemsex intervention, insights will be solicited from MSM, MSW and *hijra* and service providers via qualitative interviews. During the data analysis phase, member-checking sessions will be conducted with study participants to verify the correct interpretation of the data. Moreover, MSM, MSW and *hijra* will participate in the intervention design workshops, and their recommendations will be considered in the formulation and validation of the intervention.

ETHICS AND DISSEMINATION

Participants will be engaged in the study on a voluntary basis. Verbal consent will be taken from MSM, MSW, *hijra* and written consent will be taken from key informants. In the case of quantitative survey with the MSM, MSW and *hijra*, verbal consent will be taken. Experiences of working with MSM, MSW, *hijra* suggest that many MSM, MSW, *hijra* are reluctant to disclose their identity in writing as their sexual practices are either criminalised by law or subject to discrimination/stigmatisation. Therefore, soliciting their written consent would make them suspicious about the intent of this study, thus influencing their decision to participate in the study and respond to particularly sensitive questions. Hence, verbal consent from the informants (ie, MSM, MSW, *hijra*) and written consent from the key informants will be taken for this study. Trained research team members will obtain informed consent. Verbal informed consent will be recorded using a digital recorder, and all these recordings of verbal consent will be kept in the computer.

The research participants will be oriented about the study objectives and purposes. They will be ensured of the anonymity of their responses, and data collection tools will not contain any identifying information. If any research participant does not agree to his responses to be

Table 4 Methodology at a glance

	Phase 1 (formative phase)		Phase 2 (quantitative cross-sectional survey)	Phase 3 (explanatory phase for formulating interventions)	
	Literature review	Qualitative interview		Explanatory phase	Intervention formulation
Methodology		Qualitative	Quantitative	Qualitative	
Data collection technique	Evidence synthesis through review of global and national documents, scientific articles, guidelines, etc.	IDI, FGD, KII	Survey	IDI, KII	Intervention design workshops, validation workshop
Study population		*IDI and FGD*: MSM, MSW, *hijra* engaged in chemsex *KII*: DIC service providers, researchers, academicians, programme personnel, policymakers, sexologists, gender specialist and other relevant stakeholders	MSM, MSW and *hijra* who are aged between 18 and 70 years, and enlisted in the participant list of the selected DICs	*IDI*: MSM, MSW, *hijra* engaged in chemsex *KII*: service providers and stakeholders knowledgeable about chemsex	Relevant stakeholders
Sample size and sampling method (total number of interviews: *Qualitative* (IDI, KII, FGD): 37–58 Quantitative: 458)		IDI (15-20): maximum variation sampling KII (10-15): intensity sampling FGD (2-3): convenience sampling	*Sample size*: 458 *Sampling*: the sample size will be proportionately distributed among MSM/MSW/*hijra* enlisted at four DICs and selected randomly from the mother list	IDI (5-10): maximum variation sampling KII (5-10): intensity sampling	► Intervention design workshops: 4 ► Validation workshop: 1
Data collection tool		Interview and FGD guidelines	Survey questionnaire	Interview guidelines	
Data analysis		Thematic analysis	Univariate, bivariate and multivariate analysis	Thematic analysis	
Expected outcome of the phase	► Explore the issues related to chemsex and gain in-depth understanding of the chemsex situation ► Generate and prioritise survey variables		To measure the prevalence of chemsex, reasons for engaging in chemsex and sexual risk behaviour associated with chemsex	► Add qualitative depth to survey responses and explore possible explanation ► Develop chemsex intervention	

DIC, drop-in centre; FGD, focus group discussion; IDI, in-depth interviews; KII, key informant interviews; MSM, men who have sex with men; MSW, male sex workers.

recorded, written notes will be taken. The research participants can decline to answer any questions, can stop the interview and leave at any point of the interview.

Unique identification numbers will be assigned to each research participant. The address or any information such as mobile number or ID in the mother list will be kept in a separate partition of a hard disk drive to identify research participants. This will only be accessible by the approved study personnel in the password-protected computers.

Table 5 Data triangulation plan

Type of triangulation	Definition	Process of triangulation in this study
Methodological triangulation	Methodological triangulation utilises multiple methods to explore phenomena. It seems preferable for verifying findings, collecting in-depth data, enabling validity and increasing the comprehension of the studied phenomena.[53]	In this study, the three phases will follow two individual methods. Phase 1 (formative research) will follow the qualitative method, phase 2 (cross-sectional survey) will follow the quantitative approach and phase 3 will follow the qualitative approach. In this study, the qualitative findings of phase 1 will support the quantitative findings of phase 2 and will identify appropriate variables/issues for the quantitative survey questionnaire. In contrast, the qualitative findings of phase 3 will complement the qualitative and quantitative findings of phases 1 and 2, and add qualitative depth to survey responses and explore possible explanations. Method triangulation will be achieved through this qualitative (phases 1 and 3) blending process and quantitative approach (phase 2).
Data source triangulation	Data source triangulation entails gathering information from different individuals, groups of people, families and communities to acquire different points of view and data authentication.[54]	In this study, data source triangulation will be done intraphase and interphase. The intraphase data triangulation process will be followed in phase 1 (formative research). In this phase, secondary data will be extracted through a literature review, and primary data will be collected using IDI, KII and FGD. Regarding primary data source triangulation, IDI data represents the views, experiences and knowledge individuals acquire. The community perspective gathered through FGD will support or supplement the individual perspective. In contrast, the expert opinion on this issue, or KII, will provide a logical basis for the findings of IDI and FGD, complementing the primary findings. The literature-based data either supports or challenges the primary findings, which will open a new way of exploring the issues more thoroughly. In the case of interphase data triangulation, the qualitative data collected from phase 1 using IDI, KII, FGD and literature review will be triangulated with the quantitative data from phase 2 using a survey. Here, the qualitative data will complement the quantitative data. Then, the remaining gaps in triangulation will be filled in/backed up by the qualitative data from phase 3.
Investigator triangulation	Investigator triangulation refers to the collaboration of multiple researchers in one research project that produces several findings and conclusions. This sort of triangulation may validate findings and multiple perspectives, broadening the scope of the investigated phenomenon.[54 55]	This study involves investigators from different academic backgrounds with their own specialities and expertise in this field. The investigator's team comprises anthropological, sociological, public health, biomedical, statistical and psychological experts. The experts will bring their opinions and thoughts regarding these issues to the table, giving this study a multidisciplinary and trans-disciplinary aspect in data collection, analysis and interpretation. Through this, we will ensure investigator triangulation.
Theoretical triangulation	The triangulation of theories employs multiple theories to evaluate and comprehend data. Using this form of triangulation, multiple hypotheses or theories can help the researcher argue for or refute their findings.[54]	This study will use psychosocial theories and socioecological models of behaviours to explain and interpret the qualitative findings. Here, theoretical triangulation will be ensured in two ways; one is within the theories' triangulation, where multiple theories will be triangulated within them to come up with a detailed and more comprehensive version of the theories, and the other is the theoretical triangulation with data, where the qualitative data will be triangulated with existing theories or frameworks. These theories or frameworks will analyse and interpret the study's findings according to the theories' frameworks.
Analytical triangulation	Triangulation of data analysis is the amalgamation of two or more data analysis methodologies. These strategies may include distinguished statistical test families or distinct statistical methods for determining similarities or validating data.[56]	In this study, the thematic analysis will be followed in the qualitative phase (phases 1 and 3), and the univariate, bivariate and multivariate analysis will be followed in the quantitative phase (phase 2). These two analyses will produce qualitative and quantitative findings, complementing each other to present the findings related to the objectives.

FGDs, focus group discussions; IDIs, in-depth interviews; KII, key informant interviews.

Ethical clearance was attained from icddr,b's Ethical Review Committee (ERC), which follows international ethical principles to ensure anonymity, confidentiality and consent.

We plan to disseminate our study findings at the organisation and then branch towards policymakers and other relevant stakeholders to facilitate policy translation. We also plan to disseminate to a variegated audience through various scientific platforms including peer-reviewed journals, and national and international conference presentations.

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