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# Physical Factors that Influence Participation: Reflections from Co-design Workshops with Peruvian Low-resource Communities

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**Abstract.** Participatory Design (PD) approaches have been widely applied in different contexts and locations. However, there are still challenges when PD is used in low-resource communities in the Global South. The main objective of this work is to understand how to adapt PD approaches and design materials to enhance participants' engagement during co-design sessions. We conducted four co-design workshops (including two future workshops and two prototyping workshops) with healthcare professionals (HCPs) and caregivers in two low-resource communities in Peru to promote nutrition for children under two years. We identified that physical, social and temporal factors influenced HCPs and caregivers participation. In this position paper, we focus on

the physical factors, such as the characteristics of the venue and the design materials to support more active participation in co-design workshops.

## 1 Introduction

Participatory Design (PD) approaches aim to engage different actors through cooperative, hands-on activities aiming to influence the design and development of technologies that will impact their everyday lives (Bødker et al., 2022). PD has been widely applied in different locations and contexts. However, there are challenges in creating and adapting suitable tools and materials to enhance participation, especially in low-resource communities in the Global South, as socio-cultural factors can affect participants' engagement (Hussain et al., 2012; Till et al., 2022).

We identified that physical, social and temporal factors influenced the engagement of participants (Ortega et al., 2024a) while conducting co-design workshops (including four ideation, two future, two storyboard and two prototyping workshops (Rousham et al., 2023)) with healthcare professionals (HCPs) and caregivers of children under two years old in Peru. In this position paper, we will focus on some of the physical factors and design materials that had an impact on participants' engagement during future and prototyping workshops (Ortega et al., 2024a,b).

## 2 Case study: Engaging with low-resource communities in Peru

The World Health Organization (WHO) estimates that 45% of deaths of children under five years are related to nutrition factors (who, 2020). Peru is a country in South America facing a double burden of malnutrition, for instance, children experiencing anaemia or obesity/overweight, particularly in urban centres within low socioeconomic sectors (Pradeilles et al., 2022).

This position paper reports on a project that aims to address the double burden of malnutrition among children aged 6-23 months in two peri-urban communities in Peru. Including Manchay in Lima, located in the coastal region, and the city of Huánuco in the Huánuco district, situated in the Andean highlands of the country.

### 2.1 Physical Factors that Influence Participation

Physical factors and design materials, such as the venue and visual and tangible materials, played a crucial role in supporting HCPs and caregivers' participation.

### 2.1.1 The Characteristics of the Venue

For this work, we needed spaces to allocate participants for the co-design activities (e.g., including tables). In Huánuco, we conducted the co-design workshops in the auditorium of the healthcare centre. Here, it was accessible to invite caregivers who attended the medical consultation with their children to the workshop. In the same way, HCPs could attend more easily. In previous workshops, we identified that the auditorium in the healthcare centre of Manchay was small, making it difficult to move within it. Moreover, caregivers had to have their children in their arms, making their participation more challenging. Thus, renting a space close to the healthcare centre allowed us to have a bigger and illuminated space that made participants feel more comfortable in it. For the workshops, participants brought their children with them (including children older and under two years old). Having a bigger space also allowed us to arrange/prepare a space for children where people could help supervise them during the co-design workshop to reduce distractions for caregivers and HCPs. Our data analysis showed that participants could focus during the sessions but still got distracted by children crying or in moments when some caregivers had to breastfeed their babies.

### 2.1.2 Design materials

Design materials supported participants' engagement by attracting their attention and helping to build a common understanding of concepts and ideas. We had pre-designed materials, such as sketches of clusters of ideas for future workshops and low-fidelity tangible materials for prototyping workshops.

**Visual materials** In the future workshops, the visual sketches helped to facilitate the discussion and understanding of the clusters of ideas from previous ideation workshops and portrayed by our designer. Participants elicited questions to confirm their understanding. In addition, pre-designed sketches of the waiting area worked as a base for participants' sketches in Huánuco. Sketches allowed HCPs and caregivers to situate themselves in the spaces (in this case, the waiting area) that they would re-design. Participants visualised the spatial dimensions of the physical infrastructure, including the constraints, facilitating visualisation of the current and future state of the waiting area while being engaged with the activity.

During prototyping workshops, participants co-created sketches portraying physical elements augmenting the floor and wall surfaces to support play and promote nutrition. These co-created sketches allowed participants to convey their ideas on how to engage children and caregivers while incorporating the food elements to promote healthy eating. They illustrated familiar games and elements and even explored the materiality (e.g., cushioned surfaces). In addition, we gave participants paper templates and printed screenshots of a mobile app prototyped in Figma. With these materials, participants co-created paper prototypes of a mobile app to support parents in managing the health and well-being of their infants. This

facilitated the visualisation of the app features that participants wanted to integrate into the design.

**Tangible materials** Besides similar properties and benefits of visual materials, such as visualising and conveying ideas or solutions, tangible materials allowed participants to explore the interaction types and interfaces of their prototypes. When participants co-created their low-fidelity prototypes with tangible materials (e.g., 3D objects like cubes), it helped them explore, materialise, and manipulate these objects, bringing them closer to the final version they wished for their prototypes. In this way, participants used this tangibility to add another layer to refine their prototypes and create the rules or steps on how they would be played.

In all the workshops, during the presentations of the outcomes (sketches and low-fidelity prototypes), the visual and tangible materials supported participants to engage with the audience and enrich different perspectives. Furthermore, the materials were like reminders of details that participants discussed previously and could present to the group.

## 2.2 Limitations

One of the limitations of this study is that the target population are children under two years. Most of the time, these children depend on their caregivers for care, making it impossible for them to participate directly in the workshops. Thus, we include caregivers and HCPs as proxy co-designers due to their expertise with children under two years old. In addition, as facilitators and external actors (Mainsah and Morrison, 2014), intentionally or unintentionally, we may have impacted participants' involvement (Dearden and Kleine, 2018), such as asking more questions or helping some participants more than others. However, we intended to reduce our influence by encouraging active participation for HCPs and caregivers.

**Positionality** The research team acknowledges that our experiences and backgrounds influence the way we see the world and how this may shape our work (Motti Ader et al., 2023; Secules et al., 2021). Most of the research team belongs to an upper-middle socio-economic class. In spite of that, our team has comprehensive experience conducting research in Latin America and the Global South following the best practices.

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