

Songs, Stories, Design, and Dialogue: Intervention Mapping, Human- Centered Design, and Arts-Based Methods for a Chhaupadi (Menstrual Seclusion) Intervention Development in Nepal

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ABSTRACT

Background:

Menstrual stigma and chhaupadi (menstrual seclusion) persist in rural Nepal despite criminalization in 2017, highlighting the limitations of legal approaches and interventions implemented to date. Creative and community-engaged tools such as arts-based methodologies and human-centered design (HCD) offer participatory, iterative approaches that center community voices in intervention development. However, its application to menstrual health in rural Himalayan settings remains largely unexplored. Pairing creative methods with a structured approach – Intervention Mapping (IM) – allows for a flexible yet rigorous participatory and evidence-based approach for designing solutions to address complex health issues.

Methods:

Eleven women currently practicing chhaupadi were recruited for heterogeneity to participate in a 10-day co-design workshop in Dailekh, Nepal. Participants engaged with a package of HCD and arts-based tools, including collaborative storytelling, photo journaling, clay modeling, role-play, participatory art, deuda folk song composition, and more. These activities were guided by the IM framework, including a needs assessment,

developing change objectives, and program design activities. Concurrent Key Informant Interviews and Community Dialogue Sessions added insights. Data presented in this paper was generated through facilitator field notes, team debriefs, workshop documentation, and post-workshop reflections with participants.

Results:

Culturally grounded and multimodal tools generated the highest levels of engagement and meaning making, enabling participants to participate as active co-designers. Relational practices, like Walk-a-Mile home visits and culturally meaningful gestures of recognition functioned as key components of participation rather than supplementary activities. Notably, some participants began changing their behavior during the workshop itself, before any formal intervention was deployed, suggesting that the boundary between intervention development and intervention delivery is not as clear-cut as often assumed. Key challenges included cognitive demands of abstract tools such as the Impact Ladder, social tensions arising from participant selection, logistical constraints, and unmet childcare and economic needs.

Conclusions:

Integrating IM, HCD and arts-based methods demonstrate meaningful potential for menstrual health intervention development in Nepal. The co-design process itself functioned as an early mechanism of change, challenging the assumption that intervention development and behavior change are temporally distinct. Future co-design frameworks should build relational infrastructure into the research scaffolding from the outset.

92

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95 chhaupadi, methods innovation

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98 **INTRODUCTION**

99 **Menstruation: Global and Nepal Contexts**

100 Menstruation is a natural biological process experienced by more than half the global
101 population over the life course, yet it remains widely stigmatized and poorly addressed
102 within public health policy and practice.^{1,2} Menstrual health and hygiene management
103 (MHH) is increasingly recognized as a human right, gender equity, and public health
104 issue that can affect education, psychosocial wellbeing, and equitable participation in
105 daily life.^{1,3} Despite growing global attention, many menstrual health initiatives
106 prioritize products or infrastructure while insufficiently engaging with the social norms
107 and cultural meanings that shape menstrual experiences.³

108 In Nepal, menstruation is governed by deeply embedded sociocultural beliefs that frame
109 menstruating individuals as impure, resulting in a range of behavioral restrictions.⁴⁻⁷
110 These include limitations on food preparation, social interaction, mobility, and
111 participation in religious activities.^{2,8,9} One of the most severe manifestations of these
112 norms is *chhaupadi*, a practice in which menstruating women and girls are required to
113 live separately often in makeshift huts or animal sheds during menstruation.^{4,10,11}

Qualitative research has documented the physical dangers and psychological harms associated with *chhaupadi*, including exposure to extreme weather, animal attacks, infections, fear, and social isolation.¹²

Although *chhaupadi* was criminalized in Nepal in 2017, evidence suggests that the practice persists in parts of far-western Nepal, highlighting the limitations of legal prohibition when not accompanied by culturally grounded, community-engaged approaches.¹³ Studies examining community responses to criminalization have shown that awareness of the law does not necessarily translate into behavior change, particularly when menstrual restrictions are reinforced by religious beliefs, intergenerational norms, and concerns about social sanctions.^{4,8}

An Opportunity for Human-centered Design and Community-engaged Approaches

This study builds on prior qualitative research examining menstrual beliefs and practices in Western Nepal, which underscored the need for methodologies that move beyond documenting harm to actively engaging communities in reflection and dialogue around menstruation.^{14,15,16} Traditional research approaches may not create space for communities to articulate and interrogate the meanings underlying restrictive practices, thus inadequately capture the complexity of menstrual stigma.

Human-centered design (HCD) offers a participatory and iterative approach that centers the experiences, values, and priorities of end users throughout the research and design process.^{14,17} Within global health, HCD has been applied to intervention development across domains such as maternal health, HIV care, and adolescent wellbeing, with the

aim of fostering empathy, creativity, and locally grounded solutions.^{18,19} Proponents argue that HCD can surface tacit knowledge and challenge assumptions embedded in externally driven interventions. However, scholars have also raised concerns regarding its resource intensity, facilitation power dynamics, and challenges related to evaluation and scalability.¹⁸

Despite its growing use in global health, HCD has not been widely applied to the study of menstruation or menstrual stigma through extended, community-embedded participatory processes in Nepal. This paper builds on pilot work conducted in Dailekh district,¹⁵ where a 10-day HCD-informed workshop engaged community members in storytelling, mapping, art activities, and collective sense-making around menstruation and *chhaupadi*.¹⁵ Rather than positioning menstruation as a problem to be solved, this approach sought to explore how menstrual meanings are constructed, negotiated, and potentially transformed within communities.

Specific Aims

This study was conducted as part of the BLINDED study [grant/registration number BLINDED], a community-engaged, multi-phase research initiative examining menstrual health practices and intervention development in Karnali Province, Nepal (full study protocol is available elsewhere).²⁰

In this investigation, we examine the benefits and challenges of applying HCD, arts-based research activities, and Intervention Mapping (IM) in low-resource settings to inform collective sense-making and intervention development. We present findings

from a 10-day co-design workshop in mid-west Nepal that implemented a package of participatory tools to develop a community-centered menstrual health intervention.

The aims of this manuscript are to: (1) describe the implementation of HCD tools, arts-based approaches and IM to explore menstrual experiences and restrictive practices in rural Nepal; and (2) assess their effectiveness in facilitating community participation, dialogue, and critical reflection. By evaluating HCD as both a research and engagement methodology, this study contributes to intervention development and community-engaged research literature by highlighting contextually grounded approaches for engagement and design.

METHODS

Overview

This study employed a community-engaged, creative, HCD approach to explore and design solutions to address menstrual health, stigma, and the practice of *chhaupadi* in mid-western Nepal. The approach was intentionally participatory by centering community voices, valuing lived experience, and celebrating local knowledge as a form of expertise. Rather than positioning community members as research subjects, the study engaged participants as co-designers and collaborators through iterative, visual, and experiential methods.

Team

177 To ensure the study was grounded in local expertise and community relevance,
178 BLINDED STUDY established an Advisory Board that has been engaged from the
179 study's conceptualization and consulted throughout at annual meetings and key
180 milestones. Board membership spans academic, programmatic, and community
181 perspectives, with expertise in public health, implementation science, menstrual health,
182 sexual and reproductive health, and community health. Critically, the board includes
183 community members with lived experience in Sudurpaschim Province, a region where
184 menstrual seclusion remains prevalent, as well as men and women across a range of
185 professional levels, ensuring that diverse voices informed study design and
186 implementation decisions.

187 The study is further supported by an academic mentorship team of senior researchers
188 whose expertise spans global health, mixed methods research, women's health,
189 community-engaged research, biostatistics, and participatory action research. Together,
190 the Advisory Board and mentorship team provide complementary layers of guidance,
191 one rooted in lived experience and programmatic knowledge of the Nepal context, the
192 other in methodological rigor and scholarly expertise, ensuring that BLINDED STUDY
193 is both scientifically robust and community-responsive.

194 The core study team reflects a deliberately assembled range of training, experience, and
195 positionality. Team members range from early-career researchers with MPH-level
196 training to doctoral-level researchers, creating a collaborative environment that
197 integrates emerging and established scholarship. The team draws on the expertise of
198 Nepali researchers and practitioners with direct experience in international
199 development and program evaluation in Nepal, alongside international researchers with

extensive experience in global health across multiple contexts. Two of the international team members bring between 12 and 30 years of sustained engagement working in Nepal specifically, providing historical depth and relational continuity with the communities and systems the study seeks to support. This layered positionality – spanning career stage, disciplinary background, national context, and depth of Nepal-specific experience – strengthens the team's collective capacity to conduct research that is both methodologically rigorous and deeply contextually informed.

Study Site and Participants

The study was conducted in Dailekh District of Karnali Province, Nepal. Dailekh was selected based on multiple considerations: it has been identified as a high-prevalence area for *chhaupadi* practice;²¹ it is accessible to the research team via road; and it was deemed an appropriate site to meet the study objectives by members of the BLINDED STUDY Advisory Board, study leadership and mentorship team, and municipal government representatives. Most of the study activities were conducted at the local health post (Figure 1), with some additional activities taking place at the participant households throughout the community (Figure 2).

218 [INSERT FIGURE 1 HERE]

219 *Figure 1. The Health Post, where most study activities took place. This photo was*
220 *captured by a study participant during the photo journaling exercise. The Health Post*
221 *is considered as an asset in her community.*

222

223

224

225

226 [INSERT FIGURE 2 HERE]

227 *Figure 2. Sattalla community, a cluster of homes where several of our study*
228 *participants reside.*

229 The co-design workshop was carried out with 11 women who formed the Community
230 Design Team (CDT). Participants were recruited through purposive sampling, with
231 recruitment led by a local team member with lived experience in the region to ensure
232 culturally appropriate identification and outreach. Eligibility criteria included:
233 identifying as female; being 15–59 years of age; currently practicing *chhaupadi* (self-
234 reported, as they define it at the community level); residing in the community for at
235 least one year; and being able to participate in the full 10-day workshop. An initial roster
236 of 50 women from Sattalla village in Aathabis Municipality was developed, in which
237 details of the study expectations, compensation, and timing were shared in the Nepali

language. Thirty-eight met the eligibility criteria. Next, field researchers narrowed the list to 20 women based on logistical considerations, including proximity to the centrally located workshop site and availability to attend all sessions. From these 20, the research team extended invitations to a final sample of 11 participants who were deliberately selected to ensure diversity in age, marital status, parity, caste, and ethnic background, thereby capturing a broad range of perspectives and lived experiences related to *chhaupadi* practices. All participants approached agreed to take part, and there was no attrition throughout the 10-day workshop.

A similar recruitment process was followed to recruit community members to participate in key informant interviews (KIIs) (n=9) and two Community Dialogue Sessions (CDS) (n=8, n=6). They were recruited purposively based on heterogeneity (age, occupation, gender) and their ability to speak to the current *chhaupadi* context in the community. These informants included a range of individuals such as farmers, health post staff, persons with disabilities, and Female Community Health Volunteers (FCHVs).

Ethics

The study received ethical approval from the relevant Institutional Review Boards in both the United States and Nepal (BLINDED FOR PEER REVIEW; study numbers to be provided upon publication). Informed consent was obtained from all participants through both verbal and written procedures, with explanations delivered in Nepali to ensure full understanding. Participants were clearly informed of the voluntary nature of

their involvement, their right to withdraw at any time, and the measures in place to maintain confidentiality. Additionally, explicit permission was obtained for audio recording, photography, and the use of any visual materials produced during the workshop. Participants received daily compensation and travel reimbursement, in accordance with local research standards. In addition, lunch and snacks were provided each day, and participants were welcome to bring their young children if needed.

Data Collection: HCD Co-design Workshop

The workshop was led by two PhD-trained researchers with expertise in participatory and community-engaged research methods. Drawing on their experiences as women, mothers, and menstruators, the facilitators were able to establish strong rapport and foster trust with participants. BLINDED NAME is an expert in qualitative research, trained as a human-centered design facilitator, and trained in Implementation Mapping. She is also an artist, photographer, and filmmaker, and holds a PhD in public health from the United States. She has over 12 years of experience in public health programming and research in the Nepal context and speaks intermediate Nepali. BLINDED NAME specializes in participatory research in the Nepalese context, with a background in nursing and extensive experience facilitating workshops in Nepal. She identifies as Nepali and has lived experience following menstrual restrictions. She holds a PhD from Nepal and is fluent in both Nepali and English. Additional research assistants supported facilitation, documentation, translation, and logistics throughout the workshop.

The workshop was conducted over 10 days and integrated key frameworks, activities, and principles from IM, HCD, and arts-based methods. All tools were carefully adapted to the local sociocultural context and designed to be accessible regardless of literacy level. Each day began and ended with a mood chart and reflection, where participants shared how they felt upon entering and leaving the workshop. At the close of most days, women also reflected on the activities through a brief focus group discussion. All activities were conducted in the Nepali language.

Day 1: Relationship Building and Study Orientation

Welcome and Orientation.

The workshop opened with an inauguration session that included welcome remarks from the Health Post In-Charge and the Ward Chair. The study team then introduced themselves and provided an overview of the study objectives and workshop structure. Icebreaker activities (e.g., name ball pass) were conducted to build familiarity among participants. Together, the group established ground rules to promote comfort, respect, and inclusivity throughout the 10-day process (Figure 3).

[INSERT FIGURE 3 HERE]

Figure 3: Community Design Team Ground Rules; 1. Let's listen to each other attentively: (a) Let's avoid interrupting when someone is speaking and respect their opinions, viewpoints, and the time limit, (b) Let's participate actively in every activity and share our thoughts clearly, (c) Let's respond positively to others' opinions and ideas. 2. Let's respect confidentiality: (a) Let's not share ideas and discussions from this workshop outside this group. 3. Let's recognize that everyone's views and ideas are

equally valuable: (a) Let's openly support differing opinions and ensure everyone has a chance to express themselves.

Presentation of Existing Evidence.

The research team delivered a Nepali-language presentation summarizing findings from a realist synthesis conducted during the formative phase of the study.(Baumann et al., 2025) This synthesis reviewed prior *chhaupadi* interventions implemented in Nepal and highlighted key lessons learned. Sharing these findings ensured participants were grounded in existing evidence and created a common foundation for subsequent co-design activities.

Logic Model of the Problem Activity.

Participants were introduced to the Logic Model of the Problem (LMOP), a core tool within the Intervention Mapping framework.²² The research team presented a visual depiction of key challenges associated with *chhaupadi* and related contextual factors. Using the HCD activity Rose–Thorn–Bud, participants provided structured feedback on the model by identifying elements they valued (roses), disagreed with or found problematic (thorns), and areas requiring clarification or further exploration (buds). Feedback was captured using icons, markers, and colored sticky notes (Figure 4).

[INSERT FIGURE 4 HERE]

Figure 4. Feedback was gathered on the Logic Model of the Problem (LMOP) using Post-it notes. The LMOP was presented as a visual poster with icons and graphics to facilitate participant dialogue on the root causes and consequences of chhaupadi.

Introduction to Photo Journaling.

Participants were then introduced to a photo journaling activity to be completed the following day. The team provided training on the use of iPads and the camera function. In pairs, participants practiced taking photographs within the community. Images were printed in real time and displayed collectively to affirm participants' engagement and emerging skills.

Concurrent Key Informant Interviews.

In parallel with workshop activities, a member of the research team conducted key informant interviews with community stakeholders, leaders, and subject-matter experts to further contextualize local *chhaupadi* practices. Findings from these interviews are reported separately.(BLINDED CITATION, in review)

Day 2: Storytelling, Photo Journaling, and Stakeholder Mapping

Icebreaker and Storytelling Activity.

The day began with an icebreaker designed to continue relationship-building from Day 1. Participants sat in a circle and collaboratively developed a story about a girl who practices *chhaupadi* (Figure 5). Starting with the first person, each participant added one sentence to build on the previous contribution. The story was based on participants' experiences within their community but was a fictional story. This exercise aimed to elicit insights into the lived experiences of women and girls affected by *chhaupadi* through collective storytelling. The storytelling exercise continued on the following days.

344 [INSERT FIGURE 5 HERE]

345 *Figure 5. Participants gathered to create their own fictional story about a girl who*
346 *practices chhaupadi in their community.*

347

348 **Photo Journaling: Community Assets.**

349 Building on the skills developed during the introduction to photo journaling session on
350 Day 1, participants completed a photo journaling exercise focused on community assets.
351 They were prompted with the question, “What are things that you love in or about your
352 community?” Working in pairs, participants spent one hour photographing responses
353 within the community using iPads (Figure 6). The research team later organized the
354 images into a PowerPoint presentation for discussion the following day.

355 [INSERT FIGURE 6 HERE]

356 *Fig 6. Photographs captured by participants during the photo journaling activity. (Left)*
357 *menstruating woman staying in a plastic tent instead of a traditional menstrual hut, reflecting*
358 *participants' observations that while some practices have changed, menstrual seclusion persists*
359 *in new forms. (Right) local tailoring service that enables community members to have clothes sewn*
360 *nearby, reducing the need to travel long distances.*

361 **Stakeholder Mapping.**

362 Participants engaged in a Stakeholder Mapping exercise to identify key gatekeepers and
363 influencers of the *chhaupadi* tradition, including those who practice it, perpetuate it, or
364 hold the power to enact change. For each stakeholder, participants discussed prevailing

mindsets and then collectively voted to select the five stakeholders they considered most important for promoting change (Figure 7).

Experience Diagram.

The Experience Diagram activity focused on visually mapping individual women's journeys through *chhaupadi*. Participants identified aspects of the experience they valued, as well as aspects they disliked or wished to improve. Using visual icons, painting, writing, or drawing, participants created diagrams representing these experiences. Ideas were then synthesized into a collective "master" diagram to capture shared perspectives (Figure 7).

[INSERT FIGURE 7 HERE]

Figure 7. The Stakeholder Map (Left) identifies key people who need to be considered in a chhaupadi intervention, and priority groups (e.g., families, neighbors, husbands etc.). The Master Experience Diagram (Right) synthesizes insights from all participants to depict the typical daily experience of chhaupadi in the community, illustrating both positive experiences (top of the diagram) (e.g., They don't have to cook food) and negative experiences (bottom of the diagram) (e.g., We are not allowed to touch food during the time of menstruation) from morning (left) to night (right).

Community Mapping.

At the end of Day 2, participants collaborated with facilitators to create a map of the community, marking the locations of all participants' households (Figure 8). This map served as a planning tool for the walk-a-mile immersion activity scheduled for Day 4.

[INSERT FIGURE 8 HERE]

Figure 8. Map of community created with participants, which supported with planning the WAM activities strategically.

Day 3: Storytelling, Photo Reflection, and Impact Planning

Icebreaker and Storytelling Activity.

Day 3 began by continuing the collaborative story initiated on Day 2. Participants added further detail to the narrative about a girl practicing the *chhaupadi* tradition, deepening the exploration of community experiences and perspectives.

Photo Journaling Discussion.

The study team presented the photographs captured by participants in the previous day's photo journaling exercise using a PowerPoint presentation. For each image, the photographer shared the meaning behind the photo, explaining why it represented an asset within their community and discussing potential ways these assets could inform *chhaupadi* intervention development. Other participants were invited to provide input and ideas throughout the discussion.

Creative Break.

During lunch, facilitators asked CDT members to participate in a creative activity to encourage enjoyment and self-expression. Participants expressed interest in singing and dancing to *deuda*, a local folk music genre. Facilitators followed along as the CDT members performed *deuda* songs and encouraged participants to explore writing their own lyrics. This activity was well-received and subsequently incorporated into the workshop program given the passion the participants have for music and *deuda*.

Impact Ladder.

The Impact Ladder exercise was designed to capture the long-term social changes that participants hoped to see in their community related to *chhaupadi* (e.g., improvements in physical and mental health). Using large chart paper depicting a ladder, facilitators guided participants to identify short- and intermediate-term steps toward achieving these outcomes. The group collaboratively selected 1–3 ultimate program goals for the intervention and refined them into “SMART” goals (Specific, Measurable, Achievable, Relevant, Time-bound) (Figure 9).

[INSERT FIGURE 9 HERE]

Figure 9. The final Impact Ladder visual created by participants, which reflects a long-term goals (e.g., Ending of chhaupadi) and the necessary steps to reach the goal when it comes to addressing chhaupadi in their community (e.g., Women education and enhancing decision making capacity for women).

Day 4: Walk-a-Mile Immersion

Walk-a-Mile Immersion.

On Day 4, the research team conducted a Walk-a-Mile (WAM) immersion by visiting each CDT participant’s household. This activity allowed the team to observe firsthand how *chhaupadi* is practiced within the home and surrounding environment. The WAM immersion fostered empathy and a deeper contextual understanding of participants’ lived experiences. By engaging with family and community members, and witnessing the household dynamics, the research team gained insight into the complexities of

429 *chhaupadi* in the community and strengthened relationships with participants (Figure
430 10).

431 [INSERT FIGURE 10 HERE]

432 *Figure 10. Photographs captured by the study team during WAM (Photographs by BLINDED NAME). (Top Left 1) A family*
433 *member demonstrates attaching a hose to redirect water for menstruation, avoiding contamination of the main tap. (Top*
434 *Left 2) A participant talks with the study team outside her menstrual shed while another takes notes, and family members*
435 *listen and contribute. (Top Right 1) The research team engages in dialogue with multiple family members, including a*
436 *husband who supports ending menstrual seclusion. (Top Right 2) View of a participant's house showing the menstrual*
437 *shed beneath the staircase. (Bottom Left) A participant shows her chhau goth, an outdoor shed attached to the house*
438 *with its own door, lock, and light. (Bottom Right) A participant sits outside her home, sharing her experience of sleeping*
439 *arrangements during menstruation.*

440

441 **Community Dialogue Session.**

442 A research assistant from the study team met with a diverse group of community
443 members (n=8) to share the outputs from the initial 3 days of activities. Community
444 members then reflected and shared feedback and additional ideas to consider when
445 designing *chhaupadi* interventions. This information was shared back with participants
446 on Day 5.

447 Day 5: Story Finalization, Community Feedback, and Impact Ladder Refinement

448 **Icebreaker and Storytelling Activity.**

449 Day 5 began with participants finalizing the collaborative *chhaupadi* story developed
450 over previous sessions. At the conclusion of the activity, the facilitator read the full story
451 aloud, and participants were invited to suggest edits or additions to ensure the narrative
452 accurately reflected their preferences and vision for this fictional story.

453 **Feedback from Community Dialogue Session.**

454 Facilitators summarized key findings from the community dialogue session and

provided participants with an opportunity to discuss the input. Participants were encouraged to consider this feedback as they refined the Impact Ladder in the following activity.

Impact Ladder Probing.

The group collectively reviewed the Impact Ladder, clarifying and elaborating on different aspects of the ladder before moving on to prioritizing the SMART goals developed on Day 3. This step ensured that the ladder accurately reflected participants' perspectives and the steps needed to achieve desired social change.

Day 6: Personal Storytelling, Reflection, and Intervention Prioritization

Icebreaker: Personal Chhaupadi Stories.

While earlier storytelling activities focused on a fictional narrative, Day 6 shifted to personal experiences and stories participants had heard about women practicing *chhaupadi*. Participants were prompted with the question: “Tell us about a time when you or someone you know ‘broke the chhaupadi rules.’ What happened?” Participants took turns sharing stories, laughing, and reflecting on their own experiences with pushing boundaries. This activity encouraged openness, trust, and deeper insight into the lived realities of *chhaupadi*.

Mirror Reflection.

In this activity, participants were invited to look into a mirror and reflect on their own strengths (Figure 11). Initially, participants felt shy when looking at themselves. However, they later found the activity very useful for encouraging self-recognition, confidence-building, and personal empowerment. They reflected that they had

previously used a mirror only for makeup or to check their appearance but looking into a mirror and engaging in self-reflection was a completely new experience.

[INSERT FIGURE 11 HERE]

Figure 11. (Left) A participant engages in the mirror reflection exercise. (Right) Participants were provided with fake bills to "purchase" aspects of the intervention that they felt would make the biggest impact in their community (Buy-a-feature).

Importance–Difficulty Matrix.

To prepare for intervention development, the research team generated a list of performance objectives derived from the Impact Ladder. These objectives represented smaller sub-steps necessary to achieve medium-term goals. Participants prioritized these items using an Importance–Difficulty Matrix, considering both feasibility and importance. The facilitator illustrated the concept using the example of purchasing items for a wedding with limited funds, demonstrating how to decide which items are most important and achievable.

Creative Break.

During lunch, a group of participants collaborated to develop lyrics for *deuda* songs that reflected their *chhaupadi* experiences, building on the creative activities introduced in previous days.

Buy-a-Feature.

To further refine potential intervention activities, pairs of participants were provided with “fake bills” to “purchase” the intervention ideas they found most valuable and

wished to prioritize (Figure 11). This exercise helped narrow the focus to the activities participants were most interested in developing and implementing.

Day 7: Concept Development, Color Selection, and Creative Collage

Concept Posters.

Participants worked in pairs to further develop intervention ideas using a concept poster template and creative materials. They used their Buy-a-Feature selections to expand one or more chosen ideas, responding to prompts on the poster through drawings, writing, or other expressive formats (Figure 12). Each pair then presented their intervention to the larger group, and participants provided feedback and exchanged ideas for improving the ideas as a group. Following the presentations, each participant was given five Post-it notes to vote for their favorite ideas across all posters. The five ideas receiving the most votes were prioritized for inclusion in the intervention and summarized for group agreement.

[INSERT FIGURE 12 HERE]

Figure 12. Participants created concept posters in pairs to define their ideal intervention activities, then voted on their favorite components of all posters.

Color Selection.

Participants engaged in a creative exercise to identify themes, colors, and words that resonated with their vision for the *chhaupadi* intervention. Using a collaborative brainstorming tool (e.g., <https://coolors.co/>), facilitators guided participants to select colors representing their concept poster ideas—whether light or dark, bright or muted—

and explain the rationale behind their choices. Notes were taken on the symbolic significance of each color. This activity produced a diverse color palette, providing a visual and thematic foundation to guide the continued collaborative development of the intervention design (Figure 13).

[INSERT FIGURE 13 HERE]

Figure 13. The final color palette that participants developed to represent key aspects of their intervention design.

Dream & Design: Creative Collage.

Building on the discussion of colors and themes, participants engaged in a collage exercise to translate their intervention ideas into a tangible, visual format (Figure 14). The group received a base of cloth and explored the community in small groups to collect natural or household items that reflected their experiences with menstruation and *chhaupadi*. Upon returning, participants arranged these items on the base to create rangoli-inspired collages symbolizing their collective vision for a supportive menstrual experience. Additional creative materials, including paint, drawing supplies, and clay for three-dimensional elements, were provided, which participants particularly enjoyed.

[INSERT FIGURE 14 HERE]

Figure 14. Participants creating their dream and design collages. (Left) Participants were invited to work individually or in small groups, and they all gathered around a large white cloth to create. (Middle) Several participants were inspired by

542 elements in their environment, such as Pepal leaves, and used them in creative ways such as tracing and making small
543 bowls. (Right) Participants used painting, drawing and clay to express their experiences.

544

545 Day 8: Finalizing Collages and Developing Example Intervention Activities

546 **Dream & Design: Creative Collage.**

547 Participants continued finalizing their rangoli-inspired collages. Each participant then
548 presented their work, explaining the significance of the objects and the stories behind
549 them. Group discussion explored similarities and differences across collages, including
550 shared colors, shapes, and thematic elements. Facilitators guided participants to
551 identify common ideas and elements to incorporate into the intervention theme,
552 summarizing key words, objects, and concepts to inform the development of final
553 intervention materials.

554 **Creation of Example Intervention Activities.**

555 Participants worked in small groups to develop example outputs for intervention
556 activities they wished to include in the intervention. A group of participants collaborated
557 on developing social media content for a potential awareness campaign, another group
558 refined *deuda* songs for educational use, and the other group designed a
559 sample *natak* (theater) activity to promote community engagement and dialogue
560 (Figure 15). These exercises helped the research team visualize how proposed
561 intervention activities could be implemented in the community context.

562

563 [INSERT FIGURE 15 HERE]

Figure 15. (Left) A group collaborated on writing and performing their own deuda folk song to reflect on chhaupadi impacts in their community and raise awareness. (Right) Another group wrote and performed a natak (local drama) to summarize key issues they experience during practicing chhaupadi.

Day 9: Visualizing Impact, Reflection, and Exhibition Planning

Icebreaker – Place the Tika.

The day began with a brief icebreaker activity, *Place the Tika*, designed to foster connection and positive group energy before transitioning into reflective creative work. This activity focused on building self-belief and the ability to stay focused despite distractions. In the activity, one participant's eyes were covered with a shawl, and she was asked to place a tika on the forehead of a picture of a woman hung on the wall. As she moved toward the wall to place the tika, other participants tried to distract her. However, her main objective was to stay focused and place the tika correctly on the picture. Participation in this activity was designed to encourage women not to be influenced by distractions from others, but to trust themselves and remain focused on their goals.

Visual Voices.

Participants engaged in a structured art-based activity reflecting on the prompt, “*What would an ideal community be like if your intervention were successful?*”.^{23,24} The session began with a blind drawing exercise, in which participants drew their homes with their eyes closed. This lighthearted activity encouraged creative risk-taking and reduced fear of making mistakes. Participants then spent several hours using paints, markers, and other materials to collaboratively create a large group art piece

representing their ideal community (Figure 16). Following completion, the group discussed the visual elements, themes, and symbolism represented in the piece.

[INSERT FIGURE 16 HERE]

Figure 16. Visual Voices activity. (Top Left) Participant completes a blind drawing activity. (Top Middle) Participants were invited to reflect on the creation of their ideal community using painting. (Top Right). Next, participants used writing and poetry to write about their ideal community. (Bottom) Finally, participants worked together or organize the creative outputs in a way that was meaningful to them. Here they organized the art and writing around an ideal community that they hope to have in the future.

Henna Celebration and *Chatpatey* Making

As a gesture of appreciation and recognition of participants' engagement, facilitators applied henna, offering a culturally meaningful expression of care. Participants also initiated a shared activity of preparing homemade *chatpatey* (popular Nepali street food commonly shared as a snack in social settings) for the group, which fostered a sense of collective teamwork (Figure 17). This experience created an opportunity for participants to share locally rooted food practices and cultural traditions with the research team, further strengthening rapport and mutual exchange.

[INSERT FIGURE 17 HERE]

Figure 17. Participants prepared a local snack, chatpatey, for the group, and the research team applied henna for participants as a form of celebration.

Exhibition Planning.

Participants collaborated to plan the final-day exhibition. They expressed interest in

having a CDT member deliver a speech at the event, and facilitators supported them in drafting and practicing their remarks. Participants also finalized and rehearsed their *deuda* performance, which they intended to present during the closing celebration.

Day 10: Final Celebration

The final day comprised a formal program and celebratory activities designed by participants. Activities included a *deuda* performance, presentation of research outputs, screening of a recap film highlighting key moments from the 10-day workshop, and an exhibition of participant-created artworks (Figure 18). The program concluded with a formal closing session, featuring remarks from the Ward Chair and the Health Post In-Charge, as well as reflections from two study participants (Figure 18). Attendees, as selected by the participants, included key leaders in the community such as health care workers and government leaders.

[INSERT FIGURE 18 HERE]

Figure 18. (Left) Exhibition of final participant art works and photographs. (Right) Two participants provided closing remarks.

Analysis

Analysis integrated three complementary data sources: facilitator field notes, structured end-of-day debrief sessions with the core research team, and focus group discussions (FGDs) with CDT participants. FGDs were conducted at the close of most workshop days, lasting approximately 30 minutes, and were designed to elicit participant

reflection on daily activities – specifically what they found valuable, what was difficult, and what they would change. This iterative feedback structure allowed the research team to remain responsive to participant experience throughout the workshop. Research team debrief sessions were conducted after the participants departed for the day and involved independent researcher reflections documented on a shared Mural board (Figure 19), followed by discussion to synthesize observations and emerging insights about the process.

All FGD audio recordings were transcribed and translated into English; field notes were similarly translated in preparation for analysis. Using an inductive approach and constant comparison, two members of the research team independently reviewed all data sources before collaboratively synthesizing key findings and themes. This multi-source analytic approach allowed for triangulation across participant perspectives, researcher observations, and structured team reflection.

[INSERT FIGURE 19 HERE]

Figure 19. Example mural board of bring storming sessions that were held with the research team at the end of each day of workshop facilitation to identify things that went smoothly, things we wished would have gone differently, and things we wonder about or wish to explore further.

RESULTS

Participant Characteristics

The following findings present key insights derived from facilitator field notes and end-of-day debrief sessions with four core team members, and FGDs with 11 HCD workshop participants, referred to as Community Design Team (CDT) members. The CDT consisted of 11 women ranging in age from 18 to 45 years. The sample reflected intentional diversity across caste, marital status, and educational background. Caste representation included Chhetri (n=5), Dalit (n=5), and Brahmin (n=1) participants, capturing perspectives across socially distinct groups in the Nepal context. Most participants were married (n=8), with three identifying as unmarried. Most participants reported agriculture as their primary occupation (n=9), with two identifying as students. Educational attainment varied considerably, ranging from Class 1 to a Bachelor's degree, reflecting the broader educational disparities present in rural Karnali Province. All participants identified as Hindu. All participants were female, consistent with the study's eligibility criteria.

Key Strengths

Findings from the co-design approach indicate that participatory and creative methodologies were central to fostering participant agency and engagement, enabling individuals to move from passive recipients of information to active contributors in the intervention development process, and even in the activity selection throughout the workshop (Table 1). Approaches such as *deuda*, storytelling, and role-playing facilitated the translation of abstract concepts into lived experience, supporting both ownership and meaning-making. In parallel, the use of visual and interactive tools (e.g., the Visual Logical Model of the Problem and the Buy-a-Feature activity using mock currency)

served as critical mediators of comprehension, enabling participants to engage with complex ideas and actively shape intervention priorities through locally grounded examples. Creative and technological modalities further reinforced engagement by introducing novel forms of expression; for many participants, this included first-time experiences with materials such as clay and digital tools such as tablets. Together, these findings suggest that methodological flexibility, multimodal engagement, and the use of contextually relevant examples are key mechanisms through which understanding and participation are enhanced.

The importance of relational integration was also evident, as trust-building activities and the involvement of local facilitators enabled deeper insight into community practices and norms while mitigating potential resistance. Participants demonstrated rapid internalization and application of concepts, often identifying feasible points of change within their immediate social environments and, in some cases, initiating behavioral shifts during the workshop itself. Relational care practices, including culturally meaningful forms of recognition and small gestures of appreciation, further strengthened participants' sense of value and inclusion. Intentional efforts to create space for participant leadership, such as opportunities to practice public speaking and to design and lead the final celebratory event, reinforced ownership and agency. Collectively, these findings underscore that effective co-design extends beyond knowledge transfer, operating through relational, experiential, and contextually grounded processes that foster meaningful engagement, creativity, and early behavior change.

Table 1. Key Strengths of a Participatory, Creative Co-design Approach

Theme	Methodological Application	Key Evidence & Illustrative Sub-themes
Participant Engagement & Agency	• Deuda (Folk song/dance), • Collaborative storytelling • Dream & Design using paint, play and found materials • Role-playing	Participants transitioned from initial hesitation to active engagement, including composing deuda songs and leading the final celebration. Activities fostered two-way communication and connection to lived experiences. The workshop was designed with flexibility to allow for participants to shift directions and develop new activities.
Methodological Flexibility & the Use of Visual Tools	• Visual Logical Model of Problem (LMOP) • Buy-a-feature • Community Dialogue Sessions (CDS)	Visual tools simplified complex concepts and enabled direct feedback. Interactive activities supported prioritization and refinement of intervention ideas.
Rapport Building & Contextual Integration	• Walk a Mile (WAM) • Local facilitators and leaders	Home visits during WAM fostered trust and revealed harm-reduction strategies. Local facilitators provided contextual support and helped navigate community dynamics.
Immediate Application of Learning	• Impact Ladder • Community Dialogue Session (CDS) • Photo journaling	Participants applied concepts in real time, prioritizing change within households and demonstrating behavioral shifts during the workshop.
Technological & Creative Engagement	• Photo Journaling • Dream and design • Intervention Colors	Participants engaged with new technologies and creative methods (tablets, clay), enhancing engagement and skills development.
Recognition, Value & Relational Care	• Tokens (e.g., <i>khada</i> ceremonial scarf, own name tags, stationaries, stickers, art supplies) • Celebratory Activities (Henna, Tika, local snacks, dance, song)	Small gestures fostered feelings of value and care, providing a reprieve from daily labor and strengthening inclusion.

Key Challenges

In contrast, several challenges emerged, primarily reflecting design limitations and contextual constraints that hindered smooth implementation (Table 2). Some of the participatory tools were abstract, such as the Impact Ladder and Experience Diagramming (ED); as such, they posed a “heavy cognitive lift” and were difficult to convey, with translation further complicating understanding. Activities that had direct

710 tangible steps for completing them, with a clear focus, were more appreciated by
711 participants.

712

713 Logistical and environmental barriers contributed to delays during data collection;
714 inaccessible roads impeded the timeline of KII, and power outages interrupted planned
715 video presentations during the workshop. Social tensions also arose during recruitment
716 when exclusion of certain community members generated feelings of aggression and
717 jealousy, which delayed the program. To overcome this challenge, the team had to work
718 closely with the Health Post in Charge to hold a community meeting to clearly outline
719 the objectives and limitations of the program. Additionally, although a local translator
720 was available as a research assistant, there were still some language barriers.

721 Participants generally understood and spoke Nepali clearly; however, they sometimes
722 used their local language when communicating with each other, which the facilitators
723 could not always understand.

724

725 Compounding these issues, unmet care and economic needs among participants—
726 including the absence of childcare and participant fatigue during a peak agricultural
727 period—impacted engagement. Having small children attend the HCD workshop with
728 their mothers made it challenging to facilitate and manage the sessions efficiently.
729 Finally, preparation-intensive tasks, small workshop spaces, and other contextual
730 limitations collectively challenged the pace and flow of workshop activities, highlighting
731 the complex interplay of methodological, social, and environmental factors in field-
732 based intervention design and delivery. These challenges need to be closely considered
733 when planning future co-design workshops.

Table 2. Key Challenges of a Participatory, Creative Co-design Approach

Theme	Methodological Application	Key Evidence & Illustrative Sub-themes
Cognitive & Linguistic Barriers	- Impact Ladder - Experience Diagramming (ED) - Concept Posters - Translation	The Impact Ladder imposed a heavy cognitive lift for participants, especially around the need to think about abstract concepts years into the future; this was challenging as the participants were not accustomed to thinking and dreaming about their long-term desires and plans. At times, the local dialect was challenging to understand, and thus it was critical to have team members from the locality to support with clear communication.
Recruitment Friction & Social Conflict	- Participant selection process - Public presentation	Exclusion of certain community members led to “aggression” and confrontations. Government leaders were also accustomed to a traditional structure for public programs, which do not always allow space for community members to openly share their thoughts. This was distinct from other programs, and was challenged (e.g. the chairperson must speak first).
Logistical & Environmental Constraints	- Workspace - KIIs - Visual aids and resource preparation	Poor road conditions and long hikes to complete KIIs let to logistical challenges. Additionally, power cuts interrupted video presentations, and limited space constrained audience observation. Preparing poster templates was time-intensive. Some visual aids were “too small” to see all icons.
Unmet Care & Economic Needs	General Workshop Attendance	Lack of childcare required facilitators to watch children. Peak agricultural season left participants “very tired,” and those with professional jobs struggled to attend 10 AM sessions.

Considerations for Future Implementation: Reflections from Research

Team Members

Research team members identified multiple opportunities to refine both study design and facilitation strategies in future co-design workshops. Some activities were perceived as lengthy, and facilitators suggested that shortening certain exercises could improve comprehension and efficiency. Additional design refinements were recommended, including the use of color images for LMOP, structured prompts to support deeper exploration during concept poster activities, simplified slides, and revised phrasing for the mirror activity.

Team members also proposed modifications to logistical arrangements to enhance engagement and data collection. Recommended changes included assigning co-facilitators to support quieter participants and implementing daily mood checks at both

749 the start and end of each session. Providing childcare to enable mothers' participation
750 was also highlighted as an important logistical consideration.

751 Broader structural recommendations focused on program flow and participant learning.
752 These included integrating the *chhaupadi* narrative throughout the program to
753 strengthen its connection to intervention development and following up with
754 participants who had altered menstrual practices during the workshop to better
755 understand their experiences. Facilitators noted that participants generally had limited
756 awareness of legal frameworks surrounding *chhaupadi*; offering information and raising
757 awareness of current programs and interventions would provide a tangible benefit to
758 participants.

759 Finally, facilitators emphasized the importance of incorporating additional support
760 mechanisms for participants beyond the scope of the workshop. Reflection prompts and
761 activities can elicit emotional responses, highlighting the need for a trauma-informed
762 approach. Suggested strategies included engaging a psychologist to address fears and
763 self-doubt and ensuring participants are connected with appropriate mental health
764 resources.

765 **Experiences from within the Co-Design Process: Reflections from the**
766 **Community Design Team (CDT)**

767 Through the focus group discussions held at the end of most workshop days, CDT
768 members shared their reactions to workshop activities and reflections on the impact of
769 the workshop itself. Over the course of the ten days, several components of the
770 workshop were highlighted as central to the CDT's experience, they included the safe

771 environment developed, active trust-building, creativity as a tool for reflection,
772 encouragement to push beyond their comfort-zone, and co-design as a spark for attitude
773 shifts and behavioral experimentation.

774 The CDT positioned their experiences at the workshop as overwhelmingly positive,
775 especially appreciating the opportunity to be together and have their expertise
776 recognized by the research team. CDT members emphasized learning and open
777 discussions around their experiences with *chhaupadi* as particularly impactful
778 components of the workshop. This sentiment was prevalent in the first days of the
779 workshop when activities were centered on learning from and about each other. The
780 facilitator's role in creating this environment for open sharing: "*We usually can't talk*
781 *openly about the simple things related to chhaupadi, but you all have created an*
782 *environment where we feel comfortable sharing our experiences. Although chhaupadi*
783 *isn't a new topic, we usually avoid discussing it freely, but now we can speak openly*
784 *because of the supportive environment you've created.*"

785 Home visits through the Walk-a-Mile activity contributed to the relationship and trust-
786 building between facilitators and CDT members and were especially appreciated by
787 participants. CDT members shared that during these visits they felt proud to share the
788 experiences and knowledge gained so far in the workshop with their families and
789 community. Additionally, they were excited to continue sharing their experiences of
790 *chhaupadi* with the research team through tours of their homes and spaces where they
791 isolate during menstruation.

792 Throughout the workshop, CDT members highlighted creative activities as their
793 favorite, with deuda and natok reigning as the most frequently cited and appreciated
794 activities. The natok performed by the CDT was especially thought provoking,
795 prompting participants to consider challenges in changing chhaupadi practices. One
796 participant shared “[referring to the traditional healer (dhami) who was the protagonist
797 in the rama performance] *Many of us tried to make [the dhami] understand the reality*
798 *of menstruation, but he kept refusing to listen and firmly stood by his beliefs [in the*
799 *drama]. This made me realize how challenging it will be in real life as well to convince*
800 *dhami/jhankri to change their views.*” This was just one example of how creative
801 activities sparked deeper thinking and reflection among participants.

802 Participants also enjoyed less familiar creative activities. The mirror reflection activity,
803 one that was entirely new to them, was challenging at first but ultimately impactful.
804 Participants shared that it was empowering to view and talk to themselves as
805 independent and capable individuals. This reflects the impact of selecting both familiar
806 cultural activities (e.g., deuda, natok) as well as activities that productively push
807 participants out of their comfort zone (e.g., mirror activity, visual voices, photography).

808 Participants discussed their appreciation for the opportunity to actively explore how to
809 change *chhaupadi* practice in their community. One member of the CDT used a
810 metaphor of falling down the stairs to explain the long road of change ahead, saying
811 “*You know when you fall down, it takes a while to stand up, and our condition is*
812 *similar to that. We are learning slowly and it takes a while for us to stand up.*” While
813 many participants echoed this gradual approach to change, some provided evidence that
814 learning is not temporally detached from behavior change. A few CDT members began

to challenge their own *chhaupadi* practices while still engaged in the workshop; one participant shared that her daughter began her menstrual cycle during the workshop, and she decided to hold her daughter close during this time instead of sending her to sleep separately. Several participants shared plans for their next time menstruating including staying inside the home, not telling people when they are menstruating, eating separately but inside the home, and using other CDT and community members as examples that bad things do not happen if *chhaupadi* is not followed. This anecdotal evidence supports the role of co-design in changing attitudes and inspiring behavioral experimentation.

DISCUSSION

This study examined the application of a participatory, creative co-design workshop methodology to menstrual health and *chhaupadi* practices in Karnali Province, Nepal. Overall, findings demonstrate that multimodal and relational facilitation approaches fostered meaningful participant engagement and agency, enabled comprehension of complex concepts through culturally grounded tools, and supported early behavioral shifts among participants during the workshop itself. At the same time, contextual constraints — including cognitive demands of abstract tools, logistical barriers, and unmet care needs — posed significant implementation challenges that must inform future co-design efforts in similar field settings.

***Multimodal and Culturally Grounded Methods as an Epistemological
Necessity***

The differential reception of activities across the workshop underscores that methodological fit in participatory co-design is not merely a pedagogical accommodation, but an epistemological and ethical commitment. Activities grounded in embodied, culturally familiar forms, such as deuda, collaborative storytelling, clay modeling, and role-play, generated the highest levels of engagement and meaning-making. Tools requiring abstract, future-oriented thinking – a mode of temporal reasoning that many participants found unfamiliar – such as the Impact Ladder and Experience Diagramming, imposed what facilitators described as a "heavy cognitive lift." This finding resonates with critiques of standard HCD tools applied uncritically in global health contexts. Scholars have raised epistemological concerns about what counts as knowledge in co-design, noting that paradoxically, many tools used to evaluate or structure co-design processes are developed by researchers alone, reproducing rather than redistributing epistemic authority.²⁵ The current study adds to this critique at the implementation level, showing that tools requiring abstract conceptual work, regardless of stated intent, risk positioning community members as respondents to a researcher-designed logic rather than as co-authors of the process. Multimodal participatory approaches that combine visual, material, and narrative methods have been found to support participants in being heard on their own terms,²⁶ and the present study corroborates that this is especially true when those methods draw on existing cultural repertoires of expression.

Recent work on multimodal participatory approaches in South Africa found that creative, arts-based methods, including drawing, painting, and object elicitation, were credible, contributory, and communicable, generating contextually rich data and providing accessible ways for diverse participants to express their experiences.²⁶ The present study extends this evidence to a Himalayan context, demonstrating that the inclusion of culturally specific expressive forms, such as *deuda* folk song, is not optional enrichment but a methodological necessity for ensuring that co-design processes are genuinely participatory rather than nominally so.

Future co-design efforts in Karnali and comparable rural Low- and Middle-Income Country (LMIC) settings should therefore treat methodological selection as an ethical act, systematically assessing not only the comprehensibility of tools but their cultural commensurability, or the degree to which they align with local ways of knowing, communicating, and making meaning.

Relational Infrastructure as a Prerequisite, Not a Supplement, to Co-Design

Among the most striking facilitation insights emerging from this study is the role of relational practices in mediating whether co-design processes can function at all in high-trust-deficit, socially embedded rural communities. Activities and arrangements that might appear peripheral to the workshop's methodological objectives — Walk-a-Mile home visits, the provision of *khada* scarves (ceremonial scarves symbolizing respect and honor) and personalized name tags, henna and celebratory activities, and the central involvement of local leaders — performed critical relational work. They supported with building enough trust to enable participants to speak openly about sensitive menstrual

practices, navigate social tensions around exclusion and hierarchy, and ultimately invest in the workshop as a shared project. This finding aligns with a substantial literature on the role of community health workers and local facilitators as trust mediators in LMIC health research contexts. Research on community health workers' role in trust-building has argued that the relational quality of communication deserves as much attention as its informational content, and that trust cannot be earned overnight but requires time and consistent relational investment.²⁷ The involvement of locally embedded facilitators in this study was not incidental but structurally generative; it enabled the research team to navigate community dynamics, address the local dialect, and manage the political frictions that arose around exclusion of non-selected community members. A scoping review of trust in participatory health research networks found that trust functions simultaneously as a context enabling participation, a mechanism through which participation produces outcomes, and an outcome of participation itself, a tripartite function clearly visible in this workshop's unfolding.²⁸ This has practical implications for how future co-design protocols are costed and timed: relational infrastructure requires investment that is not easily compressed without compromising the integrity of the participatory process.

Co-Design as Intervention — Blurring the Line Between Development and Change

One of the more theoretically significant findings of this study is the observation that some participants began altering their menstrual practices during the workshop itself, prior to any formal intervention being deployed. This finding challenges a tacit assumption underlying much intervention development literature: that co-design is

preparatory work that precedes the "real" intervention. Scholars in participatory action research have noted that the empowering participatory process is as effective an intervention as the end result,^{29,30} and the current evidence provides concrete behavioral corroboration of this claim in a menstrual health context.³¹ A realist review of participatory research benefits identified that the main challenge in evaluating participatory research is analytically distinguishing between the benefits of co-governance for research processes and the benefits of the research program itself, acknowledging the difficulty of attributing outcomes to the participatory process or to other design features.^{30,32} Rather than treating this ambiguity as a limitation, we argue it reflects a genuine ontological feature of high-quality co-design: the process of naming, examining, and collectively re-evaluating community practices in a structured, trusted, and participatory space is itself a mechanism of change.^{33,34} Future reporting frameworks for co-design studies in public health should account for this blurring, incorporating process-level outcome measures that can capture early behavioral shifts and emergent agency rather than treating these only as noise prior to intervention implementation.^{25,35}

This study has several limitations that should be considered when interpreting findings. The workshop was conducted with a single community cohort in Karnali Province, and findings may not be directly transferable to other geographic or cultural contexts within Nepal or across the broader Himalayan region. The sample was purposively selected in consultation with the Health Post and local government, which may have introduced selection bias and contributed to the social tensions observed during recruitment. Reliance on facilitator reflections and thematic analysis of workshop documentation,

while appropriate to the exploratory and participatory nature of the study, means that behavioral shifts observed during the workshop could not be systematically tracked or verified beyond the workshop period. It is therefore not possible to determine whether early behavioral changes persisted following the workshop's conclusion, and longitudinal follow-up with participants who reported practice changes is an important priority for future research. Additionally, participant fatigue during peak agricultural season, the absence of childcare provisions, and limited workshop space may have affected the depth and inclusivity of engagement in ways not fully captured in the analysis. Finally, as a study of co-design methodology rather than of a completed intervention, efficacy outcomes fall outside the scope of this work and will require evaluation in subsequent implementation phases.

CONCLUSION

This study demonstrates that participatory, arts-based co-design can serve as both a methodology and a mechanism of change in addressing menstrual stigma and *chhaupadi* practice in rural Nepal. When applied with attention to cultural compatibility, relational infrastructure, and methodological flexibility, HCD tools successfully engaged community members as co-designers rather than research subjects. This enabled collective sense-making, creative expression, and early behavioral shifts within the workshop period itself. The observation that participants began altering menstrual practices during the workshop, prior to any formal intervention, challenges the prevailing assumption that co-design and intervention are temporally distinct phases. Overall, methodological selection in global health co-design must be understood as an ethical act, one that either redistributes or reproduces knowledge

957 related authority depending on whose ways of knowing are centered. Future work
958 should prioritize longitudinal follow-up with participants who reported practice changes
959 and should develop evaluation tools capable of capturing the extent of change that
960 participatory co-design can set in motion.

961

962 **LIST OF ABBREVIATIONS**

963 CDS - Community Dialogue Sessions

964 CDT – Community Design Team

965 FCHV – Female Community Health Volunteers

966 FGD – Focus Group Discussion

967 HCD - Human Centered Design

968 IM – Intervention Mapping

969 KII – Key Informant Interview

970 LMIC – Low-and Middle-Income Countries

971 LMOP – Logic Model of the Problem

972 MHH - Menstrual health and hygiene management

973 MPH – Master of Public Health

974 **BLINDED STUDY**

975 SMART - Specific, Measurable, Achievable, Relevant, Time-bound

976 WAM – Walk-a-Mile

977

978

DECLARATIONS

- **Ethics approval and consent to participate:** This study was approved by Nepal Health Research Council (NHRC) Ethical Review Board and the Institutional Review Board, University of Pittsburgh. All participants 18 years and older provided written informed consent to participate in this study. We confirm that informed parental/guardian consent, along with youth assent, was obtained for all participants under the age of legal consent, specifically those under 18 years.
- **Consent for publication:** Written consent for use of identifying photographic material was obtained from all performers.
- **Availability of data and materials:** Due to the sensitive nature of chhaupadi and the ethical and privacy risks of identifying participants who discussed a criminalized practice, the datasets analyzed during the current study are not publicly available. De-identified data may be available from the corresponding author on reasonable request, subject to institutional and ethical approval.
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- **Authors' contributions:** Authors' contributions are described below using the CRediT framework.

- 1002 ○ Sara Baumann: conceptualization, investigation, methodology, project
- 1003 administration, funding acquisition, supervision, writing – original draft,
- 1004 writing – review and editing
- 1005 ○ Sanjana Murthy: formal analysis, writing – original draft
- 1006 ○ Nikita Sharma: data curation, formal analysis, writing – original draft
- 1007 ○ Annika Agarwal: formal analysis, writing – original draft
- 1008 ○ Sudha Ghimire: writing – review and editing
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- 1010 review and editing
- 1011 ○ Bhimsen Devkota: supervision, writing – review and editing
- 1012 ○ Elizabeth Miller: supervision, writing – review and editing
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1021 **AI USE STATEMENT**

1022

1023 Disclosure of Delegation to Generative AI

1024

1025 The authors declare the use of generative AI in the research and writing process.
1026 According to the GAIDeT taxonomy (2025), the following tasks were delegated to GAI
1027 tools under full human supervision:

1028

1029 - Literature search and systematization

1030 - Proofreading and editing

1031 - Summarizing text

1032 - Adapting and adjusting emotional tone

1033 - Reformatting

1034

1035 The GAI tool used was: Claude Sonnet 5.

1036 Responsibility for the final manuscript lies entirely with the authors.

1037 GAI tools are not listed as authors and do not bear responsibility for the final outcomes.

1038 Declaration submitted by: BLINDED AUTHOR

1039

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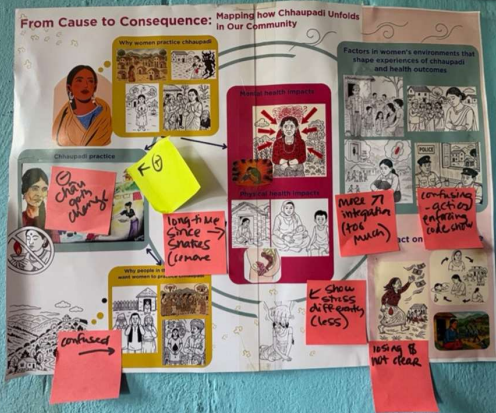




के हाथी कैह दिन यसो गर्न सम्झ ?

एक भर्त्ता को कुरा ध्यानपूर्वक सुनौ।

- भद्र बोल्दा बीच मा नबोलौ र सबैको विचारलाई सम्मान गर्ौ। समयको पालना गर्ौ।
- सबै तालिबानिमा खुलेर सह भागी हो ओर आ-आपना विचार राखौ।
- सकारात्मक सोचका साथ अरुको विचारलाई सहयोग गर्ने तरिकाले प्रतिक्रिया दिऔ।
- गोपनीयता कायम गर्ौ।
 - कार्यशालामा व्यक्त गरीएका व्याक्तोगत कुराहरू बाहिर नपुन्याओ।
- सर्वेको विचार महत्वपूर्ण छ भन्ने बुझौ।
 - फरक मतलाई दिक्कार गर्ौ ? सबैलाई बोल्ने अवसर दिऔ।







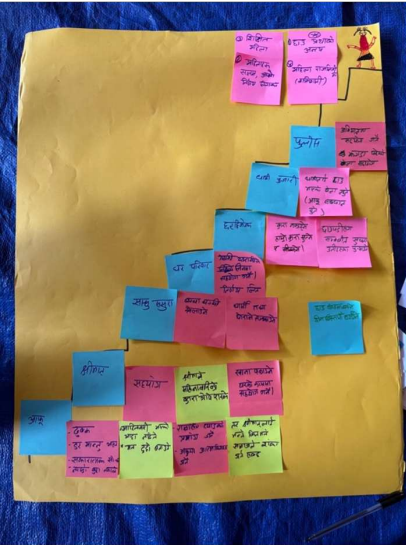
Map 1. British Army

North

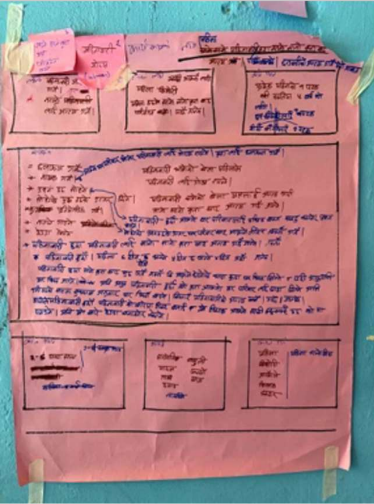


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- Road
- Path
- River







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**Day 1 - Inauguration, Name ball pass, Realist Synthesis Findings, Ground Rules, LMOP
RTB, KIs, Photojournaling (Pair photos), FGD Feedback - At Sattala Health Post, Dailekh**

