



ASLI QoL 2022



# AicQoL2022Penang

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10<sup>th</sup> AMER International Conference on Quality of Life  
Shangri-la Rasa Sayang, Malaysia, 16-17 Mar 2022



## Identifying Workplace Lactation Room Design Gaps

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### Abstract

Exclusive breastfeeding among employed mothers in Malaysia remains low despite numerous health benefits to mothers and children. Inadequate provision of a lactation room at the workplace contributed to the low rate of exclusive breastfeeding among working mothers. The objective of this paper is to identify the design gaps in the lactation room at the workplace in Selangor. The results suggest that adopting the first step of the user-centred design (UCD) method enables the identification of design gaps in the lactation room: location, room size, allocation of table and chair, milk storage, sink, and additional storage facilities.

Keywords: breastfeeding, working mothers, lactation room, user-centred design

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DOI: <https://doi.org/10.21834/ebpj.v7i19.3126>

### 1.0 Introduction

To exclusively breastfeed, mothers returning to work must express their breastmilk every three hours to maintain their supply. Based on this routine, the employer's support is pivotal in providing accessibility to a proper facility (Breastmilk: Every Ounce Counts, 2019). According to a study in Australia, a breastfeeding-friendly workplace tends to be more successful as the rate of absenteeism among employees is lower since their babies suffer from fewer illnesses (Smith et al., 2013). Furthermore, it leads to essential economic gains for the workplace because of reduced health care costs, improved productivity of employees, and a positive corporate image (Companies Commission of Malaysia, 2011). In consideration of the targets set by the Malaysian Government on the Female Labor Force Participation Rate and the economic empowerment of women, UNICEF Malaysia has initiated 'A Nursing Mother's Program' that sets to support and assist working nursing mothers towards a positive outlook in returning to work after maternity leave. In line with the said program, creating a safe, secure, clean, and comfortable space for lactating purposes is essential. Despite these efforts, the rate of exclusive breastfeeding among working mothers in Malaysia is still low (NHMS, 2016). Workplace barriers such as inadequate facilities may exacerbate the problem, leading many working mothers to discontinue nursing before the minimum period recommended. Hence, this paper investigates the design attributions of lactation rooms in the workplace. The objectives of this study are to determine how working mothers practice breastmilk expression at the workplace and identify design gaps in the lactation room at the workplace.

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## 2.0 Literature Review

### 2.1 Breastfeeding Practices and Challenges at the Workplace

Breastfeeding or nursing is the act of feeding an infant with a mother's breastmilk through latching or by bottle-feeding with milk expressed from the mother's breast. Working mothers away from their infants need to express their breastmilk via pumping, as it helps maintain breastmilk supply and prevent engorgement. Continued breastfeeding among working mothers has been widely discussed under workplace breastfeeding support programs. In Malaysia, the prevalence of breastfeeding among employed mothers is high at around 95%. However, it was found that only 14.5-25.4% of employed women practised exclusive breastfeeding (NHMS, 2016).

Concerns have been expressed about a lack of clear guidance on employed mothers' right to breastfeed in the workplace in Malaysia (Musa et al., 2016). In correspondence to this, a survey conducted by Indrawanto et al. (2017) in Indonesia have shown that despite receiving breastfeeding support from employers, it was not supported by written policy from the management. Hence, this dramatically affects the availability of completed lactation room and break time for pumping or expressing breastmilk. A broadly similar point has also been made by Soomro et al. (2016), who revealed that inadequate support for workplace breastfeeding resulted in working mothers discontinuing breastfeeding earlier than planned in Pakistan.

A study by Tsai (2013) in Taiwan revealed that women faced challenges to continued breastfeeding due to lack of break time to express breastmilk, short duration of maternity leaves and most importantly inadequate facilities for pumping and storing milk. In Malaysia, a similar theme is also identified from a recent study that draws attention to working mothers feeling dissatisfied with the lack of space to express and store breastmilk (Buss, 2019). In addition, a local study by Amin et al. (2011) also stresses the importance for workplaces to provide adequate breastfeeding facilities as a determinant for continued breastfeeding among employed mothers.

Apart from the provision of space and facilities of a lactation room in a workplace, the location, size, and furniture of the room also plays a crucial role. The recent UNICEF's Breastfeeding Room Guide (2020) emphasised the importance of the location of a lactation room to be directly accessible and close to the workspace. Furthermore, the research conducted by Badriyah et al. (2020) in a recent Indonesian study highlights a minimum standard size of 3m x 3m for the lactation room. In another study, Van Dellen et al. (2021) also suggests furniture elements as part of developing a lactation room quality checklist.

### 2.2 The Benefits of Continued Breastfeeding in the Workplace

A study has shown evidence that breastfeeding decreases the risk of cardiovascular disease and, in the long run, improves the quality of life and mental health of mothers (Del Ciampo et al., 2018). Research done by Holloway (2017) also proves that breastfed infants develop physically and cognitively better than formula-fed infants. This association leads to a decrease in absenteeism among working mothers, as Jordan (2018) revealed that fewer workdays are missed with healthier infants in the United States. Employers also save on average \$3 for every \$1 invested in breastfeeding support which is a significant Return of Investment (R.O.I.) by simply helping working mothers maintain their breastfeeding goals and easing the transition of returning to work. In Malaysia, it has been deduced that a supportive environment for breastfeeding improves a company's public image and enhances its ability to recruit the best talents available (Companies Commission of Malaysia, 2011). The Mid-Term Review of the 11th Malaysia Plan 2016-2020 also highlighted one of the strategies to increase Female Participation in the Labour Force as part of empowering human capital. In the long run, this will build resilient infrastructure by promoting inclusive and sustainable industrialisation, aligned with Goal 9 of the United Nations Sustainable Development Goals.

### 2.3 Designing Through the User-Centred Approach

The user-centred design (UCD) method first came through in the 1980s. UCD is defined as an iterative process that focuses on the users and their needs in each phase of the design process (User-Centered Design, 2020). Based on the UCD, the Interaction Design Foundation has established four (4) steps illustrated in Fig. 1.

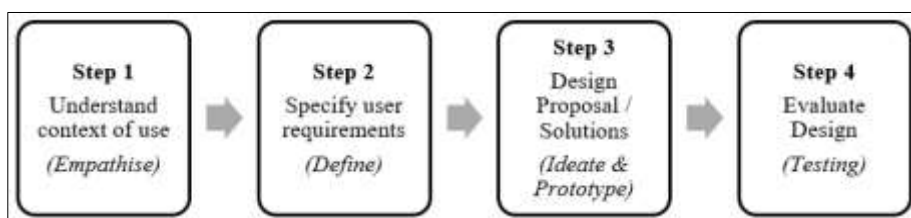


Fig. 1: User-centred design method  
(Source: Interaction Design Foundation, 2019)

Although this method is commonly used in digital product development such as websites or mobile applications, the process can be applied to almost any product. For example, a study in Turkey by Demir et al. (2017) revealed that the UCD method was implemented in furniture design and deemed necessary in that industry. The importance of UCD was also recently recognised in interior design, where users' quality of life can be improved through spaces designed with their needs at the centre (Kunst, 2020). Understanding the context of use in Step 1 is a gateway in reframing the users' problems and paves the way towards inclusive design (Barroso, 2021). The context of use in the UCD method is defined as empathising with what users need, how they interact and behave whilst using a product. The Double Diamond design process by Design Council U.K.(Fig. 2) illustrates how step 1 converges to visualise the amount of information discovered through empathy with users.

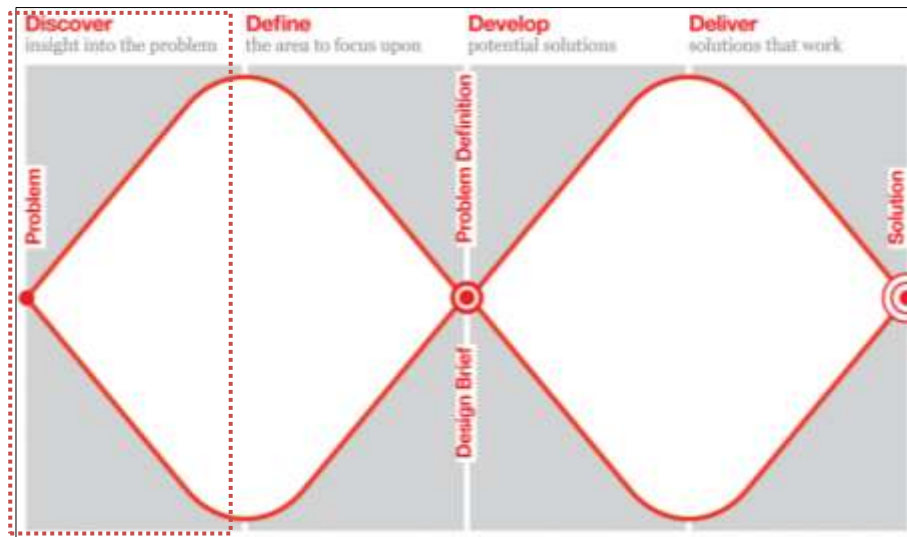


Fig. 2: The Double Diamond Process  
(Source: Design Council UK, 2013)

All the information gathered regarding a user’s experiences through understanding the context of use is often mapped to the user journey, which gives an overview of how users behave or interact with a product. For interior designers, a user journey map allows understanding how a space might be used through emotional attributes in different design touchpoints (Normoyle, 2017). A recent study also proved that integrating user journey maps into the design process allowed architects and interior designers to analyse spatial layout and functionality (Akdag et al., 2021).

### 3.0 Methodology

This study adopts Step 1 of the UCD method that empathises with users by understanding the context of use. Further breakdown of this step leads towards a fundamental tool called User Need Statements which is an approach that helps define the problems that the users want to be solved (Gibbons, 2019). This tool was framed as a guiding methodology towards achieving the objectives of this study, as illustrated in Fig. 3.

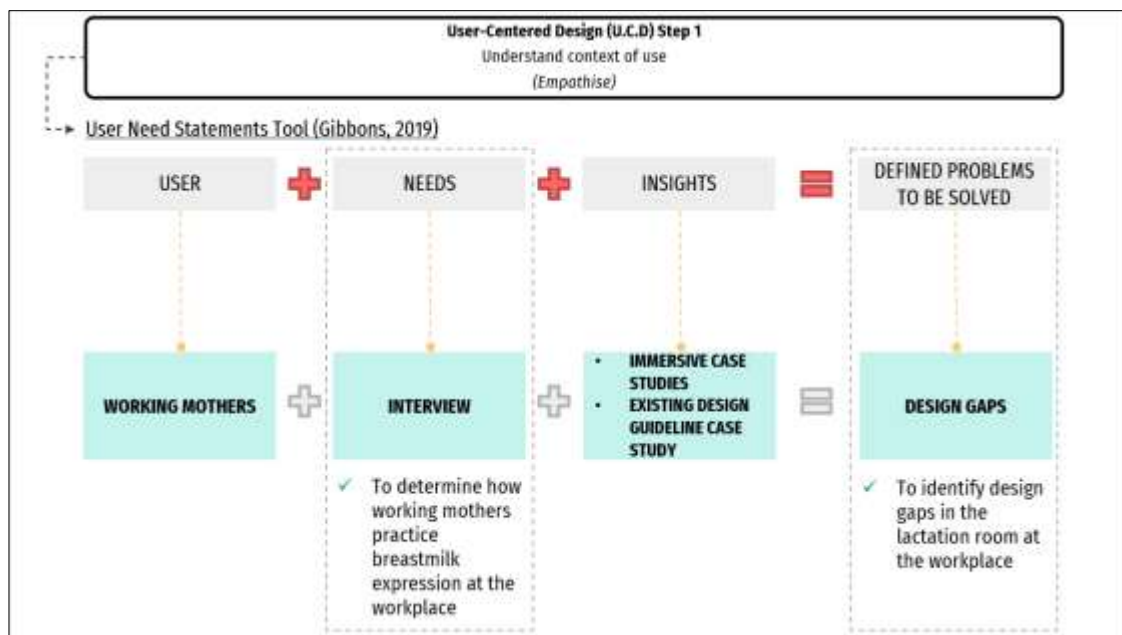


Fig. 3: Research Framework  
(Source: Author)

### 3.1 Understand Context of Use Through User Persona Interview

Designers typically use investigative methods such as interviews to deep dive into users' experiences and pain points. In the context of this study, an interview with working mothers who are currently breastfeeding their child (defined as the persona) was conducted to gain insights into how they use the lactation room at a workplace. Convenience sampling was used to select working mothers who are currently breastfeeding and have consented to participate in this study. The purposive selection of three working mothers with different ages of infants implied different frequencies to pump. As such, it was deemed sufficient to reach information saturation because breastmilk expression at work is a fixed process. The following questions have been used as prompters to ignite findings around the first objective: 1) How do you practice expressing breastmilk at your workplace? 2) Please describe the elements and facilities available in the lactation room at your workplace, 3) Please describe to me your feelings while using the facilities within the lactation room. Key findings were then consolidated in a User Journey Map highlighting negative experiences or pain points while using the facility.

### 3.2 Insights Through Immersive Case Study and Existing Design Guideline

An immersive case study was conducted to get further insights through observation and validate pain points mentioned in the user persona interview. The case studies chosen were private workplace sectors located in an urban area in Selangor. These criteria were taken from the National Health and Morbidity Survey (NHMS) 2016 findings, which revealed that mothers in urban areas have shorter breastfeeding durations and those who work in the private sector have a lower prevalence of exclusive breastfeeding.

The study then continued with the review of a lactation room design guideline by the American Institute of Architects (A.I.A.). According to Lee (2016), this pioneered guideline trailblazed into more extensive national conversations around a changing workforce, maternal health, and well-being. Hence, it serves as a benchmark for a good lactation room design to confirm the design gaps from the user persona interview and immersive case study that need to be improved.

### 3.3 Limitation of Study

For this study, the focus was given to working mothers in private workplace sectors and within the urban area in Selangor. Therefore, the context of use cannot be generalised due to the differences in working natures between industries, each with a different scope of work and demands.

## 4.0 Findings

### 4.1 Breastmilk Expression Activity and Frequency in the Workplace Lactation Room

Based on convenience sampling, the respondents were working mother personas between the ages of 25 and 35 who were currently breastfeeding their infants aged 4 to 10 months. It was found that the working mother personas use lactation rooms at various times of the day and adhere to a fixed schedule for breastmilk expression. The feedback gathered at this point revealed that working mothers visit the lactation room three times a day: in the morning, afternoon, and evening before leaving for work.

"I need to pump basically the same frequent amount of time I feed my baby at home. So that's around three times throughout my day at the office."

**(Working Mother Persona 1 - 25-year-old first-time mother to a four-month-old baby)**

"My baby is already ten months old and not entirely relying on my milk since he started eating solid foods already. Usually, I will go either during or after lunch hour, and I will stop by to collect my milk and bag before I go off for the day."

**(Working Mother Persona 2 - 31-year-old mother to a ten-month-old baby)**

"I follow the recommended pumping schedule for my baby's age. The 3-4hours gap. So once in the morning, and then at lunchtime and once more around 4 PM."

**(Working Mother Persona 3 - 35-year-old mother to a five-month-old baby)**

The interview findings also uncovered three key actions that occurred during the process of expressing milk: connecting the pump components to start expressing (I Use), storing the expressed milk (I Store), cleaning the pump parts (I Clean) and putting back in the locker (I Store) before returning to work (I Leave). These key actions were repeated as illustrated in Fig.4, Fig. 5, and Fig. 6, consistent with each working persona's frequency of visits throughout the day.



Fig. 4: Lactation room user journey during the morning session  
(Source: Author)



Fig. 5: Lactation room user journey during the afternoon session  
(Source: Author)



Fig. 6: Lactation room user journey during the evening session  
(Source: Author)

#### 4.2 User Journey Map in Workplace Lactation Room

The interview then proceeded to deep dive into the experiences of the working mother personas in using the lactation room provided at their respective workplace. The negative experiences or pain points while using the facility were highlighted in the User Journey Map for each working mother persona as illustrated in Fig. 7, Fig. 8, and Fig. 9.

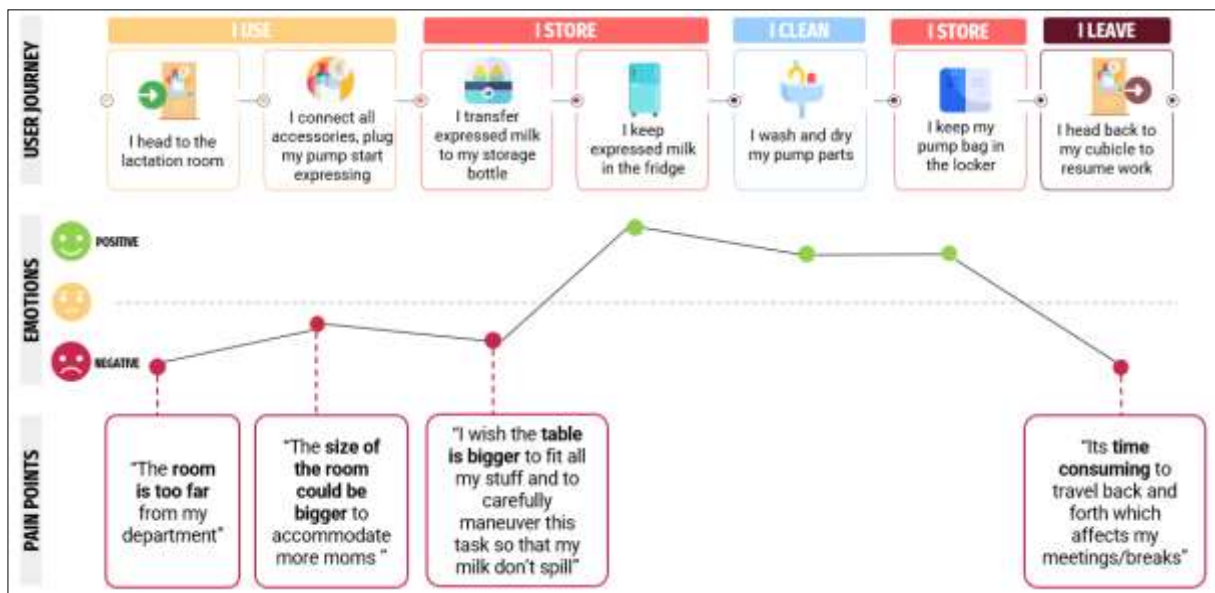


Fig. 7: Working mother persona 1's User Journey Map  
(Source: Author)

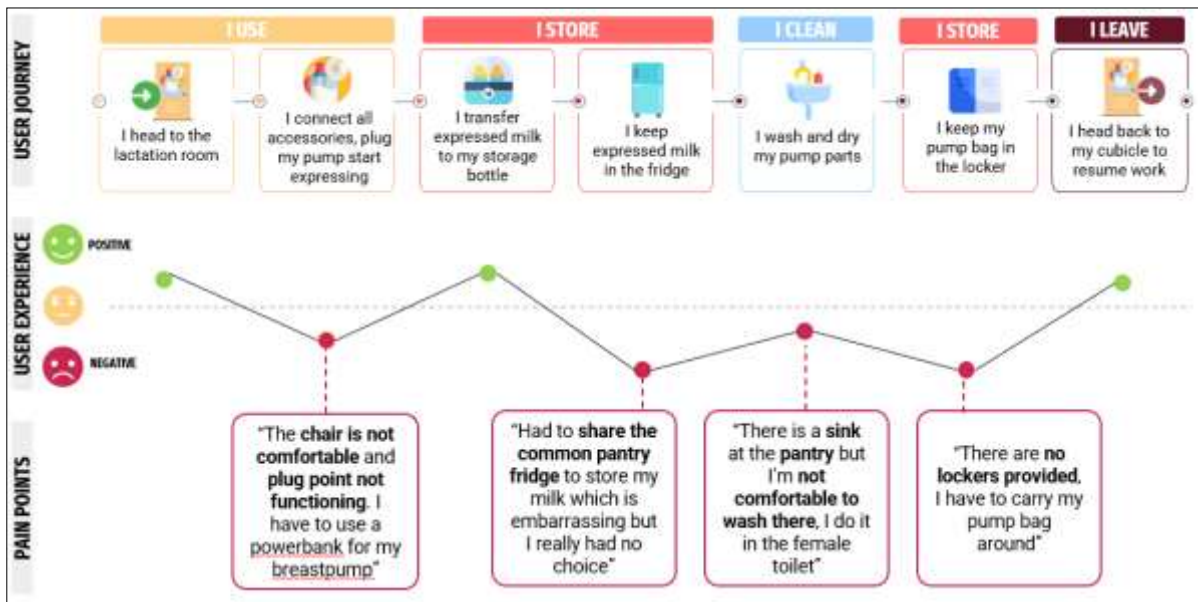


Fig. 8: Working mother persona 2's User Journey Map  
(Source: Author)

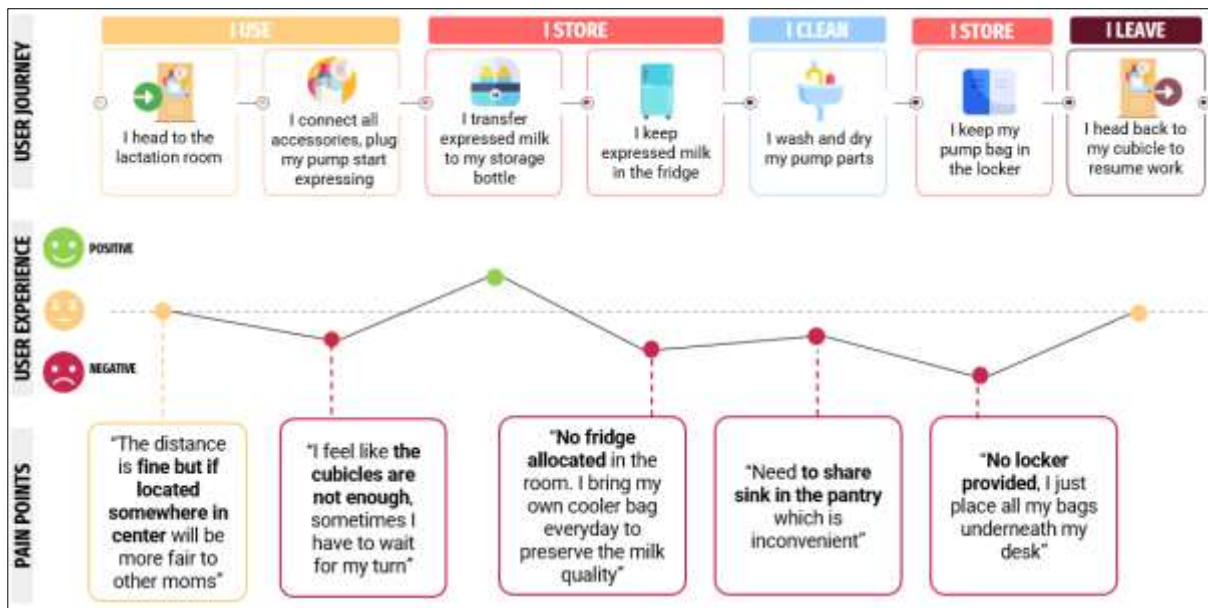


Fig. 9: Working mother persona 3's User Journey Map  
(Source: Author)

The common design elements that were highlighted as pain points across all working mother personas were the location of the room that is too far, inadequate size of the room, lack of table and chair inside the cubicle, no provision of the fridge and sink in the room and additional storage facility to store pump accessories and bag.

#### 4.3 Provision of Design Elements in Lactation Room Case Studies

The research then follows with an immersive case study in three locations to observe the design gaps based on the pain points highlighted in the working mother persona interviews. In all three case studies, cubicles with a single-seater sofa and table were made available, divided by track curtains for privacy. The observation also revealed that dedicated fridges, sinks and storage units were provided in Case Studies 1 and 2. However, in Case Study 3, it was discovered that the refrigerator and sink had to be shared at the common pantry, and no storage space was provided. Table 1 summarises the findings from all immersive case studies.

According to Liz York, a contributor to (A.I.A) Best Practices on lactation room design, the necessity for a dedicated location in the workplace where mothers can comfortably and quickly collect and store breastmilk is pivotal for returning to work. The design guideline states that the room requirements should support the activities during the pumping session. Table 2 shows that the room requirements in the guideline were also similar to the identified design gaps from the interview and the provisions in the immersive case study, namely: location, size, chair, table/counter, sink, milk storage, and accessories.

Table 1: Summary of Immersive Case Studies (Source: Author)

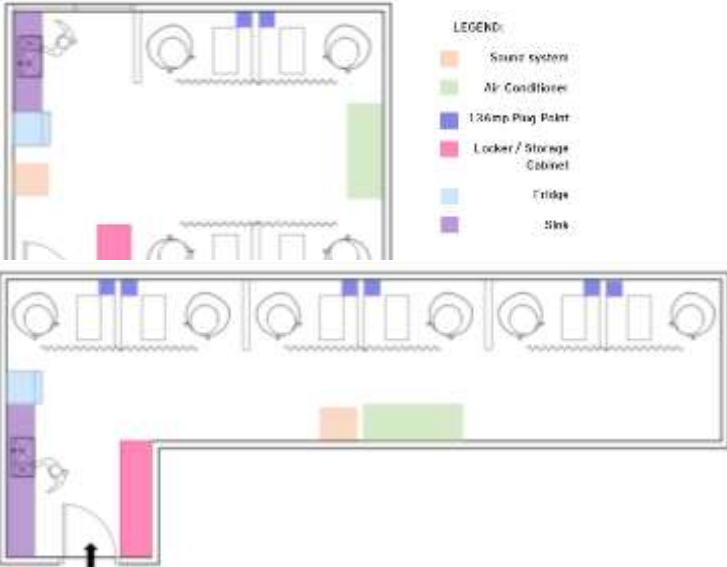
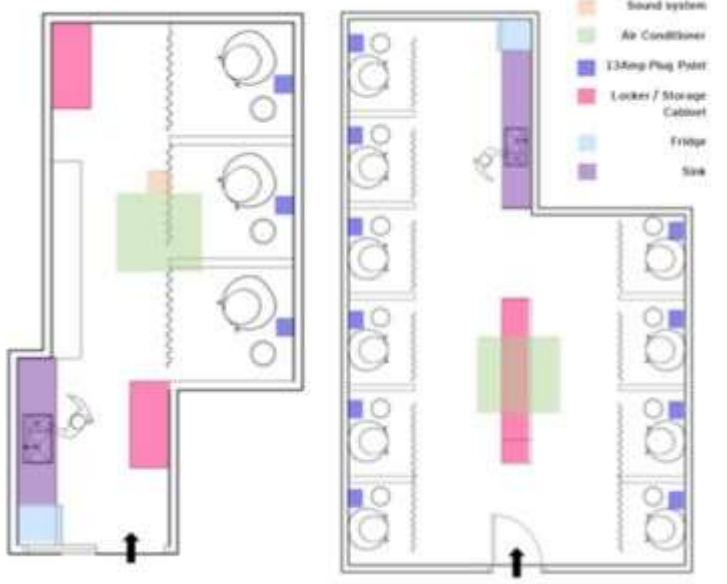
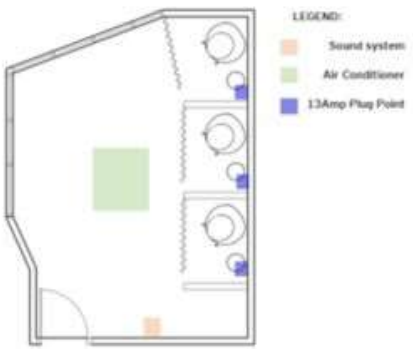
CASE STUDY	LAYOUT PLAN	PROVISION OF DESIGN ELEMENTS
<p>Immersive Case Study 1</p>	<p>• Room 1</p> 	<ol style="list-style-type: none"> <li>1) <b>Location</b> <ul style="list-style-type: none"> <li>• Room 1 and Room 2 located at different levels</li> </ul> </li> <li>2) <b>Size</b> <ul style="list-style-type: none"> <li>• Room 1 has four cubicles, and Room 2 has six cubicles separated with track curtains</li> </ul> </li> <li>3) <b>Table &amp; Chair</b> <ul style="list-style-type: none"> <li>• Each cubicle is furnished with a single task chair and a small table</li> </ul> </li> <li>4) <b>Milk Storage</b> <ul style="list-style-type: none"> <li>• Both rooms have a two-door fridge for milk storage and light snacks</li> </ul> </li> <li>5) <b>Sink</b> <ul style="list-style-type: none"> <li>• Both rooms equipped with sink</li> </ul> </li> <li>6) <b>Locker</b> <ul style="list-style-type: none"> <li>• Both rooms have locker units for accessories and pump bag storage</li> </ul> </li> </ol>
<p>Immersive Case Study 2</p>	<p>• Room 1      • Room 2</p> 	<ol style="list-style-type: none"> <li>7) <b>Location</b> <ul style="list-style-type: none"> <li>• Room 1 and Room 2 located at different levels</li> </ul> </li> <li>8) <b>Size</b> <ul style="list-style-type: none"> <li>• Room 1 has four cubicles, and Room 2 has six cubicles separated with track curtains</li> </ul> </li> <li>9) <b>Table &amp; Chair</b> <ul style="list-style-type: none"> <li>• Each cubicle is furnished with a single task chair and a small round table</li> </ul> </li> <li>10) <b>Milk Storage</b> <ul style="list-style-type: none"> <li>• Both rooms have a two-door fridge for milk storage and light snacks</li> </ul> </li> <li>11) <b>Sink</b> <ul style="list-style-type: none"> <li>• Both rooms equipped with sink</li> </ul> </li> <li>12) <b>Locker</b></li> <li>13) Both rooms have open shelf units to place pump bags</li> </ol>
<p>Immersive Case Study 3</p>		<ol style="list-style-type: none"> <li>1) <b>Location</b> <ul style="list-style-type: none"> <li>Located at the same level as the cafeteria</li> </ul> </li> <li>2) <b>Size</b> <ul style="list-style-type: none"> <li>Three cubicles separated with drywall and track curtains</li> </ul> </li> <li>3) <b>Table &amp; Chair</b> <ul style="list-style-type: none"> <li>Each cubicle is furnished with a single task chair and a small roundtable</li> </ul> </li> </ol>

Table 2: AIA Lactation Design Guideline

ROOM REQUIREMENTS	DESCRIPTION
Size	A minimum footprint of 7 feet by 7 feet is recommended, and other sizes, such as 10 feet by 5 feet, work nicely as well.
Location	Mothers' rooms should be in a safe area accessible to all. They should not be in areas that would not be suitable for the preparation and storage of food.
Chair	Provide a task chair suitable for a workstation. Seat, back, armrest, lumbar, tension, and height adjustments are preferable.
Table/Counter	Provide a minimum 20-inch deep by 30-inch-wide work surface for the pump and bottles to rest on in front of the task chair. Provide above counter outlets at the work area. If a telephone is provided, it should be within easy reach of the work area.
Sink	Provide a sink and faucet combination deep enough to wash bottles and pump parts. Gooseneck or kitchen type faucets are recommended. If possible, locate the sink adjacent to the work area.
Milk Storage	Install a midsize or compact refrigerator for milk storage. Under-counter models help conserve floor space but should not take up the knee space beneath the work area.

(Source: Liz York, 2008)

## 5.0 Discussion

Based on the user persona interview, immersive case studies and review of the existing guideline, the study is further analysed through a comparative matrix. Table 3 summarises the frequency of design element provision across the case studies and guideline against the gaps mentioned in the user interview.

The design comparative matrix found that elements addressed as pain points in the persona interview mainly were present across the immersive case studies. For example, working mother persona 1 mentioned that the room is too far, in which the A.I.A design guideline also highlighted that location should be accessible by all. Case Study 1 and 2 lactation rooms were located at different levels to accommodate working mothers equally in terms of distance from the working space to the lactation room. Case Study 3 was located at the same level as the cafeteria, which also responds to A.I.A design guideline that the room should be in areas that are also suitable for food preparation. In addition, these similarities are also aligned with the UNICEF's global guide for breastfeeding room which emphasises the importance of the location of a lactation room (UNICEF, 2020).

Another design gap identified and confirmed by observations in all three immersive case studies was room size, measured by the number of cubicles available. The overall room/ cubicle size found in Case Study 1, 2 and 3 were of minimum 2m x 2m. This confirms the requirement spelt out in the A.I.A design guideline which suggested a minimum size of 2m x 2m for the cubicles. Furthermore, it is encouraging to compare this requirement and measurement to that obtained in a recent Indonesian study (2021), which suggests a close minimum size standard of 3m x 3m.

The unsatisfactory condition of the chair and table mentioned by working mother personas 1 and 2 respectively were also validated as design gaps. Based on the A.I.A design guideline, a task chair and table for the pump and bottle should be provided in the lactation rooms. This finding also supports the previous work by Van Dellen et al. (2021) on the provision of furniture in the lactation room quality checklist.

There was no provision of a dedicated fridge for milk storage and sink in Case Study 3, which were also identified as design gaps. This contrasted finding aligned with working mother persona 2's experience of sharing the common pantry's fridge and sink, which was not ideal by choice. She expressed feelings of embarrassment and discomfort, which is consistent with the previous study conducted by Amin (2011) that stresses the importance of adequate breastfeeding facilities in a lactation room.

The comparative design matrix also highlights an interesting finding on the provision of the locker. It was discovered in the persona interviews the need for this element to store their pump bags within the lactation room, which was observed available in Case Studies 1 and 2. However, this was not included in Case Study 3 and the A.I.A design guideline as best practices for a lactation room design. A possible explanation for this missing element in the A.I.A design guideline is due to cultural or localised context, as Malaysian mothers require additional storage facilities to store their pump equipment. Conclusively, the Design Comparative Matrix supported further analysis and provided detailed insights that confirmed the design gaps in the workplace lactation room as per the research framework (Fig. 3).



Table 3: Design Comparative Matrix

DESIGN ELEMENTS ADRESSED IN PERSONA INTERVIEW	LITERARY CASE STUDY (AIA LACTATION DESIGN GUIDE)	IMMERSIVE CASE STUDY		
		CASE STUDY 1	CASE STUDY 2	CASE STUDY 3
Location	Accessible to all	●	●	●
Size	Size of cubicle should be min. 2m x 2m	●	●	●
Table	Table/work surface for pump and bottle	●	●	●
Chair	Task Chair	●	●	●
Milk storage	Mid-size refrigerator for milk storage	●	●	●
Sink	Sink and faucet to wash bottles and pump parts	●	●	●
Locker	-	●	●	●

(Source: Author)

## 6.0 Conclusion & Recommendations

By adopting UCD Step 1, the results suggested that the objectives of the research have been achieved as working mothers utilise lactation rooms three times a day: in the morning, at lunchtime and at the end of the day before leaving the workplace. The design gaps identified and confirmed while using the lactation room are location, room size, allocation of table and chairs inside the cubicle, dedicated fridge for milk storage, sink and allocation of additional storage facilities. This study significantly contributes to the scant evidence on user-centred design of lactation spaces for employees (Henry-Moss et al., 2018). The findings from this study suggest a proper lactation room based on the seven design elements and may serve as basic design parameters for Malaysia's standardised lactation room design model, aligning with the nationwide target on mother-friendly workplace implementation (Ministry of Health Malaysia, 2016). Following that, the female participation rate in the workforce may also increase which responds to United Nations' SDG Goal 9 in promoting decent work and economic growth through women empowerment. Subsequently, this study signifies to achieve the National Plan of Action for Nutrition of Malaysia III (2016-2025) that targets to improve at least 70% rate of exclusive breastfeeding below 6 months of age, which is also one of the core indicators for the Global Nutrition Targets 2025. The following research can utilize the remaining steps in the UCD method to establish a design proposal or solution for a comprehensive lactation room design.

## Paper Contribution to Related Field of Study

This paper shall define new design attributes of a lactation room in a workplace in Malaysia. The attributes provide an excellent guideline for employers to provide lactation rooms for working mothers.

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