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THE DESIGN OF MATERNITY UNITS IN CONTEXTS WITH LIMITED RESOURCES

INTEGRATING INTERNATIONAL GUIDELINES SPECIFICATIONS WITH A CULTURAL APPROACH TO IMPROVE THE QUALITY OF CARE

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Master's degree in architecture for Sustainability

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The design of Maternity Units in contexts with limited resources

Integrating international guidelines specifications with a cultural approach to improve the quality of care

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"Architectural design must understand human needs, especially in healthcare environments."

Michael Murphy

(co-founder of MASS Design Group)

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ABSTRACT

English Version

Within the projection of maternity units, there are different international organisations and governments that develop guidelines for these health infrastructures to meet all the requirements of hygiene, sanitation, infection and disease prevention and control. However, in resource-limited settings, access to maternal health and/or adequate health facilities is restricted, putting the lives of mothers and babies at risk.

In such contexts, the application of international guidelines may vary according to socio-cultural factors and characteristics of the population. For this reason, it is important to adapt international guidelines for maternity units to the needs of the local context and culture.

On this basis, this thesis is the result of research to assess which cultural factors can be integrated into the design of a maternity unit, responding to the needs of users, improving the user experience, and the quality of care offered.

This research was conducted through a literature review that allowed for the recognition of new approaches to design and care, to respond to the needs of users and to implement a culturally sensitive approach. In addition, a methodology was developed to identify which features are important to include within the maternity unit, according to the perceptions of a specific culture. This tool is primarily designed to assess resource-limited and underdeveloped contexts.

An analysis of maternity unit projects built around the world was also conducted to better understand the spatial and functional characteristics that they develop, as well as to identify whether they incorporate non-conventional spaces.

Finally, a conceptual proposal is arrived at for a possible spatial organisation of the maternity unit that integrates non-conventional spaces as a response to the different cultural needs that the users of the unit may have.

ABSTRACT

SpanishVersion

Dentro de la proyección de unidades de maternidad, existen diferentes organizaciones internacionales y gobiernos que desarrollan los lineamientos para que estas infraestructuras sanitarias cumplan con todos los requerimientos de higiene, saneamiento, prevención y control de infecciones y enfermedades. Sin embargo, en contextos con recursos limitados, el acceso a la salud materna y/o a una instalación de salud adecuada es restringido, lo que pone en riesgo la vida de las madres y los bebés.

En este tipo de contextos, la aplicación de los lineamientos internacionales puede variar según los factores y características socio culturales de la población. Por esta razón es importante adaptar las directrices internacionales de las unidades de maternidad a las necesidades del contexto y la cultura local.

Partiendo de esta base, este trabajo es el resultado de una investigación que tiene como fin evaluar qué factores culturales pueden ser integrados dentro del diseño de una unidad de maternidad, respondiendo a las necesidades de los usuarios, mejorando la experiencia de estos, y la calidad del cuidado ofrecido.

Esta investigación se realizó a través de una revisión bibliográfica que permitió reconocer nuevos enfoques de diseño y atención, para responder a las necesidades de los usuarios e implementar un enfoque cultural sensitivo. Adicional, se construyó una metodología, que sirve para identificar qué características son importantes incluir dentro de la unidad de maternidad, según las percepciones que pueda tener una cultura específica. Esta herramienta esta principalmente diseñada para evaluar contextos de recursos limitados y bajo desarrollo.

También se realizó un análisis de proyectos de unidades de maternidad construidas en diversas partes del mundo, con el fin de comprender las características espaciales y funcionales que desarrollan, así como identificar si incorporan espacios no convencionales.

Finalmente, se llega a una propuesta conceptual para una posible organización espacial de la unidad de maternidad que integra espacios no convencionales como respuesta a las diferentes necesidades culturales que pueden tener los usuarios de la unidad.

ACRONYMS

MMR	Maternal Mortality Ratio
RMC	Respectful Maternity Care
EPMM	Ending Preventable Maternal Mortality
MLU	Midwives Led Unit
CLU	Consultant Led Unit
SDGs	Sustainable Development Goals
MDGs	Millenium Development Goals
TBA	Traditional Birth attendants
MWH	Maternity Waiting Home
FCC	Family Centred Care
PA	Pregnancy Assessment room
US	Ultrasound room
OPD	Out Patient Deparment
LDCs	Least Developed Countries
WHO	Worl Health Organization

01

MATERNITY UNIT

01.1 State of meanings

For this study, it is essential to define different terms related to the maternity unit and the concept of maternity itself, to have clarity on the subject.

Maternity:
The concept of maternity usually is understood by people as the pregnancy period, the delivery, and child rearing. However, for this work the term will be assumed as the period of pregnancy, childbirth, and postpartum period, considering six weeks after birth. Obstetrics and midwifery are disciplines related to the concept of maternity (AusHFG, 2023).

Maternity Care:
Maternity care, as its name suggests, focuses on providing care for both the mother and the baby, beginning from the preconception period and continuing through each stage of pregnancy. Stages range from antenatal care, labour, childbirth, and postnatal care for both mothers and newborns, extending up to six weeks after birth (AusHFG, 2023).

Maternity care "may be provided in several different ways that will impact on the organisation and provision of facilities" (TAHPI, 2022, p. 4). Links between maternity, neonatal and more specialised services are also essential to ensure quality care.

Maternity Unit:
The maternity unit is a health unit that can be a stand-alone facility or be within a larger infrastructure such as a hospital or health centre. This unit focuses on the care of the woman, ideally starting with family planning and pregnancy, followed by care during pregnancy, childbirth, and the postpartum period, which is considered up to 40 days after delivery.

Among the services that a maternity unit can provide are preconception care, antenatal care, assistance in the assessment and management of childbirth, in-patient accommodation in a birthing unit or birthing suites, delivery and post-delivery observation, postnatal care, and neonatal care (TAHPI, 2022). Each of the services and facilities provided within the unit also require specific spaces that have contrasting functions. Spaces are organised following the natural phases of pregnancy until delivery and post-delivery.

Preconception Care:
This type of assistance "includes counselling and the provision of biomedical, behavioural and social health interventions to optimise the health of women and their partners prior to pregnancy to improve health related outcomes for themselves and their children" (AusHFG, 2023, p. 5).

Preconception care can serve as support for family planning, sexual and reproductive health counselling, and motherhood awareness.

Antenatal Care:
During the pregnancy period, pregnant women are required to attend antenatal examinations and screenings (NHS, 2013) which are responsible for monitoring the health of both the mother and the baby, thereby preventing potential complications or risks. "It is a routine part of pregnancy care which aims to support and monitor the woman and detect complications early so they can be actively managed" (AusHFG, 2023, p. 5).

This type of care consists of two components: outpatient care, which, in addition to the evaluation, management, and monitoring of pregnancy, may also include services related to parenting education and health. Additionally, it includes in-patient care which is an area that will be provided with accommodation because in some cases, women require more detailed assessments or follow-ups. Also, there might be a case of a woman who is already admitted and needs an antenatal ward hours before delivery (NHS, 2013).

Birth Unit or Birth Centre:
This unit within the maternity unit is another area dedicated to "provide facilities for the safe prenatal care, delivery and immediate postnatal" (TAHPI, 2023, p. 3) meaning it has birth rooms and a nursing base. A birth unit can manage low-risk deliveries attendant by midwives and will be able to support women with antenatal care, delivery, and postnatal care until discharge (TAHPI, 2022 and AusHFG, 2023).

Birth Suite:
The suite has several birth rooms designed for flexible use, allowing it to accommodate different service models and approaches to care. This facility covers the phases of labour, delivery, and the immediate postpartum period. Following one to two hours after birth, the mother is transferred to a postpartum inpatient bed (AusHFG, 2023).

Birth Room:
It is "a room designed to support any woman through labour, birth, and the early postnatal period. It will be adapted to support a range of care needs" (AusHFG, 2023, p. 6). A birth room must ensure the safety of mothers and babies, provide privacy for mothers, and offer freedom of movement. It also must allow staff, equipment, and services available to women in the place by providing flexibility in their use, reduce the risk of cross-infection, and provide access to water during labour to alleviate pain (NHS, 2013).

Postnatal Care:
Postnatal care encompasses the care provided to both mothers and newborns following childbirth. This care typically involves general recovery in an inpatient unit for both mother and baby, along with parenthood and lactation education. Additionally, it may include outpatient clinics, and in some cases, extended follow-up through community or home-based services, ensuring ongoing support during the postnatal period (AusHFG, 2023).

Neonatal Care or Newborn care:
Neonatal care requires a dedicated unit which is essential but is not always located within the maternity unit. This specialised facility is designed to provide care for newborns whose medical needs exceed what

can be offered at the mother's bedside (NHS, 2013). In these cases, the neonatal unit is equipped to manage conditions that require close monitoring or advanced medical interventions, ensuring that infants receive the appropriate level of care for their specific health requirements, which cannot be adequately addressed within the standard maternity setting.

Early Pregnancy Assessment Care:
This type of care aims at pregnant women with complications during the first months of pregnancy that require screening and counselling, pregnancy tests, and ultrasound scans to assess aspects such as the viability of the pregnancy, the gestational age, and whether the pregnancy is intrauterine (NHS, 2013).

Also, can be provided support and accompaniment, "within a sensitive and confidential environment, for women who are experiencing threatened miscarriage, ectopic pregnancy and other early pregnancy conditions, usually defined as up to 20 weeks gestation" (AusHFG, 2023, p. 8).

Midwifery led Unit:
These types of units are distinct in that they are managed and staffed by midwives, who can care for women with low-risk or uncomplicated pregnancies, as deliveries are usually conducted with few or no interventions (NHS, 2013). The services offered by a midwifery unit vary depending on whether it is a unit within a larger health infrastructure or a stand-alone unit.

If the unit is "co-located with another healthcare facility, the MLU may use their antenatal and out-patient clinics. If stand-alone, it may include these and other diagnostic services" (NHS, 2013, p. 2).

The unit may also be known as a birth centre because it focuses especially on the time of delivery and postpartum and does not offer specialised medical services such as a caesarean section.

Consultant led Unit:
"These secondary-level units are located on a hospital site and provide antenatal outpatient and in-patient services, birthing and postnatal care, with facilities for neonatal care and access to adult critical care facilities" (NHS, 2013, p. 2).

The difference with the midwife unit is that the consultation unit offers much more specialised medical services and allows for a more rigorous examination and monitoring of pregnant women in the prenatal period. The midwife unit can be within the consultation unit, or they can be managed separately.

All these terms were explained for the reason of differentiating each of the specific points of care required by the maternity unit, as well as the variations that can be found around the same theme. However, the terms can sometimes be recognised by a different name but represent the same thing in terms of their function and services offered.

In summary, the maternity unit, often referred to as the obstetrical unit, includes spaces such as the birthing unit that can be known by other names like birth centre, or delivery unit. It encompasses the birthing rooms, which are alternatively termed birth suites or delivery suites (NHS, 2013).

01.2 Technical specifications and Functional requirements

Aiming to understand deeply how a maternity unit works, what are the required spaces, how are their functional relationships, what are their spatial characteristics and required dimensions, a comparison was made among three types of models proposed by international guidelines to identify clearly and concisely all the necessary technical and functional requirements.

Australasian guidelines applied in Australia, New Zealand, and some Asian countries were taken as the first reference. Then, the international health facility guidelines proposed by Total Alliance Health Partners International were taken for referencing the inpatient maternity unit, these directrices are implemented in numerous countries globally, especially in areas emphasising better healthcare infrastructure. These international (TAHP) principles are extensively applied in numerous countries in the Middle East, Asia, and Africa, which are heavily investing in healthcare advancement.

Finally, the England health building notes which although are designed for England, can also impact other nations in the UK such as Wales, Scotland, and Northern Ireland, which may have similar guidelines. Furthermore, healthcare organisations and institutions around the world may use the principles outlined in the health building notes as a guide for healthcare facility design.

Australasian Guidelines:

From the Australasian guidelines was as reference the model of complete maternity unit. In this model the design is focused on providing a woman centred care: "Aims to meet the woman's physical, emotional, psychosocial, spiritual, and cultural needs, it enables individual decision-making and self-determination for the woman to care for herself and her family" (AusHFG, 2023, p. 7).

The model determines and differentiates the functional areas that make up the maternity unit, starting with the entrance area, where the reception, waiting room and an area for public services are located. It continues with the outpatient area, which is more focused on antenatal care. In the outpatient area there are consulting rooms, and rooms for monitoring and examining the mother and baby. In addition, a room can be integrated to offer antenatal education programs.

The maternity acute assessment unit is included within the complete maternity unit just in the case where the infrastructure offers a higher level of services.

It would include consulting rooms, interview rooms and day stay bays, as well as some mix rooms for procedures, ultrasound services, and neonatal resuscitation capabilities.

Then, the birth suite can be found. This area includes the birthing rooms, which should facilitate the mother's mobility during labour, provide privacy, and offer sanitary facilities such as showers and toilets. It also should have a lounge area for the family and those supporting and accompanying the mothers, which should be located next to the birthing rooms, and finally space for clinical support.

Only in some cases when the unit manages all types of pregnancies that can be progressed or scheduled as a caesarean section is the obstetric operating area included. If this is the case, "this space will be adjacent to the birth suite so that it is easily accessible, recovery bays will be required for the mother and to undertake initial baby health checks" (AusHFG, 2023, p. 17).

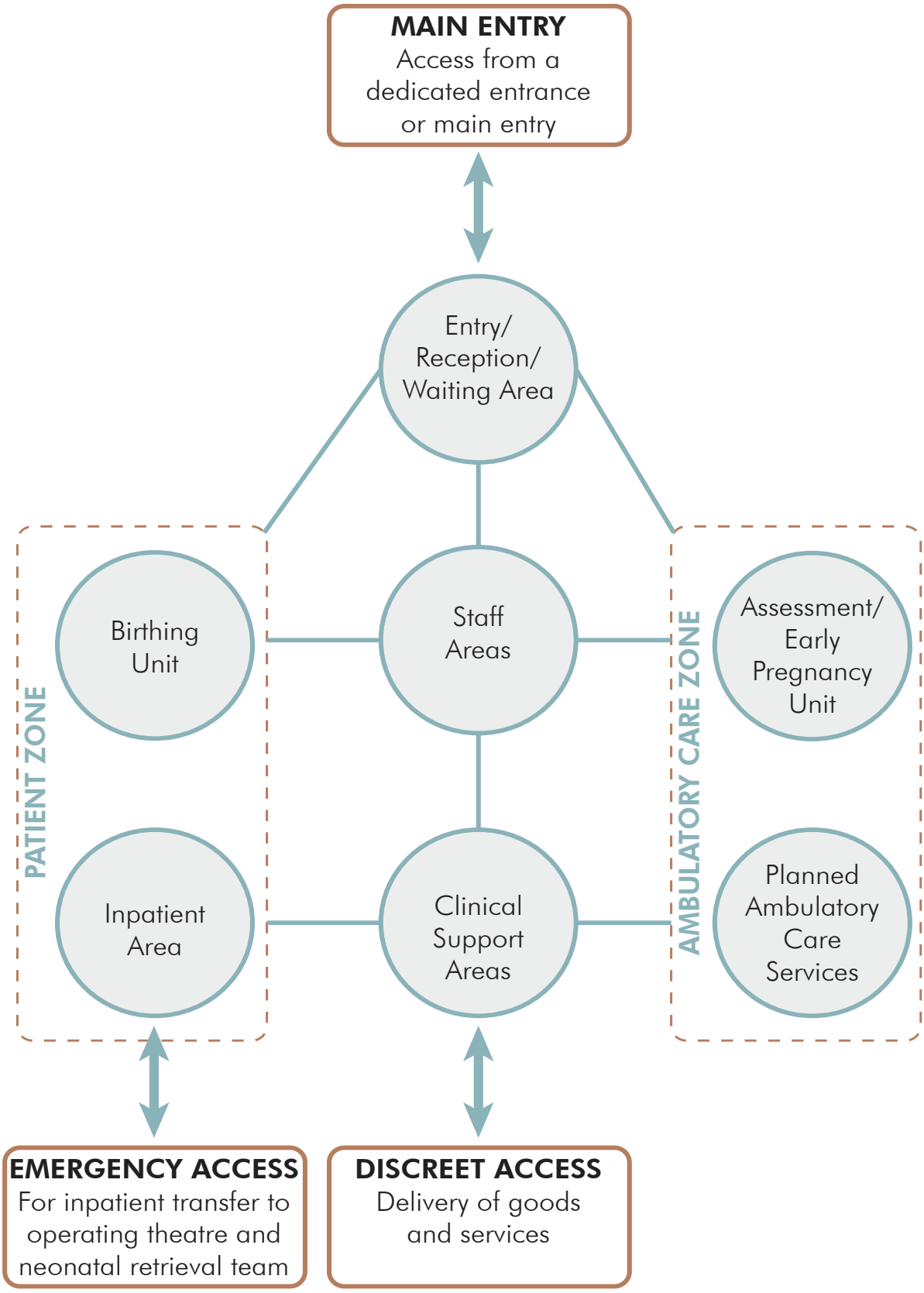
Following, there is the inpatient area where there is a division of antenatal care beds and postnatal care beds. It is recommended to have a separate room per bed with its own sanitary facilities included, however, "two bed rooms may be an option where this will positively affect the wellbeing of new mothers, e.g. Indigenous communities, young mums" (AusHFG, 2023, p. 17). In addition, there could be integrated clinical support services and meeting rooms for mothers, spaces for breastfeeding, and spaces for the promotion of parenting and mothers' education.

It is also essential to include designated areas and spaces for medical personnel, both from a functional perspective, requiring meeting rooms, offices, and changing rooms, as well as from a workforce well-being standpoint, where provisions for dining areas, sanitary facilities, and resting rooms may be offered.

Functional Relationships:

If the maternity unit does not include operating theatres and neonatal care services, these should have proximity to the unit.

Additional functional connections that need to be enabled consist of clinical assistance services like medical imaging, pathology, and pharmacy, as well as ambulance transport areas and/or helipad for retrieval services, intensive care unit, high dependency- close observation units, and gynaecology inpatient beds (AusHFG, 2023).



Illus. 1. Functional relationships diagrams of Maternity unit

International Health Facility Guidelines:

Unlike the previous model, these guidelines take the model that is focused on the in-patient area of the maternity unit, offering a service of antenatal, delivery, postpartum, and postnatal care. However, it would be for all mothers who are already admitted to the unit, meaning that there is not an out-patient area.

The functional areas include an entrance area with reception, a waiting room for visitors with toilets, and prayer rooms. Then, there is the patient accommodation area, which is subdivided according to the level of care required. In this sense, there is the antenatal accommodation area, and the postnatal accommodation area where there are also meeting spaces for mothers, spaces for breastfeeding, and rooms for group education. Lastly, there is a smaller, more private accommodation area for mothers who have had a loss, and who still require postnatal and psychological care (TAHPI, 2022).

Support areas are required to ensure the efficient operation of the unit, including sanitary facilities such as utility rooms, disposal rooms, and storerooms, as well as supplementary service areas, which should include spaces such as meeting rooms for educational sessions and interview rooms.

As in the previous model, it is also essential in this model to include areas for staff, such as "offices and workstations, staff room, staff sanitation and handover room, toilets, shower and lockers" (TAHPI, 2022, p. 8).

The main difference in this model is that a nursing area is included for the newborn's care. The approach to this area can be from general care or from a much more specialised care, where more specific spaces and characteristics are required.

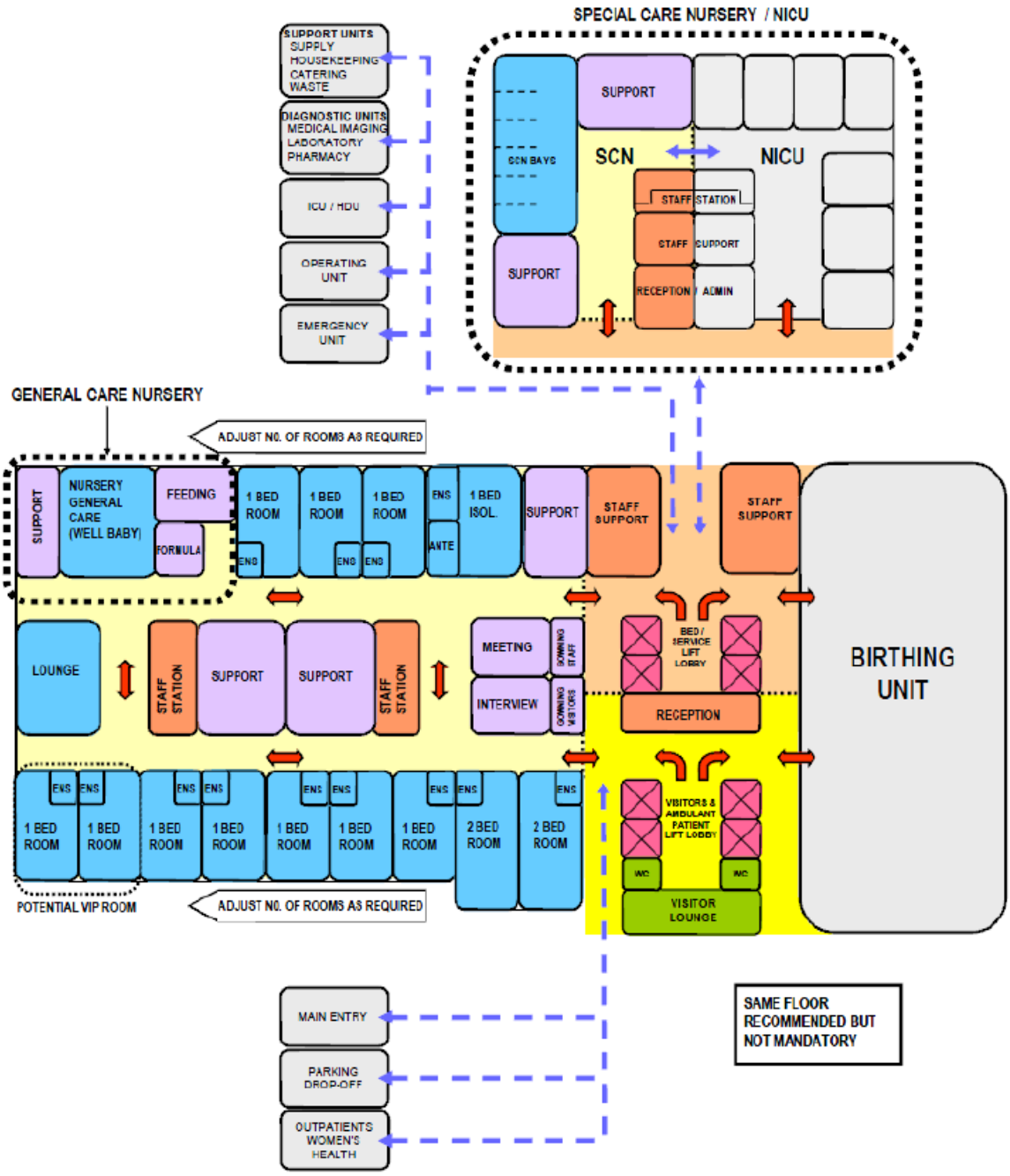
General care needs a bathing examination area, a staff station with proximity to a resuscitation trolley, and support rooms such as a cleaner's room, utilities room, and storage areas. The special care nursery will include isolation rooms, space for feeding, bathing, changing and weighing the baby, educational rooms for parents and staff, and a dark area to allow babies to sleep during the day. It will also have access to public amenities for parents. This type of care will offer short-term care, including the provision of assisted ventilation (TAHPI, 2022).

Another difference with this model is that as it includes a neonatal care area, it also focuses on offering dedicated spaces for breastfeeding and formula feeding, for example, the latter will include "benches with sink for rinsing equipment, cupboards for storage, refrigerator with freezer, baby milk warmer or electric kettle and bottle disinfector" (TAHPI, 2022, p. 9).

Functional Relationships:

The reception will assist in overseeing security for the entire unit, with staff stations and associated areas requiring direct access and visibility to patient areas. Utility and storage spaces should have convenient access to both patient and staff work areas. Shared support areas need to be conveniently reachable from the units they support (TAHPI, 2022).

Nursery zones must be easily reached from postnatal areas, with access to feeding and formula rooms provided to patients in both the nursery and postnatal units.



Illus 2: Funcionatl relationships diagram of inpatient maternity unit

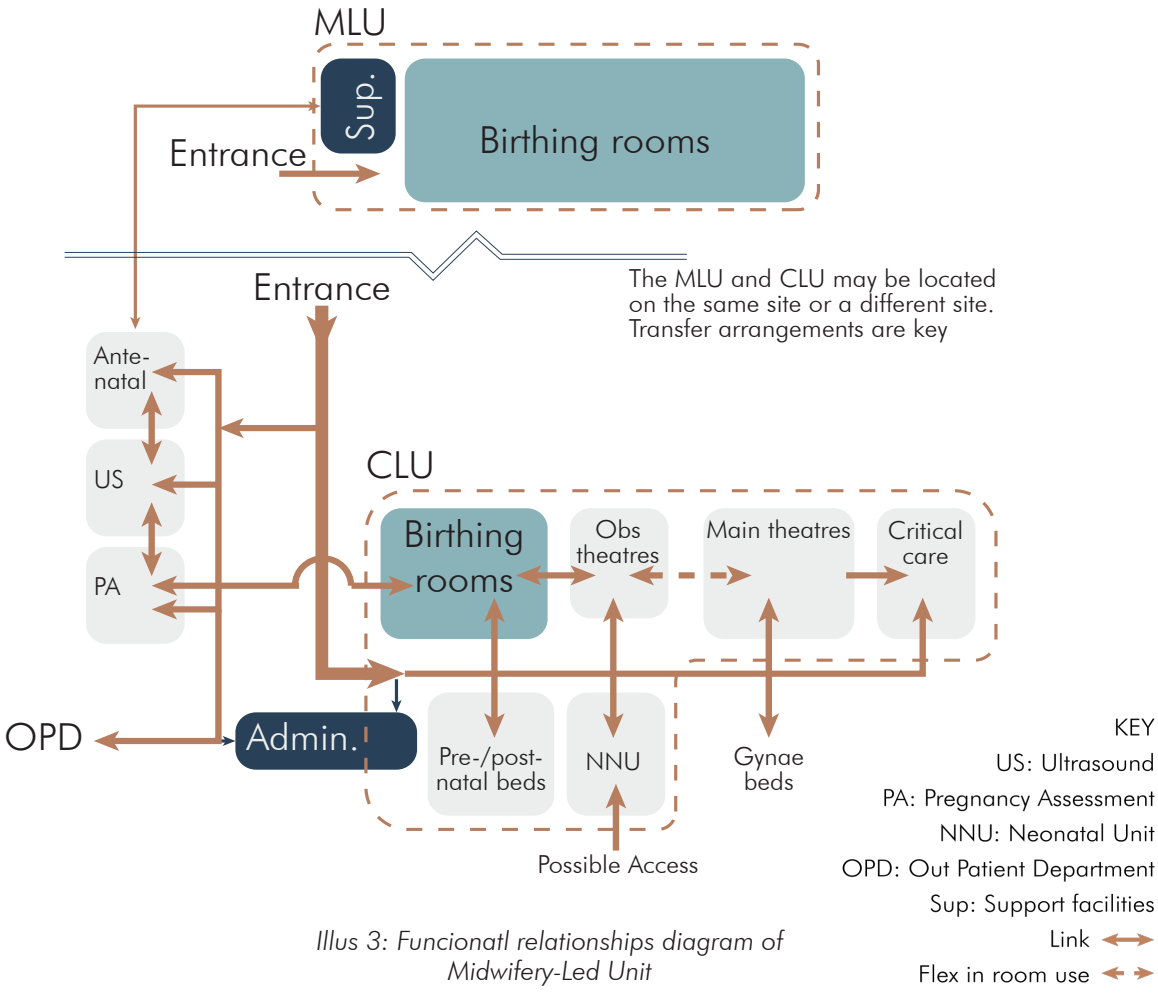
England Guidelines:

From these guidelines, the midwifery led unit is taken as a reference. As mentioned before this type of unit is managed and assisted by midwives, it can be a stand-alone facility or be within a larger health infrastructure, for either case the space requirements vary as well as their functional relationships.

In both cases, where the MLU is within a health facility or connected to a consulting led birthing unit, it would be focused on the birth moment. The birthing suite includes the triage room, consulting rooms, birthing rooms, birthing rooms with pool, bathroom, and stores. Due to the activities and functions carried out within the unit, it is also necessary supporting rooms such as the dirty and clean utility room, the ward pantry, the cleaner's room, the disposal holds, the general store, a staff communication base, and a meeting room or office for staff (NHS, 2013).

The MLD also requires spaces that house services for health personnel, such as shared toilets, kitchen, and changing rooms.

The only differences when the MLU standalone is evidenced on the entry area and additional supportive spaces. In the entry area, apart from the entrance and reception would be a nappy changing room, infant-feeding room, a sitting and beverage bay, and toilets. The accommodation section of the unit can include an information centre, single-bed rooms, shower facilities, a general store, and a room for parenthood preparation (NHS, 2013).



Illus 3: Funcionatl relationships diagram of Midwifery-Led Unit

Functional Relationships:

"In-patient accommodation should be easily accessible from, and within a short distance of the hospital entrance, antenatal and postnatal areas should be co-located for flexibility" (NHS, 2013, p. 22).

If the MLU is within a health facility, it must have its own dedicated entrance for women and families that is different from the entrance to the CLU. Effective communication in the organisation of the health structure is essential, as well as access routes between the two sites (MLU and CLU) (NHS, 2013).

Operating theatre suite:

Within the maternity unit, the operating area can be included. However, it is an object of discussion according to the context in which the project is developed and the analysis of the care services needed. Having an obstetrical operating area within the maternity unit enables the management of all types of pregnancies, provided that the necessary supplies, medications, and specialised medical equipment are available.

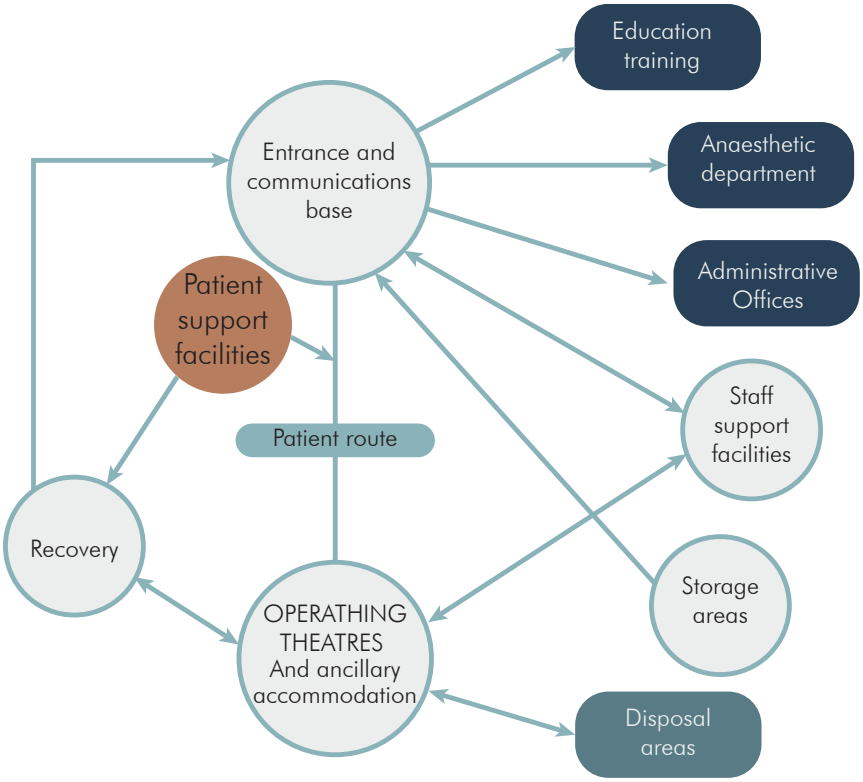
If the unit includes this specialised area, it may be necessary to increase postnatal accommodation capacity or designate a space for post-surgical recovery.

The obstetrical operating area would include an anaesthesia room, obstetric theatres, scrub and gowning room, an exit bay, disposal hold, storage spaces, a preparation room, and a dirty utility room (NHS Estates, 2004).

Functional Relationships:

The positioning of the obstetrical operating area is crucial. All birthing facilities inside and outside the maternity unit must have direct access, 24 hours a day.

The neonatal unit should have theatres nearby for easy transfer of the baby, with convenient access to adult critical care facilities.



Illus 4: Functional relationships diagram of an operating theatre

Schedule of Accommodation:

For a comparison of the three models a schedule of accommodation is shown, this contains the required spaces, the recommended number of spaces or rooms and the required spatial dimensions. Although the three models are different in their functional relationships, the spatial and dimensional requirements do not vary much, but rather the variations are identified in the inclusion of some spaces within specific areas.

Model 1:

The model one takes as reference a "level 3 maternity service within a small hospital incorporating 2 birth rooms, 5 maternity inpatient beds and 2 cots to support step-down transfers of infants from networked neonatal care units" (AusHFG, 2023, p. 30).

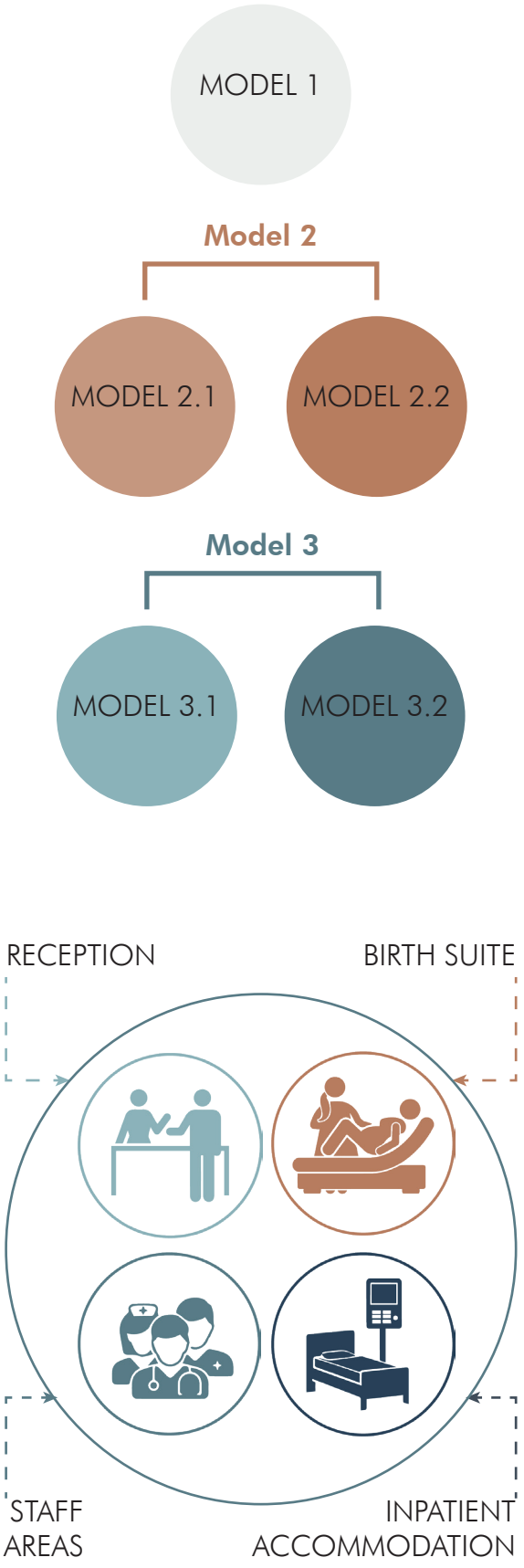
Model 2:

The second model is represented by a maternity impatient unit with accommodation for 25 beds. To have a more detailed approximation of the spatial requirements, it is taken from the same model as an alternative that manages as an accommodation programme two rooms within the birth unit.

That is, there is model 2.1, which represents accommodation for 25 patients and model 2.2, which represents two rooms i.e. it would be for two individual patients.

Model 3:

The third model is focused on a midwifery led unit in which 500 births occur per year. This reference is conceived in two ways, when the MLU is co-located with a consultant-led unit (Model 3.1) and when standalone (Model 3.2).



Illus 5: Models and scheme for the schedule of accommodation, own elaboration

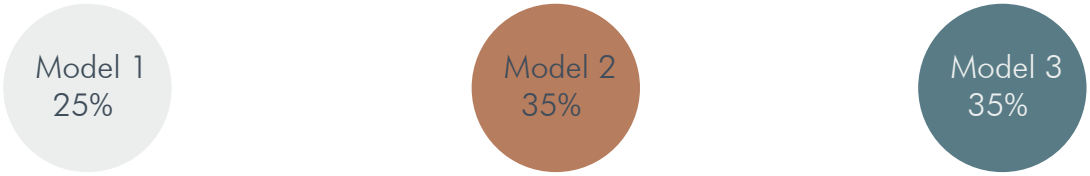
Reception Area

	ENTRY - RECEPTION - WAITING	Model 1 Qty	Model 1 m2	Model 2 Qty	Model 2 m2	Model 3 Qty	Model 3 m2
Public amenities	Reception	1	10	1	10	1	5,5
	Bay for vending machine	-	-	/	/	/	/
	Bay - Vending fountain	-	-				
	Parenting room	-	-				
	Waiting area	1	10				
	Accessible Toilet	1	6	1	6	1	5,5
	Public Toilet	1	3	1	3	/	/
	Visitor lounge room			1	30		
	Meeting room			1	12		
	Play area			1	10		
	Bay - Wheelchair park			1	2	1	2
	Nappy changing room					1	5
	Infant feeding room					1	6
	Sitting and beverage bay: 6 places					1	12

Note:
- No dimensions specified
/ Same dimensions as previous model

Data from: NHS, 2013. TAHPI, 2022. AusHFG, 2023.

Discount circulation :



Illus 6: Dimensional requirements for the reception area, own elaboration

Within the reception area there are some required spaces that can be highlighted, such as the lounge and beverage area that could serve as a more comfortable place for visitors. The meeting room which could be considered as a communal lounge to develop education programmes or to hold conferences. Also, there are other spaces more dedicated to the wellbeing of mothers and their children, such as the play area, the nappy changing room, and the feeding room, which provides more privacy for mothers and babies.

An interesting point proposed in the international guidelines (TAHPI) is the inclusion of one or more prayer rooms in the reception area, which suggests a perspective of respect for the beliefs and cultural diversity of patients and their companions. It also offers a space for emotional and spiritual support where visitors can express their needs, concerns or even prayers that are part of their traditions.

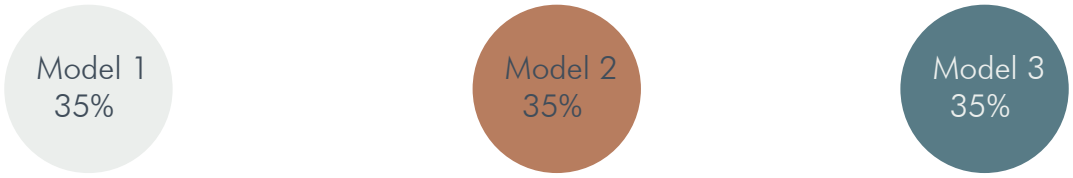
Inpatient antenatal and postnatal care:

INPATIENT UNIT / ANTENATAL POSNATAL CARE	Model 1 Qty	Model 1 m2	Model 2 Qty	Model 2 m2	Model 3 Qty	Model 3 m2
1 Bed room	5	16,5	4	18	N.A	
1 Bed room isolation	1	16,5	1	18		
Ensuite standard	4	5	19	5		
Ensuite accessible	1	7	1	6		
Neonatal bay	2	12,5	/			
Newborn bathing room	1	12				
Handwashing	1	1				
Linen	1	2	2	2		
Mobile equipment	1	2	1	4		
Bay - meal trolley	1	4	/			
Milk preparation and storage	1	6	1	10		
General equipment	1	8	1	20		
1Bedroom large			1	30		
Anteroom			1	6		
Lounge patient			1	20		
Sitting alcove			2	2		
Sitting and beverage bay: 6 places					1	12

Data from: NHS, 2013. TAHPI, 2022. AusHFG, 2023.

Note:
- No dimensions specified
/ Same dimensions as previous model
N.A: Not applicable

Discount circulation :



Illus 7: Dimensional requirements for the inpatient area, own elaboration

Of the spaces for inpatient antenatal and postnatal care, two spaces can be highlighted. The patient lounge, as this room could be a space where mothers can gather and feel more accompanied during the day, and the seating area for companions, due to considering companions during the birthing process is a crucial factor.

Depending on the type of maternity unit, more outpatient spaces can be included in the antenatal care area to expand the coverage of care provided. In this outpatient antenatal care area, consultation rooms, interview rooms, an ultrasound room, and even a pregnancy assessment room can be integrated. Although, this last space will re-

require more trained medical staff, which means that it will only be included in maternity units with a higher level of service.

One space mentioned in all three models is the bereavement room, which is a space dedicated to "women and families who suffer bereavement at any stage of pregnancy" (NHS, 2013, p. 5). This space is important to offer postnatal care to women and psychological support, "it should be away from the birthing area and with a separate exit from the ward" (NHS, 2013, p. 5).

Birth Unit:

This area of the unit is quite technical and in general the three models do not specify any other spaces beyond those necessary for effective functionality. However, it is the area of the unit that requires the most support space, as it is there that most of the technical procedures are carried out and therefore must have all the necessary equipment and supplies for successful interventions.

Although the models mention the possibility that the birthing rooms have the option to include or not a swimming pool, the most important thing is that they offer the possibility for the woman to move freely during labour and to adopt the position of her choice.

Depending on the level of care of the unit, it is also essential to have all the necessary equipment for the care of the newborn with in the birth room, which is why there is a neonatal resuscitation area in the room.

Staff Areas and amenities:

The medical staff zone in the maternity unit is essential for ensuring the well-being of the healthcare workers and at the same time to offer them some services and facilities. Consequently, integrating space for them within their work area helps to improve the performance of the unit.

In addition to the required spaces such as the staff station, toilets, offices, and meeting rooms there are some spaces that can be integrated as staff overnight bedrooms that not only allow staff to rest after long shifts but could ensure that there is continuous availability of health personnel in the maternity unit. This is because one of the recurrent problems in remote areas or low-income settings is that medical staff are not always available in health centres due to difficulties in access to these facilities.

Providing space and facilities for staff to stay in the facility for certain periods of time, if necessary, can improve the quality of service and encourage more women to choose to deliver in maternity units rather than at home (Essendi et al., 2015).

Optional accommodation:

These spaces are some additional rooms that support the activities developed in the midwifery led unit when standalone. They are not obligatory but can be integrated as support spaces for other areas of the unit.

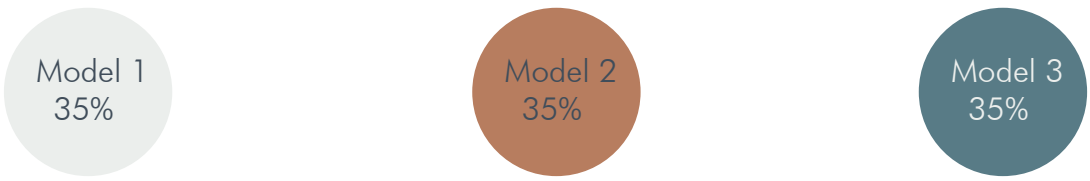
Birth Unit:

BIRTH UNIT	Model 1 Qty	Model 1 m2	Model 2 Qty	Model 2 m2	Model 3 Qty	Model 3 m2
Assessment room	1	20	/		-	
Ensuite- standard	1	5	19	5		
Birth room without pool	2	34	/		1	24
Birth room with pool	2	40,5			2	34,5
Ensuite birthing	2	7			2	6
Bay PPE-Personal protective equipment	1	3	1	1,5	N.A	
Family bereavement room	1	15	/			
Neonatal resuscitation	1	15				
Staff station	1	12	1	14	2	5,5
Clean store / Medication room	1	12	1	10-12		
Dirty utility room	1	10	1	14	1	12
Storage	1	1	/		3	4
Mobile equipment	1	2	1	4	N.A	
Linen	1	2	1	2		
Blanket	1	1	/			
Resuscitation trolley	1	1,5	1	1,5		
Handwashing	1	1	1	1,5		
Equipment	1	8	1	20		
General store	1	9	1	10	1	3-4
Cleaner's room	1	5	1	6	1	8
Disposal room	1	8	1	8	1	12
Patient and family lounge	1	12	1	20	N.A	
Bay - Beverage enclosed	1	5	1	5		
Office	1	9	2	12	1	16
Bay - Staff property	1	3	/		-	
Store - sterile stock			1	6		
Clean Utility room					1	16
Ward pantry					1	12
Triage					1	16
Consulting room					1	12

Data from: NHS, 2013. TAHPI, 2022. AusHFG, 2023.

Note:
- No dimensions specified
/ Same dimensions as previous mode
N.A: Not applicable

Discount circulation :



Illus 8: Dimensional requirements for the birth unit, own elaboration

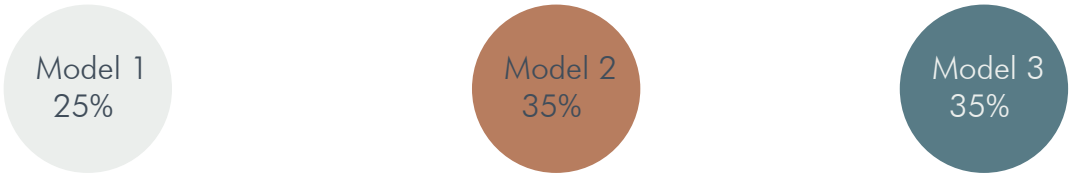
Staff areas and amenities:

STAFF AREAS AND AMENITIES	Model 1 Qty	Model 1 m2	Model 2 Qty	Model 2 m2	Model 3 Qty	Model 3 m2
Meeting room	1	12	1	20	N.A	
Workstation	1	4,5	/			
Store files	1	1				
Staff room	1	15	1	14		
Staff toilet	1	3	2	3	1	2
Bay - property staff	1	2	2	2	N.A	
Muntifunction device	1	3	/			
Staff lounge			2	15		
Office clinical / handover			1	15		
Change - staff (female/male)			1	10	10	1,4
Overnight stay - bedroom			2	10	N.A	
Overnight stay - ensuite			1	4		
Staff rest and mini kitchen (size based on number of seats)					3	1,8

Data from: NHS, 2013. TAHPI, 2022. AusHFG, 2023.

Note:
- No dimensions specified
/ Same dimensions as previous model
N.A: Not applicable

Discount circulation :



Illus 9: Dimensional requirements for staff areas and amenities, own elaboration

Optional Accommodation:

OPTIONAL ACCOMMODATION FOR MLU	Model 3 Qty	Model 3 m2
Information/resource centre: 3 persons	1	12
Single-bed room	1	19
Shower room en-suite: chamfered	1	4,5
Preparation for parenthood room (size based on number of places)	1	7
General store	1	12

Illus 10: Dimensional requirements for optional accommodation for the midwifery Led Unit. (NHS, 2013)

Environmental characteristics:

In general, but not least, the three guidelines set out environmental characteristics that the maternity unit should have, all three models agree that the environment should be a welcoming space and avoid the institutional atmosphere, on the contrary, manage a more informal environment. Including access to some outdoor areas also is considered an important point, especially in the birthing unit (AusHFG, 2023 and TAHPI, 2022). The connection with natural elements helps to reduce the levels of stress during labour, for that reason the importance of allowing mobility between internal and external spaces.

"Birth rooms should provide a calm and safe setting where mothers can control and alter, as much as possible, the room environment" (AusHFG, 2023, p. 20). Keeping privacy is an essential aspect to consider in the design of birth rooms, because it gives the mother more security and makes them feel better in space.

All the internal characteristics include "furnishings, style, colour, textures and ambience, influenced by perception and culture" (TAHPI, 2022). "The decoration of the Unit should be of a standard that meets the expectations of the clients using the services and make every effort to reduce an institutional atmosphere" (TAHPI, 2022, p. 16).

One possibility in the maternity unit is to manage a "Homelike environment" which promotes a calm and stress-free environment (AusHFG, 2023). The decoration of the environment may include the use of artwork or other visual elements that create a positive distraction for the mother during labour.

Another relevant aspect is the use of natural light, this on should be maximised throughout the unit. "Windows are an important aspect of sensory orientation and psychological well-being of patients" (Health Facility Guidelines, n.d., p. 8). "Natural light must be available in all bedrooms and is desirable in inpatient areas such as lounge rooms" (TAHPI, 2022, p. 15).

Acoustics and ventilation are correlated features. On one hand, the noise should be reduced as much as possible in the birthing unit and in the inpatient accommodation areas; to achieve this is necessary an acoustic treatment especially because in the birthing unit it is uncomfortable for mothers to listen to another woman during labour. On the other hand, depending on how the ventilation is connected, sounds may or may not be transmitted. "The ventilation distribution ductwork should be designed to minimise the transmission of sound from one area to another by suitable routing or separate distributions" (NHS, 2013, p. 40).

In summary, the above-mentioned guidelines and models provide a structure for the maternity unit, independent of its focus of care. They have already studied guidelines that ensure the good functioning of the unit, the maintenance of hygiene and sanitation, and the prevention of infections or contagious diseases.

01.3 WHO's Framework for Respectful and Supportive Maternity Care

Beyond the technical guidelines there is another approach of care in the maternity unit proposed by the World Health Organization, this approach is oriented to offer women a positive childbirth experience through a respectful maternity care, an effective communication, an integration of the companionship during labour and childbirth, and a continuity of care (WHO, 2018).

To better understand this approach, it is essential to define what constitutes a positive childbirth experience and respectful maternity care.

Positive Childbirth Birth Experience:
According to WHO (2018) a positive childbirth experience is one:

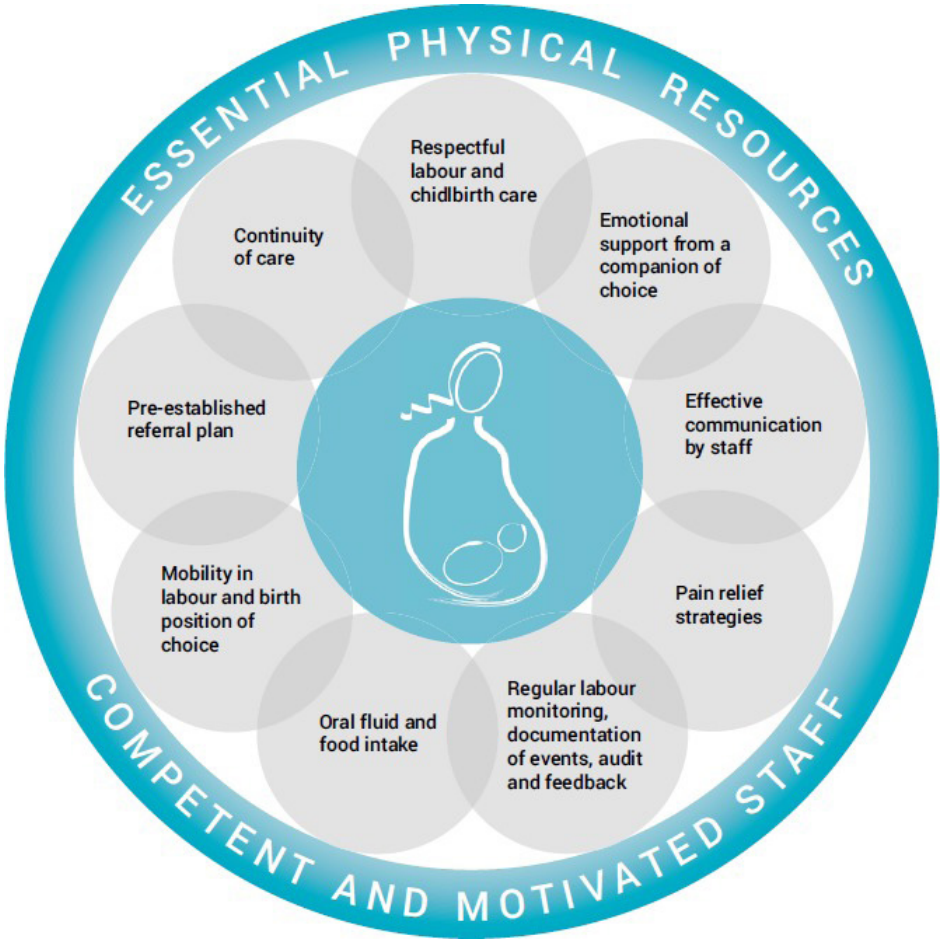
That fulfils or exceeds a woman's prior personal and sociocultural beliefs and expectations, including giving birth to a healthy baby in a clinically and psychologically safe environment with continuity of practical and emotional support from a birth companion and kind, technically competent clinical staff (WHO, 2018, p. 1).

Respectful Maternity Care:
"Which refers to care organised for and provided to all women in a manner that maintains their dignity, privacy, and confidentiality, ensures freedom from harm and mistreatment, and enables informed choice and continuous support during labour and childbirth" (WHO, 2018, p. 3).

With the aim of achieving such a positive childbirth experience there are some standard recommendations suggested by WHO, but at the same time the recommendations proposed the integration of new techniques that could improve the woman's experience.

Among the main needs to provide respectful maternity care in reference to the infrastructure are the following:

Allow women and their babies to remain together, this can be translated in inpatient rooms with enough space for both. Another recommendation is oriented to maintain labour, childbirth, and neonatal areas clean, appropriately illuminated, and well-ventilated, as well as prioritising privacy through curtains, screens, and partitions (WHO, 2018).



Illus 11: Schematic representation of the WHO intrapartum care model, (WHO, 2018)

It is also important to have enough bed capacity to meet the needs of the community in which the maternity unit is located, as well as to provide all women with access to sanitary facilities such as cleaning bathrooms during labour.

According to the WHO recommendations, supportive facilities for the mother, her companion, and even her other children are essential to respectful maternity care. These guidelines emphasise the need for labour facilities that accommodate companions, offering a private space for the mother and her chosen support person. Additionally, basic amenities such as a chair, space to change clothes, and access to a toilet are recommended to enable the companion to provide continuous and meaningful support throughout labour and delivery.

Lastly, to have an effective communication that brings the mother security about the procedures, the interventions, and the general process of birthing, WHO recommends have within the health facility, "training facilities to support development of skills and competencies in effective communication" (WHO, 2018, p. 27). This can be interpreted in meeting rooms or social settings, utilised for diverse purposes such as training for healthcare staff and educational sessions for mothers and fathers.

One of the most important aspects of the WHO recommendations published in 2018 is the inclusion of relaxation techniques for pain management. Healthy pregnant women looking for pain relief during labor can benefit from relaxation techniques such as muscle massages, breathing, music, and mindfulness, depending on their preferences (WHO, 2018).

The relaxation techniques can be categorised depending on the technique used and the equipment required, the spatial characteristics, and the physical infrastructure may vary.

The general relaxation techniques include "breathing techniques, progressive muscle relaxation, and combined breathing and muscle relaxation techniques" (WHO, 2018, p. 106). The yoga techniques work with different yoga postures that will help the mother to relieve pain during labour.

The music is also used as a technique offering to the woman a selection of music for labour, this technique can be related with the audio-analgesia technique, which, as the name suggests, uses some soothing sound to relieve pain and reduce stress.

Integrating these techniques into the maternity unit can have a positive effect on the women's experience, and they are low-cost interventions, "as most of these techniques can be performed by the woman herself once learned, or with the support of a labour companion, while others require little staff time and effort" (WHO, 2018, p. 108).

However, they may require some modification of the unit spaces or additional equipment, for example the yoga technique will require sufficient floor space to spread a yoga mat. In the case of the use of music techniques, equipment will be necessary for playing music (e.g. phone, CD player, MP3 player, speakers).

There are other methods that can be adopted, such as manual techniques, which use massages or the application of warm compresses to relieve pain in women with low-risk pregnancies (WHO, 2018). These methods only require constant access to warm water, and they are low-cost because they can be performed by the woman's companion.

Continuing with the idea of a positive childbirth experience, WHO recommends maternal mobility during labour and the possibility to women for choosing the birth position of their preference. If it is a low-risk pregnancy, the upright position can be adopted. To follow these recommendations, it is essential to include in the birthing room a standard bed suitable for recumbent positions, ensuring comfort and versatility for various birth preferences.

Additional options, such as birthing cushions or alternative support for upright positions, as well as a birthing stool, may be provided to accommodate and facilitate upright birth positions, enhancing comfort and choice for the mother (WHO, 2018).

As mentioned above, the quality of care provided directly influences the experience of the mother, which is why it is essential to offer quality care oriented towards respectful care in health facilities and maternity units. In general terms, to improve the quality of care, WHO also sets standards that focus on the provision of care, the experience of care and the human and physical resources available to provide care.

"Good-quality care requires appropriate use of effective clinical and non-clinical interventions, strengthened health infrastructure, optimum skills, and a positive attitude of health providers" (WHO, 2016, p. 5). In that sense WHO (2016) proposes eight domains to define the priorities for quality improvement:

Standard 1: "Every woman and newborn receive routine, evidence-based care and management of complications during labour, childbirth and the early postnatal period, according to WHO guidelines" (WHO, 2016, p. 2).

Standard 2: "The health information system enables use of data to ensure early, appropriate action to improve the care of every woman and newborn" (WHO, 2016, p. 3).

Standard 3: "Every woman and newborn with condition(s) that cannot be dealt with effectively with the available resources is appropriately referred" (WHO, 2016, p. 3).

Standard 4: "Communication with women and their families is effective and responds to their needs and preferences" (WHO, 2016, p. 3).

Standard 5: "Women and newborns receive care with respect and preservation of their dignity" (WHO, 2016, p. 3).

Standard 6: "Every woman and her family are provided with emotional support that is sensitive to their needs and strengthens the woman's capability" (WHO, 2016, p. 3).

Standard 7: "For every woman and newborn, competent, motivated staff are consistently available to provide routine care and manage complications" (WHO, 2016, p. 4).

Standard 8: "The health facility has an appropriate physical environment, with adequate water, sanitation and energy supplies, medicines, supplies and equipment for routine maternal and newborn care and management of complications" (WHO, 2016, p. 4).

For this paper, I focus on the latter standard which provides the infrastructural requirements and amenities necessary to offer quality care.

Firstly, the maternity unit must have all the supplies it needs to operate, which include adequate sanitation and hygienic of the space. It must be stocked with the medicines required for procedures and interventions. In addition, it must have sufficiently trained medical staff.

Secondly, the unit would be organised and maintained in a way that every woman and newborn can be cared for according to their needs in private, to facilitate the continuity of care. It includes a designated area in the labour and childbirth section specifically for newborn resuscitation, furnished with essential equipment such as a radiant warmer, and appropriate resuscitation supplies. An adequate number of clean, well-lit, ventilated, and private birthing rooms are available to accommodate the estimated number of births in the service area. The facility also supports 24-hour rooming-in to enable mothers and babies to remain together (WHO, 2016).

Additionally, a functional, accessible bathroom is available solely for women in labour, and the proximity of a fully equipped operating theatre ensures swift access for surgical needs.

A recovery room is reserved for women with complications, and a dedicated ward is available for the care of unwell or unstable infants, ensuring comprehensive maternal and neonatal support.

Finally, the maternity unit should have "adequate stocks of medicines, supplies and equipment available for routine care and management of complications" (WHO, 2023, P. 60).

All the above-mentioned aspects guarantee the proper functioning of the unit, which will improve the care and quality of care for mothers and newborns. If facilities have the necessary equipment, supplies, drugs, and human resources to adequately attend births and provide quality antenatal and postnatal care, the objective of improving quality will be met. And the dignity, privacy and confidentiality of the mother will be maintained as well as avoiding negative experiences for them and ill-treatment.

02

PROBLEM STATEMENT

The worldwide current situation of maternal and newborn health during pregnancy, childbirth, and the postpartum period continues to represent a considerable challenge, for countries and for various international organisations, such as the World Health Organization (WHO) and different United Nations agencies. Despite efforts, the presence of numerous maternity units around the world that operate under a variety of approaches, and established international guidelines, significant limitations persist in both the quality of care offered and access to these health facilities.

These barriers particularly affect context with limited resources, where access to quality antenatal, delivery, and postnatal care is restricted and where relevant socio-cultural aspects are often not considered. As a result, many mothers prefer to opt for home births, which increases the risks for both mother and newborn, in the absence of adequate care.

From this scenario it can be understood why, notwithstanding global efforts to reduce maternal mortality rates, the rates of maternal mortality and health complications remain high. This situation reflects a significant challenge in the field of public health, since, despite the policies and programs implemented with the aim of reducing these figures, substantial progress has not yet been made in improving the quality of health services provided to mothers.

It is therefore necessary to re-evaluate how architecture directly and indirectly influences the health services offered to mothers. While there are international standards for how maternity units should be structured, it is equally important to consider how these facilities can be more accessible, including socio-cultural factors and be designed with a focus on users' needs. By addressing these issues, a reinterpretation of the maternity unit could be made to improve maternal experience, and consequently influence access to care and reduce maternal mortality rates.

To understand this problem in greater depth, it is necessary to present the problem from three perspectives: first, by reviewing the objectives and goals set over the last 20 years to improve maternal and neonatal health, and how maternal mortality rates have evolved. The second, from the existing limitations to access and quality service in health centres or maternity units. The third, focuses on how maternity units and delivery areas are currently conceived from a medical perspective, when they should be human-centred and have a more integrated approach.

02.1 International goals and maternal mortality rates

According to the most recent report by the WHO published in 2020, "an estimated 287,00 women lost their lives globally due to maternal causes, which translates to nearly 800 maternal deaths each day" (WHO, 2023, p. 2); or roughly "one death every two minutes" (WHO, 2023, p.2). These figures reveal a critical need for enhanced efforts at both global and regional levels to ensure that health systems are sufficiently equipped and accessible to all women. Furthermore, it is essential to explore why some women in certain regions opt not to utilize health facilities for antenatal care or choose home deliveries.

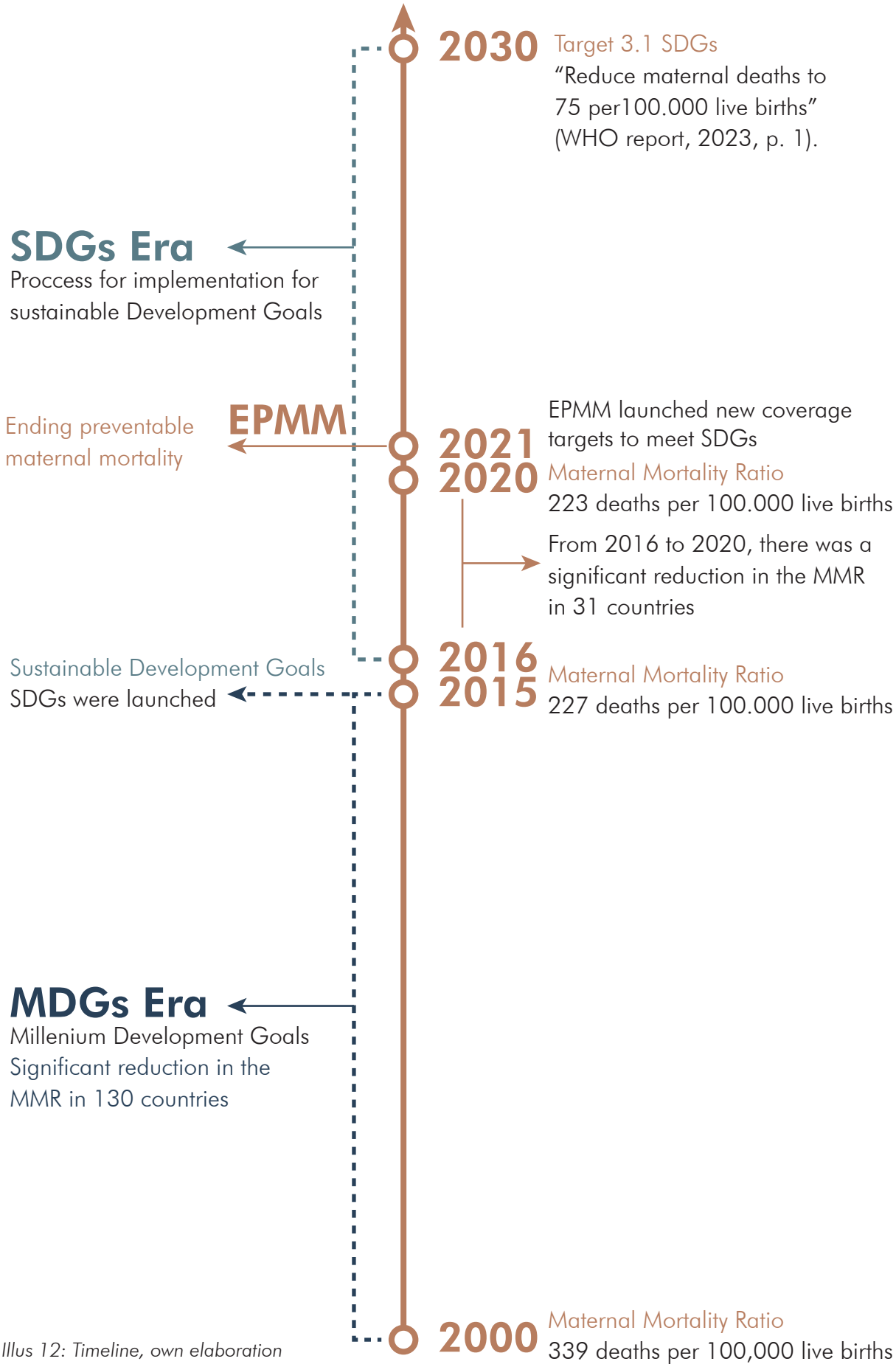
With the intention of providing a historical background of the global goals established over the years, a comprehensive analysis spanning from 2000 to 2020 is examined. This period is coherent with the WHO report "Trends in Mortality 2000 to 2020," which was published in 2023 and includes estimates from WHO as well as other organizations such as UNICEF and the World Bank Group.

In 2000, 339 maternal deaths per 100,000 births were recorded in the MMR statistics report, indicating a significant milestone: the beginning of the Millennium Development Goals. These goals aimed to achieve eight milestones by 2015, with Goal 5 focusing on improving health outcomes and including targets detailed in a document released by WHO on February 19th.

The target 5.a. was "reduce by three quarters, between 1990 and 2015, the maternal mortality ratio" (WHO, 2018). And the target 5.b. was "achieve, by 2015, universal access to reproductive health" (WHO, 2018).

The Sustainable Development Goals (SDGs) launched in 2015 with a timeframe spanning from 2016 to 2030 include a focus on goal three. "Ensuring lives and wellbeing all at every stage of life" (WHO report, 2023). This study focuses on target 3.1. "aimed at lowering MMR to below 70 deaths, per 100,000 live births by 2030" (WHO report, 2023, p. 1).

As of the most recent WHO report, maternal mortality rates decreased only slightly between 2016 and 2020. As a result, meeting the SDG target by 2030 will require significant efforts; an average annual rate (ARR) reduction of approximately 11.6% must be realized between 2021 and 2030 (WHO report, 2023).



Illus 12: Timeline, own elaboration

As shown in the the WHO report (2023), the MMR for 2020 varies significantly across the world's regions.

- Latin America and the Caribbean accounted for "88 deaths".
- North Africa and West Asia "84 deaths".
- East and Southeast Asia "74 deaths".
- Europe and North America "13 deaths".
- Australia and New Zealand "4 deaths"

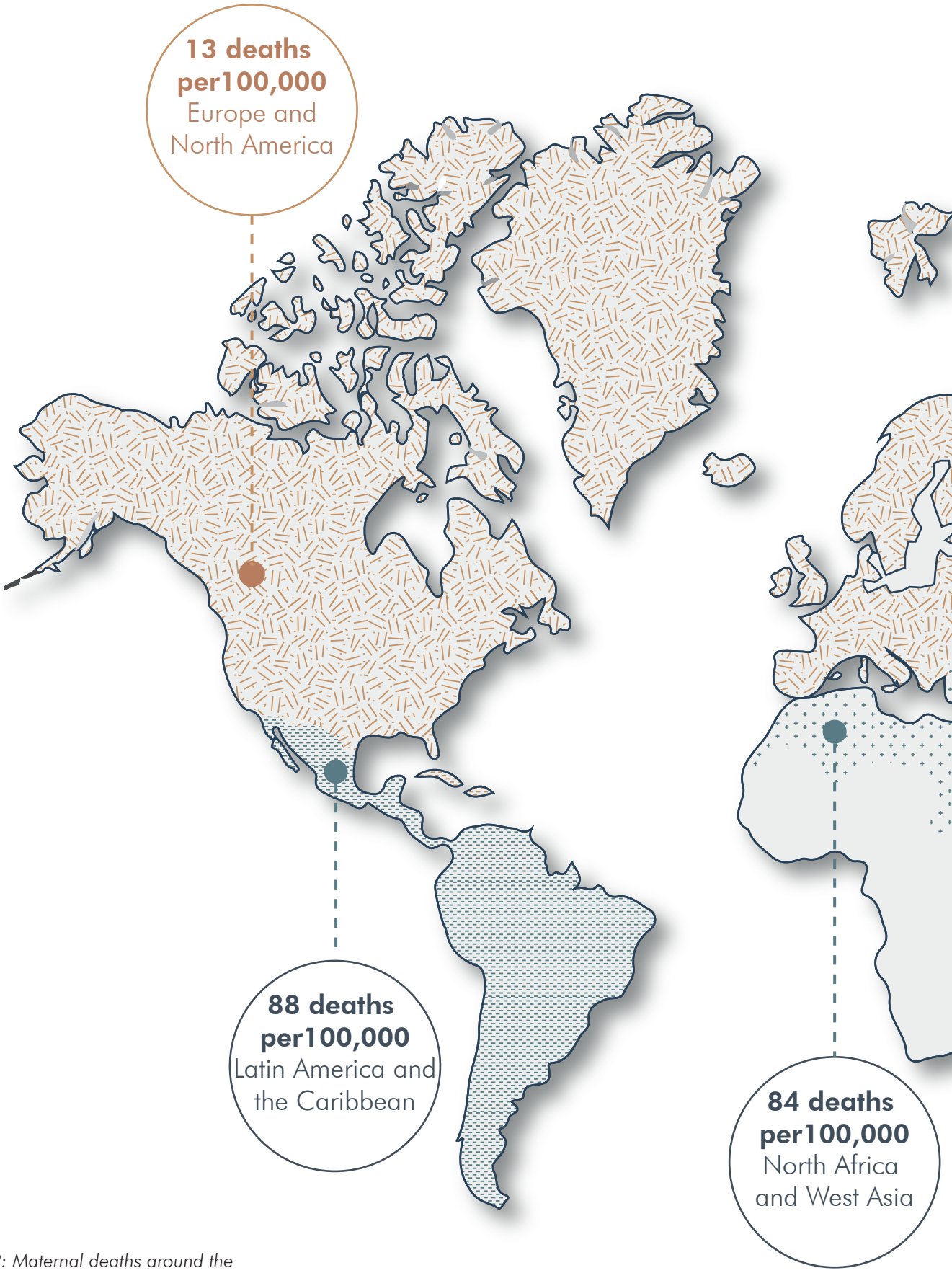
Sub-Saharan Africa evidenced an alarmingly high MMR of 545 maternal deaths per 100,000 live births; this region "accounted for approximately 70% of global maternal deaths in 2020, followed by Central and Southern Asia, which accounted for nearly 17%" (WHO, 2023, p. 2).

This inequity in maternal mortality rates is concerning and highlights the limitations for accessing to healthcare between high developed and least developed countries (LDCs). Nevertheless, "only 13% of the world population lives in least developed countries" (WHO, 2023, p. 2). The LDCs had a large share of aggregated maternal deaths, taking around 42% of all global maternal deaths as late as in year 2020. These countries have an estimated Maternal Mortality Ratio (MMR) of 377 deaths per 100,000 live births (WHO, 2023).

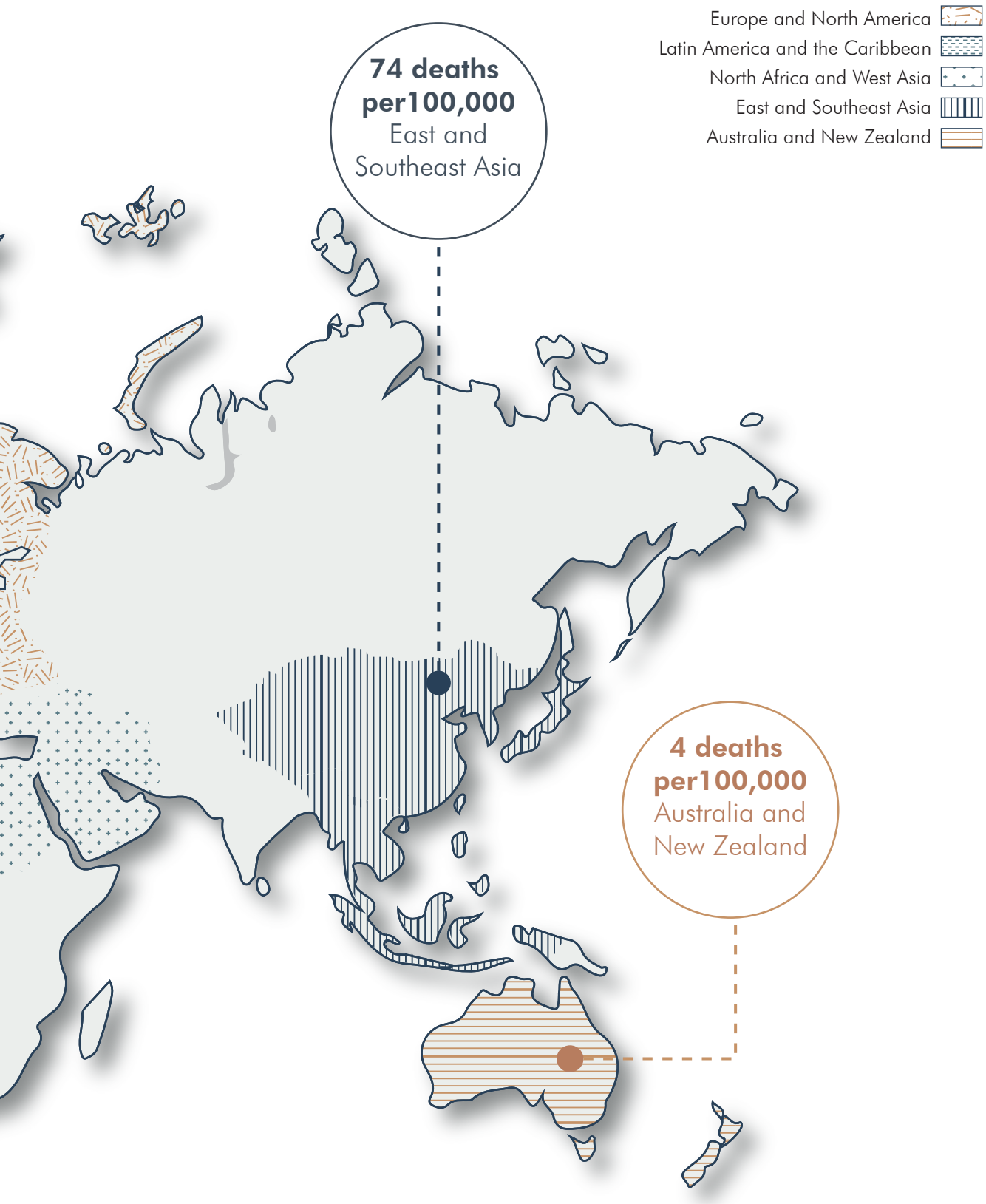
As the evidence shows, unfortunately, low-income and least developed countries still have difficulties in ensuring access to quality health care, partly due to distinct factors such as the health policies applied, the distribution of supplies and resources, cultural and contextual differences, among others. Such deficiencies in the health system, infrastructure, transport and sanitation problems and lack of adequate personnel contribute to the fact that maternal mortality rates are not declining as expected.

In difficult and precarious environments, the causes of death may be direct obstetric burdens such as "postpartum haemorrhage, pre-eclampsia, and hypertensive disorders, pregnancy-related infections, complications of unsafe abortion" (WHO, 2023, p. 6), indirect causes such as infectious and non-communicable diseases (WHO, 2023).

These complications may also be due to the prevalence of mothers having their deliveries assisted by traditional birth attendants, which exposes women and newborns to the lack of an adequate response to complications and infections.



Illus 12: Maternal deaths around the world, own elaboration


Europe and North America
Latin America and the Caribbean
North Africa and West Asia
East and Southeast Asia
Australia and New Zealand
74 deaths per100,000
East and Southeast Asia
4 deaths per100,000
Australia and New Zealand

02.2 Factors influencing the quality of care

Ensuring that mothers have access to adequate care is critical to reducing the potential risk of illness and death, thanks to efforts for improving the quality of care offered to mothers also the maternal mortality rates have been reduced (Chang et al., 2020). However, achieving this is not a simple task and not only improving the quality of clinical care but also the non-clinical care of women must be considered, considering other socio-cultural factors to provide a positive experience during all stages of pregnancy and the immediate postpartum period (Asefa et al., 2020).

Unfortunately, ensuring such access is not always possible and the quality of care does not always meet the standards previously set by international standards. Firstly, due to the lack of rigorous monitoring by international mechanisms and secondly because the same indicators for measuring the service quality in health facilities are extensive and distant from medical personnel (Chang et al., 2020).

A clear problem is related to the guidelines established, as evidence shows that they were not designed precisely for the settings where implementation is most critical to saving the lives of mothers and newborns, nor assessed in low- and middle-income settings (Manu et al., 2018). Neither the guidelines include socio-cultural aspects within the requirements of care to be provided to mothers, based on international directives that focus on providing a technical structure of the maternity unit and the spaces that support health services, but do not integrate factors that influence users' experience such as their culture, beliefs, and traditions.

The lack of consideration of local realities, both in terms of infrastructure, resources, culture, traditions, and even human capacities, can limit the effectiveness of interventions and, in some cases, even aggravate contrasts in access to health. This suggests a call for standard-setting organisations to place more emphasis on country contexts and conditions to improve policies and better manage health programmes (Victora et al., 2019).

While it is indisputable that standards still have room for improvement, they are not the only cause limiting access to health and undermining quality of care, as other factors such as the physical infrastructure of the facility, access to the facility, water and electricity supplies, and even the health personnel available are more detailed in these types of low-income contexts.

Physical infrastructure:

The infrastructure of health facilities is another factor that directly affects the quality of care offered, considering that it has different components such as "the facility and its management, the physical infrastructure, the supply facility system, the disposal system, technical medical equipment, information, communication technology, and the outreach services" (Scholz et al., 2015, p. 2). If the overall conditions are not optimal, the quality of the care that can be offered decreases.

The experience of women and her companions within the maternity unit can be affected by physical factors, as well as the care and attention offered to mothers and newborns. This is the case in many facilities around the world, especially those in contexts of scarcity, where for example the facilities themselves do not meet hygiene standards, are not adequately stocked with medicines and special equipment, do not have a constant supply of water and energy, are not adequately maintained, and do not have a referral system due to difficulty of access, variables that hinder the effectiveness of the procedures and services that can be offered, as well as the satisfaction of mothers for being cared in maternity units.

Continuing in a deeper sense in the limitations of the sanitary facilities, this includes the dysfunction or complete absence of utilities such as showers and toilets, shortage of water supply, no waiting area for accompanying persons, and poorly ventilated rooms (Asefa et al., 2020). These shortcomings are not only related to the quality of the service, but also to the patient's experience and the failure to meet their physical and emotional needs, for example, the woman in labour will not feel equally comfortable if the space where she is, does not have some sense of privacy, good lighting, and ventilation. Instead of the experience being rewarding and helping her in labour, on the contrary, it may cause stress and hinder the natural process of childbirth.

In reference to the infrastructure itself it is significant to mention that when talking about low-income settings there may be deficiencies in service capacity. For example, where there may be a shortage of beds or overcrowding of patients (Asefa et al., 2020). This becomes a negative aspect faced by women who attend a health facility with the assumption that they will receive a better service. On the contrary, it becomes a factor that, if it becomes common, influences women to continue to prefer home births.

Offering quality care and attention is not only related to the service, but also to the infrastructure available to offer the service, because beyond being functional. It must correspond to the characteristics of the environment in which the health facility plans to be developed, to achieve a correct performance.

Electricity and Water supply:

Water and electricity supply are key elements to ensure the proper functioning of any health facility regardless of its scale. However, in difficult contexts with limited resources, water and electricity supply cannot always be assured, putting at risk the service that can be provided and generating other problems consequently.

In the case of not being able to count with water supply 24 hours a day, every day, can complicate the functioning of the maternity unit and even put patients at risk (Essendi et al., 2015).

Illus 14: Al-Shaheed Mahnaf Hospital in Loader district, Abyan governorate, Yemen

Illus 15: Child welfare clinic, Batapotha, Battaramula, Sri Lanka

The scarcity of drinking water implies serious hygiene and sanitation problems, because it reduces the frequency with which hands, equipment, and instruments used in procedures can be cleaned and disinfected, which exposes mothers, newborns, and health personnel to infections.

In addition, without a continuous water supply, some of the relaxation techniques proposed by WHO for a positive birth experience cannot be applied, reducing the options for pain relief during labour. This reduces the possibilities for the maternity unit to offer quality care to the mother.

On the other hand, electricity supply is also an indispensable requirement for the correct and efficient functioning of the health facility, considering that many medical equipment used daily depend directly on the continuous and stable flow of electricity to operate properly. In turn, the lack of electricity supply has direct implications for the conservation of medicines and vaccines, which must maintain a cold chain. If this chain is interrupted, essential supplies for the treatment and prevention of diseases could be lost.

The power supply is an important factor for a maternity centre because many of the medical equipment used to monitor mothers and newborns are completely dependent on electricity. If the continuous supply of electricity cannot be guaranteed the monitoring and checking of pregnant women and babies can be put at risk, endangering their lives and well-being, and diminishing the quality of care.

In a maternity centre, the supply of essential resources such as water and electricity must be guaranteed so as not to put mothers and newborns at risk, especially if there are targets aiming to reduce maternal mortality and morbidity.

Access:

Access to health services is another point that must be addressed in low developed regions, especially in rural areas where the access to health centres or maternity units presents different limitations. This aspect is related to transport infrastructure, which includes both roads and available means of movement.

The difficulties that may arise due to the available transport infrastructure becomes a determining factor in the availability of service, since if for example roads are in poor condition access to necessary medical supplements, health care providers, and even patients, can be disrupted (Maternal, 2012); and the referral system between health facilities may also be affected.

This situation is aggravated in rural areas where the precariousness of roads becomes a barrier to access to health and referrals for mothers and newborns (Essendi et al., 2015). As a result, access to adequate health care is limited and the risk of complications during pregnancy and childbirth increases.

If a pregnant woman does not have a healthcare centre or maternity unit nearby, or if access to such facilities is challenging due to poor road conditions, infrequent transport options, or high additional transportation costs, she is unlikely to attend regular checkups. Furthermore, at the time of delivery, she may still prefer a traditional midwife at home (Essendi et al., 2015 and Amouzou et al., 2019).

That is why in some regions of the world, the design of waiting houses for mothers, or transitional facilities where mothers can stay even up to six weeks before the scheduled date of delivery is being considered. This type of facility ensures that the mother can access adequate care. In addition, this model can have some benefits, they can be used for educational programs, as support facilities for the mother's companions and other children and serve as a temporary residence for premature births.

Health personnel:

Today we are facing a worldwide crisis of the availability of medical care. This has an impact on the health care that can be offered especially to mothers and newborns, even more considering the shortage of midwives, gynaecologists, and obstetricians. This aspect is relevant if the aim is to provide a high quality of care (Asefa et al., 2020).

Consequently, if there is a shortage of health professionals of doctors, midwives, and nurses, some women users will prefer to seek care from the TBA (traditional birth attendants) and opt for this alternative that guarantees them will always be available to provide care and support (Essendi et al., 2015).

This shortfall is due to several factors which will not be detailed, but if a solution is needed especially because the percentage of available active medical personnel is not evenly distributed. It is even more difficult to have qualified personnel in precarious contexts, for example, "Sub-Saharan Africa hosts 11% of the world's population, but carries 24% of the global maternal morbidity burden and only 3% of the world's health workforce and is narrowly attributed to 1% of the world's health expenditure" (Maternal N, 2012, p. 7).

The capacity of health personnel is another factor directly affecting the quality of care and influences the decision of many women to use health facilities and the western health system, especially in precarious contexts with different traditions and cultures. Better planning of health systems and their infrastructure is required to improve care, especially in contexts with limited resources where adaptation is needed.

In conclusion, in many places there are still significant disparities in the equitable coverage of essential maternal and perinatal health interventions, which is an obstacle (Maternal Health, 2021). It is critical that global standards are developed with an inclusive approach focused on women and their needs. But also consider the variations between contexts in terms of resources, health conditions, and access to health care.

It is essential to pay particular attention to those environments where local culture and traditions conflict with the strict application of international guidelines, which may lead to tensions or discrepancies in their effectiveness. Consequently, it is necessary to adapt the maternity units towards a sensitive and contextualised approach that considers socio-cultural particularities to achieve a more adequate and effective implementation.

02.3 A new conception of the maternity unit-delivery space

Nowadays, the maternity unit is conceived as a medical structure where mothers and newborns are cared for during pregnancy, delivery, and postnatal period. Beyond the medical perspective, there are more possibilities for designing a maternity unit, it could be based on design approaches that "support normal physiological birth processes and emotionally satisfying birth experiences" (Balabanoff, 2023, p. 414). However, studies in this field are not relevant today.

The birth environment plays a significant role not only in promoting physical progress but also in supporting emotional well-being of the mother, which is essential for a positive birth experience. For that reason, it is significant to know how the spatial atmosphere in the maternity unit can impact the hormonal birth process in both ways, positive or negative (Balabanoff, 2023). The biomedical model of birth care frequently overlooks the personal and emotional experiences of childbirth, prioritising clinical procedures over the holistic needs of the mother.

As Balabanoff (2023) explains, "In labour, anxiety or situations in which the woman does not feel private, safe, and undisturbed may provoke epinephrine-norepinephrine elevations, which may slow or stall labour and reduce foetal blood supply via epinephrine-norepinephrine effects" (Balabanoff, 2023, p. 421). This can exemplify how the natural process of childbirth may be affected, influencing both maternal and neonatal physical and emotional outcomes (Nilsson et al., 2020).

The birthing room is used by various individuals at different stages, including mothers, supporters, and midwives, necessitating an adaptable environment that accommodates the evolving needs of each stage of the birth process (Setola et al., 2019). This adaptability is particularly relevant when considering cultural differences as the birth spaces should embody cultural and spiritual traditions, fostering respect and dignity for all involved.

For instance, some women from diverse cultural backgrounds perceive medical birth facilities as hostile rather than welcoming environments. "Indigenous women's birth practices have traditionally been situated in their surrounding environments, which are sometimes purpose-built" (Sheila Kitzinger cited by Balabanoff, 2023, p. 429).

Improving the maternity unit has demonstrable effects, such as reducing the need for epidurals and other medical interventions, lowering stress and anxiety levels, and enhancing the ability of medical personnel

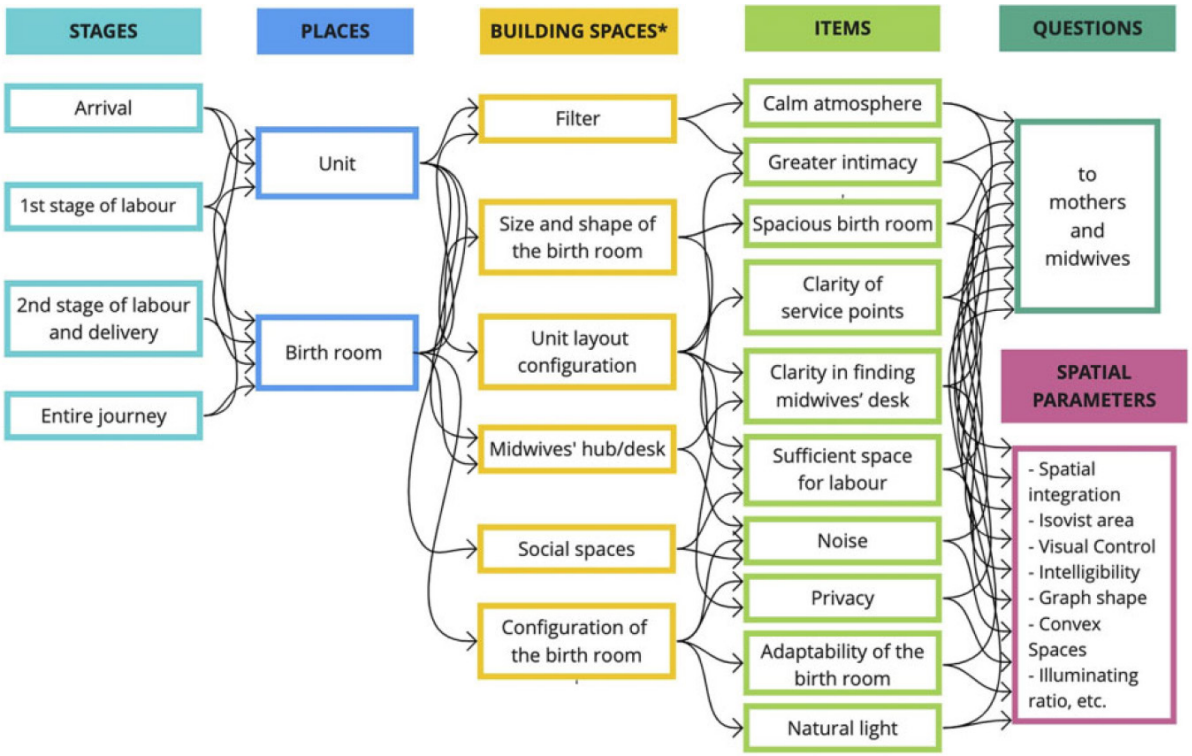
to perform their duties effectively (Setola et al., 2019). In line with these findings, the latest World Health Organization guidelines underscore the importance of supporting the physiological process of childbirth across all birth settings (WHO, 2018).

Advocating for birth environments that meet the medical and emotional needs of the mother, in addition to including sociocultural factors, could promote overall maternal and neonatal health outcomes. However, it is essential to generate more studies with this type of approach.

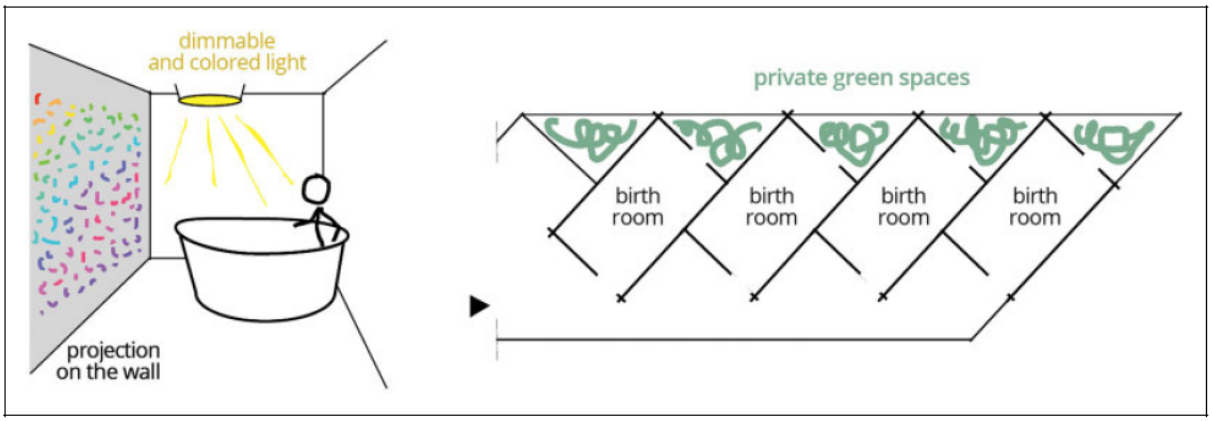
To conclude the chapter, it is important to consider the gap between current designs and international guidelines on maternity units, because they are not geared to supporting the natural process of childbirth from a holistic perspective focusing on women and their needs. Nor does it consider socio-cultural factors that support and integrate women's beliefs, and in turn encourage a positive birthing experience.

This gap should be considered as a relevant issue, since it is not included in the already established directives, and it is not developed in contexts where its application would bring improvements in outcomes. If today, there are organisations and governments worldwide that focus on improving maternal and neonatal health and care, including other design approaches in maternity units could bring more positive results, and would help to reduce problems related to access, infrastructure, medical staff, maternal mortality rates and women's preference for home births.

To improve the maternal experience and reduce maternal mortality rates, the architecture of the maternity unit needs to be reassessed, considering socio-cultural factors and users' needs. This may lead to a more integrated approach to maternity units and delivery wards and address existing limitations in terms of quality of care at maternity units.



Illus 16: The logic behind the construction of the Birth Environment Spatial Perception Questionnaire (Nicoletta et al., 2022).



Illus 17: Different sensory elements creating a calm and relaxing atmosphere in the birth room (Setola et al., 2019).

03

STUDY FRAMEWORK

03.1 Problem

In the field of maternity unit design, and projection of guidelines for maternity care infrastructures, there is a growing gap in the inclusion of cultural aspects and more integrated human-centred approache to care.

Currently, there is little development and research on the inclusion of cultural factors within the maternity unit, as well as a lack of emphasis on users' needs, especially woman needs. This is most relevant in regions of the world with limited resources, where culture, traditions, and beliefs vary. This issue is of paramount importance if global goals are to increase access to health services, improve the quality of care offered to mothers and newborns, and reduce maternal mortality rates.

One of the factors contributing to this problem is that most international guidelines, standards, and recommendations focus on the organisational requirements and layout of the maternity unit. These directives are aimed at designing a functional and hygienic structure, which maintains sanitary parameters, avoids preservation and transmission of diseases, and functions efficiently.

On the other hand, there are still limitations in terms of access to health care, especially in low developed settings, ranging from the physical conditions of the facility, the supplies and equipment available for quality care, the means available for accessing maternal services, and the availability of medical personnel.

If this problem is not addressed, many women around the world in different contexts will continue to prefer not to access these types of health services. Mothers may experience dissatisfaction with these infrastructures due to unmet expectations of care, discomfort with the environment or the staff's treatment, unfamiliarity with the setting in where they are, a perceived lack of attention to their needs, or instances of mistreatment and abuse during their care.

This problem influences women to continue preferring home births, to be cared for in a close and familiar environment, and to be assisted by traditional birth attendants or women from the same community, putting the life of the mother and baby at risk. Especially given that the global goals are to reduce maternal deaths while increasing and improving access to health care.

From this perspective, it is necessary to question:

How to integrate socio-cultural elements, considering the needs of women, her family, and the medical personnel within the maternity unit?

How to support the natural process of childbirth keeping in mind the physiological and psychological needs of women within maternity units, respecting the requirements already included in international guidelines, to be more flexible and adaptive in the implementation of such sanitary infrastructure in contexts with limited resources?

Illus 18: Haiti's Precarious State of Health Care for Pregnant Women

03.2 Objectives

General aim:
The principal aim of the thesis is evaluating the elements that can be included in thedesign of maternity units to integrate cultural, social, and contextual factors, in regions with limited resources. And then prioritise the needs and experience of all the users involved.

Specific objectives:
1. Characterise the maternity unit, its spatial requirements, functions, operational connections, and spatial particularities.

2. Identify the factors that contribute to the problem's continued existence.

3. Identify new maternity unit design concepts and approaches to care in the existing literature.

4. Analyse and define which concepts can contribute to the inclusion of sociocultural factors and users' needs in the maternity unit.

5. Develop an assessment tool that can be applied to different contexts with the aim of identifying which spaces and characteristics should be included in the maternity unit depending on local conditions.

6. Evaluate the evidence of maternity units, both built and proposed, to identify which elements of the literature are being applied and, if not, what new proposals exist that respond more adequately to the needs of users and the specific issues of the contexts in which they are located.

7. Propose a spatial scheme that includes non-conventional spaces within the maternity unit, to integrate cultural factors that allow a better adaptation of the health infrastructure within the context where it will be located.

03.3 Methodology

The study was developed in two parts, the first focused on a literature review of innovative approaches to design maternity units and new perspectives of care. And the second was evidence-based, taking case studies, and analysing them.

In the first part, research was done taking scientific articles, which were then analysed to obtain new concepts of design and care. From these innovative approaches, it was obtained some new spaces that could be integrated into the structure of a maternity unit, and environment features that help the woman in the process of childbirth.

FIRST PART

Literature review:

A search was conducted on scientific articles published within the last 14 years, with a particular emphasis on the most recent literature on new approaches to the design of maternity units or healthcare facilities, which take a much more personal approach to the patients and staff experience, considering contextual, socio-cultural, and traditional differences.

This step aims to identify what has been done, researched, and written about the integration of cultural aspects, considering the integration of non-conventional spaces and environmental characteristics within the projection of maternity units, especially in low-income settings.

Databases such as Scopus, PubMed, Open Athens, BMJ Open, and ResearchGate were used for this search.

Data Analysis:

After collecting all the articles, they were analysed in a way that identified and categorised innovative design concepts of maternity units and new approaches to care. The current ideas emerged from the articles support the development of the thesis, such as the inclusion of unconventional spaces within the maternity unit and suggested environmental features to enhance the users' experience within the unit.

These aspects benefit socio-cultural differences and individual perceptions that vary across regions of the world. Thus, enriching the understanding of the maternity unit by appreciating the cultural and social diversity in each specific context.

Assessment Tool:

The information was divided into innovative design and care approaches, and indicators on unconventional spaces and environmen-

tal features, this information was used then to build a matrix. The matrix allows linking new design approaches with new spaces that integrate socio-cultural differences and environmental features to enhance the experience within the unit.

Through this matrix, an assessment tool was generated to assess which characteristics and spaces can be included in the maternity unit depending on the context in which it is to be located.

Tool Application:
First, a methodology was developed so that the tool can be used and applied in different contexts, it functions as an assessment instrument to integrate cultural and social aspects within the maternity units.

Then, the assessment was applied in two contexts with quite different visions of maternity and conception of childbirth, this to recognize what social, cultural, and traditional factors influence the design of maternity units and that depending on the context some spaces or features should be integrated or omitted.

SECOND PART
Case studies analysis:
This analysis aimed to identify successful designs or innovative proposals that integrate unconventional spaces, consider cultural factors, adopt a comprehensive approach, and prioritise users' specific needs.

Proposal:
Finally, a proposal was made focused on the integration of unconventional spaces within the structure of a maternity unit, supporting socio-cultural and contextual differences. This proposal is based on the configuration of the maternity unit already validated by international organisations.

04

CONCEPTUAL FRAMEWORK

04.1 New Approaches to design and care

To develop a conceptual framework a literature review was made to obtain innovative approaches of design more focus on integration of contextual, sociocultural, and traditional factors. And different carepers-pectives that consider women as the primary focus of care and their needs, as well as the demands of her family or companions and the health personnel.

The present research covers a period of 14 years, from 2010 to 2024, to consider the most recent advances in the last decade and to analyse the evolution of the topic over the years. Initially, a study period limited to the last 10 years was contemplated; however, significant findings were identified since 2010, which allows inferring that the topic of the projection of maternity units, focused on diverse perspectives and oriented to users such as mothers, their families, and staff, has been addressed for some time. Nevertheless, there are still important gaps in the practical application and research in this field.

The analysis of the last 14 years corroborates the validity and relevance of the topic, showing that, with the advance of technology and the facilitated access to knowledge exchange, the argument in favour of investigating new approaches in maternity units has gained strength. This highlights the need for further research that addresses the implementation of approaches that consider specific cultural and contextual factors. Although the period of study is broad to enrich the development of this work, emphasis is placed on the review of more recent literature, with the intention of maintaining an updated perspective based on contemporary studies.

The key words used in the literature search were maternity, maternity unit design, maternal health, maternity units, maternity care, barriers to maternity care, maternity services, birthing unit, childbirth, birth unit design, birth environment, birth experience, birthing process, physiological birth, labour and delivery units, birthing room, needs of birthing woman, midwifery unit, midwives, midwife-led unit, family centred care, and healthcare environment.

The research was carried out using databases such as PubMed, Scopus, ResearchGate, Open Athens, BMJ Open, and BMC Pregnancy and Childbirth. From the search results, the thirty most relevant articles related to the development of this research were selected. Then, the articles were read to establish a baseline of innovative approaches for the projection of maternity units, and new perspectives of care considering the viewpoint of mothers, companions, and health personnel.

Within the analysis of the articles, it was found that several of the concepts and approaches to care mentioned by the authors were repeated and suggested the need and lack of research that exists into the design and conception of health facilities and care, more focused on the experience of the users. Furthermore, there is currently a large gap in the conceptualisation of childbirth as a natural phenomenon that considers the physical and emotional needs of the mother, as well as the lack of humanisation in birth environments, aspects that are little considered in maternity units.

Each of the articles reviewed provided a detailed description of the position and perspective from which they were developed, based on new approaches to care or design concepts for the birth environment. From this basis, the articles highlighted features of the environment that should be considered, spaces that could be integrated into the maternity unit, and best practices for the care of mothers, newborns, families, and midwives, also highlighting the importance of the relationships between these actors.

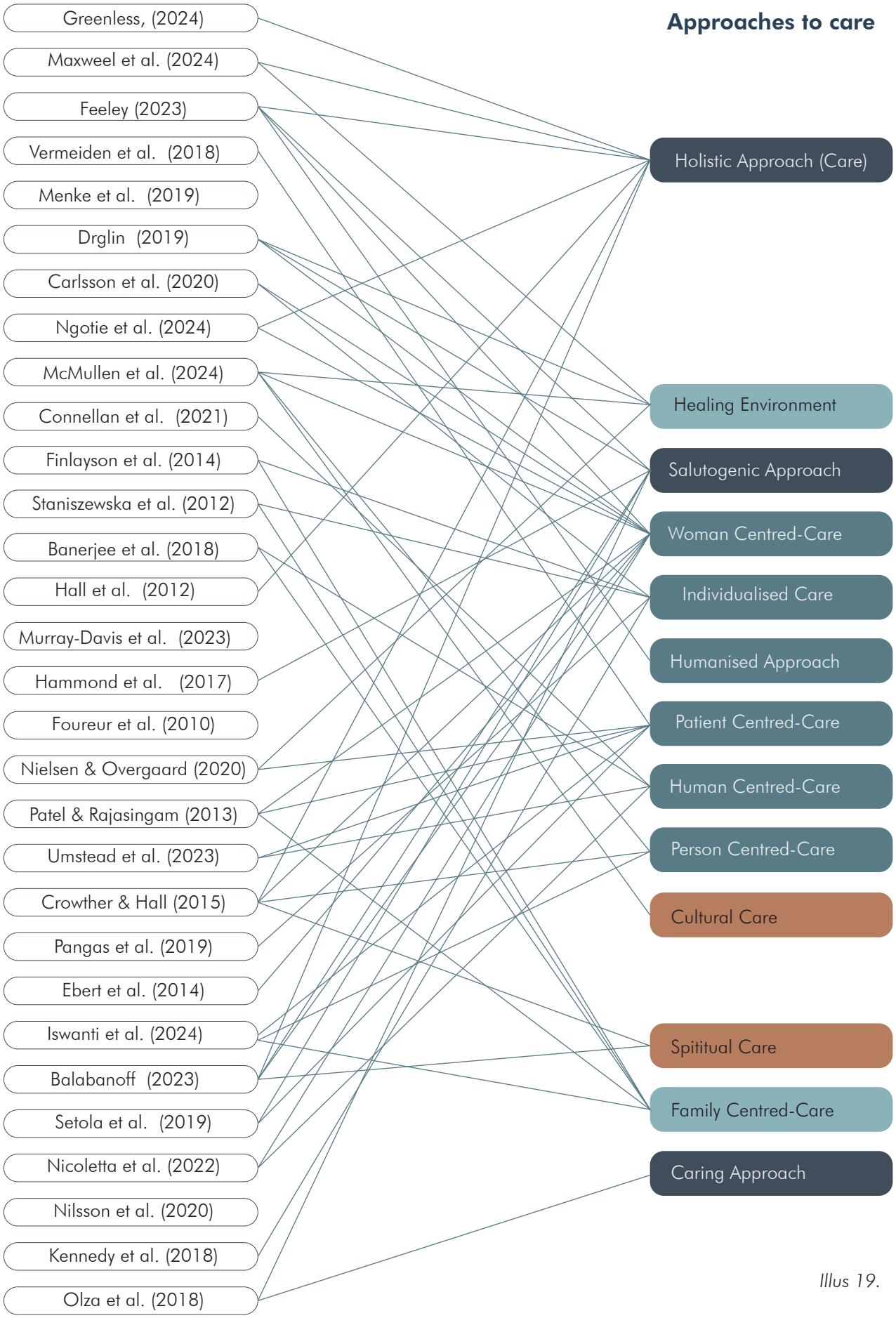
For better understanding the information obtained was classified into innovative approaches to care, new concepts related to architectural design and environmental characteristics, and independent concepts. The latter are considered because of their importance in the process of pregnancy, birth, and postnatal care.

The group of care approaches is divided into two subgroups, approaches that take a broader view of the general environment in the maternity unit and birth wards, and approaches that are focused on the care offered in the health facility. Within the first subgroup is the holistic, salutogenic, humanised, and caring approach. In the second subgroup is the individualised care, woman centred care, patient centred care, person centred care, human centred care, cultural care, family centred care, and spiritual care.

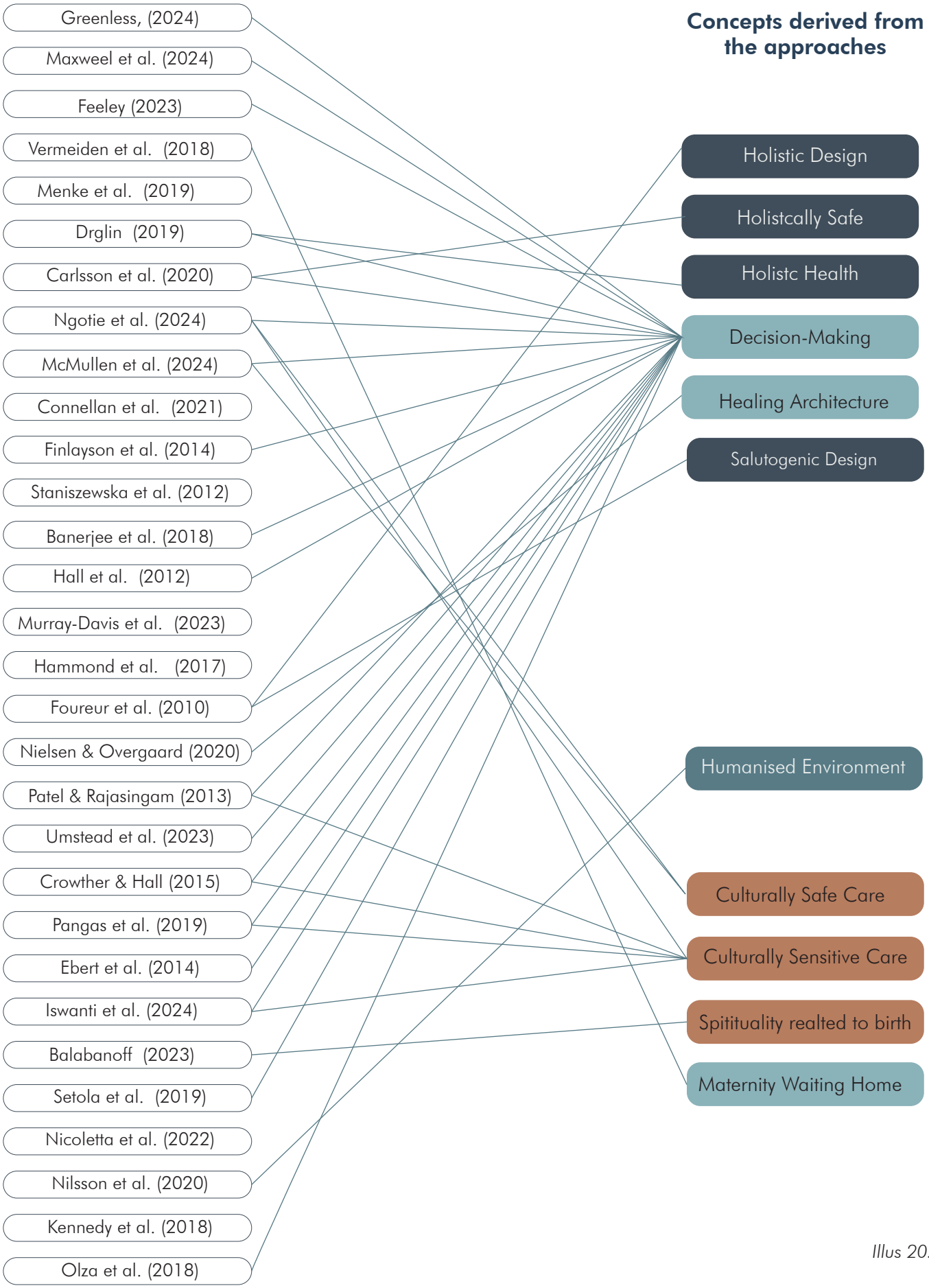
The new concepts found related to architectural design and environmental features are healing architecture and environment, maternity waiting home, holistic health and safety within the maternity unit, friendliness, functionality and freedom in the unit, holistic design, salutogenic design, and humanised environment. Finally, the independent concepts are the decision making and the spirituality but related to the birth experience.

One of the findings, which is not part of the above-mentioned classification groups, but is equally relevant is the BUDSET tool, which is important because it "was developed to inform improvements in birthing environment design, and it has been validated by caseload midwives and women in their care" (Menke et al., 2019, p.372). This tool is useful because it provides a list of factors and features to apply within a maternity unit environment, to make them more optimally designed.

"The BUDSET is based on 18 design principles and is divided into four domains" (Foureur et al., 2010, p. 43). The fear cascade includes reception space, birth rooms, sense of domesticity, privacy, and noise control. The facility integrates physical support, birth bath and ensuite facilities. The aesthetics domain has light, colour, texture, indoor environs, and femininity. And support encompasses food and drink for woman, and accommodation for companions and birth attendants.


Approaches to care
Greenless, (2024)
Maxweel et al. (2024)
Feeley (2023)
Vermeiden et al. (2018)
Menke et al. (2019)
Drglin (2019)
Carlsson et al. (2020)
Ngotie et al. (2024)
McMullen et al. (2024)
Connellan et al. (2021)
Finlayson et al. (2014)
Staniszewska et al. (2012)
Banerjee et al. (2018)
Hall et al. (2012)
Murray-Davis et al. (2023)
Hammond et al. (2017)
Foureur et al. (2010)
Nielsen & Overgaard (2020)
Patel & Rajasingam (2013)
Umstead et al. (2023)
Crowther & Hall (2015)
Pangas et al. (2019)
Ebert et al. (2014)
Iswanti et al. (2024)
Balabanoff (2023)
Setola et al. (2019)
Nicoletta et al. (2022)
Nilsson et al. (2020)
Kennedy et al. (2018)
Olza et al. (2018)
Holistic Approach (Care)
Healing Environment
Salutogenic Approach
Woman Centred-Care
Individualised Care
Humanised Approach
Patient Centred-Care
Human Centred-Care
Person Centred-Care
Cultural Care
Spititual Care
Family Centred-Care
Caring Approach

Illus 19.


Greenless, (2024)
Maxweel et al. (2024)
Feeley (2023)
Vermeiden et al. (2018)
Menke et al. (2019)
Drglin (2019)
Carlsson et al. (2020)
Ngotie et al. (2024)
McMullen et al. (2024)
Connellan et al. (2021)
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Hall et al. (2012)
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Umstead et al. (2023)
Crowther & Hall (2015)
Pangas et al. (2019)
Ebert et al. (2014)
Iswanti et al. (2024)
Balabanoff (2023)
Setola et al. (2019)
Nicoletta et al. (2022)
Nilsson et al. (2020)
Kennedy et al. (2018)
Olza et al. (2018)
Concepts derived from the approaches
Holistic Design
Holistcally Safe
Holistc Health
Decision-Making
Healing Architecture
Salutogenic Design
Humanised Environment
Culturally Safe Care
Culturally Sensitive Care
Spitituality realted to birth
Maternity Waiting Home

Illus 20.

Approaches description:

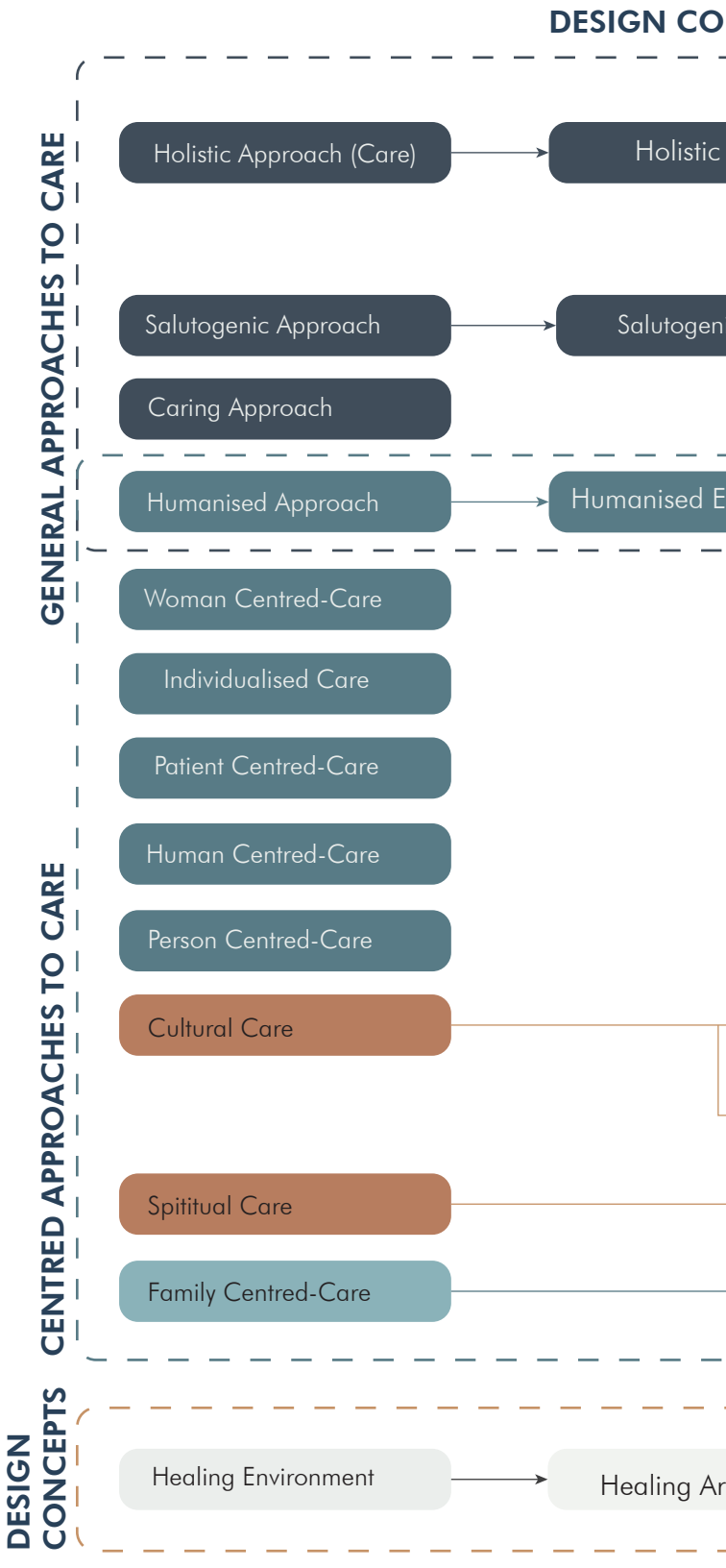
Before going into detail on each approach, it is necessary to understand what a normal physiological birth is and what is meant by physiological birth alternative choices.

Normal physiological birth: WHO defines a normal birth as "spontaneous in onset, low risk at the start of labour and remaining so throughout labour and delivery" (Technical Working Group & World Health Organization, 1997, p. 1 cited by Amis, 2019).
Feeley adds that a normal physiological birth "progresses without incident nor requires medical intervention and ends in a spontaneous birth where the mother and baby are both well" (Feeley, 2019, preface, p.24).

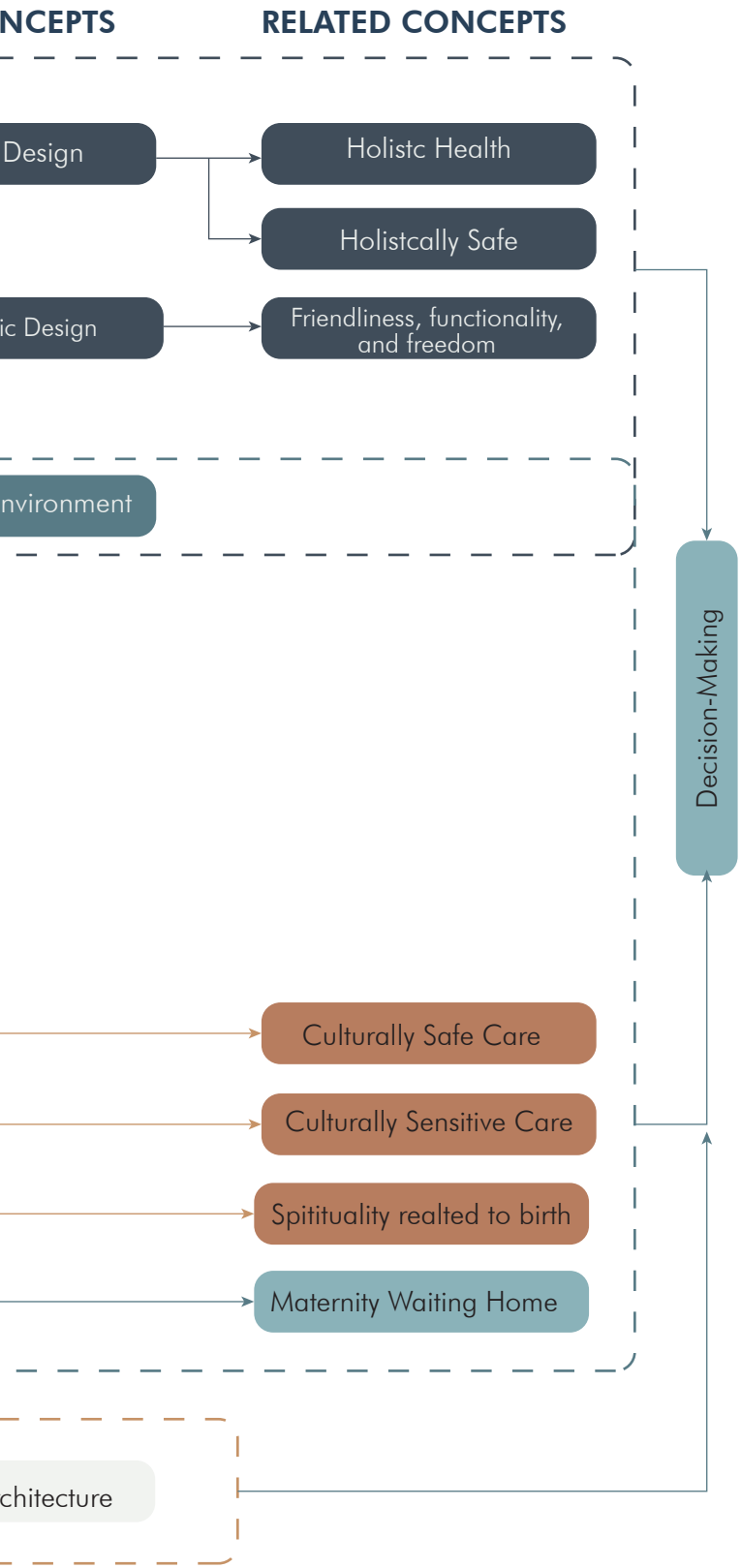
Physiological birth alternatives: They are options that fall outside of local and/or national maternity guidelines because mothers prefer to receive other care that supports physiological birth, rather than supporting recommended medical interventions.

Holistic approach:
The holistic approach is mentioned by different authors and refers to comprehensive care that involves the physical and psychological needs of mothers, their companions, and midwives. This care should be oriented to include the mother's emotional needs (Greenlees, 2024) and promote women's autonomy.

As Hall et al. (2012) mentioned, holistic care should support the physiological process of childbirth, and preferably be attended by midwives, as they also bring a holistic overview, and can offer the mother the use of complementary therapies that enhance the labour experience and help the mother relieve pain.



Illus 21: Relationship between approa



aches and concepts, own elaboration

"The evidence suggests that the use of complementary therapies reflects appreciation of a holistic approach, rather than dissatisfaction with conventional care" (Hall et al., 2012, p. 11).

In addition, it is important to understand that the design of the birthing environment impacts maternal morbidities and mental health, which is why it is so important to create environments that cultivate meaningful relationships, and trust and mutual respect between patients and medical staff to enhance women's experience and ensure their safety within the environment (Maxwell et al., 2024 and Feeley, 2019).

At this point it is necessary, "a re-evaluation of current practices and environments in which childbirth takes place, advocating for a more holistic approach that encompasses emotional, psychological, and physical well-being" (Maxwell et al., 2024, p. 22). And at the same time, environments which offer women feelings of deep safety and rightness within the maternity Unit (Balabanoff, 2023).

This approach, worked by several authors, suggests the inclusion of space for the use of complementary therapies or alternative medicine, accommodation for companions, and single birthing rooms to provide more privacy for the mother. And within the environmental features, space should be welcoming, familiar and calm, allow for the creation of social relationships, provide a sense of service and security, provide clean and inviting birthing rooms, apply soft lighting, and make use of soothing sounds.

Salutogenic Approach:

The salutogenic approach aims to generate a positive experience of childbirth, which should

occur naturally following the physiological phases of dilation, expulsion, and delivery. From this perspective, childbirth should provide the people involved with mental health and physical well-being (Olza et al., 2018).

As Drglin mentions in her book (2019):
Salutogenetic birth environments enable the dynamic integration of people according to the needs of the woman giving birth: they enable a woman to connect with herself, her feelings and experiences, the baby, her partner, other relatives, and the medical staff. "A salutogenetic birth space ensures privacy with different options to establish a personal and intimate area, it allows women to temporarily adopt it, control who enters, and what is going on with the space in general" (Drglin, 2019, p. 102).

In summary, a salutogenic design should prioritise the holistic health of the mother, baby, and family, which is why it also recommends the implementation of individual birthing rooms. In addition, the design of the maternity unit should provide a relaxing and domestic atmosphere, offer freedom of movement during labour, provide a room that adapts according to the changing needs of the woman in labour, and ensure the connection of natural elements through sensory channels (Drglin, 2019 and Olza et al., 2018).

Spiritual care:
Spirituality is a very important factor in the essence of being human and therefore should be included within the concept of health, even more so in the birth environment, however, it is an aspect that is little considered but has re-emerged and become an area of interest for researchers (Crowther & Hall, 2015).

Childbirth is a significant time for women, caregivers, families, and society at large, and for this reason spirituality should be considered during childbirth, as an individual's spirituality can enrich the birth experience, provide inner strength, acknowledge the sacredness of new life, and foster a deeper human connection (Crowther & Hall, 2015). That is, recognising the birthing process as a spiritual experience can enhance the care provided to the mother, and the service offered by medical personnel.

If the birth process were understood from a deeper sense of the human being, its spatial conception might be different as well the experience for all involved. "Birth is a fundamentally spiritual experience that connects humans to all species' regenerative capacity, regardless of time, culture, or geography" (Balabanoff, 2023, p. 415).

"A mindful birth environment curates and balances the complexities of its environment to allow a focus on being in the moment, deeply aware of the power and beauty of birth" (Balabanoff, 2023, p. 427).

According to Crowther et al. (2015) it could be inferred that, the maternity unit could incorporate spaces for meaningful rituals or practices, which align with mothers' spiritual beliefs, as engaging in rituals that are meaningful to the woman can enhance the spiritual experience, provide comfort, and support during labour. Sacred spaces that allow for reflection, prayer, or meditation may also be included. Creating quiet and peaceful spaces in the maternity unit for patients and families to engage in spiritual practices and find solace (Crowther et al., 2015).

Culturally Sensitive Care:

Considering the cultural needs that women may have during pregnancy and childbirth can improve the quality of care and services offered to mothers. However, not all health professionals today are sensitive to cultural differences, which can lead to discriminatory treatment or mistreatment of women (Iswanti et al., 2024).

Addressing these issues is critical to improving the quality of care offered to mothers and their caregivers, which is why the WHO recommends that maternity care services should be culturally sensitive to improve the health of both mothers and newborns. "Providing culturally sensitive services, which consider the individual preferences and cultural backgrounds of people and their communities, is a significant aspect of delivering high-quality healthcare" (Iswanti et al., 2024, p. 1259).

Mothers' perceptions of the quality of care can vary according to cultural beliefs and values, and in turn influence the experience they may have within the unit. For this reason, it is important to address cultural diversity in maternity care, to lead to better care outcomes and patient-centred approaches. Embracing inclusive practices that align with the cultural norms of diverse communities can improve the overall maternity care experience.

This can be addressed within the maternity unit by engaging communities to support the planning of maternity care services, to generate inclusion and cultural sensitivity.

On the other hand, Ngotie et al. (2024) suggests that women's experiences within healthcare infrastructures are influenced by cultural practices, therefore, there is a need to adopt beneficial cultural practices in maternity care interventions to create a balance and ensure culturally sensitive care.

Other authors are also cited to highlight that health systems and the community must work together to harmonise the impacts of cultural practices within the health care provided. Some of the cultural practices related to maternity care and childbirth include the use of herbal medicines, modifications in diet before and after childbirth, modifications in dress during pregnancy and the performance of traditional ceremonies or rituals (Ngotie et al., 2024).

As an additional point, McMullen et al. (2024) suggest that the implementation of traditional practices during childbirth and pregnancy has the potential to connect the woman, the baby, and her companions to their culture.

Some of the characteristics of this approach include space for companions as they are an essential support for women in the birthing process, and space for the performance of traditional rituals or ceremonies. These spaces can be internal or external, as, for example, in some cultures the burning of the placenta is an important cultural act and would require an external space dedicated to this practice.

Humanised approach or Human centred care:

The humanised or human centred approach emphasise the understanding of all the persons involved in the health facility, which means the patients, their company, and the health personnel. In this approach, the design of maternity units must consider distinct aspects to improve the experience of all involved and at the same time make them

participants of the design process, ensuring reciprocal participation between the users and the design of the maternity unit can help improve the quality of care (Umstead et al., 2023 and Hammond et al., 2017).

The users' experiences within the birth environment are shaped by interconnected factors such as design, culture, and model of care (Hodnett et al., 2012 cited by Hammond et al., 2017, p. 137). In addition, to considering cultural or model of care factors, it is essential to consider the views of all users, i.e. mothers, their companions, and medical staff, to value their experiences, and to identify their needs.

Within Maternity units "human centred design can incorporate user driven insights to question the status quo, bring light to systems that sustain health inequities, and offer novel opportunities to improve health and wellbeing across generations" (Umstead et al., 2023, p. 9).

Another important point of the human-centred approach is that it must provide all users with a favourable experience, including compassion, concordance in communication and procedures, and non-discriminatory treatment, to create an environment of mutual trust, where mothers and their companions have confidence in the medical staff, and vice versa, the medical staff also have confidence in the patients.

In general terms, the approach is designed to meet the needs of users, and to generate a friendly environment in the unit that provides comfort and confidentiality, as well as being a functional and efficient environment, where workers have the facility to interact with patients and adequately carry out all required procedures. Along the same lines, the article by Hammond et al. (2017) makes some recommendations on the design of maternity units, which should allow freedom of movement for users, especially mothers in labour, and in the case of the birthing environment, the position of the bed in the birth room should be changed, so that it is not in the centre of the room, and the room should be spacious and free of distractions, allowing an atmosphere of calm and relaxation.

Patient centred care, person centred care and individualised care:

For the purpose of the paper, patient-centred care, person-centred care and individualise care are explained together as they are related and basically have the same focus.

A patient-centred approach must include various aspects of a person's individuality, which vary depending on culture, beliefs, and traditions. For this reason, maternity units may adapt to this individuality and implement different programmes, such as a culturally sensitive diet for different populations, freedom of movement during labour, and freedom of choice in birthing position (Patel & Rajasingam, 2013).

The design process of maternity units, in addition to being based on an analysis of the context and the users, must also relate to the local socio-economic conditions and the culture of the users (Nielsen & Overgaard, 2020). This means developing a patient-centred design while remaining clinically feasible and accommodating informational, emotional, and logistical requirements (Umstead et al., 2023).

Patient-centred care relates to women's experience within the unit, i.e. it aims to

respect their needs, values, and autonomy, as well as providing them with appropriate care and communication (Nielsen & Overgaard, 2020). Emphasising person-centred care is about recognising women's beliefs, values, and spiritual preferences to tailor the care offered in the unit to meet their spiritual needs, while fostering a sense of support and understanding during labour (Crowther & Hall, 2015).

As a consequent effect, developing a patient-centred model allows improving the quality of service and care offered; the medical staff plays a significant role in this regard because they must be able to recognize patients' needs and allow them to actively participate in their care plans (Patel & Rajasingam, 2013).

Woman centred approach:

This approach places the woman at the centre of the design, as the maternity unit must respond to her needs, desires, cultural perceptions, and philosophy of birth to provide a positive experience and improve the quality of care. In this sense, women's experience is influenced by different complex factors, such as cultural expectations, norms, and previous experiences, aspects that must be integrated into the design of maternity units (Carlsson et al., 2020).

Woman centred care allows women to have more decision-making power over their pregnancy and childbirth and strengthens their capacity for autonomy, as quoted in the article of Nicoletta et al., (2022). "As a consequence of a woman centred philosophy, women have the right to choose from many care options and birth settings which have been shown to positively impact on women's experience of childbirth" (Migliorini et al., 2019 cited by Nielsen & Overgaard, 2012, p. 205).

Feeley (2023) is another author who supports the woman-centred care as an approach that responds to women's needs and thus facilitates and supports alternative choices to physiological birth, choices that are influenced by culture, politics, and ethical values. Additionally, "woman centred care implies a collaborative approach to encounters involving cultural practices" (Ngotie et al., 2024, p. 4).

One of the models that is most in favour of this approach is the Midwifery-led Unit, as the care midwives provide is focused on individual care and they are the most skilled personnel to enable physiological birth. "Institutional restrictions on midwifery practice can limit women's access to individualised woman centred care and skilled physiological birth care" (Feeley, 2023, p. 35).

This approach must be supported by midwives, and an environment must be created within the unit that allows for a continuous relationship between the woman and the midwife. It should also create a holistically safe space, i.e. an atmosphere constructed jointly between the midwife and the woman, where the woman can feel safe (Carlsson et al., 2020).

At this point, it is possible to introduce the term decision-making, an important aspect in relation to pregnancy and childbirth, as it allows the woman to make autonomous decisions about how to carry her pregnancy, how to have her birth, and also provide control over her body, , this decision making should be guided by the autonomy of the woman without considering the beliefs of the staff attending her.

Feeley (2023) defines this term as "the ability or opportunity for women to make choices during pregnancy and childbirth is embedded within governmental policies, cultural norms and women's expectations" (p. 34).

Family centred care:

Family-centred care is oriented towards treating the family with dignity and respect within the environment of the maternity unit or neonatal care area, allowing their participation in the policies and programmed development around the provision of care. Medical personnel have a great responsibility to implement this approach, as they must construct a relationship of trust with the mother and her companions, as well as assertive communication that allows the mother and her family to maintain control and independence in pregnancy and childbirth (Banerjee et al., 2018).

Usually, this approach is applied in more neonatal care units, "the term family centred care (FCC) has been used to describe a model of health care which recognizes the significant role played by family members in the well-being of a hospitalised child or infant" (Finlayson et al., 2014, p. 119).

In the case of premature babies or newborns who must remain in the neonatal care area, this approach is more oriented towards providing parents with sufficient tools so that they can also care for their children, in that sense a relationship of mutual support must be generated between medical staff and parents. The family-centred model seeks to involve parents in a way that creates physical, emotional, and social well-being between the infant and the parent (Finlayson et al., 2014).

Within the literature review the POPPY (Parents of Premature Babies Project) model was found, which supports the family-centred approach. This model highlights the importance of a parent's perspective and aims to place parents and family at the centre of health care, promoting individualised and flexible care (Staniszewska et al., 2012).

Four of the twelve principles proposed by the model are important to highlight. First, be aware of the needs of parents, the emotional impact of preterm birth, and the individual differences in parents' responses and needs. Second, to provide practical help to parents in caring for babies. Third, to foster parenting skills in caring for and interacting with the baby. And fourth, to provide adequate facilities for families.

To this paper, these principles can be translated into spaces within the maternity unit that support mothers, their families, and companions. That is, the unit may include a transitional care facility for parents, care areas for children, a room where parents can sit and be comfortable, space to provide parents with food and beverage services, and family rooms for parents to stay overnight.

Maternity Waiting home:

MWH is not an approach, but a new concept applied in contexts with many constraints in access to health. Maternity waiting homes are residential structures near a health centre or hospital that house high-risk pregnant women and those living far from a facility in the final weeks of pregnancy (Vermeiden et al., 2018, p. 1332).

In Ethiopia, from 2014, these facilities began to be incorporated to reduce maternal deaths and in comparison, with the figures for 2016 to 2020, it can be evidenced that

there was an impact. By 2016, the maternal mortality ratio (MMR) was 412 per 100,000 live births, and by 2020, it had decreased to 200 per 100,000 live births (Vermeiden et al., 2018, p.1332).

This type of facility arose as a solution to a problem of accessibility to health care, within contexts with many limitations. These facilities allow the mother to have a place to stay weeks before her due date or to stay more days in the case of premature births or babies in neonatal care. These facilities should provide accommodation for both mothers and their families, common spaces such as kitchen, sanitary facilities such as toilets and laundry areas (Vermeiden et al., 2018). As an additional point, they could serve to promote educational programmes or generate some kind of knowledge that impacts the economy of the mothers or the community in general.

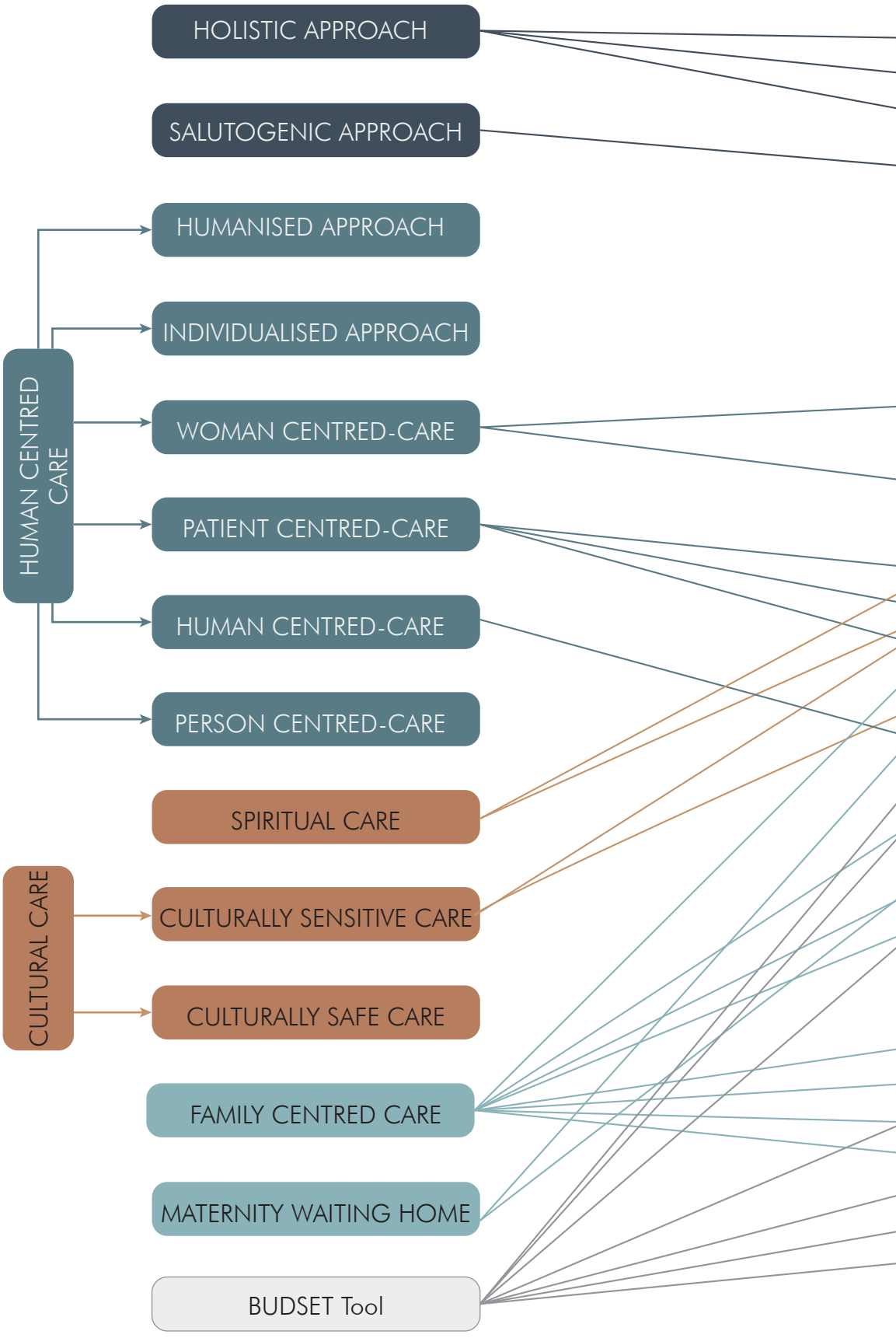
04.2 Construction of Matrix

The construction of the matrix is based on a literature review, as the analysis of the selected articles allowed not only to identify new approaches and concepts, but also to highlight the need to include certain spaces within maternity units and to define specific features of the environment that can enhance the experience and care in these settings.

From the information gathered, the purpose of the matrix was to establish meaningful relationships and connections between the various elements identified. On the one hand, it sought to create interconnections between the different approaches; on the other hand, it aimed to support each approach by incorporating specific spaces and relevant environmental features that respond to the physical and emotional needs of mothers, newborns, their companions, and the health personnel. In this way, the matrix acts as an integrative tool, allowing the spatial features and the concepts of care to be related in a structured and coherent way.

Once the matrix was constructed, the results could be translated into a series of functional and practical characteristics that can be applied in the design and adaptation of maternity units. These characteristics strengthen the conceptual basis for the design of humanised spaces that promote wellbeing and integrated care within maternity services.

MATRIX OF NON-CONVENTIONAL SPACES



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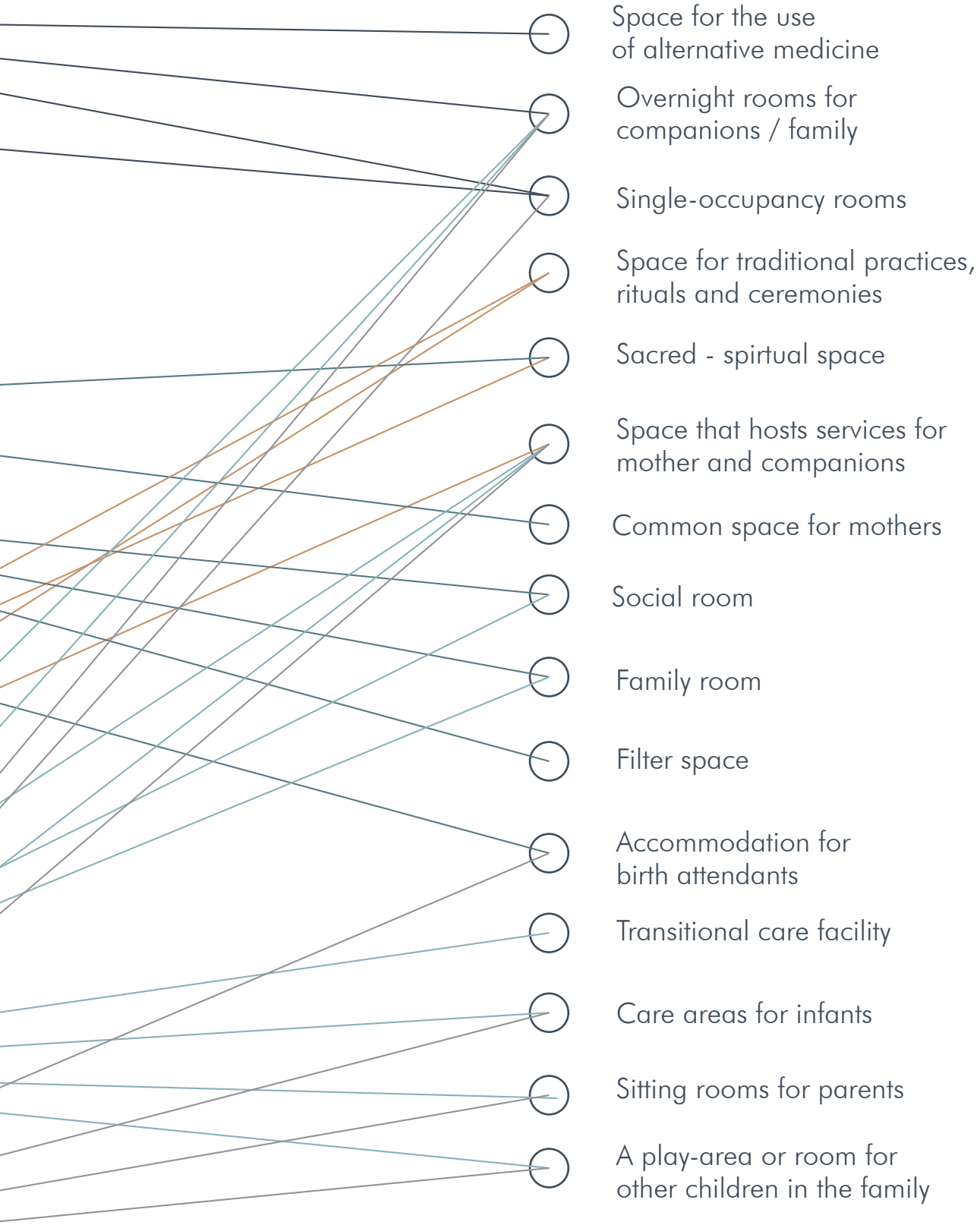

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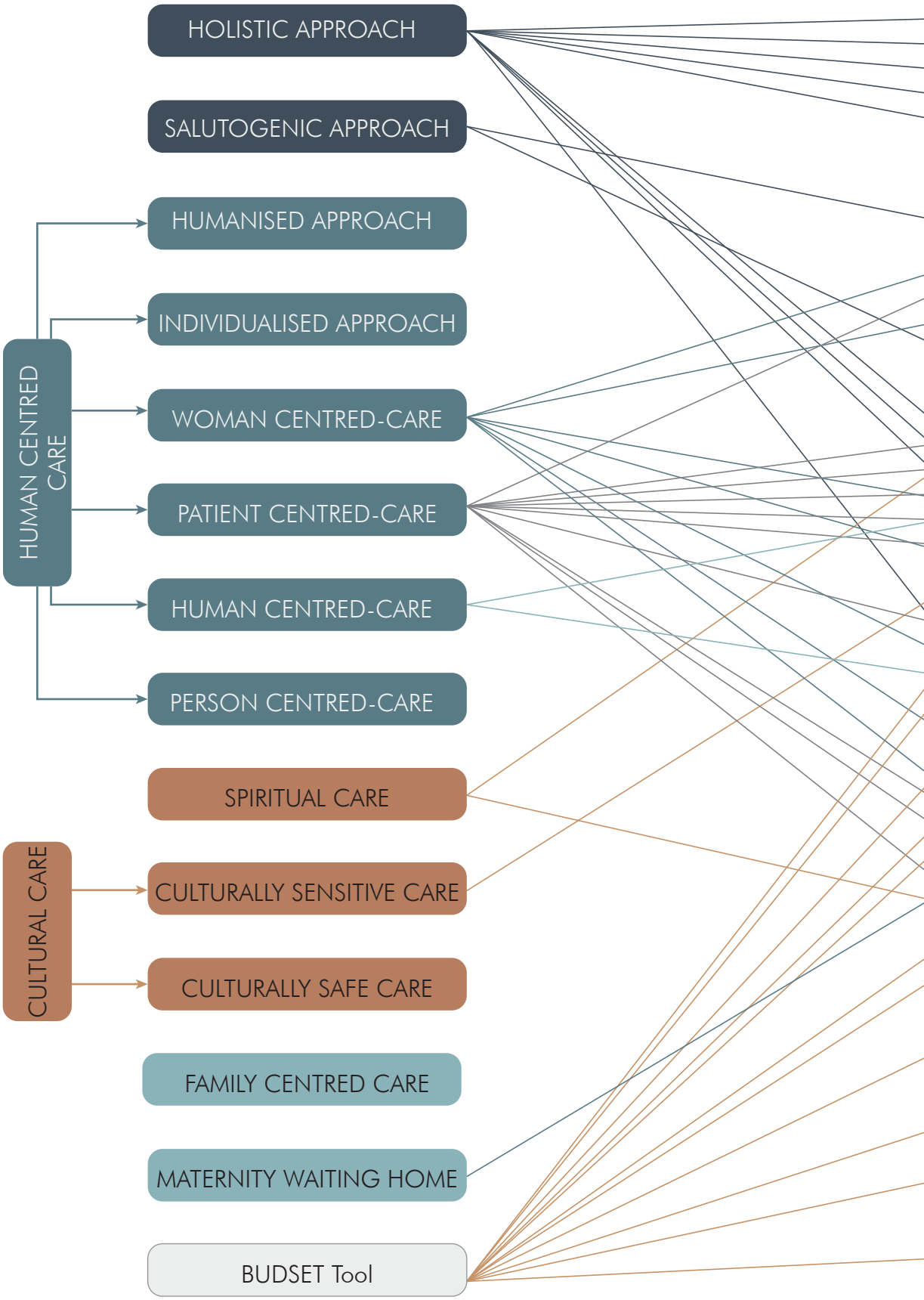
MATRIX OF ENVIRONMENTAL FEATURES



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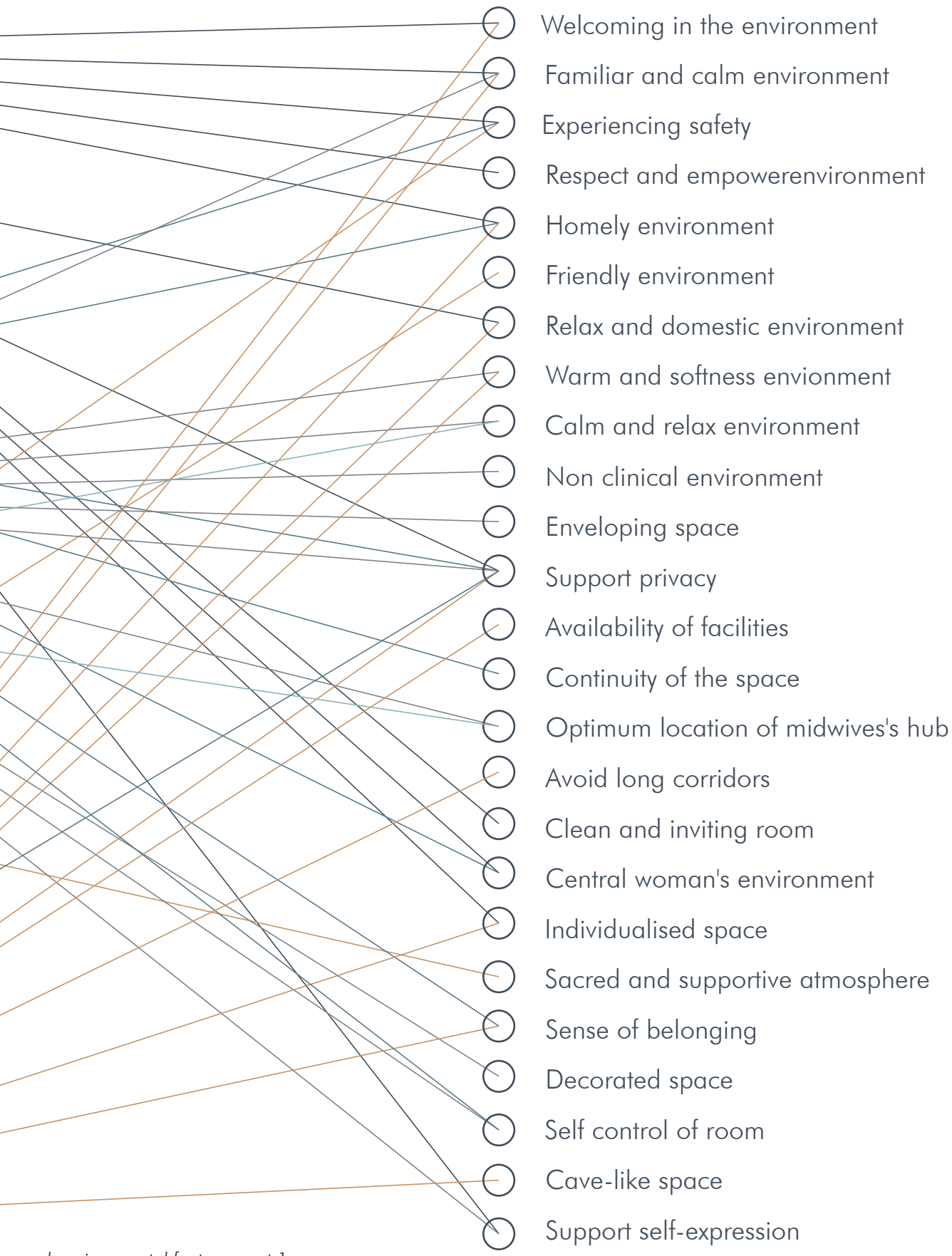

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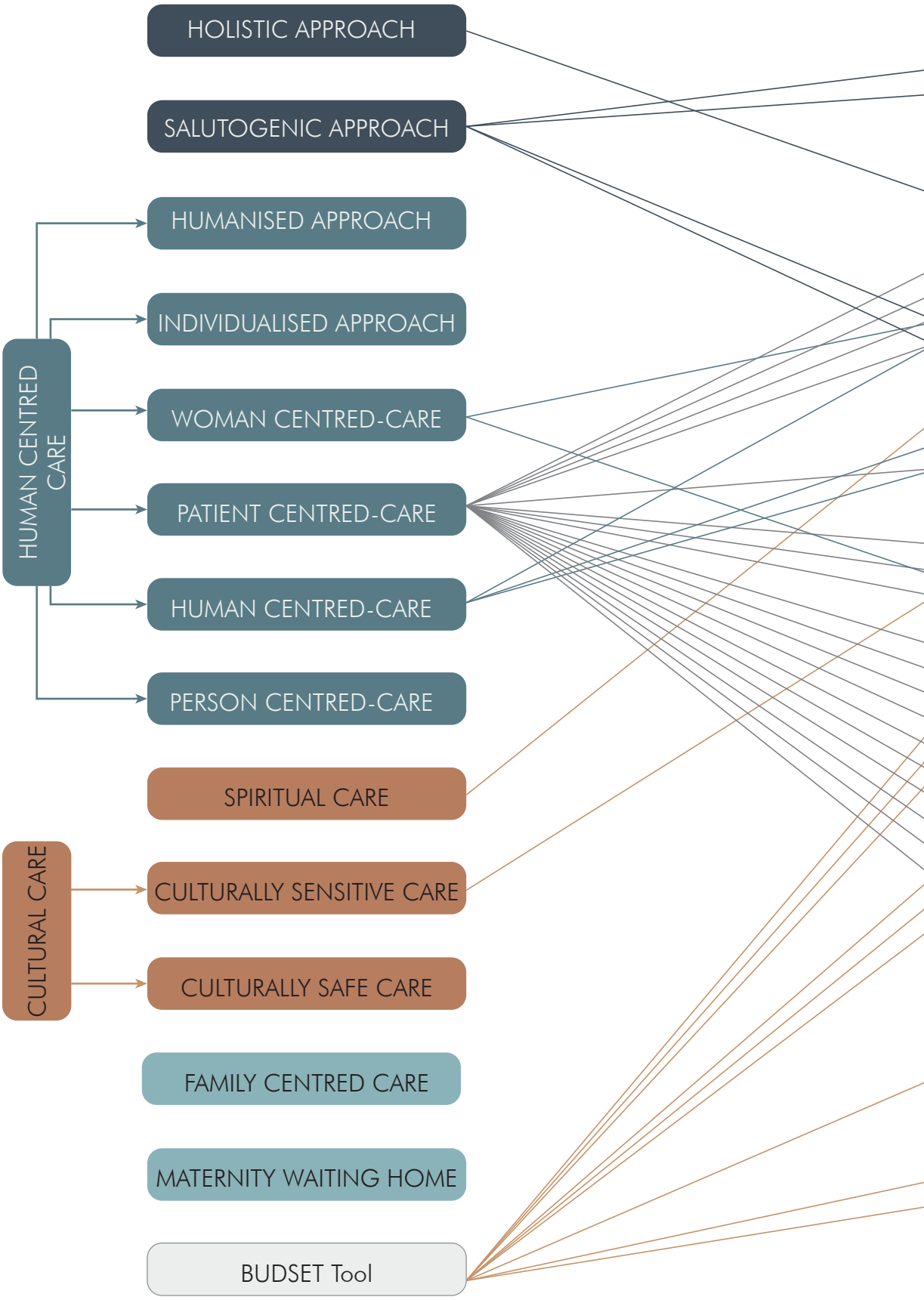
MATRIX OF ENVIRONMENTAL FEATURES



Illus 24: Relation between approach
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aboration

04.3 Indicators development

The indicators are developed under the premise of having an instrument to evaluate the performance and conditions of maternity units, with the purpose of making them more efficient and encouraging their continuous improvement. The use of these indicators can help units to improve both the care they provide and the overall experience of mothers, their companions, and staff, particularly midwives.

The aim of these indicators is to assess what spaces can be included within the organisation of a maternity unit already established by international organisations, considering other approaches to care that integrate contextual and socio-cultural factors. And recognising the diversity of users' own needs. In this way, different findings can be obtained in relation to the spatial features that can improve the experience of all users within the unit, promoting a more humanised environment adapted to the cultural and social realities of the context.

These indicators make it possible to integrate the different variables that may be present in the design of maternity units, variables that depend on contextual and socio-cultural factors, as well as on the beliefs, customs, and traditions of the users. Consideration of these aspects ensures that the units not only meet the technical demands and requirements, but also adapt to the needs and experience of the people who use these health facilities.

For better understanding and future application, the indicators were subdivided into subgroups according to main aspects for adaptation and application within the maternity units. The main groups are non-conventional spaces, unit environment, unit layout, birth room environment, birth room layout, physical elements, supporting elements, lighting, sounds, colours, smells, and materials and textures.

As an additional point, it is worth mentioning that the proposed indicators also support and integrate the latest recommendations of the WHO (2018), which recommend the use of different relaxation techniques, such as massages, yoga positions, and the use of audio-visual aids during labour.

In conclusion, the development of these indicators seeks to meet the objective of integrating new spaces and approaches in the organisation of maternity units, as well as other spatial characteristics within a medical environment, making the maternity unit a more welcoming and familiar environment for mothers and their companions.

NON-CONVENTIONAL SPACES

- Room for the use of alternative medicine
- Overnight rooms for companions and family
- Single occupancy birth rooms
- Room for traditional practices, rituals, and ceremonies
- Sacred room / spiritual space
- Service Ward (It hosts services for mother and companions)
- Common room for mothers
- Social room
- Family room
- Filter space (in birthing room)
- Accommodation for birth attendants
- Transitional care facility
- Sitting room for parents
- Care areas for infants
- Play area for other children in the family

Illus 25.

UNIT ENVIRONMENT

- Welcoming environment
- Familiar and calm environment
- Experiencing safety in the space
- Respect and empower environment
- Homely environment
- Friendly environment
- Relax and domestic environment
- Warm and softness environment
- Nonclinical environment
- Enveloping space

Illus 26.

UNIT LAYOUT

- Support privacy within the space
- Availability of facilities
- Allow continuity of the space
- Optimum location of midwives' hub or staff base
- Avoid long corridors

Illus 27.

BIRTH ROOM ENVIRONMENT

- Clean and inviting room
- Central woman's environment
- Individualised space
- Sacred and supportive atmosphere
- Sense of belonging within the space
- Decorated space
- Self-control of room
- Cave-like space

Illus 28.

BIRTH ROOM LAYOUT

- Allow for adaptability of space
- Facilitate freedom of movement
- Ensure a private toilet, bath, and shower
- Use of mobile furniture
- Spacious rooms
- Flexible room
- Change bed position, not in the centre

Illus 29.

PHYSICAL ELEMENTS

- Use of calming items in the room
- Provide comfortable pillows and seating within the birthing ward
- Use of elements that provide physical support in the room

Illus 30.

SUPPORTING ELEMENTS

- Enable connection to natural elements
- Use of sensory channels
- Use of visual elements
- Use of distracting elements
- Use of communicative elements

Illus 31.

MATERIALS AND TEXTURES

- Use of different textures and natural materials
- Avoid using glare-producing surfaces
- Use of rugs on the floors

Illus 32.

LIGHTING

- Soft lighting in the environment
- Allow control of light intensity in the birth room
- Use of natural light

Illus 33.

COLOURS

- Use of warm colours

Illus 34.

SOUNDS

- Use of soothing sounds
- Use of soundproofing in the birth unit
- Use of sounds from nature

Illus 35.

SMELLS

- Use of aromas

Illus 36.

05

ASSESSMENT TOOL

05.1 Presentation of the Tool

The main purpose of this tool is to provide an assessment that allows a better approach to the design of maternity units, respecting and taking care of social and cultural factors, customs, and beliefs in contexts with limited resources, where currently there is a gap in the implementation of different approaches in the maternity unit, as it is mostly considered the indications and guidelines of the western health system.

This tool allows to identify which unconventional spaces can be integrated within the unit and some recommendations for their organisation and environmental characteristics, so that the environment of the healthcare facility becomes much more familiar and welcoming for women, her companions, and staff, taking their needs into consideration.

From this perspective, this instrument can help in the design of maternity units in contexts of scarce and low resources, where local conditions, habits, beliefs, and traditions are unknown, allowing to be aware of the situation and therefore to have a better approach to the design of the unit or application of the international guidelines.

Specific Objectives:

1. Identify and understand the main cultural perceptions in relation to maternity, childbirth, antenatal care, and postnatal care.
2. Identify the cultural barriers that limit appropriate maternal and newborn care.
3. Recognise health accessibility issues and contextual constraints.
4. Assess what unconventional spaces can be integrated within the maternity unit to ensure a relationship between users' beliefs and culture.
5. Identify the features and elements that should be integrated into the unit's spaces to support the mother's diverse choices in care and preferences during childbirth, and at the same time support the staff practices.

This tool is presented as a checklist to be evaluated according to the information acquired about the context and the population to be worked with. The checklist is divided into subgroups with indicators that are assessed as high, medium, and low importance. The subgroups are listed below:

- Non-conventional spaces
- Characteristics of the spatial layout
- Environment features, this group includes physical elements, supporting elements, materials and textures, lighting, sounds, colours, and smells.

The checklist represented in tables can be found in the appendices section.

05.2 Methodology of application

It is important to highlight that this tool, because of the methodology it follows. It is designed to be used by international organisations or local governments. On the one hand, international organisations can follow this study to adapt already established requirements to contexts with different difficulties, ensuring that the maternity unit is not only efficient in terms of its operation, but also responds to the needs of its users.

On the other hand, local governments can also use this tool for the same purpose, to adapt international directives to the particularities of their specific contexts. By considering local needs, culture, and traditions, governments are promoting a deeper ownership of health care provided to the community. Also, by incorporating local perspectives and priorities, local governments are responding effectively to the specific challenges of the context. This aspect is supremely important considering that precarious contexts have different limitations in access to maternal and neonatal care.

To use this tool, the methodology to be followed in assessing the context in which the work will be conducted is outlined below, with the aim of obtaining insights that will contribute to the planning of the maternity unit.

Step 1:
Characterise the population or context with which the work will be conducted. Recognise where it is located, what its population is, and its main characteristics. If possible, it would be ideal to conduct fieldwork to make a physical reconnaissance.

Step 2:
Conduct a literature review of articles, books, and reports on the population or context with which the work will be conducted. These will later serve to acquire knowledge, generate proximity to the context, and finally serve as support for the evaluation.
Where possible, the collection of information can also be acquired through field work.

Step 3:
Analyse the literature and, in this case, the information collected in fieldwork, to recognise the main problems that urgently need to be addressed in the context and the population. Whether due to maternal mortality rates, limitations in accessing quality health services, or difficulties in providing adequate sexual and reproductive health.

Step 4:
Analyse the literature and, in this case, the information collected during fieldwork, to identify cultural perceptions and differences.

It is necessary to identify, for the specific context, what is their perception of maternity and childbirth, recognising what is the preferred position of women to give birth, if they carry out any type of traditional postpartum ceremony, what position the family and the companions have, and in general what are their beliefs about pregnancy and childbirth.

At this stage, where social and cultural aspects are addressed, it is also important to recognise the cultural barriers to access to health care. What is the vision or relationship that the context has in relation with health, and what is the role of women and men in society and during pregnancy.

Step 5:
Conduct an assessment following the proposed indicators and assigning importance to each one. To carry out this assessment, it is necessary to consider all the information collected so that the evaluation is based either on the literature review or on evidence.

Step 6:
Analyse and interpret the results, highlighting key aspects to be applied within the design and organisation of the maternity unit.

Step 7:
Generate a final report documenting the development, testing, validation, and results of the assessment tool. This report will be the support for the adaptation of international guidelines and/or local policies to the development and design of maternity units. The final report will allow justifying each of the interventions or design decisions.

Step 8:
Conduct an evaluation of the tool to enable its evolution and increase its effectiveness, recognising which aspects of the instrument could be improved for future evaluations. At this stage, it is also possible to suggest adjustments, applications, or limitations of the tool for international organisations or local governments.

05.3 Assessment application

To exemplify the application of this tool, two case studies are taken from completely different contexts, where the assessment is conducted following the methodology mentioned above. These two contexts are Colombia and Senegal, which, despite their socio-cultural and geographical differences, in rural areas the cultural characteristics vary, there are limitations in access to health, and there is little economic investment in health infrastructures such as maternity units.

These two contexts present limitations for study as they are unfamiliar contexts, I have

never physically been to either place, so the assessment can only be based on the literature review. For Colombia, the Nasa population is chosen; the literature available for this population is limited; however, more general supporting literature on indigenous perspectives on health can be used. In the case of Senegal, when working with populations in rural areas, the literature is also limited, as most of the studies and articles found are developed in the main cities. Nevertheless, despite the limitations and scarcity of resources to support the assessment of the two contexts, they are important and interesting examples to be studied.

In the case of Colombia, where I come from, I know first-hand that there are also many problems and limitations in access to maternal health, as most of the development and investment in public health is done in the main cities and their surroundings, which makes rural areas far from receiving quality maternal health. Due to challenging geographical conditions and the state of country's road infrastructure, many women in remote rural areas are unable to access quality prenatal and postnatal care, in addition to the fact that these women may belong to an indigenous, Afro-Colombian, or ethnic community, and in most cases are of limited resources.

For this type of remote context, the constraints in accessing health care increase, as the geographical conditions complicate the maintenance of health infrastructures, the supply of essential medical resources, and the provision of qualified medical staff. For these reasons, it was found necessary to address a population that is not very well considered, because, although I am not physically familiar with the culture and surroundings, I could have easy access and make a positive contribution to a current problem in my country.

In contrast, as part of my training experience during my internship I had the opportunity to participate in an architectural competition for the design of a maternity unit in Senegal. This experience first of all, brought me closer to the design of maternity units in this context, but also allowed me to realise that there are many limitations to accessing adequate maternity care in rural areas, that most studies on maternal health are carried out in major cities, that little consideration is given to socio-cultural factors in the development of health infrastructures, and that in most places where maternal care and attention is most urgent, economic precariousness is very high.

Moreover, being Colombian a background completely different, but as a designer I must be able to approach completely different contexts and unknown to me, where social, cultural, and customary factors vary, in that sense my responsibility as a designer is to find a tool or methodology that allows me to design for an unknown context. On the other hand, from a more scientific aspect, Senegal belongs to the Sub-Saharan Africa region, the region of the world that represents more maternal deaths, which is why most of the international organisations and foundations are focused on developing health centres or maternity units that improve care and expand health coverage.

In general terms, they are considered important contexts to analyse because, despite deficiencies in the health system, sanitary infrastructures, and access to maternal care, the issue of *maternal health* is considered from a global and centralised country perspective, without considering the

the perceptions that are generated throughout the territory.

The study was intended to show that the approach to maternity unit design in these contexts is different and at the same time, to prove that the tool can be applied to new different contexts and through the assessment can be highlighted important elements to the unit's design, demonstrating that the results vary according to the local conditions and the variables applied.

CASE OF COLOMBIA:

Characterisation of the population:
The Nasa Indigenous people are in specific regions of Colombia, with most of their population located in Cauca, Valle del Cauca, Huila, and Nariño. According to the report on *the Indigenous population of Colombia* published in 2019, their population is 243,176 and they are one of the four most numerous Indigenous people in the country (DANE, 2019).

Literature Analysis: Problems
In most cases, Indigenous populations do not seek health services for obstetric emergencies for several reasons. Firstly, cultural and social factors, because the context in which the woman finds herself means that she is not always able to recognise signs of seriousness during pregnancy, and even if these symptoms do occur, they may be considered a cultural factor, rather than an alarm, preventing the mother from accessing health services. Another point is related to economic factors, since travelling to a health centre represents an economic cost, as does hospitalisation, which becomes a constraint, especially for Indigenous populations living in remote rural areas and in precarious contexts (Florez, Muñoz & Ramírez, 2010).

The adaptability of health systems is also another critical point, because intercultural adaptations in health centres are not common, but if they were applied, they would allow for better service and user experience. Furthermore, for health facilities in remote contexts, the economic investment is low, generating limitations for the facility to be able to function adequately due to the lack of adequate supplies and infrastructure, and medical equipment.

Finally, in Latin America, the health system, its organisation, and financing, tends to be centralised, which means that healthcentres around the country have little capacity to function autonomously, i.e. they depend on the capacity of the government and its institutions to establish policies, prioritisation mechanisms, regulation, and allocation of resources. For this same reason, it can be considered that "maternal mortality in Latin America and the Caribbean is a particularly serious public health problem in the case of Indigenous women" (Florez et al., 2010, p. 1).

A situation that is generated in the health system that becomes a barrier to access to adequate maternal health services is that there is little tolerance, respect, and understanding on the part of the staff towards the culture of the indigenous user, generating indigenous women may feel mistreated, or suffer abuse in care (Bornacelly, n.d.). This situation leads to adverse experiences for mothers and increases the gap in the participation of Indigenous women in the health system, consequently increasing the risk for the mother and baby.

COLOMBIA - NASA INDIGENOUS
Region of Cauca, Valle of Cauca, Huila and Nariño

Illus 37: Location and population of Nasa indigenous in Colombia, own elaboration

In most of these contexts and populations there are also different problems in relation to sexual reproductive health and family planning, which according to their perceptions is not an important aspect. The issue of family planning causes a division of opinions among the Indigenous population, i.e. between those who consider it a right and those who qualify it as "another invention of the Western world to break with the schemes of the indigenous world" (CEIMM, 1995 Cited by Castillo-Santana et al., 2017).

From the perspective of maternal deaths, by 2020 the maternal mortality rate of ndigenous women in Colombia was 268,6 per 100,00 live births, representing 13,3% of the total MMR of the country. The total number of maternal deaths (TMM) of Indigenous women for provinces where the Nasa population is located are Cauca: 178,4, Nariño: 64,9, and Valle del Cauca with 1087,0 deaths. These figures show that Valle del Cauca is the third place in the country with the most maternal deaths (DANE, 2021).

Literature Analysis: Cultural perceptions

Motherhood and maternity:

For the Nasa population, motherhood is a responsibility of the mother, it is considered as another stage in the natural life cycle of women, which means that it should not be associated with any kind of risk (Castillo-Santana et al., 2017, p.5). Practically, the responsibility of prolonging the community in biological and cultural terms is exercised on the woman's body, fulfilling the feminine role that is imposed on her (Bornacelly, n.d.).

On the other hand, maternity is a process that involves the family; it is impossible to think of a woman's pregnancy without the support of her family, which becomes a central axis of support (Castillo-Santana et al., 2017).

Childbirth:

Childbirth is conceived as a participatory moment, where the family and the community can be involved, who can provide support to the mothers, usually they are assisted by midwives and if possible, also by a traditional doctor. Culturally women have a vertical birth, "the woman is perpendicular to the ground, kneeling, or squatting and attached to a rope or *chumbe*" (Castillo-Santana et al., 2017, p.66). Being assisted by midwives and having their births at home allows them to preserve family traditions, to feel supported by their community, and to allow the newborn to receive "the energy of the three worlds: the spiritual, the land, and the world below" (Castillo-Santana et al., 2017, p.66).

Illus 38: Cosmovision of the Misak people, (Tunubala & Trochez, 2008).

In this sense, the moment of birth can be summarised as a cultural experience within the life cycle of women, involving the family, the community, and traditional birth attendants.

Placenta's importance:

For many Indigenous cultures, the placenta has a symbolic importance, as special powers and potential negative consequences are attributed to it, if it is not handled properly. Such cultures have a deep respect for the placenta, considering it an element loaded with symbolism and capable of influencing the wellbeing of the newborn and the mother, which is why in most cases a ceremonial treatment of the placenta is conducted (Florez et al., 2010).

Cultural barriers:

As pregnancy is considered a natural and normal stage of a woman's life, pregnant women do not take certain precautions regarding their activities, physical exertion, and antenatal care. This means that certain signs of seriousness and obstetric complications are not recognised in time, and health services are not used (Florez et al., 2010). This can lead to complicated pregnancies, spontaneous abortions, illnesses during pregnancy such as hypertension, and even the death of the mother or baby.

Another important barrier is that due to cultural differences and the treatment that women may have in qualified health centres, access may be limited, which is why in Colombia in some health centres some changes were made in relation to food, the participation of midwives in labour and, the delivery of the placenta, this allowed more women to frequent health centres and improve their experience (Castillo-Santana et al., 2017).

Role of women and men in society:

Women have the responsibility to preserve the community and culture through conception, which is part of their role as women, where they must not only bear the burden of pregnancy, but also care for and raise their children throughout their lives.

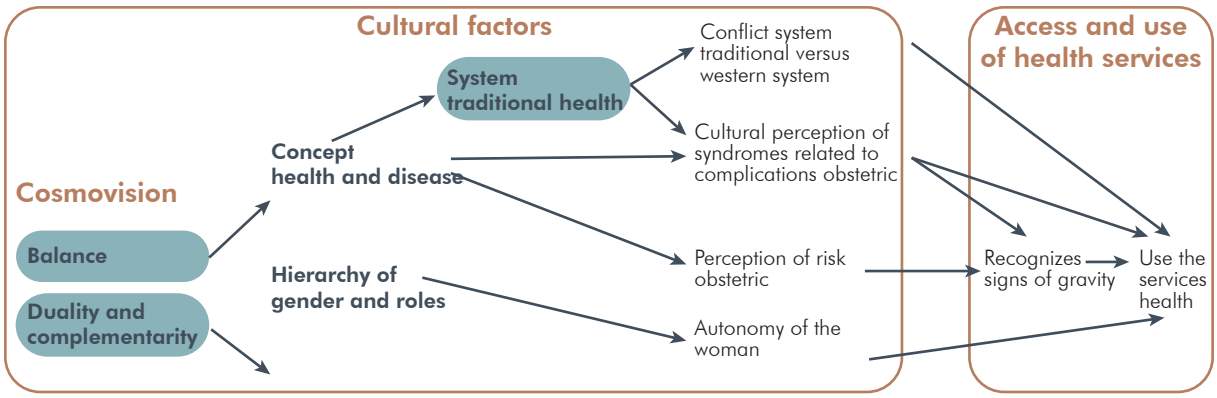
In this sense, women have the responsibility of social and biological reproduction. Social because as caretakers of culture, they are expected to monitor and enforce cultural practices. And biological responsibility, because women are the only ones capable of giving existence to everything that exists (Florez et al., 2010). This last point generates problems if seen from an external perspective, because according to social conceptions the only way to see a woman's body is within motherhood, detracting from the value of everything that being a woman represents.

On the other hand, the man's role is to provide for and preserve the family. "Men conceive of fatherhood as a great responsibility that is associated with the idea of reproducing and leaving offspring" (Bornacelly, n.d., p. 20).

Health:

The perception of health for Indigenous people is quite different from how health is known in the West system, "health is understood as a space of harmonious and systemic relationships between the individual and the various levels of daily life that is expressed in wellbeing and quality of life" (Castillo-Santana et al., 2017, p. 64).

Within their worldview of health, two important aspects must be considered, balance, duality, and complementarity. Balance is maintained when humans have respect for nature and other superior beings, while



Illus 39: Relationship between the cultural factor and the use of health services. (Florez et al., 2010).

duality and complementarity derive from the gender roles that must be acquired in accordance with society.

Balance is achieved when living in harmony within the Indigenous community and respecting nature. When nature is disrespected or harmony is disrupted, catastrophes and illnesses can occur as punishment, thus endangering the health of the community. In contrast, Indigenous women understand the duality between man and woman as a complementarity between the two. Women are connected to the earth and therefore to fertility, for this reason they have the esponsbility to preserve reproduction in the community (Florez et al. 2010).

In contrast is the Western health system, which, according to Indigenous people, considers pregnancy as a risky stage for the woman, where she must take precautions for herself and the baby, and avoid putting the lives of both at risk (Castillo-Santana et al., 2017). Furthermore, most Western health systems have limitations for the cultural expression of different populations, in a conventional health centre a Nasa woman is not allowed to give birth in an upright position, because it could be considered risky. In addition, mistreatment by medical personnel can occur due to these same cultural differences, "doctors and health personnel point to the stubbornness of Indigenous mothers, along with expressions such as 'they are closed', 'they don't understand' or 'they hide'" (Castillo-Santana et al., 2017, p. 67).

As mentioned by Castillo-Santana et al. (2017), it is necessary to recognise the traditional medical system in its diversity, so as not to fall into the imposition of a health care model that is far from the expectations and needs of the population, a model that, despite being legitimate for the State, is still foreign to some indigenous mothers, who trust and give validity to traditional medicine.

Assessment application:

The following assessment is based on a literature review, most of the indicators are justified with a reference which is indicated by a number, at the end of the evaluation all references are shown in relation to their corresponding number.

INTEGRATION OF NON-CONVENTIONAL SPACES

INDICATOR	Low Importance	Medium Importance	High Importance	
Room for the use of alternative medicine			X	1 5 17
Overnight rooms for companions and family		X		2
Single occupancy birth rooms	X			
Room for traditional practices			X	2 3 4 17
Sacred room / spiritual space		X		5 6
Service Ward			X	7 8
Common room for mothers		X		8 9
Social room			X	10 11 12
Family room	X			
Filter space (in birthing room)	X			
Accommodation for birth attendants		X		7 13
Transitional care facility			X	8 14
Sitting room for parents			X	15 16
Care areas for infants		X		
Play area for other children in the family	X			15 16

Table 1.

CHARACTERISTICS OF THE UNIT ENVIRONMENT

INDICATOR	Low Importance	Medium Importance	High Importance	
Welcoming environment			X	1
Familiar and calm environment			X	6
Experiencing safety in the space			X	18
Respect and empower environment			X	18
Homely environment			X	6
Friendly environment		X		18
Relax and domestic environment		X		6
Warm and softness environment		X		6
Nonclinical environment			X	21
Enveloping space		X		6

Table 2.

UNIT LAYOUT

INDICATOR	Low Importance	Medium Importance	High Importance	
Support privacy within the space		X		
Availability of facilities			X	7 8
Allow continuity of the space	X			
Optimum location of midwives' hub/staff base		X		13
Avoid long corridors		X		

Table 3.

CHARACTERISTICS FOR THE BIRTH ROOM

INDICATOR	Low Importance	Medium Importance	High Importance	
Clean and inviting room	X			
Central woman's environment			X	20
Individualised space		X		22
Sacred and supportive atmosphere			X	17 6
Sense of belonging within the space			X	6 21
Decorated space	X			
Self-control of room			X	6 21
Cave-like space		X		

Table 4.

BIRTH ROOM LAYOUT

INDICATOR	Low Importance	Medium Importance	High Importance	
Allow for adaptability of space			X	21 25
Facilitate freedom of movement			X	21 25
Ensure a private toilet, bath, and shower	X			
Use of mobile furniture			X	21 25
Spacious rooms	X			
Flexible room			X	
Change bed position, not in the centre		X		

Table 5.

PHYSICAL ELEMENTS

INDICATOR	Low Importance	Medium Importance	High Importance	
Use of calming items in the room	X			
Provide comfortable pillows and seating within the birthing ward		X		
Use of elements that provide physical support in the room			X	25

Table 6.

SUPPORTING ELEMENTS

INDICATOR	Low Importance	Medium Importance	High Importance	
Enable connection to natural elements			X	23 24
Use of sensory channels	X			
Use of visual elements	X			
Use of distracting elements	X			
Use of communicative elements			X	12

Table 7.

MATERIALS AND TEXTURES

INDICATOR	Low Importance	Medium Importance	High Importance	
Use of different textures and natural materials			X	23 24
Avoid using glare-producing surfaces	X			
Use of rugs on the floors	X			

Table 8.

LIGHTING

INDICATOR	Low Importance	Medium Importance	High Importance	
Soft lighting in the environment		X		
Allow control of light intensity in the birth room	X			
Use of natural light			X	18 24

Table 9.

SOUNDS

INDICATOR	Low Importance	Medium Importance	High Importance
Use of soothing sounds		X	
Use of soundproofing in the birth unit	X		
Use of sounds from nature		X	

Table 10.

SMELLS

INDICATOR	Low Importance	Medium Importance	High Importance
Use of aromas		X	

Table 11.

COLOURS

INDICATOR	Low Importance	Medium Importance	High Importance
Use of warm colours		X	

Table 12.

Assessment references:

1. "Recognizing the diversity of the traditional medical system is necessary to avoid imposing a model of health care that falls short of the expectations and needs of the population, a model that, although legitimate for the State, is still alien to some indigenous mothers who trust and validate traditional medicine" (Castillo-Santana et al., 2017, p. 71).

2. For the Indigenous people, "birth is a participatory concept, which allows the child to be born with the energy of the three worlds: the spiritual, the territory and the world below" (Castillo-Santana et al., 2017, p. 66).

3. The childbirth is considered as an important event within the community, it "has a normative order with defined rules of behaviour and ritual systems that serve as the basis for the organisation of the social life of a group. In this context, childbirth transcends the biological realm to become a social and cultural phenomenon" (Medina and Mayca, 2006 cited by Florez et al., 2010, p. 27).

4. Importance of the placenta for indigenous cultures: "The placental disposition is done with more care in the Aymara zone: it is washed, burned and buried in the shade, in a place where it does not receive heat, away from the sun" (Florez et al., 2010, p. 38).

5. As mentioned in the article of Tunubala and Muelas:
For the Misak people, ancestral knowledge is an intrinsic part of their cultural identity and dignity and are essential elements to ensure their cultural preservation. The European Commission has published a report on the "Conservation of Biodiversity", which is a very important and valuable tool for the development of biodiversity (Tunubalá & Muelas, 2008, p. 43).

6. "Indigenous health systems have a social function, not only to prevent and restore health, but also to strengthen the worldview and cultural heritage from which they come" (Florez et al., 2010, p. 28).

7. There are some changes in the health services aimed at making the experience more pleasant for indigenous mothers and therefore the centres were more frequented, these changes included "feeding, participation of midwives into labour, and delivery of the placenta" (Castillo-Santana et al., 2017, p. 68).

8. Indigenous women do not always have special care during pregnancy, may use too much force in their work, may be likely to hit or fall while carrying out their daily responsibilities, may be mistreated by their partners, and are not always well nourished (Florez et al., 2010).

9. Women are connected to the earth and therefore to fertility, for this reason they have the responsibility to preserve reproduction in the community (Florez et al., 2010).

10. "It is necessary to provide spaces for dialogue of knowledge, with the mediation of indigenous, and western health authorities, that allows the recognition and understanding of the logics of action of each system" (Castillo-Santana et al., 2017, p. 17).

11. María Mercedes Arias-Valencia (2001) "found that in these communities' women start their marital union at a very early age, between 14 and 15 years. The first pregnancy and delivery take place before the age

of 20; intergenerational intervals are less than 24 months and limiting pregnancies is not well-regarded" (Florez et al., 2010, p. 46).

12. Within the cultural barriers, there is a lack of knowledge about the availability and ways to access contraceptive methods, insufficient access to accurate and high-quality information on the safety and effectiveness of contraceptives, mistrust of Western reproductive health services (Bornacelly, n.d.).

13. Indigenous women will always prefer to be attendant by midwives (Castillo-Santana et al., 2017).

14. Some situations associated with the woman's living conditions and her role within the family unit may put the life of the mother and baby at risk (Florez et al., 2010).

15. "The care and upbringing of children is carried out by women, if it is considered a woman's activity" (Bornicelly, n.d., p. 16).

16. The mother figure predominates as "the one responsible for protecting, to care, advise, love and in general accompany their children during their life course which is related to the conceptualization of the *good mother* valued by the care of children" (Bornicelly, n.d., p. 18).

17. For indigenous people, "health incorporates several paradigms and is expressed in dynamic relationships between inseparable components: first, the individual, which is physical, mental, emotional and spiritual; and second, in the collective, which is ecological, political, economic, cultural, social and spiritual" (Florez et al., 2010, p. 28).

18. Health personnel have little tolerance and respect for the indigenous user's culture, which can generate adverse experiences for users and consequently perpetuate a dislike for the Western health care system (Florez et al., 2010).

Analysis and interpretation of results:
In conclusion, after the assessment of the case study in Colombia, it can be summarised that it is important to include in the design of maternity units, space for the use of alternative medicines and different relaxation techniques. It is also important to include a space that allows for traditional practices and ceremonies to take place, spaces that provide the mother and her companions with services and facilities. And finally, a social hall, considering that for this population the birth is a participatory event in the community.

It is also crucial to integrate the midwives in the development of the unit and to offer them a suitable environment. In terms of spatial characteristics, the environment should be familiar, generate a sense of security, respect for the woman's culture, have a very calm environment, a supportive and sacred atmosphere, and generate a sense of belonging. In terms of physical elements, support elements should be included, to support unusual positions during labour, to generate a connection with the natural elements, and to use more local materials that give the mother a sense of familiarity.

CASE OF SENEGAL:

Characterisation of the population:
Considering that Senegal is a large country in which conditions are not homogeneous throughout the territory, the analysis focuses on rural areas where resources are more limited and cultural factors also vary. Approximately 42% of the population lives in rural areas, representing 7.8 million people, according to UN projections (World population review, n.d.).

The population density and living conditions in rural areas vary remarkably compared to urban areas, which impacts on access to basic services and economic opportunities, with rural areas being less developed in terms of infrastructure and social services (World population review, n.d.).

Literature Analysis: Problems
Problems related to maternal health can be divided into two broad groups, problems of accessibility to care and health, and problems related to contextual factors. Access to quality maternal care can be limited by several factors, firstly, due to the precarious conditions of road infrastructure and the means available to reach health facilities, many women prefer home births, additionally being attended in a maternity unit can represent an economic expense, which neither women nor their families can afford (Faye & Ndiaye, 2010).

Secondly, considering that rural areas have conditions of scarcity, many women are unable to afford adequate care, or within their cultural perceptions perceive home births as a cheaper option. These same difficulties in access mean that women approach maternal care or the health system too late or of inadequate quality, supporting the continuation of home births. Delays in consultation, evacuation, and treatment of patients are also factors that contribute to maternal mortality in the region (Biaye et al., 2019).

The other large group is related to social contextual factors, as women in rural areas have less decision-making capacity and autonomy over their bodies and their pregnancies. According to a study conducted by Sougou et al., in Senegal, the more education women have, the more decision-making capacity and autonomy they will have during pregnancy and childbirth. This study highlights that women between 20 and 24 years of age tend to have less autonomy in health-related matters, as do women living in rural areas with fewer economic resources. The situation is the same for married women, as many of their health decisions are made by their partners (Sougou et al., 2020).

From this perspective, Sougou suggests some improvements that can be made within public health to solve this problem. First, investment can be made in educating women, especially in remote areas of the territory, so that they can reinforce their autonomy in making decisions about their health and their babies' health, through awareness-raising and education campaigns. Public health policies can also be integrated to ensure equal rights and opportunities for women, and to encourage support for women in creating activities that allow them to generate new income, so that they also have economic independence and thus autonomy in health choices (Sougou et al., 2020).

Another problem is that most of the studies and evaluations on maternal health and mortality are done in the main cities, which

SUB-SAHARAN AFRICA / SENEGAL
Rural Areas

Population in Rural Areas

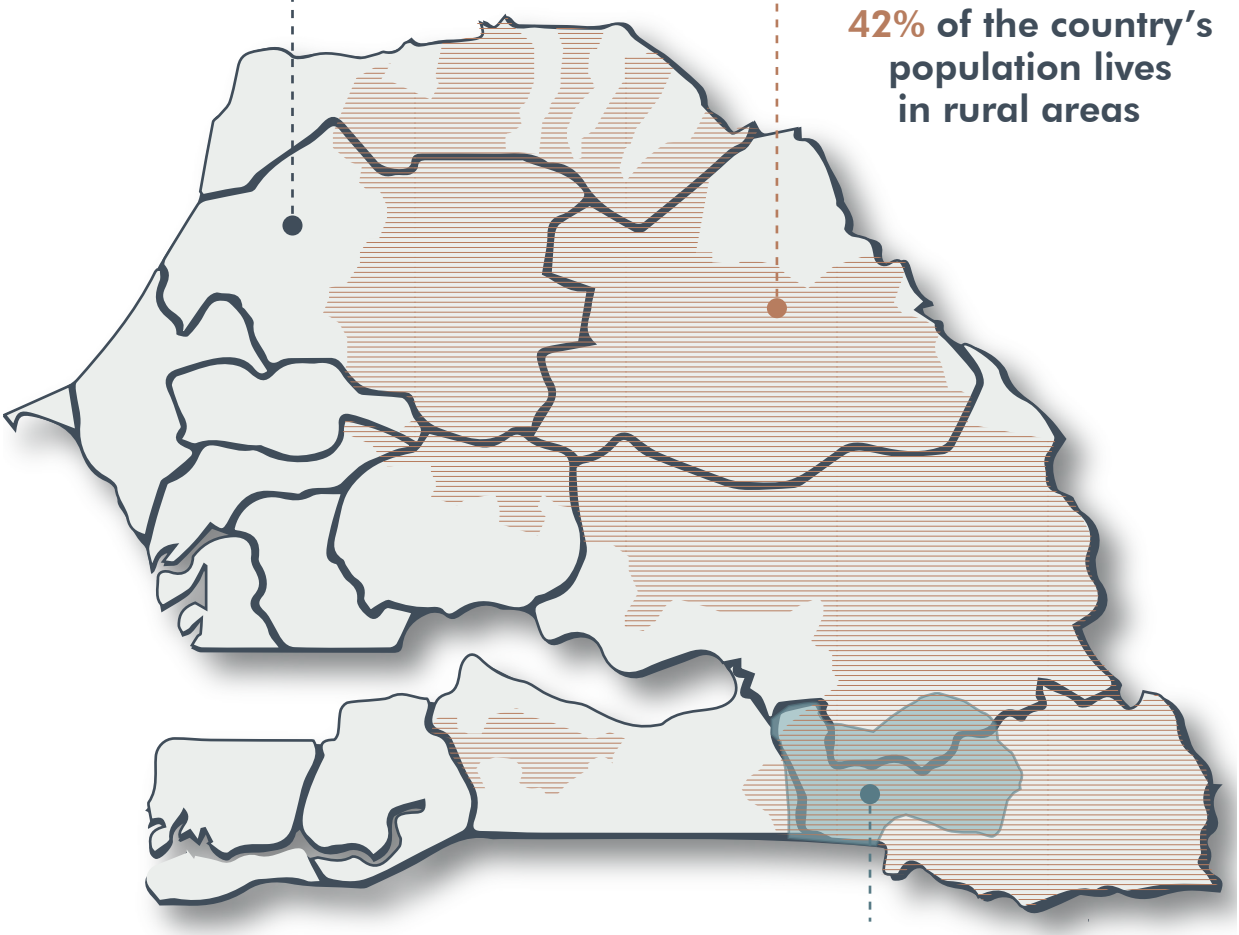
7,8 millions

Reference:
World population review, 2024

42% of the country's population lives in rural areas

Country's population
18,502,000

Reference:
World population review, 2024



Niokolo Koba National Park

High preference for home births

92% of women continue to perform domestics tasks during and after pregnancy

Illus 40: Population zoning in Senegal (rural and less developed areas), own elaboration

have a larger health system and higher-level health infrastructures, resulting in a large difference in health coverage across the country. This is reflected in the maternal mortality rates, which vary across the territory, as presented in the article by Samala et al., where maternal mortality among regional hospitals outside Dakar is assessed as 1,31. Dakar hospitals have a rate of 0.3, while for district hospitals outside Dakar there is no evidence or measurement. This absence of data makes the situation in rural areas little known, and calls into question what is happening in these remote areas of the country in terms of health and sanitation infrastructure (Salama et al. 2008).

Literature Analysis: Cultural perceptions

Childbirth:

In Senegal, more than 40% of women give birth at home in the more remote rural areas of the country, often in toilets, which frequently are located behind houses (Samb, 2021). These traditional child births are assisted by traditional birth attendants, known as *new mothers*. The mother gives birth in the lithotomy position (lying on the back), this position is the most familiar and traditionally accepted at birth (Gélinas & Samb, 2023). But it is not always accepted in health infrastructures, as it is considered a risky position, even though Senegal is trying to implement a program of humanised births.

In addition to being assisted by midwives, the mother may be accompanied by other women from the community from whom she receives support, massage, and drinks from medicinal plants, such as bissap (hibiscus), kel (a sticky plant), and dates (Samb, 2021). After the birth, mother and baby can rest and receive special treatments to recover. The baby is cared for by a female entourage and undergoes a ritual bath in three phases. "The first bath is with warm water, the second is followed by soap, and the third by gold or silver jewellery and millet, this should guarantee the child a long life, health, and prosperity" (Samb, 2021, para. 4).

Placenta's importance:

The placenta and the umbilical cord have symbolism, representing the link between life and birth. There are rituals in some traditions where the placenta is buried or kept in a special place, in the belief that it possesses a special energy that can influence the destiny of the child or the relationship with the ancestors. The umbilical cord is also seen as a symbol of this primary and vital connection between mother and baby (Samb, 2021).

Cultural barriers:

A cultural constraint that prevents some women from accessing health facilities is that they are prevented from carrying out some cultural and traditional practices, including the freedom to choose the position of delivery.

In health centres, if cultural mediators are not available, the experience for the mother can be negative, since these mediators oversee trying and understanding a minimum of customs so that they can adapt to the environment of the health structure, respecting hygiene, and safety standards (Samb, 2021).

Role of women and men in society:

The men support their partners in the pregnancy process, they are organised in 'entourage' which are created of family and close friends and provide the mother with emotional, physical, and financial support (Powis & Bunkley, 2023). Additionally,

"the entourage helps women navigate the experience of pregnancy and aids women in accessing health care, finding appropriate nutrition, and taking any required medications" (Powis & Bunkley, 2023, p. 331).

Men participate in the prenatal and postnatal care of their partners in several unique and culturally appropriate ways. However, they are not allowed to participate in the birthing process due to cultural norms (Gélinas & Samb, 2023).

On the other hand, there is the conventional health system that supports clinical deliveries and obstetric interventions. Although Senegal is implementing a programme of humanised births, it is not always possible to respect traditions, to allow certain rituals and ceremonies, or to include cultural factors, such as the choice of birth position, within the maternity unit.

Illus 41: Midwife and a pregnant woman in Senegal in 2014. (RTL, 2021)

Health:

On the one hand, the health of mothers and newborns is considered to depend on cultural factors and traditional practices, which seek to protect and strengthen the wellbeing of both, using natural medicines and drinks, massages, baths, and other techniques that are not implemented in the Western medical system, in conventional health centres, or in maternity units.

Assessment application:

The following assessment is based on a literature review, most of the indicators are justified with a reference which is indicated by a number, at the end of the evaluation all references are shown in relation to their corresponding number.

INTEGRATION OF NON-CONVENTIONAL SPACES

INDICATOR	Low Importance	Medium Importance	High Importance	
Room for the use of alternative medicine			X	4 13 20
Overnight rooms for companions and family			X	24 11 12
Single occupancy birth rooms	X			
Room for traditional practices			X	11 13 22
Sacred room / spiritual space		X		22
Service Ward			X	4 11 12 18
Common room for mothers			X	18 24
Social room			X	2 14 15 17
Family room			X	
Filter space (in birthing room)	X			11 12
Accommodation for birth attendants			X	4 13
Transitional care facility			X	
Sitting room for parents	X			9 10
Care areas for infants		X		11 12 18
Play area for other children in the family		X		

Table 13.

CHARACTERISTICS OF THE UNIT ENVIRONMENT

INDICATOR	Low Importance	Medium Importance	High Importance	
Welcoming environment			X	11
Familiar and calm environment			X	5 21
Experiencing safety in the space	X			11
Respect and empower environment		X		5
Homely environment			X	13 21
Friendly environment			X	8 25
Relax and domestic environment			X	5 27
Warm and softness environment		X		6
Nonclinical environment		X		8 25
Enveloping space		X		25

Table 14.

UNIT LAYOUT

INDICATOR	Low Importance	Medium Importance	High Importance	
Support privacy within the space	X			
Availability of facilities			X	4 11 12
Allow continuity of the space	X			
Optimum location of midwives' hub/staff base			X	13 21
Avoid long corridors		X		

Table 15.

CHARACTERISTICS FOR THE BIRTH ROOM

INDICATOR	Low Importance	Medium Importance	High Importance	
Clean and inviting room		X		27
Central woman's environment		X		16 23
Individualised space		X		21
Sacred and supportive atmosphere			X	22 23
Sense of belonging within the space			X	14
Decorated space	X			
Self-control of room			X	6 7 14
Cave-like space		X		

Table 16.

BIRTH ROOM LAYOUT

INDICATOR	Low Importance	Medium Importance	High Importance	
Allow for adaptability of space			X	6 7 8
Facilitate freedom of movement			X	21
Ensure a private toilet, bath, and shower			X	19
Use of mobile furniture			X	6 8
Spacious rooms		X		27
Flexible room			X	6 7
Change bed position, not in the centre		X		26

Table 17.

PHYSICAL ELEMENTS

INDICATOR	Low Importance	Medium Importance	High Importance	
Use of calming items in the room		X		
Provide comfortable pillows and seating within the birthing ward			X	
Use of elements that provide physical support in the room			X	6 7

Table 18.

SUPPORTING ELEMENTS

INDICATOR	Low Importance	Medium Importance	High Importance	
Enable connection to natural elements		X		
Use of sensory channels	X			18
Use of visual elements	X			
Use of distracting elements		X		
Use of communicative elements			X	15 16 17

Table 19.

MATERIALS AND TEXTURES

INDICATOR	Low Importance	Medium Importance	High Importance
Use of different textures and natural materials		X	
Avoid using glare-producing surfaces	X		
Use of rugs on the floors	X		

Table 20.

LIGHTING

INDICATOR	Low Importance	Medium Importance	High Importance
Soft lighting in the environment	X		
Allow control of light intensity in the birth room	X		
Use of natural light			X

Table 21.

SOUNDS

INDICATOR	Low Importance	Medium Importance	High Importance
Use of soothing sounds	X		
Use of soundproofing in the birth unit	X		
Use of sounds from nature		X	

Table 22.

SMELLS

INDICATOR	Low Importance	Medium Importance	High Importance
Use of aromas		X	

Table 23.

COLOURS

INDICATOR	Low Importance	Medium Importance	High Importance
Use of warm colours		X	

Table 24.

Assessment references:

1. Men participate in prenatal and postnatal period of their partners, they do so in several unique and culturally appropriate ways (Powis et al., 2023).

2. In Senegal, pregnant women are at the centre of an *entourage*, a family-based social support group. "The entourage helps women navigate the pregnancy experience and helps women access health care, find proper nutrition, and take any medication required" (Powis et al., 2023, p. 331).

3. Men in Senegal are involved in prenatal and postnatal care through health interpretation, monitoring the well-being of their partners. The Ministry of Education and Science is responsible for the implementation of the National Plan of Action on Youth Employment, this involvement is valued and recognized as an important part of the support system for pregnant women in Senegal (Powis et al. 2023).

4. Women in Senegal support the concept of humanised delivery, valuing aspects such as motivated personnel, the dignity of the mother, the freedom to eat and drink, and the use of relaxation techniques (Gélinas et al. 2022).

5. The concept of 'humanised childbirth' in Senegalese health facilities is implemented through a series of conditions designed to make women feel comfortable and experience a pleasant birthing process (Gélinas et al., 2022).

6. One of the aspects integrated in the humanised childbirth is "the freedom of choice for birth positions and companionship" (Gélinas et al., 2022, p. 96).

7. "99,5% of women preferred the lying on the back position because it is what they were more used to, and they believed it to be more comfortable and safer for the baby" (Gélinas et al., 2022, p. 97).

8. The physical space and equipment in health facilities may not be designed to accommodate free birthing positions, posing a practical barrier to their adoption (Gélinas et al., 2022).

9. "Cultural norms around modesty and privacy can influence the acceptability of companionship during childbirth, some women may feel embarrassed or ashamed to have someone", even a close family member, present during the delivery. (Gélinas et al., 2022).

10. Traditional gender roles and expectations can influence the acceptability of male companionship during childbirth, men may not be encouraged or expected to participate in the birthing process due to cultural norms (Gélinas et al., 2022).

11. Due to limited domestic resources, availability of means of transport, lack of information on health services, lack of preparation for childbirth, cultural beliefs, and lack of knowledge of the required health services most of women do not access health services (Kyei-Nimakoh et al., 2017).

12. Limitations to accessing health services depend on the means of transportation available at home or the lack of transportation, the distance to health facilities and the family's income (Faye et al., 2010).

13. Cultural and social factors influence the preference for traditional birth attendants,

as well the possibility to practice in cultural practices in home births (Faye et al., 2010).

14. Women with a higher level of education are more likely to be autonomous in their decisions about health care (Sougou et al., 2020). This aspect demands a need to share knowledge related to pregnancy and maternatl heatlth.

15. Local government should invest in women's education, especially at the tertiary level, if women have a higher level of education they will have autonomy in health-related decision-making (Sougou et al., 2020).

16. Promote educational campaigns aimed at women to empower their decision-making capacity and autonomy in health-related issues (Sougou et al., 2020).

17. The study conducted by Biaye et al., highlights the importance of community education on safe motherhood, improving education levels, communication systems, transportation, access to quality reproductive health services, and emergency obstetric care to lower maternal mortality rates (Biaye et al., 2019).

18. Traditional childbirth is often carried out in rural areas. "In rural areas, women gave birth in the backyard pf their houses and then went to rest for a few days in a place that is now known as *maternité traditionnelle*" (Samb, 2021, para. 3).

19. "Women give birth in the bathrooms, often located behind houses and made of palisades without any cover or protection, the woman remains in the bathroom with the matron who assisted her until she recovers and can hold the newborn" (Samb, 2021, para. 3).

20. "The female entourage gives to the woman massages and prepares natural drinks based on bissap (hibiscus), kel (gluant plant) and dates" (Samb, 2021, para. 4).

21. "In Senegal, more than 40% of women give birth at home, they can be assisted by traditional birth attendants called *mères des accouchées*" (Samb, 2021, para. 4).

22. After the birth, both mother and baby recover from this ordeal through long rest and special treatments. For example, the baby is given a three-phase ritual bath (Samb, 2021). "The first bath is in warm water. In the second, soap is added and in the third a jewel made of gold or silver and millet. This should ensure the child a long life, health and prosperity" (Samb, 2021, para. 4).

23. The birth in hospital, although often reassured by the security that it brings, will however be badly experienced by the impossibility of respecting traditions. The nursing staff who oversee such uprooted patients shall, with the help of cultural mediators, endeavour to know a minimum of customs and prohibitions, to try to gain trust through a respectful and listening attitude and to adapt its practices as best as possible while respecting the rules of hygiene and safety (Samb, 2021).

24. With free-style delivery, the woman is in a friendly atmosphere and less stressed (Samb, 2021).

25. The woman in labour sometimes wants to be lying, sitting, bent, kneeling or squatting, because women in Senegal are subjected to the only lying position when they give birth, they do not get away, very often, with satisfaction (Samb 2021).

26. The delivery room should be airy, spacious and clean, with an atmosphere conducive to the relaxation of the woman (Samb, 2021).

Analysis and interpretation of results:
After the analysis, it can be determined that it is important to integrate non-conventional spaces within the projection of maternity units, such as spaces for the use of alternative medicines, space for traditional practices and ceremonies, and a very important point is the inclusion of a common space for mothers, since for this culture, support among women is quite relevant, that is, to provide the unit with a space to acquire knowledge and support among mothers.

It was also possible to conclude that it is important to generate accessibility to this type of health facilities and to integrate traditional midwives. In addition, it is necessary to create a family environment, so that mothers do not feel discriminated against, and on the contrary, feel that their physical and psychological needs are being met.

Considering that the maternity unit can be a meeting point for many mothers and families. It is relevant to include common spaces for awareness-raising and education programmes, not only on health-related issues, but also on women's autonomy and decision-making power.

06

CASE STUDIES

06.1 Aim of the study

Before formulating the final conceptual proposal, an analysis of different maternity unit projects worldwide was considered essential. The main objective of this analysis was to identify which existing designs or innovative proposals have succeeded in integrating unconventional spaces, considering sociocultural factors, and implementing a more integrated development approach that prioritises the needs and experiences of the users involved. This preliminary analysis provides the basis for a more solid, conceptual, and grounded proposal.

In this context, it has been decided to classify projects into four distinct categories:

1. Maternity units integrated within hospitals or health centres: These units are part of larger infrastructures, and they are located within the traditional hospital framework.

2. Stand-alone maternity units: These are structures conceived exclusively for the purpose of maternal and neonatal care,detached from the traditional hospital setting.

3. Maternity Waiting Facilities: These facilities are designed to accommodate mothers, their families, and even health personnel. They aim to solve problems related to maternal health accessibility.

4. Unbuilt design proposals: This category includes projects that have been formulated and conceptualised but have not yet been implemented. These projects provide a practical perspective to the ongoing problem of maternal and neonatal care, especially in sub-Saharan Africa.

Through the study and comparative analysis of these projects, several key aspects were identified that provide additional tools and knowledge, which are of excellent value for the formulation of the future conceptual proposal. These aspects include, firstly, the spatial organisation that characterises each maternity unit, as well as the differentiation between required spaces and non-conventional spaces that have been incorporated. In this sense, it was observed how non-conventional spaces that fulfil distinct functions contribute to a better experience for both mothers and health professionals.

In addition to spatial configurations, the inclusion of contextual and sociocultural factors in each project was considered. Elements such as the incorporation of local cultural references, the participation of

those accompanying the mothers during the birth and postpartum process, and sociological studies were analysed to adapt the implementation of the project to the specific characteristics of the community in which it is located, as this type of observation ensures greater relevance and cultural sensitivity in the design, responding to local needs and expectations.

Another important aspect that was assessed was the connection of maternity spaces with the natural environment. Projects that manage to integrate natural elements within their designs tend to promote a more relaxing and healthier environment for both mothers and newborns. In this sense, the use of local materials and the creation of a welcoming, friendly, and homely atmosphere were valued. These factors contribute to the creation of a space that not only fulfils a health function, but also supports the emotional and psychological well-being of the mothers and staff.

This analysis generates a deeper understanding of how the integration of different elements can transform the medical environment into a more humanised space oriented towards the integrated well-being of patients, their families, and the staff.

06.2 Maternity units integrated within hospitals or health centres

Maternity units that are within larger health infrastructures or within a hospital are conceived in a unique way, as hospitals already have an established basis of the services they offer and the functions they perform, which in this case would support the activities of the maternity unit. The health infrastructure can include outpatient services, consultation rooms, rooms for more detailed check-ups such as ultrasound, and even the operating area. In that sense a continuous relationship between the hospital and the maternity unit is necessary, however, the unit should be an independent area that ideally has its own access.

From this point of view, it can be recognised that maternity units that are included in another structure do not integrate all the required spaces in their design in a comprehensive manner, as many of these spaces are already within the hospital, it is therefore necessary to establish a safe and smooth connection between these spaces included in the hospital and the maternity unit.

In the following, different projects will be presented to identify which required spaces are projected within the unit and if there is relationship or integration of other types of spaces, whether medical or non-conventional.

Mother & Baby Unit at Panzi Hospital

Illus 42.

LOCATION

Bukavu, Democratic Republic of Congo

SURFACE

-- / Masterplan

YEAR

2016

ARCHITECTS

White Arkitekter

TYPE OF FACILITY

Unit within the hospital

Contextual and socio-cultural factors

- ◯ Inclusion of cultural elements
- ✓ Consideration of companions
- ◯ Sociological analysis of the site

Natural Environment

- ✓ Connection with natural elements

Materials

- ✓ Use of local materials

Environmental characteristics

- ✓ Welcoming environment
- ◯ Homely environment
- ✓ Friendly environment

This project is developed on a much larger scale considering that the maternity and baby unit is located within the Panzi Hospital, which handles 3,500 births per year, the idea of the project comes from the need to reduce the maternal and post-natal mortality rates while providing more positive birth experiences (Stott, 2019). The architectural studio White Arkitekter proposes a simple and harmonious design planned according to the principles of healing architecture. This emphasis on the connection between good design and patient recovery is demonstrated by features like clear pathways, natural light, seclusion, and views of the outdoors (Stott, 2019, para, 3).

"The new unit consists of two distinct parts: the pavilions and the intensive block, the pavilions house all post-partum patient rooms and the outpatient department in two stories" (White Arkitekter, 2018, p. 21). While the intensive block contains the labour ward and neonatal unit, ensuring that the mother and newborn do not have any separation, which is ideal the labour ward and neonatal unit lie in direct proximity, enabling co-care of mother and child. "The wards are small with patient rooms for one to two women maximum, they are grouped in small units of 8-16 patients" (White Arkitekter, 2018, p. 22).

This kind of grouping of space creates a sense of familiarity and safety for the patient, additionally each unit has privileged access to green courtyards. "The patient rooms are planned for maximum two beds, providing the patient with a calm environment in which to heal, but still sized to enable the presence and the support of family members during the stay at the hospital" (White Arkitekter, 2018, p. 28).

To apply the concept of "Healing architecture" the project develops Atriums both in the pavilions and in the intensive block, these atriums translate into internal courtyards that allow the creation of gardens and guarantee a contact with nature and provide natural light. In addition, "these gardens can be used for rehabilitation, recreation and social activities" (White Arkitekter, 2018, p. 21).

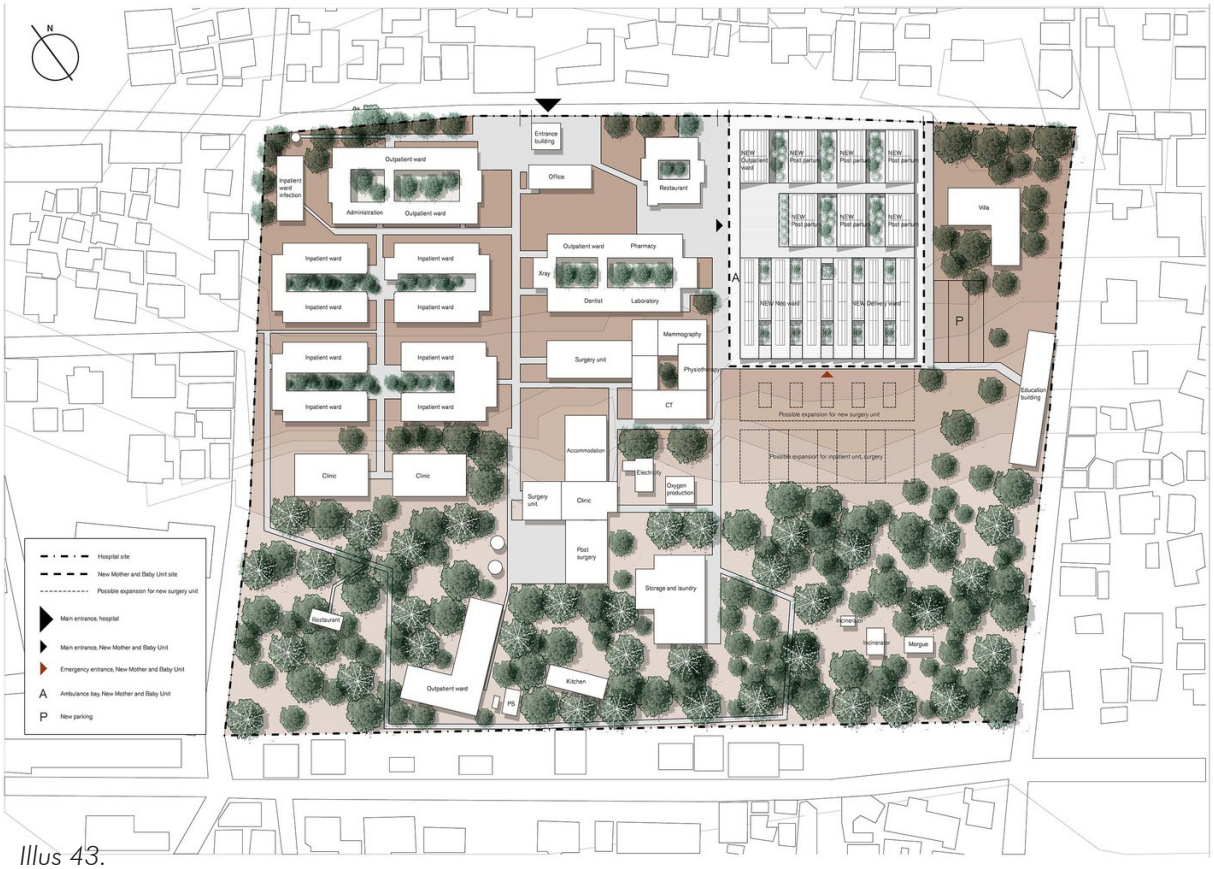
In general, the project tries to maintain a welcoming and attractive environment for patients, considering factors such as lighting, contact with nature, the use of local materials and the indoor quality (White Arkitekter, 2018). However, despite offering a different proposal, it does not innovate in the spaces beyond maintaining international requirements to ensure quality procedures, which casts doubt on whether the intervention was really the right one.

Although design focuses on the well-being and improvement of the patient, it does not consider cultural aspects and/or customs of the place where it is developed. Nevertheless, positive aspects include the integration of a conference room for educational purposes, as well as the availability of spaces within the hospital for mammography, physiotherapy, laboratory, and pharmacy, which can function as support areas for the activities of the maternity unit.

INTEGRATION OF NON-CONVENTIONAL SPACES

INDICATOR	YES	NO
Room for the use of alternative medicine		X
Overnight rooms for companions and family		X
Single occupancy birth rooms	X	
Room for traditional practices		X
Sacred room / spiritual space		X
Service Ward		X
Common room for mothers	X	
Social room	X	
Family room		X
Filter space (in birthing room)		X
Accommodation for birth attendants		X
Transitional care facility		X
Sitting room for parents	X	
Care areas for infants		X
Play area for other children in the family		X

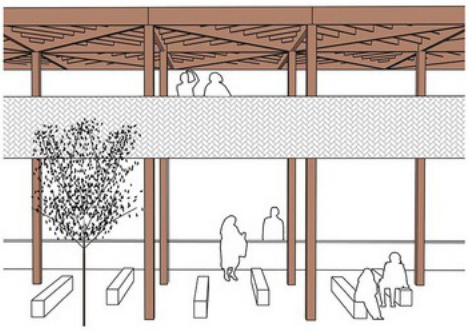
Table 25.



Illus 43.

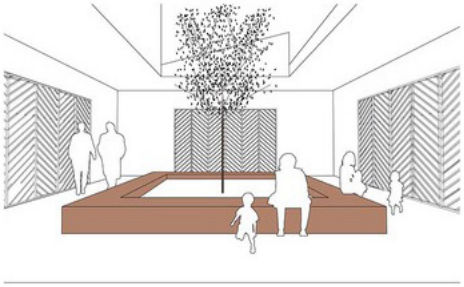
Illus 44.

Illus 45.



ATTRACTIVE AND WELCOMING ENVIRONMENT

EASY ORIENTATION



PRIVATE AND SOCIAL

Illus 46.

DAYLIGHT

Illus 47.

Bukasakya Maternity Centre

Illus 48.

LOCATION

Bukasaky, Mbale, Eastern Uganda

SURFACE

900 sm

YEAR

2022

ARCHITECTS

CAUKIN Studio in collaboration with HOK Architects

TYPE OF FACILITY

Unit within the hospital

Cultural and contextual characteristics

- ◯ Inclusion of cultural elements
- ◯ Consideration of companions
- ◯ Sociological analysis of the site

Natural Environment

- ✓ Connection with natural elements

Materials

- ✓ Use of local materials

Environmental characteristics

- ◯ Welcoming environment
- ◯ Homely environment
- ◯ Friendly environment

This project was conceived under the current premise of Mbale district in Uganda, where "women are 56 times more likely to die in childbirth compared to the United Kingdom" (Caukin Studio, n.d., para. 1). Considering this figure, it became necessarily urgent to provide the district with a maternity centre to reduce and prevent maternal deaths (Gonçalves, 2020). Thus, the aim of the project was to provide an adequate health service for the community and to give mothers the possibility of accessing a service in a health facility instead of opting for a home birth, consequently decreasing the possible dangers for mothers and newborns.

Two distinct areas can be identified in the CAUKIN architectural studio's proposal for the Bukasakya maternity centre, even though the areas are not separated by blocks or buildings. The first is the outpatient area, with the reception area, waiting room, and the other spaces required to provide good outpatient care. The second area is dedicated to inpatients, where the rooms are arranged in a certain way to follow the normal stages of labour, starting with triage and ending in the post-natal care ward. This separation of the outpatient and inpatient areas is intended to reduce crossover between patients and thus keep sanitary and hygiene requirements more under control (Caukin Studio, n.d.).

The design unfolds in a U-shape allowing the creation of an internal courtyard that consciously allows access to natural light and in turn aids air circulation. The spaces facing this courtyard are strategically located to provide a visual connection from the interior, especially for the inpatients, and ensure a link with the vegetation (Gonçalves, 2020).

In the floor plan of the project despite being a reticular centre with defined flows, in the entrance area there is a laundry and cooking space for visitors, this area can function as a facility and provide some services for the inpatient mothers and their companions.

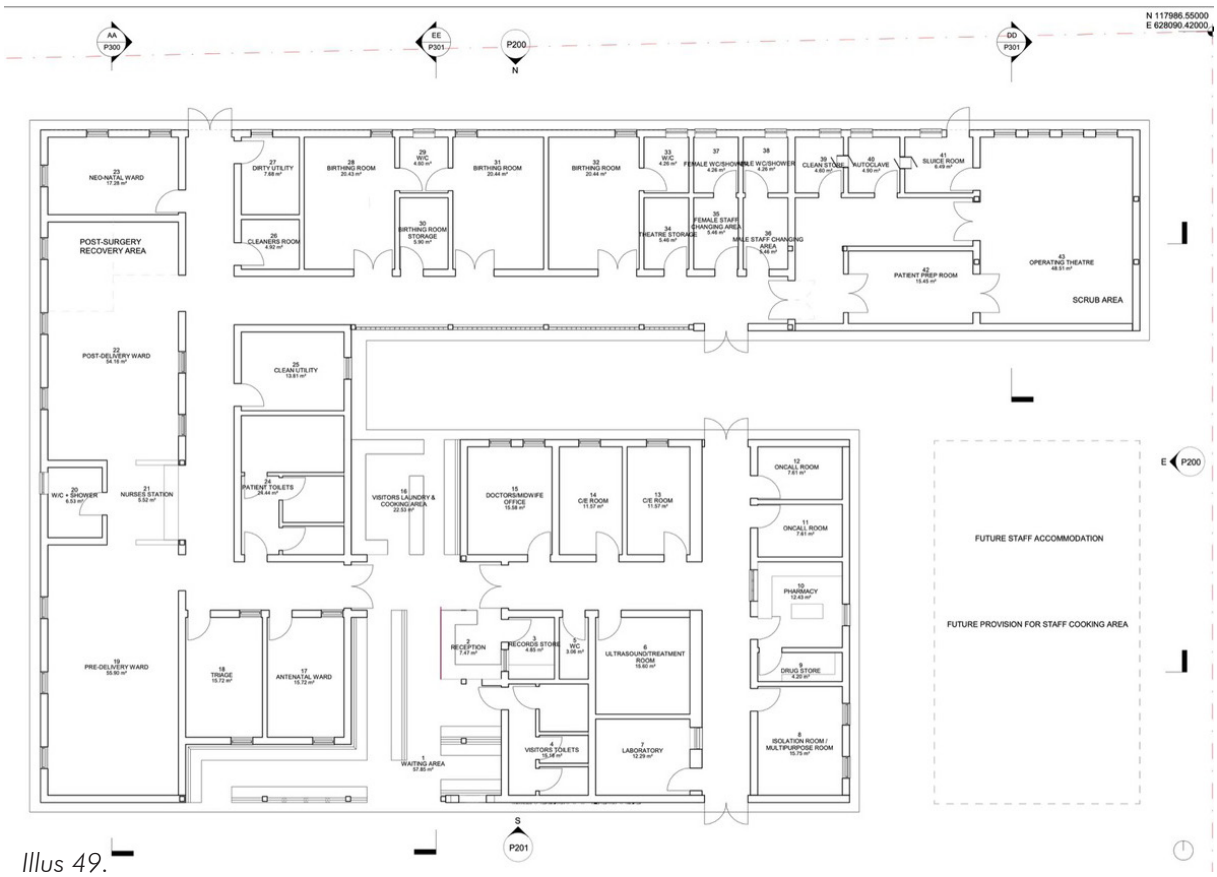
The interesting thing about the project is that it manages to incorporate this small service area within the sanitary structure itself, which is unusual due to the strictly sanitary constraints that must be met.

A relevant aspect is that the hospital structure provides for the disposal of placental waste, although without considering specific socio-cultural considerations. Nevertheless, this arrangement represents a step forward at least in terms of waste management.

INTEGRATION OF NON-CONVENTIONAL SPACES

INDICATOR	YES	NO
Room for the use of alternative medicine		X
Overnight rooms for companions and family		X
Single occupancy birth rooms		X
Room for traditional practices		X
Sacred room / spiritual space		X
Service Ward	X	
Common room for mothers		X
Social room	X	
Family room		X
Filter space (in birthing room)		X
Accommodation for birth attendants		X
Transitional care facility		X
Sitting room for parents	X	
Care areas for infants		X
Play area for other children in the family		X

Table 26.



Illus 49.

Illus 50.

Illus 51.

Illus 52.

Illus 53.

Busengo Maternity Ward

Illus 54.

LOCATION
Busengo District, Rwanda

SURFACE
297 sm

YEAR
2014

ARCHITECTS
Studio tamassociati
ASA studio

TYPE OF FACILITY
Unit within health centre

Cultural and contextual characteristics

- ◯ Inclusion of cultural elements
- ◯ Consideration of companions
- ◯ Sociological analysis of the site

Natural Environment

- ✓ Connection with natural elements

Materials

- ✓ Use of local materials

Environmental characteristics

- ◯ Welcoming environment
- ◯ Homely environment
- ◯ Friendly environment

The idea behind the proposal is to customise the standard MoH/Global fund scheme to the physical constraints of the available site in Busengo and include minor improvements (Studio Tamassociati & ASA Studio, n.d.). From an already established base, the building remains the same 297 square metres, but with the idea of generating an improvement of the unit, the physical and visual connection between the block and the existing buildings is proposed.

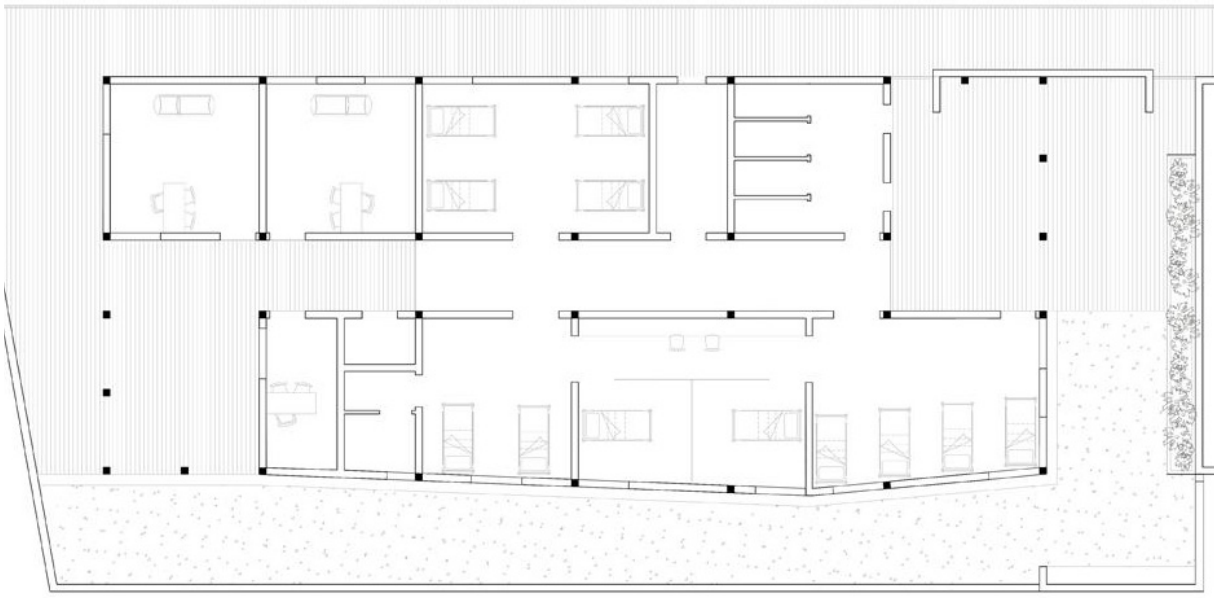
Most of the interventions in this project opt to improve the internal experience of the unit's users to create a sense of wellbeing and a better feeling of space, these interventions are not made with the inclusion of non-conventional spaces as there are limitations in the availability of space, the interventions are more in relation to lighting, ventilation, and visual connections.

A connection is established between the old health centre and the maternity unit by means of a paved outdoor area, covered by a porch, from which views of the surroundings can be appreciated. In terms of internal interventions, a central light well was constructed to allow natural light and facilitate cross ventilation, thus maximising the natural conditions of the surroundings to enhance the experience inside the building (Active Social Architecture, n.d.)

INTEGRATION OF NON-CONVENTIONAL SPACES

INDICATOR	YES	NO
Room for the use of alternative medicine		X
Overnight rooms for companions and family		X
Single occupancy birth rooms		X
Room for traditional practices		X
Sacred room / spiritual space		X
Service Ward		X
Common room for mothers		X
Social room	X	
Family room		X
Filter space (in birthing room)		X
Accommodation for birth attendants		X
Transitional care facility		X
Sitting room for parents		X
Care areas for infants		X
Play area for other children in the family		X

Table 27.



Illus 55.

Illus 56.

Illus 57.

Illus 58.

Illus 59.

Maternity Unit at Butaro Hospital

Illus 60.

LOCATION
Burera, Rwanda

SURFACE
6040 sm

YEAR
2011

ARCHITECTS
MASS Design Group

TYPE OF FACILITY
Unit within the hospital

Cultural and contextual characteristics

- ◯ Inclusion of cultural elements
- ◯ Consideration of companions
- ☑ Sociological analysis of the site

Natural Environment

- ☑ Connection with natural elements

Materials

- ◯ Use of local materials

Environmental characteristics

- ☑ Welcoming environment
- ◯ Homely environment
- ☑ Friendly environment

Just after the genocide against the Tutsi in 1994, the Rwandan government committed to rebuilding the country's health system over the next two decades (MASS Design Group, n.d.). In 2007, Burera was one of the last two districts in Rwanda without a tertiary care hospital, as part of Partners in Health's mission to bring high-quality healthcare to the country's poorest regions, a district-wide plan to increase access to care was developed in partnership with the Rwandan Ministry of Health (MASS Design Group, n.d., para. 1).

MASS Design in collaboration with (Partners in Health) aimed to create a more holistic model involving the needs of the context. In that sense, the project designed the hospital with the spatial and sanitary requirements, but at the same time involved the community in the construction process, having a double purpose of employing local people and generating awareness and training in the local community (Cohen, 2012).

"The 150-bed Butaro District Hospital was developed to provide both in- and outpatient services, with a particular emphasis on maternal health" (MASS Design Group, n.d., para. 2). The hospital's design is organised around an umuvumu tree, a traditional symbol of community gathering in Rwandan

culture, and consists of a landscaped campus composed of several terraced buildings along a hillside (MASS Design Group, n.d.). Basic services to provide critical care and referral include a laboratory, a neonatal intensive care unit and operating theatres.

Butaro District Hospital was specifically designed to minimise and control airborne disease transmission through several strategies, such as spatial planning, separation of patient and staff flows, and the use of natural cross ventilation. In addition, all hospital corridors are located on the perimeter of the building, allowing patients and staff to move in the open air, thus improving circulation and environmental safety (Cohen, 2012).

This project is quite interesting because it integrates several factors that have been mentioned in previous chapters that help to improve the experience of the mother, her companions, and the staff. Among these factors are the connection with natural elements through large windows within the ccommodation inpatient areas, and the connection with the central courtyard. The use of natural light and application of cross ventilation is also integrated into the building, as well as the use of a non-permeable continuous finish for the floor surfaces, which provides an easy-to-clean and durable surface.

In addition to the aspects mentioned above, some of the design principles of healing architecture are assessed by the well-designed outdoor spaces of the hospital, the campus developed can contribute to a heightened sense of privacy for patients, fostering an environment that supports recovery. Another aspect is the connection with natural elements, increased vegetation and views to gardens have also been shown to reduce stress and pain perception in patients, as well as increase retention of nursing staff (MASS Design Group, n.d.).

INTEGRATION OF NON-CONVENTIONAL SPACES

INDICATOR	YES	NO
Room for the use of alternative medicine		X
Overnight rooms for companions and family		X
Single occupancy birth rooms		X
Room for traditional practices		X
Sacred room / spiritual space		X
Service Ward	X	
Common room for mothers		X
Social room	X	
Family room		X
Filter space (in birthing room)		X
Accommodation for birth attendants	X	
Transitional care facility		X
Sitting room for parents		X
Care areas for infants		X
Play area for other children in the family		X

Table 28.

Illus 61.

Illus 62.

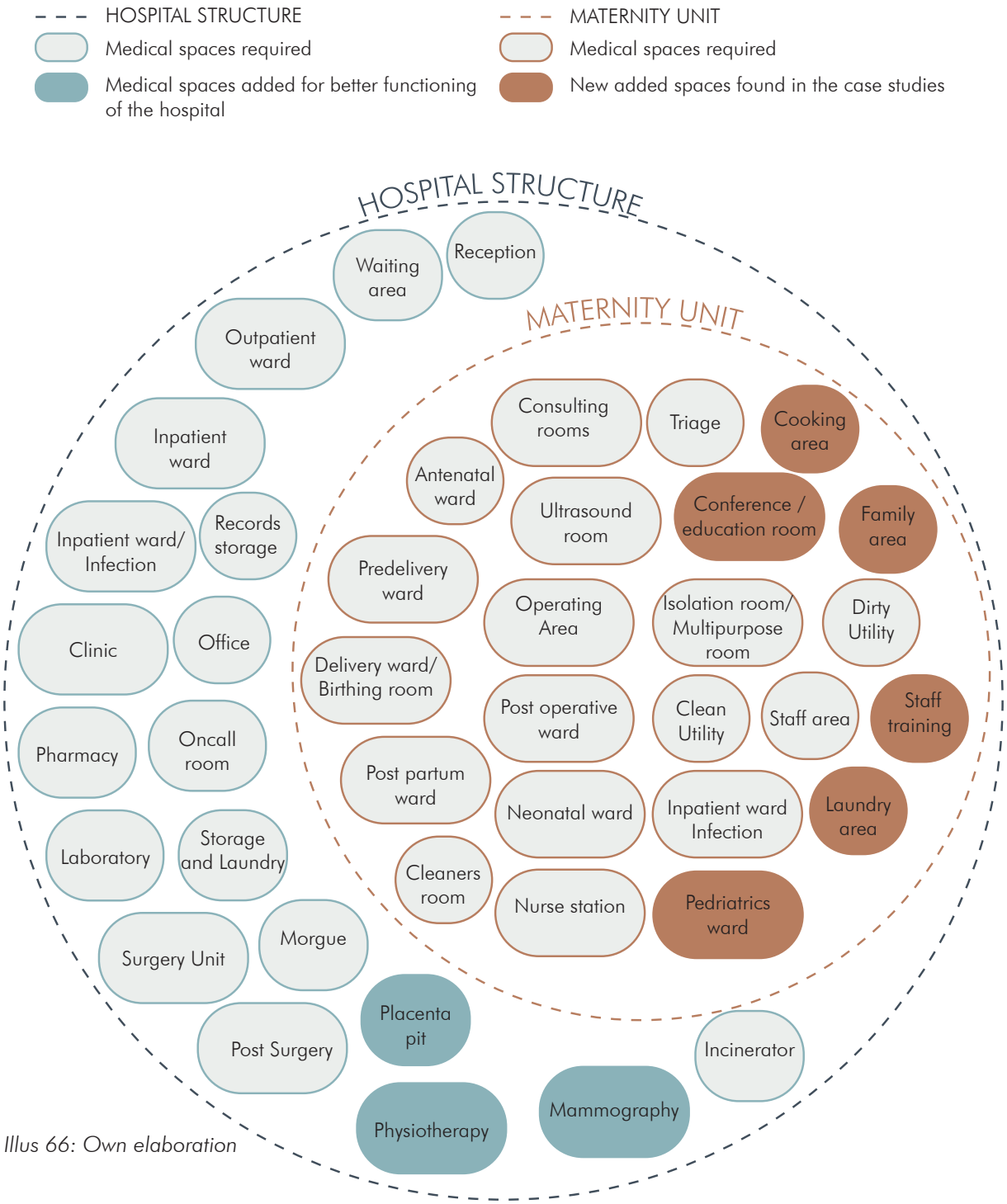
Illus 63.

Illus 64.

Illus 65.

After analysing these examples there are findings that could be considered important in the design of maternity units. Apart from the medical spaces required in a hospital, depending on the level of service, spaces that are related to and support the activities of the maternity unit could be integrated, such as a physiotherapy room, a room for mammography examinations, and a special space for the disposal of the placenta.

As for the maternity unit, in addition to its medical requirements, other types of spaces could also be included. In medical terms, a paediatric ward could be included, while unconventional spaces could include a room for educational purposes, either for parent education programmes or staff training, a cooking area, laundry, and even an area or room for the family.



Illus 66: Own elaboration

06.3 Stand-alone maternity units

Stand-alone maternity units have a different type of structure, as it must be guaranteed that mothers will receive prenatal care, delivery assitance, and postnatal and neonatal care within the same unit. In some cases, they may include an operating area, however, this depends on the level of care at which the unit is aimed and whether they have the capacity in infrastructure, equipment, supplies, and medical staff to treat all types of pregnancies from non-risk to risky.

Such units can be managed by both specialised medical personnel and midwives, or by a combination of both types of professionals. This mixed approach enables comprehensive care that is adapted to the needs of each patient, drawing on both the clinical and technical knowledge of the medical staff and the experience and skills of the midwives during delivery. This ensures a continuum of quality care, which contributes to improved maternal and neonatal health outcomes.

Some maternity units in different contexts are presented below to analyse whether they consider other approaches to maternity development, whether they consider local community factors, and which non-conventional spaces can be integrated.

Kachumbala Maternity Unit

Illus 67.

LOCATION
Kachumbala, Uganda, Africa

SURFACE
274 sm

YEAR
2017

ARCHITECTS
HKS Architects

TYPE OF FACILITY
Independent Facility

Cultural and contextual characteristics

- ◯ Inclusion of cultural elements
- ☑ Consideration of companions
- ◯ Sociological analysis of the site

Natural Environment

- ◯ Connection with natural elements

Materials

- ☑ Use of local materials

Environmental characteristics

- ◯ Welcoming environment
- ◯ Homely environment
- ◯ Friendly environment

As mentioned on the website of the architecture studio HKS Architects:

Kachumbala is a poor rural community in eastern Uganda with limited access to health care and a high infant mortality rate. "It's outdated, two-room, 1950s-era maternity unit could not accommodate nearly half of the women who travel long distances to the facility to give birth" (HKS Architects, n.d., para. 1). Rather, many women choose to stay at home and give birth without medical assistance, increasing the risk of infant and maternal mortality caused by infection or birth complications (HKS Architects, n.d.).

The project commission was born with the idea of improving local maternity capacity to increase safety for both mother and baby, the design is developed under a new distribution where existing functions are separated.

Upon entering the maternity unit, the first space will be the reception which is separate from what could be considered as the delivery area, this houses two suites connected by the sluice room and the pharmacy. On the other side is the post-natal care wing, the design considers a large room with capacity for seven beds to accommodate a minimum of six births per day (Frearson, 2018).

The same design considers the possibility of expanding this post-natal room for future expansion, which is why the two adjacent rooms are the isolation ward and the family cooking area.

In favour of generating a relation with the local context and a sense of belonging for construction of the facility "were employed workers from local families, and the project was part of a prolonged engagement with women's cooperatives in the district" (Frearson, 2018).

As well were applied local materials to respect and take advantage of some contextual factors. "Terracotta screens, a feature found in local architecture, were added to external walls to allow light and air flow through the building while being self-shading" (Frearson, 2018, para. 10).

"Bricks were handmade on site, using a press block machine developed at a Ugandan university" (Frearson, 2018, para. 12). "All materials were sourced as locally as possible, with hollow breeze blocks used as columns to extend the building's span and tiles used for the floors" (Frearson, 2018, para. 14).

One of the spaces that stands out within the plan of the project which does not fulfil a proper medical function is a type of supportive bay which was added in the design to provide a cooking and washing facilities for the women, family that come to support pregnant and new mothers.

INTEGRATION OF NON-CONVENTIONAL SPACES

INDICATOR	YES	NO
Room for the use of alternative medicine		X
Overnight rooms for companions and family		X
Single occupancy birth rooms		X
Room for traditional practices		X
Sacred room / spiritual space		X
Service Ward	X	
Common room for mothers		X
Social room	X	
Family room	X	
Filter space (in birthing room)		X
Accommodation for birth attendants		X
Transitional care facility	X	
Sitting room for parents		X
Care areas for infants		X
Play area for other children in the family		X

Table 29.

Illus 68.

Illus 69.

Illus 70.

Illus 71.

Illus 72.

Woldya Maternity Centre

Illus 73.

LOCATION

Woldya, Ethiopia

SURFACE

800 sm

YEAR

Construction start date: August 2013 until 2017

ARCHITECTS

Vilalta Architects

TYPE OF FACILITY

Independent Facility

Cultural and contextual characteristics

- ☑ Inclusion of cultural elements
- ☑ Consideration of companions
- ☑ Sociological analysis of the site

Natural Environment

- ◯ Connection with natural elements

Materials

- ☑ Use of local materials

Environmental characteristics

- ☑ Welcoming environment
- ◯ Homely environment
- ◯ Friendly environment

The design proposed by the architects is to divide the maternity care centre in two areas with specific characteristics, both spaces are connected through the entrance space. (Vilalta Studio, 2019) "The first one is the functional and operational medical space and the second, a temporary hostel for upcoming patients that need a place to stay before they enter the final stage of their pregnancy, more images and architects' descriptions after the break" (Furuto, 2013).

To meet the functional requirements the maternity unit is composed of three rectangular volumes connected by a central corridor. The first block welcomes patients and houses the reception area, which features an outdoor section to take advantage of the space and climate, while also aiming to integrate the community into the building. The next block is the inpatient area, with different shared rooms for mothers in labour and postpartum care. Finally, the last block contains the operating area (Furuto, 2013).

Following a sociological analysis of the site, the mothers' waiting area is proposed as a solution to maternal healthcare access issues. As the website of Vilalta studio presented (2017):
The design of this space is inspired by the "tukuls", the traditional Ethiopian huts and it

is composed of circular volumes connected by paths. Like a big house for new mothers, it has a day area with an open-air living room, the veranda, a kitchen, and a night area with five rooms and toilets.

Additionally, this project incorporates cultural elements such as fractal designs, "a type of pattern frequently seen in cultural artefacts across the African continent. These designs are found in textiles, architecture, sculptures, and village layouts" (Furuto, 2013). The inclusion of such elements in the design can have positive effects on the mothers' experience, as the familiar cultural patterns create a more welcoming and familiar environment.

In the project mentioned, it can be recognized as the integration of elements beyond the the basic health requirements. This demonstrates at incorporating characteristics specific to different contexts is essential, particularly considering that, in areas with limited resources, access to healthcare is constrained by numerous factors.

Creating space for the family and companions provides wellbeing not only for them but also for the mothers who can count on company and support, and knowing that they have a temporary facility at their disposal that will ensure their access to adequate health care, increases the possibility of delivering at the health facility instead of at home with traditional birth attendants, which is usually a decision based on their own comfort.

INTEGRATION OF NON-CONVENTIONAL SPACES

INDICATOR	YES	NO
Room for the use of alternative medicine		X
Overnight rooms for companions and family	X	
Single occupancy birth rooms		X
Room for traditional practices	X	
Sacred room / spiritual space		X
Service Ward	X	
Common room for mothers	X	
Social room	X	
Family room	X	
Filter space (in birthing room)		X
Accommodation for birth attendants	X	
Transitional care facility	X	
Sitting room for parents	X	
Care areas for infants		X
Play area for other children in the family		X

Table 30.

Illus 74.

Illus 75.

Illus 76.

Illus 77.

Illus 78.

Guiba's Maternity

Illus 79.

LOCATION
Guiba, Burkina Faso

SURFACE
165 sm

YEAR
2016

ARCHITECTS
Albert Faus Architecture

TYPE OF FACILITY
Independent Facility

Cultural and contextual characteristics

- ◯ Inclusion of cultural elements
- ◯ Consideration of companions
- ◯ Sociological analysis of the site

Natural Environment

- ☑ Connection with natural elements

Materials

- ◯ Use of local materials

Environmental characteristics

- ◯ Welcoming environment
- ◯ Homely environment
- ◯ Friendly environment

The project aims to rehabilitate and extend the maternity building. The design takes the existing volume and its initial layout to improve its functionality, as well as the quality of the spaces and the level of interior comfort (Faus, A., 2021).

The building is developed in a square L-shaped plan, inside, the space is divided by a longitudinal corridor that allows to illuminate the internal space and generate a ventilation channel, this opening divide the building into two blocks. The northern block encloses the public consultation space, with its respective access, an open-air terrace, the waiting room, and the consultation room. On the other hand, the southern block is more focused on the clinical part, where the delivery room and the postpartum hospitalisation room were located (Architecture & Villalba, n.d.).

Different passive strategies are applied within the project to take advantage of the local conditions, for example, as an envelope a brick wall is used in compressed earth that insulates the outside heat to keep the inside cool, rainwater is collected to redistribute it and pour it in a specific place. Strategies for ventilation and lighting are also applied, with openings on the facades that match the prevailing winds, and the new corridor

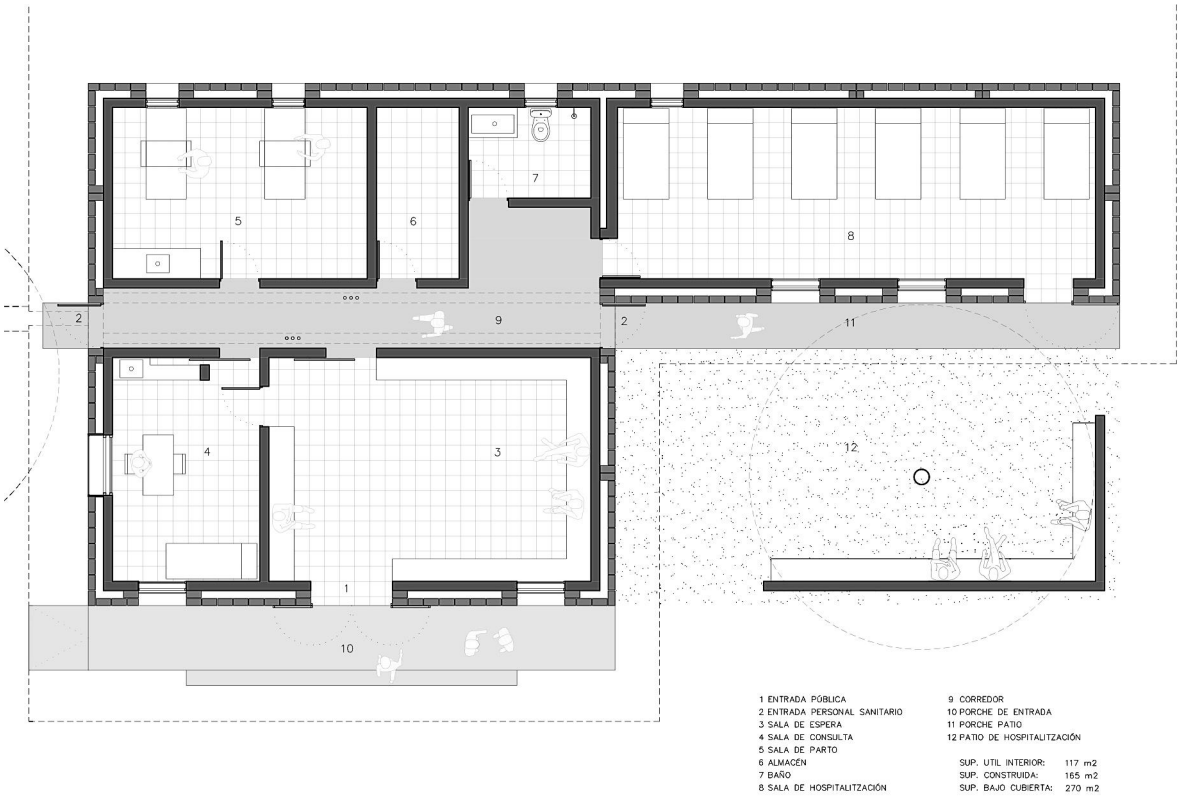
opening not only allows the air inside to be constantly renewed, but also allows the creation of private access for health staff on the east side of the building (Faus, A., 2021).

The project does not propose the inclusion of unconventional spaces within the maternity unit; rather, it carefully adapts to the conditions of the context, which has limited resources, thus making the design functional and efficient, responding appropriately to the needs of the community it serves. This approach optimises the use of available space and ensures that, even in precarious conditions, the maternity unit can offer essential and adequate services for maternal and neonatal care. The proposal, therefore, focuses on adaptability and maximising the functionality of each area, contributing significantly to the well-being of users and the accessibility of maternal health services.

INTEGRATION OF NON-CONVENTIONAL SPACES

INDICATOR	YES	NO
Room for the use of alternative medicine		X
Overnight rooms for companions and family		X
Single occupancy birth rooms		X
Room for traditional practices		X
Sacred room / spiritual space		X
Service Ward		X
Common room for mothers		X
Social room		X
Family room		X
Filter space (in birthing room)		X
Accommodation for birth attendants		X
Transitional care facility		X
Sitting room for parents	X	
Care areas for infants		X
Play area for other children in the family		X

Table 31.



Illus 80.

Illus 81.

Illus 82.

Illus 83.

Illus 84.

Maternity Centre in Anabah

Illus 85.

LOCATION
Anabah, Afghanistan

SURFACE
/

YEAR
2016

ARCHITECTS
TAMassociati
Emergency building and technical division

TYPE OF FACILITY
Independent Facility

Cultural and contextual characteristics

- ◯ Inclusion of cultural elements
- ✓ Consideration of companions
- ✓ Sociological analysis of the site

Natural Environment

- ◯ Connection with natural elements

Materials

- ◯ Use of local materials

Environmental characteristics

- ◯ Welcoming environment
- ◯ Homely environment
- ◯ Friendly environment

"In Afghanistan, where maternal mortality rate amounts to 396 for 100,000 live births, mothers' and children's health is a daily emergency, for many women" (EMERGENCY, 2016, para. 4). These demonstrate the need to improve and expand access to maternal health services. The Maternity Centre in Anabah "provides antenatal, gynaecological, obstetric, and neonatal care to the population of the Panjshir Valley and surrounding provinces" (EMERGENCY BE, n.d., para. 1).

The project is planned as an extension, with "four delivery rooms, operating theatres, a neonatal intensive care ward and step-down unit; an intensive care unit for women suffering birth complications, a clinic, a gynaecology ward, a follow-up area, and labour area" (EMERGENCY BE, n.d., para. 3).

This centre offers diagnostic services such as ultrasound, intensive care for both mothers and newborns, postnatal care, and gynaecological and obstetric procedures. In addition to medical care, the centre provides a prenatal program to help prevent complications during pregnancy. Although Afghanistan's extremely high infant and maternal mortality rates are beginning to improve.

The health centre is "the only specialised and completely free facility of its kind in an area with a population of over 250,000 people, it is open 24/7 and works alongside our network of First Aid Posts and Primary Health-care Centres spread throughout the Panjshir Valley" (EMERGENCY USA, n.d., para. 2).

INTEGRATION OF NON-CONVENTIONAL SPACES

INDICATOR	YES	NO
Room for the use of alternative medicine		X
Overnight rooms for companions and family		X
Single occupancy birth rooms		X
Room for traditional practices		X
Sacred room / spiritual space		X
Service Ward		X
Common room for mothers		X
Social room	X	
Family room		X
Filter space (in birthing room)		X
Accommodation for birth attendants	X	
Transitional care facility		X
Sitting room for parents		X
Care areas for infants		X
Play area for other children in the family		X

Table 32.

Illus 86.

Illus 87.

Illus 88.

Illus 89.

St. Boniface Maternal Health Centre

Illus 90.

LOCATION

Fond des Blanc, Haiti

SURFACE

510 sm

YEAR

2015

ARCHITECTS

Payette Architect and
Build Health International

TYPE OF FACILITY

Independent Facility

Cultural and contextual characteristics

- ◯ Inclusion of cultural elements
- ✓ Consideration of companions
- ◯ Sociological analysis of the site

Natural Environment

- ✓ Connection with natural elements

Materials

- ◯ Use of local materials

Environmental characteristics

- ◯ Welcoming environment
- ◯ Homely environment
- ◯ Friendly environment

The centre aims to provide Haitian women in rural areas with a respectful place to give birth while receiving adequate prenatal and postnatal care. "Only 39 percent of births in Haiti take place in healthcare facilities which reflects issues of access, quality, and demand as well as low rates of postpartum newborn care, this has resulted in Haiti having the highest rate of maternal mortality in Latin America and the Caribbean" (U.S. Agency for International Development, n.d.). For that reason, the maternity centre provides outpatient examinations, postpartum inpatient accommodation, pathological observation beds, labour rooms, and neonatal intensive care areas.

As stated on the website of Payette:

"The St. Boniface Hospital is the only hospital in the southern peninsula, serving a population of almost 12,000 inhabitants. Since it opened in 2015, the hospital has seen 2,000 inpatient cases, 42,000 emergency room visits and 5,000 births annually" (Payette, n.d, para. 1).

The building takes a modern, "back to basics" approach, employing local construction techniques and employing people from the local community. The design strategy is to allow the circulation, lobby, and waiting areas to be covered, but open to the outside

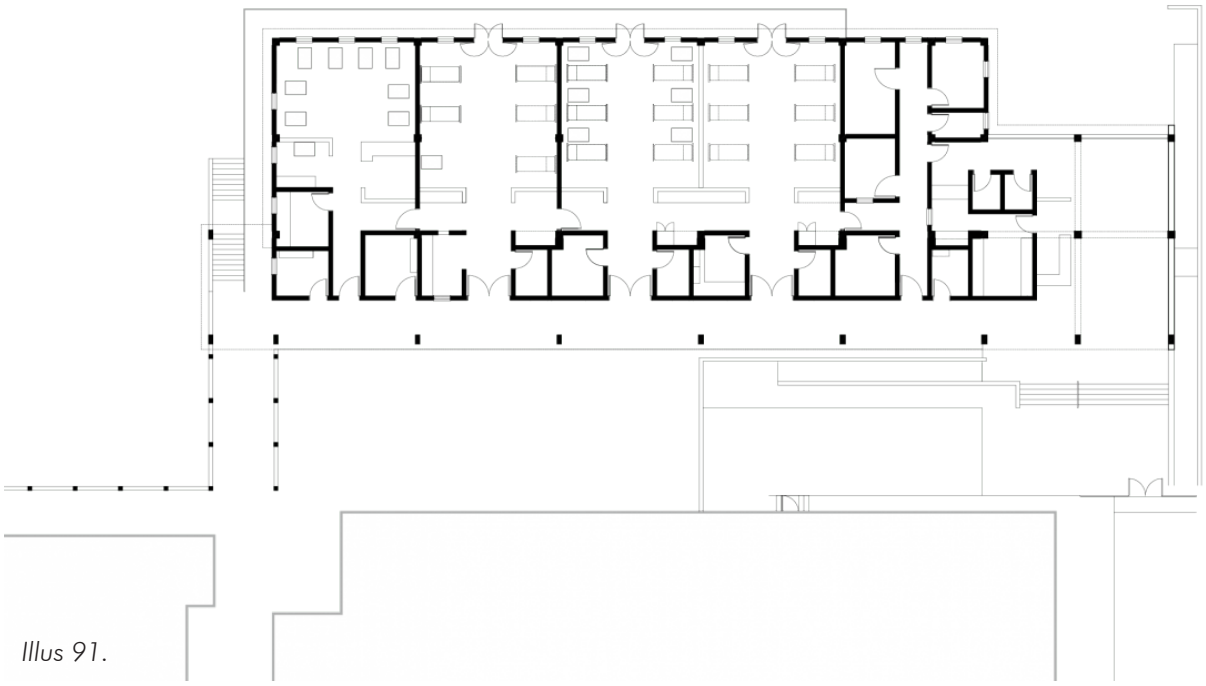
environment so that natural scenery can be appreciated. Meanwhile, all delivery rooms are completely enclosed (Payette, n.d). In addition to the building, a mother's garden is being developed with the purpose of generating a therapeutic space that accommodates the psychological and physical needs of patients, their families, and communities.

Among the innovative aspects that can be highlighted in this project is the training centre, which offers community health development programmes and related activities. And the garden of mothers, which offers a therapeutic space with a healing approach in which through the connection with natural elements the process of recovery is faster.

INTEGRATION OF NON-CONVENTIONAL SPACES

INDICATOR	YES	NO
Room for the use of alternative medicine		X
Overnight rooms for companions and family		X
Single occupancy birth rooms		X
Room for traditional practices		X
Sacred room / spiritual space		X
Service Ward		X
Common room for mothers		X
Social room	X	
Family room		X
Filter space (in birthing room)		X
Accommodation for birth attendants		X
Transitional care facility		X
Sitting room for parents	X	
Care areas for infants		X
Play area for other children in the family		X

Table 33.



Illus 91.

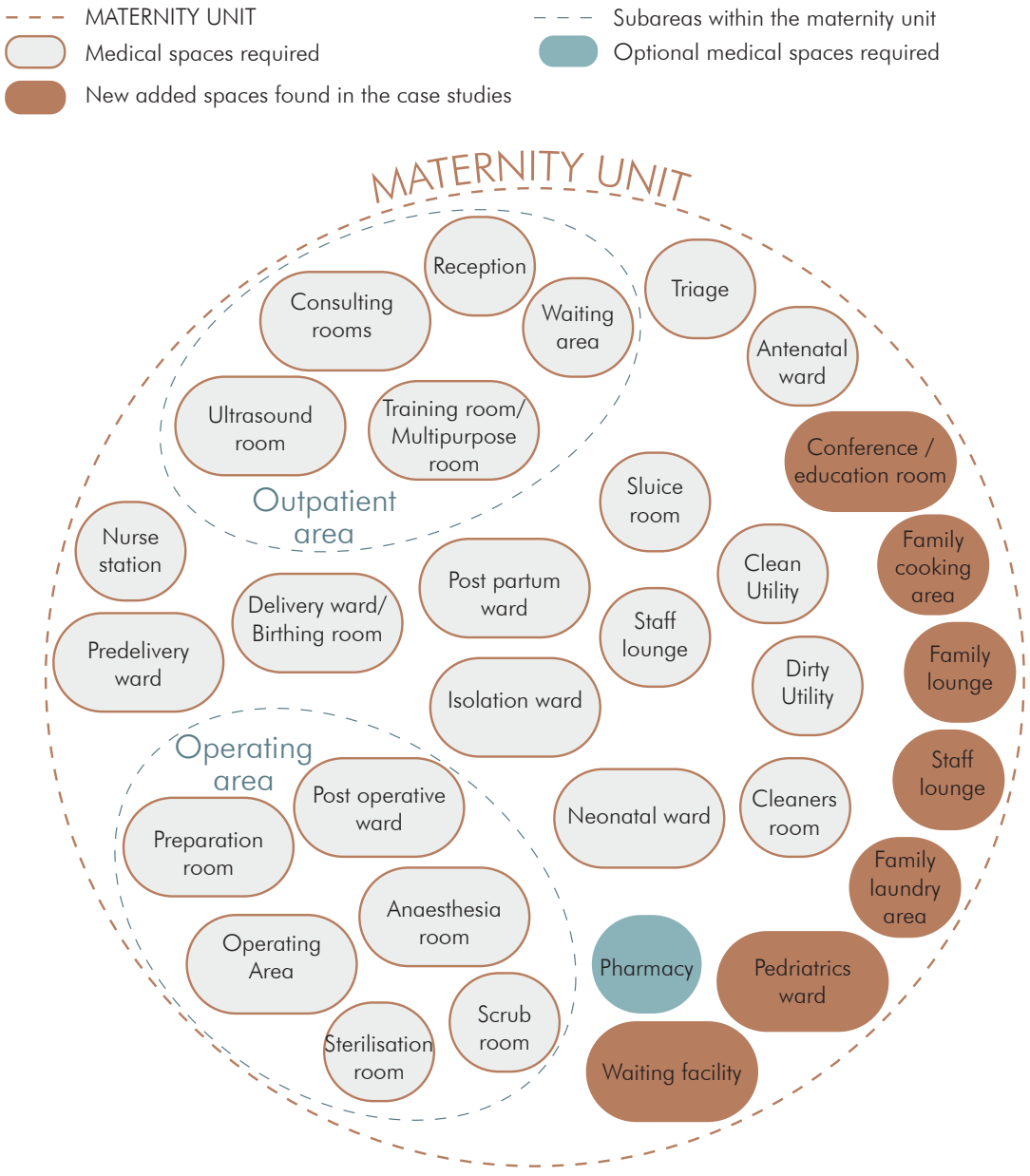
Illus 92.

Illus 93.

Illus 94.

After the analysis it can be concluded that the required medical spaces may vary within the maternity unit according to the level of service offered in the unit, i.e. depending on the complexity of services offered, the capacity of care and resources, and the infrastructure and equipment available, it is possible to integrated into the unit an operating area, a pharmacy, laboratories, a paediatric ward, examination rooms, among others.

On the other hand, it is noted that there is already an integration of non-conventional spaces such as family spaces and facilities for mothers and their companions such as cooking and laundry areas, also highlighted spaces for educational programs, lounge rooms for medical staff and midwives, and the waiting facilities which arise as a beneficial possibility for mothers, companions, and staff.



Illus 95: Own elaboration

06.4 Maternity Waiting Facilities

These types of facilities are analysed in a different way; they are considered relevant because they address a current problem in resource-poor contexts where access to health care is difficult. In many of these regions, limitations in infrastructure, medical personnel, and basic resources prevent women from receiving adequate care during pregnancy, childbirth, and neonatal care. In response to these challenges, these structures are proposed as a comprehensive solution that offers women and her family a safe and appropriate environment during the waiting period before delivery, as well as during neonatal care when necessary.

For these cases, the focus is more on what kind of spaces are included in the facility and what services can be offered to mothers and attendants. Among the essential services that these facilities can offer are access to trained health personnel, adequate rest areas, feeding services, and, in some cases, access to educational resources on neonatal care, maternal health, and sexual and reproductive health.

Maternity Waiting Village in Malawi

Illus 96.

LOCATION
Kasungu, Malawi

SURFACE
670 sm

YEAR
2015

ARCHITECTS
MASS Design Group

TYPE OF FACILITY
Supportative facility

Cultural and contextual characteristics

- ☑ Inclusion of cultural elements
- ☑ Consideration of companions
- ◯ Sociological analysis of the site

Natural Environment

- ☑ Connection with natural elements

Materials

- ☑ Use of local materials

Environmental characteristics

- ◯ Welcoming environment
- ☑ Homely environment
- ◯ Friendly environment

"In 2010 in Malawi, about one in thirty-six women had a lifetime risk of dying during pregnancy or delivery, largely from preventable causes" (MASS Design Group, n.d., para. 1). For this reason, maternity waiting facilities were established to reduce risks during pregnancy, ensure more direct access by women to maternal health services, and guarantee the availability of qualified health professionals.

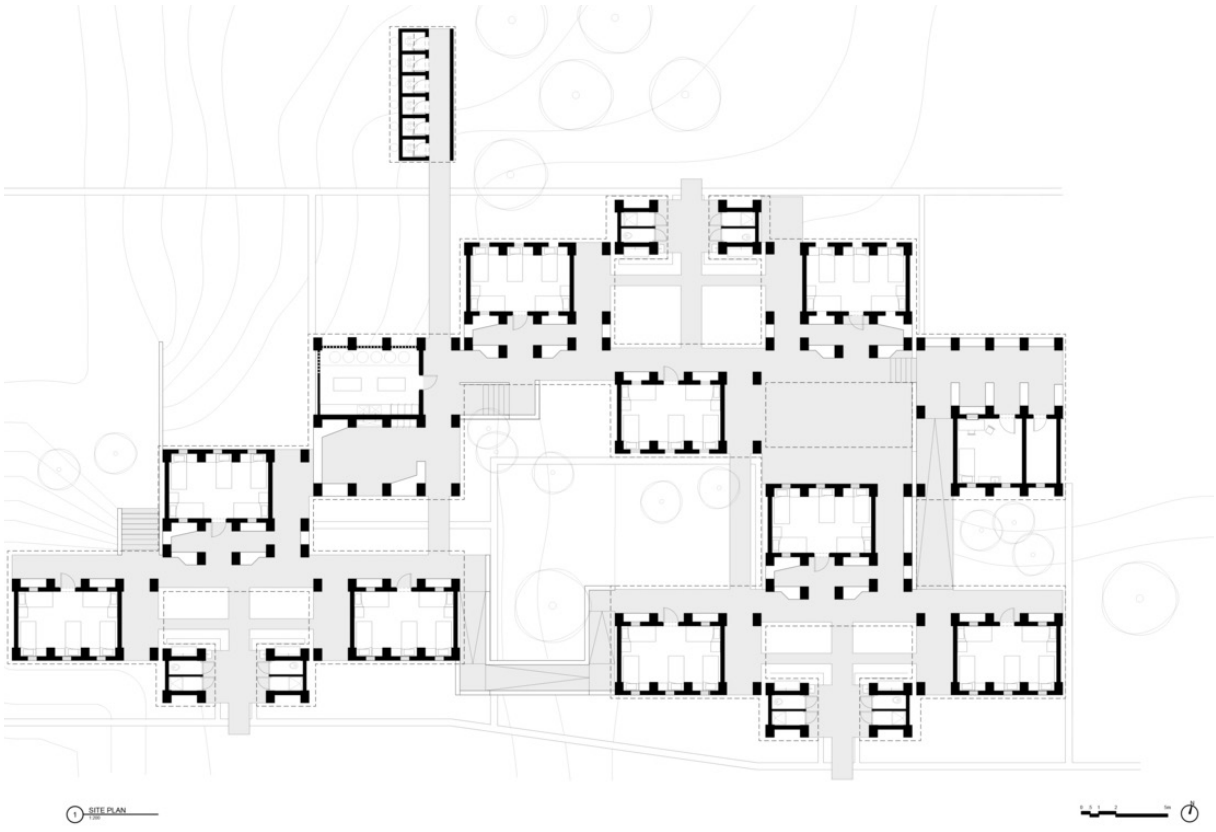
As established on the website of MASS Design Group (n.d.):
The existing prototype's single block concept was broken up into several smaller compounds arranged around tiny courtyards in the innovative design. This plan borrowed design cues from the vernacular layout of Malawian villages, where family compounds are composed of several small buildings housing branches of an immediate family. The smaller-sized housing blocks create communities that encourage knowledge sharing between experienced and first-time mothers.

This facility provides a supervised space for pregnant women from week 36 to delivery, allowing at the same time to accommodate family members and birth attendants. In this space, in addition to being cared for, women can participate in different activities that

allow the development of outdoor activities, where mothers can meet and socialise, also have educational areas where antenatal and postnatal care workshops and craft training are given to help mothers earn money while they are away from home (Silva, 2020).

This new village prototype creates a safe and familiar environment for the mothers, allowing it to be scalable and adaptable to other sites. In addition, different strategies are integrated to optimise local conditions such as the use of natural lighting and ventilation, and the use of locally sourced materials such as walls in earth blocks that absorb sunlight during the day and radiate heat during the coldest nights (MASS Design Group, n.d.).

In general terms, the inclusion of spaces outside those medically required can be highlighted, the monitoring space where mothers can be constantly examined until the time of delivery, the usability and functionality of the courtyards, the possibility of accommodation for mothers, their companions, and birth attendants, and the inclusion of educational spaces.



Illus 97.

Illus 98.

Illus 99.

Illus 100.

Illus 101.

Kay Manmito Mother's house

Illus 102.

LOCATION
Mirebalais, Haiti

SURFACE
946 sm

YEAR
2015 - 2016

ARCHITECTS
Partners in Health

TYPE OF FACILITY
Supportative facility

Cultural and contextual characteristics

- ◯ Inclusion of cultural elements
- ✓ Consideration of companions
- ◯ Sociological analysis of the site

Natural Environment

- ✓ Connection with natural elements

Materials

- ◯ Use of local materials

Environmental characteristics

- ◯ Welcoming environment
- ✓ Homely environment
- ✓ Friendly environment

This facility is designed to accommodate women with complicated pregnancies, mothers whose newborns are required to stay in the hospital's neonatal intensive care unit, and baby-sitting mothers. With in the spaces comps the structure, there is space for the accommodation of the mothers and babies, a monitoring space where "a nurse auxiliary is always on hand at Kay Manmito to answer women's questions, take vital signs, and help determine when labour has advanced enough to go to the delivery ward" (Partners in Health, 2020, para. 8). Also, a particular block offers facilities such as bathrooms for outpatients and mother's families, showers, and a common laundry area (Build Health International, n.d.).

Women staying in the residence receive three meals a day at a communal dining room where mothers socialise and share their stories, making the atmosphere much more familiar. On the other hand, women who are part of kangaroo moms stay in the same room as their babies so they can keep skin to skin contact.

In addition to the building, the Kay Manmito house offers varied daily educational programs in breastfeeding, nutrition, breast exams, among others, as well as prenatal yoga sessions. They also schedule activities outside the house such as pool days (Partners in Health, 2020).

Illus 103.

Illus 104.

Illus 33.

In summary, the role of such facilities in resource-limited settings can be highlighted from two very important points of view, the first in relation to mothers and their families or companions, and the second from the perspective of health personnel.

This type of facility allows for increased coverage of access to maternal care services, and from this perspective should be included in the public health policies of a territory. It provides women with the possibility of access to maternal and neonatal health care in a more efficient and direct way. In addition, it has other benefits, such as the preservation of traditions and culture in an environment surrounded by women and, at the same time, it provides a space for education, an important aspect in less developed contexts, i.e. the facility provides spaces for educational promotions and workshops.

On the other hand, from the point of view of health personnel, it also has benefits as these facilities can function together and serve as a temporary residence for staff, so that the continued presence of qualified personnel for the care of mothers and babies is guaranteed, ensuring that the quality of care can be maintained, as well as the correct development of interventions and medical procedures, thanks to the presence of qualified personnel.

Furthermore, if this type of facility accommodates both types of users, it is possible to foster a closer bond between medical staff and mothers, by sharing common spaces beyond the strictly medical sphere, daily interactions are generated that favour coexistence and reinforce relationships. These dynamics would strengthen the trust and connection between patients and staff, promoting a more collaborative and humane environment within the maternity unit.

06.5 Unbuilt design proposals

The projects presented below are proposals designed to improve maternity units, with a special focus on Africa, a region facing the highest maternal mortality rates in the world. These initiatives respond to the need to strengthen the quality of care provided to mothers and newborns. They also address the emergency of ensuring adequate, accessible, and equipped spaces to reduce risks and provide comprehensive care in contexts with limited resources and significant health challenges.

The first proposal implements a socio-cultural analysis of the context to integrate characteristics of local customs and culture within the health structure of the maternity unit, in this project it is possible highlight the integration of elements of internal decoration with typical Senegalese patterns, the provision of outdoor areas with traditional plant gardens for medicinal drinks, and the inclusion of a support and transition facility for women and their companions.

The second project is intended as a prototype that can be replicated throughout Uganda to ensure that the development of maternity units meets the health and infrastructure requirements for quality service.

These two examples demonstrate the different approaches that can be taken when designing maternity units. While one project considers factors in addition to medical requirements, the other project has a more functional focus, where health prerequisites based on international guidelines are met.

Kolda Maternity Centre

Illus 105.

LOCATION

Madina Ladji, Kolda, Senegal

SURFACE

350 sm

YEAR

Proposed 2024

ARCHITECTS

Mauve studio in collabortaion with Paula Garzon

TYPE OF FACILITY

Independent Facility

Cultural and contextual characteristics

- ✓ Inclusion of cultural elements
- ✓ Consideration of companions
- ○ Sociological analysis of the site

Natural Environment

- ✓ Connection with natural elements

Materials

- ✓ Use of local materials

Environmental characteristics

- ✓ Welcoming environment
- ✓ Homely environment
- ○ Friendly environment

The project was developed with a focus on the socio-cultural characteristics of childbirth in the context, maintaining as a pillar the value of women and the community in providing support during childbirth and the postpartum phase. Therefore, the design includes a community meeting space where women can stay surrounded by their families while being monitored by the medical staff at the centre.

The aim was to create a new maternity centre designed to embrace a simple and functional framework, where the architectural identity brings human values to the communities living in this area. The layout and organisation of the lot recall the traditional villages and fields of Africa, which typically have a circular configuration with buildings connected like satellites around a central hub. The design of the three buildings takes the shape of traditional houses, where the roof extends beyond the walls to form a pergola that also serves as a covered passage around the house.

In this case, the model of the house replicated is the impluvium one, where the roof converges towards the centre of the inner courtyard to collect rainwater, which can be reused for baths, irrigation of medicinal herb (like aloe, hibiscus, neem) cultivation areas,

or to create small streams that mitigate the dry climate.
The curved forms used in the design emphasise and visually resemble the shape of a mother's womb during pregnancy, thus conveying a strong sense of protection to those who visit the maternity centre. In traditional Senegalese culture, the community plays a fundamental role, especially during childbirth. The structure and buildings use different local materials to create a familiar place in this spot.

Besides functional spaces, the philosophy focuses on creating architectural details from local materials that resonate with people through the language of architecture. Two symbolic elements for African culture are incorporated: the use of fabrics to create comfortable environments for guests, which help them feel at home and provide benefits during childbirth by relieving pain and promoting relaxation through colour, thereby reducing or eliminating the need for analgesic medicines during labour. The second element is the "mashrabiya," a typical feature of vernacular architecture used for natural ventilation and to allow natural light into spaces.
The project consists of three buildings: the central one functions as a welcoming area for visitors and serves as a distribution hub, including a reception area for patients, a medical examination room, a space for the maternity centre staff, and an outdoor area covered by a pergola. The largest building is entirely dedicated to motherhood and childbirth, featuring two rooms for women about to give birth, a delivery room, an operating room, and a neonatal centre to accommodate newborns near their mothers.

The third building, located on the opposite side of the childbirth area, is designed for families. It includes bedrooms and a common area with a kitchen, allowing women who have just given birth to spend time with their families, who may come from neighbouring villages. We have also aimed to create an open space that integrates the building with the surrounding environment while retaining privacy when necessary.

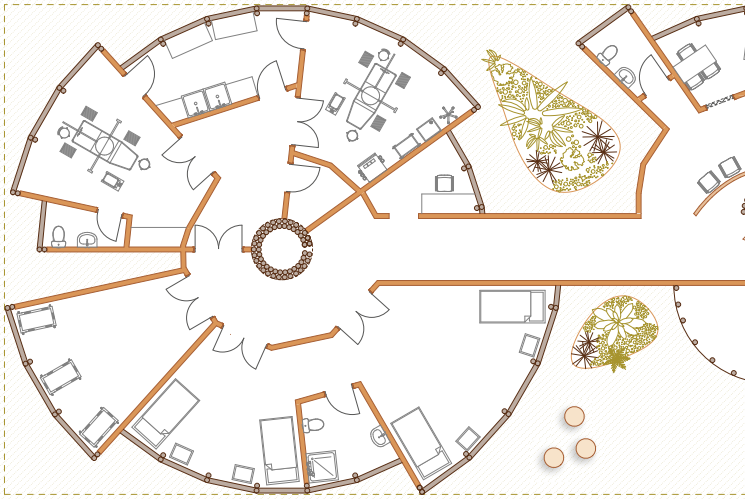
INTEGRATION OF NON-CONVENTIONAL SPACES

INDICATOR	YES	NO
Room for the use of alternative medicine		X
Overnight rooms for companions and family	X	
Single occupancy birth rooms		X
Room for traditional practices		X
Sacred room / spiritual space		X
Service Ward	X	
Common room for mothers	X	
Social room	X	
Family room	X	
Filter space (in birthing room)		X
Accommodation for birth attendants		X
Transitional care facility	X	
Sitting room for parents	X	
Care areas for infants	X	
Play area for other children in the family		X

Table 34.

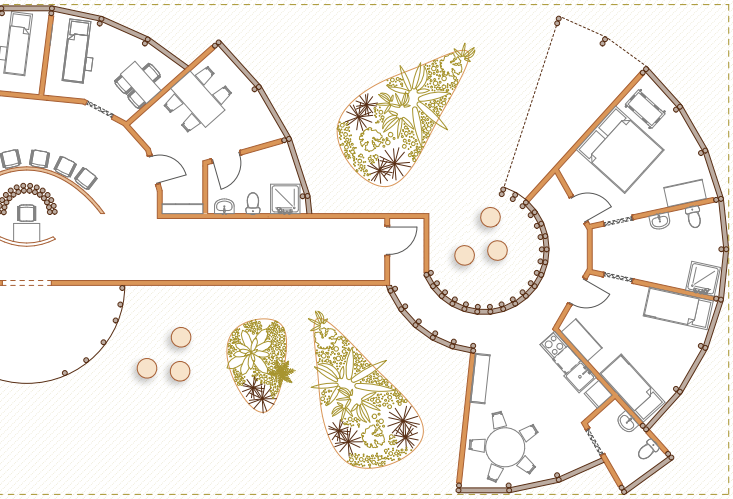
Illus 106.

Illus 107.



Illus 108.

Illus 109.



Illus 110.

Birthing Centre Prototype in Uganda

Illus 111.

LOCATION

Uganda, Sub Saharan Africa

SURFACE

446,31 sm

YEAR

Proposed 2017

ARCHITECTS

Gould Family Foundation
BHI, Dandelion Africa

TYPE OF FACILITY

Independent Facility

Cultural and contextual characteristics

- ☑ Inclusion of cultural elements
- ☑ Consideration of companions
- ☑ Sociological analysis of the site

Natural Environment

- ◯ Connection with natural elements

Materials

- ☑ Use of local materials

Environmental characteristics

- ◯ Welcoming environment
- ◯ Homely environment
- ◯ Friendly environment

This prototype was developed under the premise of setting a standard for delivery facilities in Jinja, Uganda. The design proposes an optimally functioning maternal health clinic that allows local teams to customise the program to their needs. "The prototype facility is designed with sustainable and vernacular traditions to ensure they are easily erectable by local teams and provide quality care for women and children" (Adaptiv, n.d., para. 1).

Within the design, the Build Health International organisation recognized the importance of family during birth, especially in rural areas, and it is for this reason that they propose the inclusion of flexible meeting spaces, outdoor rest areas and arrival areas are also integrated into the design. Another important aspect of this prototype is the inclusion of vernacular construction methods which allow to replicate the prototype more easily, in addition to maximising sustainable opportunities by capturing solar energy and rainwater and using local materials that have significant insulating properties (Build Health International, n.d.).

The development of this prototype makes it possible to highlight important findings in relation to socio-cultural perceptions which may vary around birth, for example,

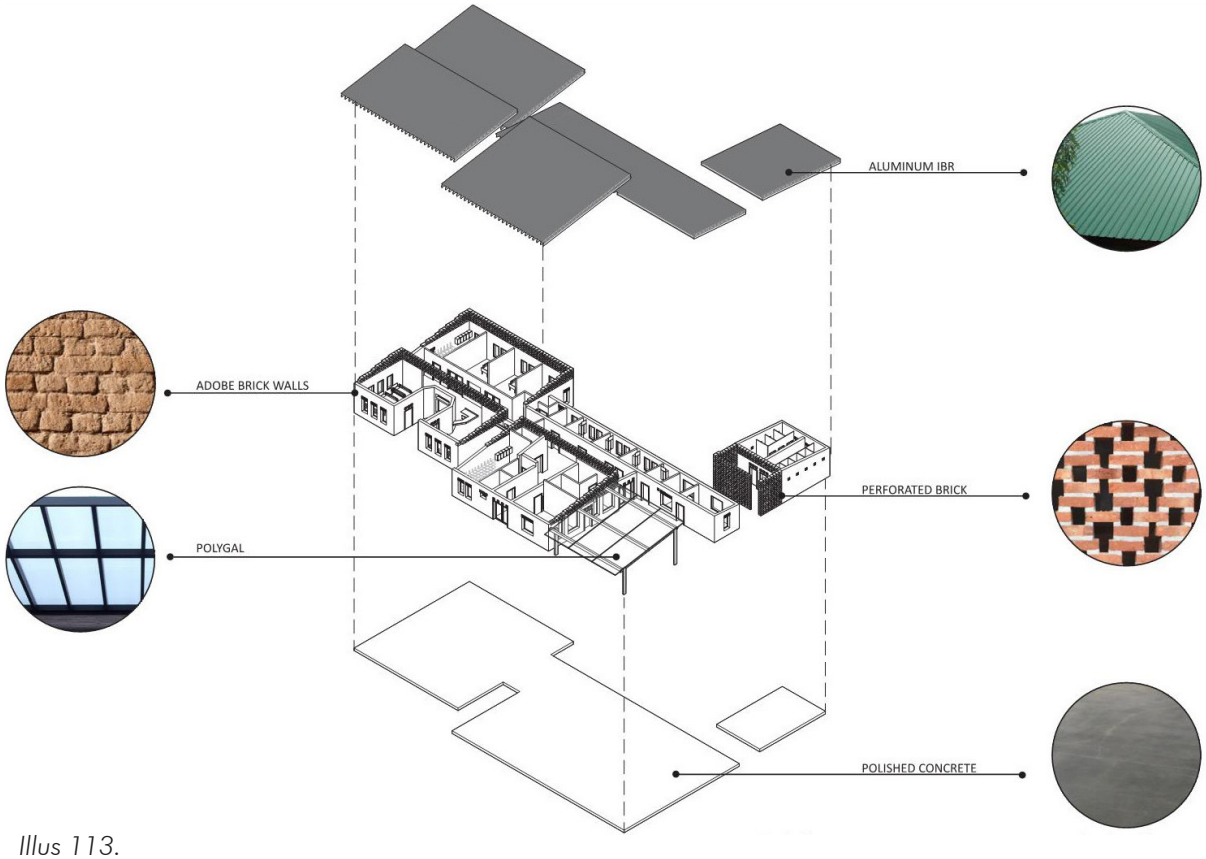
in Uganda it is traditional that births are home-based and assisted by trusted friends or midwives (Adaptiv, n.d.). This aspect proves that approaches to maternity design must adapt not only to local policies but also to the customs and traditions of the context, generating a more familiar and homely environment. Including these aspects within the unit can increase the women's visits to prenatal and postnatal care.

INTEGRATION OF NON-CONVENTIONAL SPACES

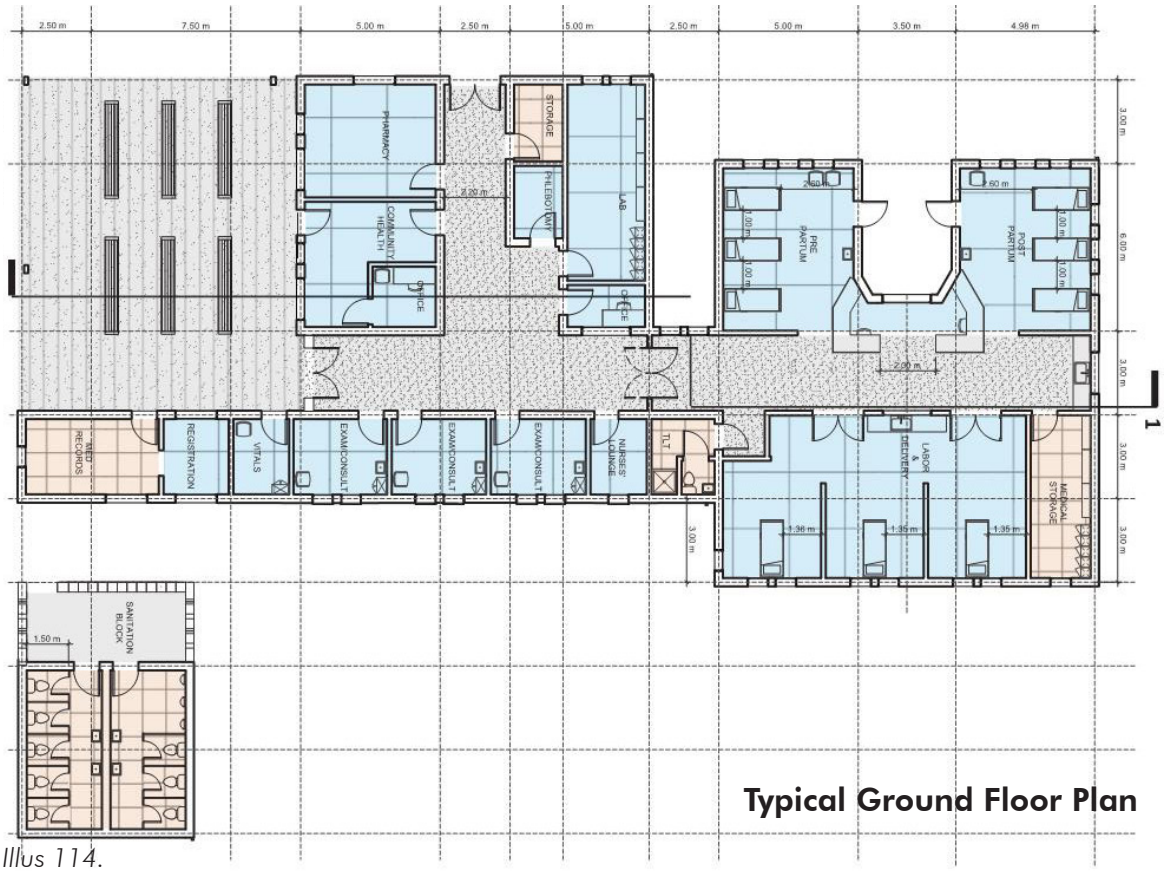
INDICATOR	YES	NO
Room for the use of alternative medicine		X
Overnight rooms for companions and family		X
Single occupancy birth rooms		X
Room for traditional practices		X
Sacred room / spiritual space		X
Service Ward		X
Common room for mothers		X
Social room	X	
Family room		X
Filter space (in birthing room)		X
Accommodation for birth attendants		X
Transitional care facility		X
Sitting room for parents	X	
Care areas for infants		X
Play area for other children in the family		X

Table 36.

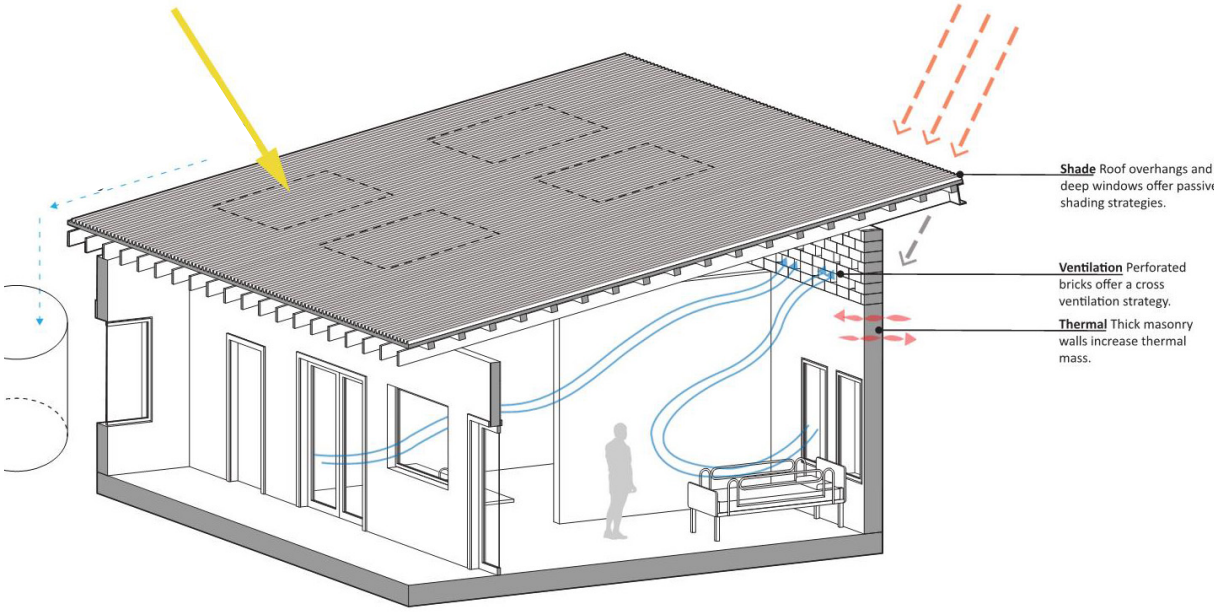
Illus 112.



Illus 113.



Illus 114.



Illus 115.

07

CONCEPTUAL PROPOSAL

The conceptual proposal is based on international guidelines from which the spatialrequirements for each area of the unit, their functional relationships, and spatial requirements are referenced. The development of the proposal is divided into four parts according to different areas of the unit where the characteristics and functions vary, taking the outpatient antenatal area, the inpatient prenatal and postnatal care area, the birth unit, and the transition facility.

The intention of this proposal is to generate a possible spatial re-accommodation of the maternity unit by integrating unconventional spaces that support different types of needs that may be presented by the mother, her companions, and the health personnel, thus expanding the range of response to changing needs, implementing new approaches to care, integrating cultural differences and beliefs, advocating different relaxation techniques in labour, and in general offering greater wellbeing to all users and improvement in the quality of care.

The proposal considers a stand-alone maternity unit that offers different antenatal services to ensure the health of mother and baby, but at the time of delivery focuses more on midwifery care and assistance, i.e. the proposal focuses on treating low-risk deliveries in the birth unit.

An important factor in establishing the proposal is that, despite the integration of new spaces, it must be ensured that the unit continues to comply with all hygiene and sanitation requirements, to avoid contaminating flows and fostering an environment that encourages the spread of illness and infection.

07.1 Outpatient antenatal area

This area, as mentioned in the first chapter, oversees offering antenatal care services, and although the proposal is more focused on the care of low-risk pregnancies, it is considered important to include this area in the prototype as it could be applied in contexts with limited resources where there are many difficulties in accessing maternal health and having adequate prenatal and postnatal care. In this way, it will be possible to keep checking and monitor women's pregnancies and maintain the health and wellbeing of both the mother and the baby.

This area requires independent access, a reception area, and the waiting area which may include the toilets, a food bay, a beverage bay, and a waiting room for children. Then, the medical part is composed of consulting rooms, an interview room, an ultrasound room for examinations, and a pregnancy assessment room. The area also should consider supportive spaces such as stores, an office, a clean utility room, a dirty utility room, and a conference or meeting room for educational programs or staff training.

Functional relationships:

- The ultrasound room may have direct access to consulting rooms and pregnancy assessment room.
- The interview room may have direct access to consulting rooms and the waiting area and try to have discreet access.
- The pregnancy assessment room should ensure direct access to the birthing unit and to the antenatal care inpatient area.

Spaces to integrate:

Sacred spiritual room:

This space is designed so that mothers, their companions, and even health personnel can practise their spirituality according to their beliefs and culture. The difference with the prayer room is that this space can host meditation practices, ritual ceremonies or sacred community gatherings.

Social room:

This space is for the community, designed as a common space to generate awareness and consent on issues related to motherhood, family planning, sexual health, and maternal health keeping in mind that many women in rural areas with few resources have little or no access to these tools.

Prayer room:

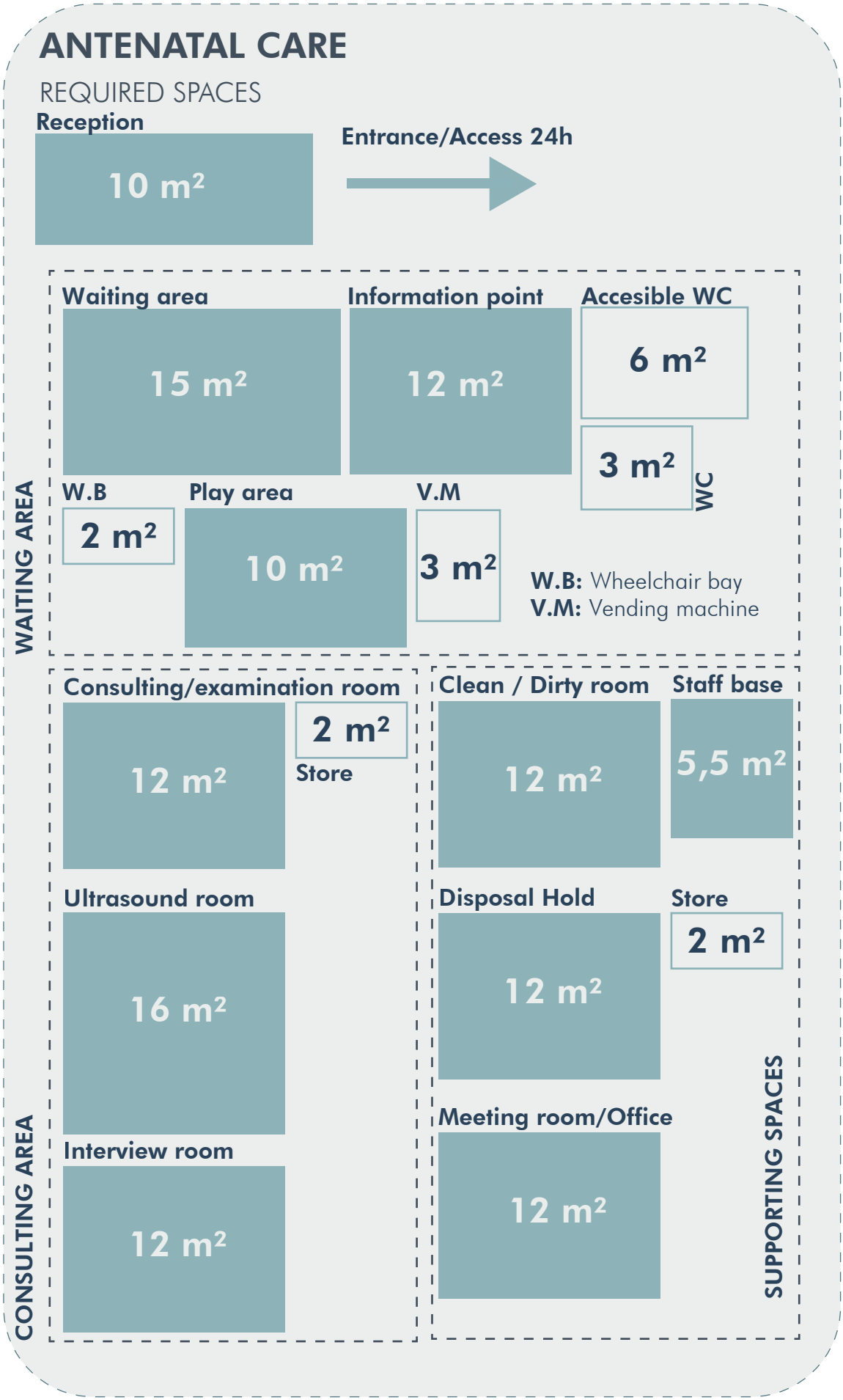
This space is destined to express anguish, needs and gratitude to the deity corresponding to each person's religion.

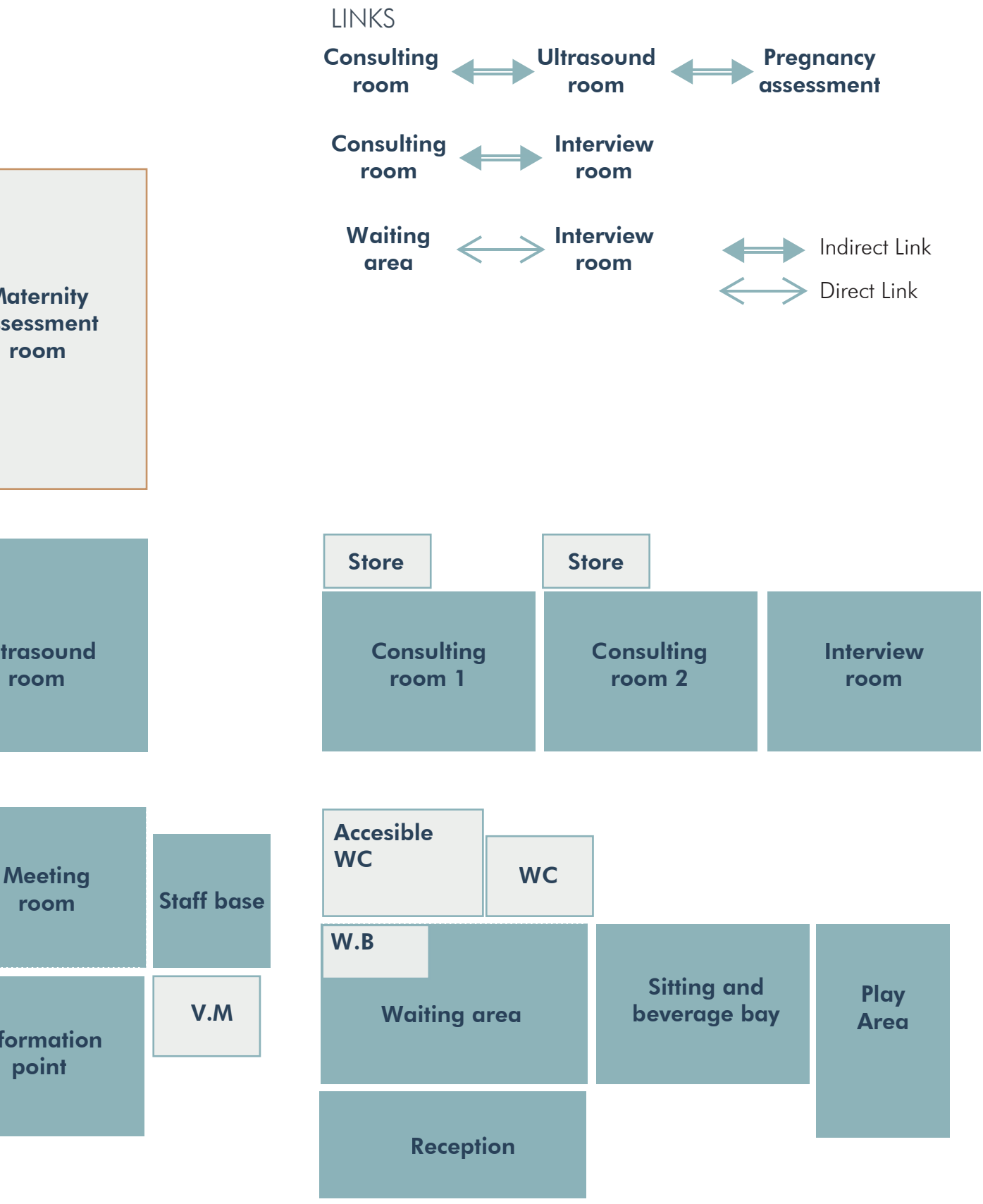
Service area:

This area is designed mainly for mothers and their companions and consists of a lounge room with access to showers, an infant feeding room, a children's care area and refreshment facilities. As an important aspect, this area may have direct access to the transitional facility.

ANTENATAL CARE

REQUIRED SPACES

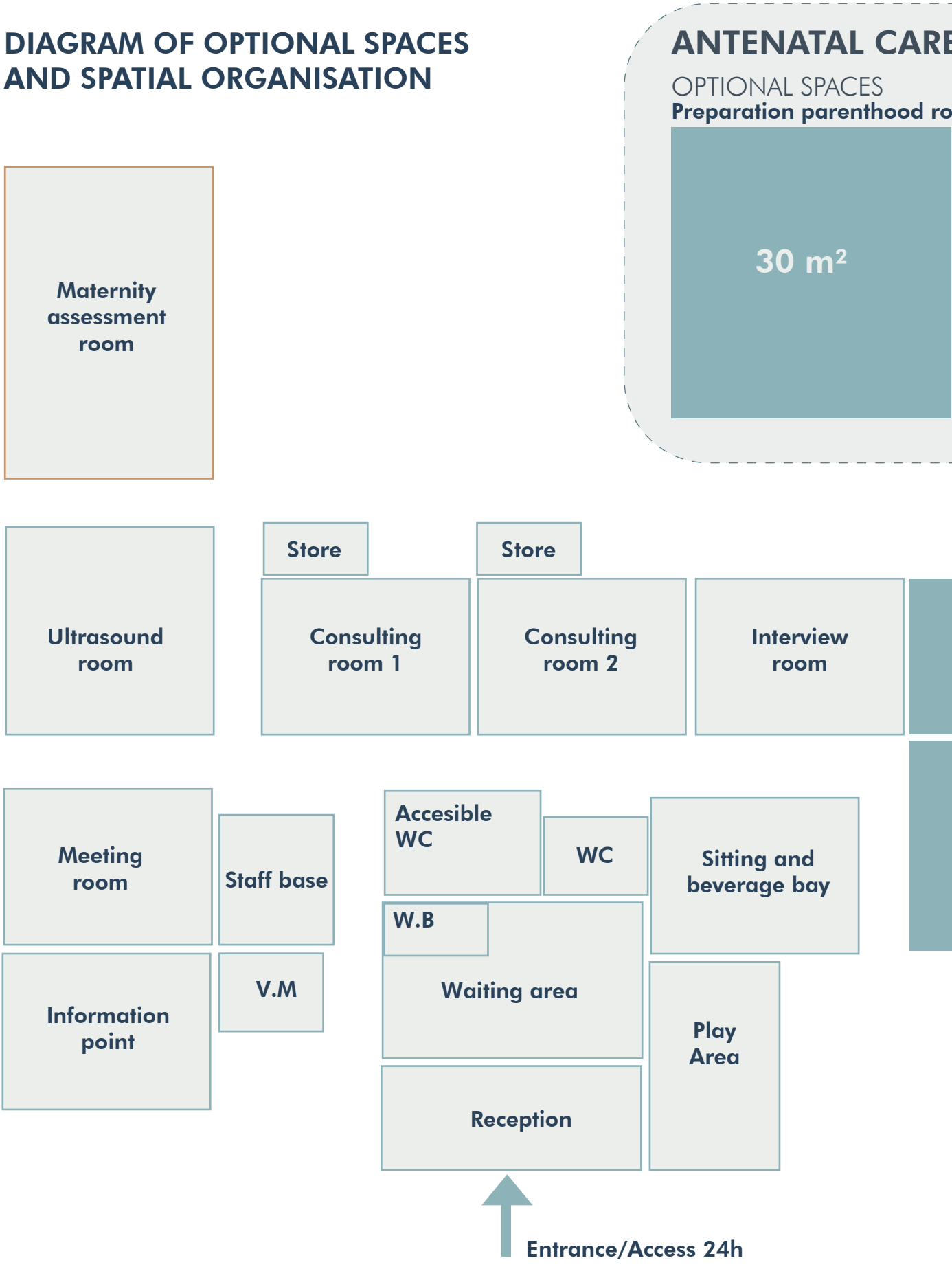


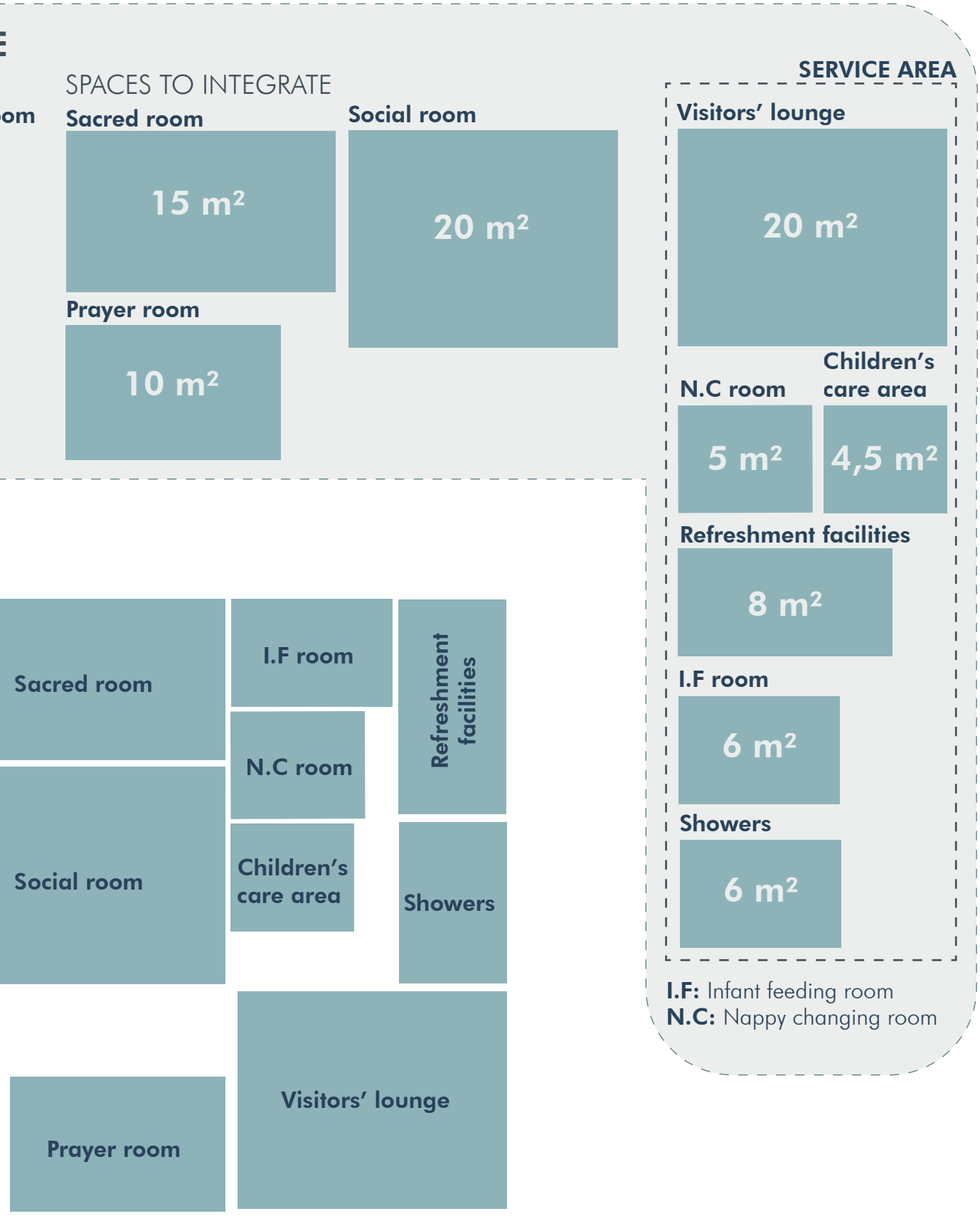


GRAM OF REQUIRED SPACES AND SPATIAL ORGANISATION

Illus 116.

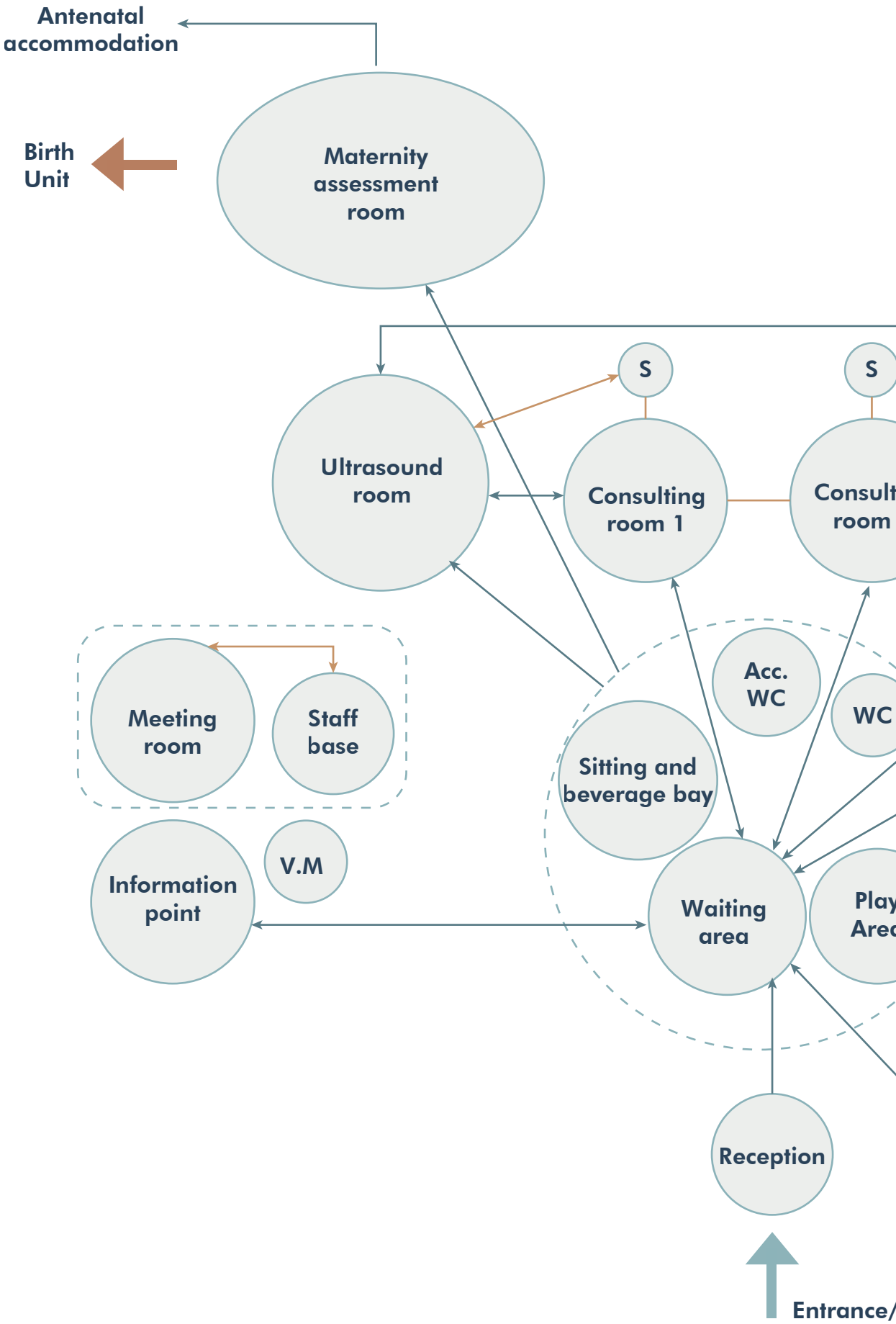
DIAGRAM OF OPTIONAL SPACES AND SPATIAL ORGANISATION




SPACES TO INTEGRATE
Sacred room
15 m²
Social room
20 m²
Prayer room
10 m²
SERVICE AREA
Visitors' lounge
20 m²
N.C room
5 m²
Children's care area
4,5 m²
Refreshment facilities
8 m²
I.F room
6 m²
Showers
6 m²
Sacred room
I.F room
Refreshment facilities
N.C room
Social room
Children's care area
Showers
Visitors' lounge
Prayer room
I.F: Infant feeding room
N.C: Nappy changing room

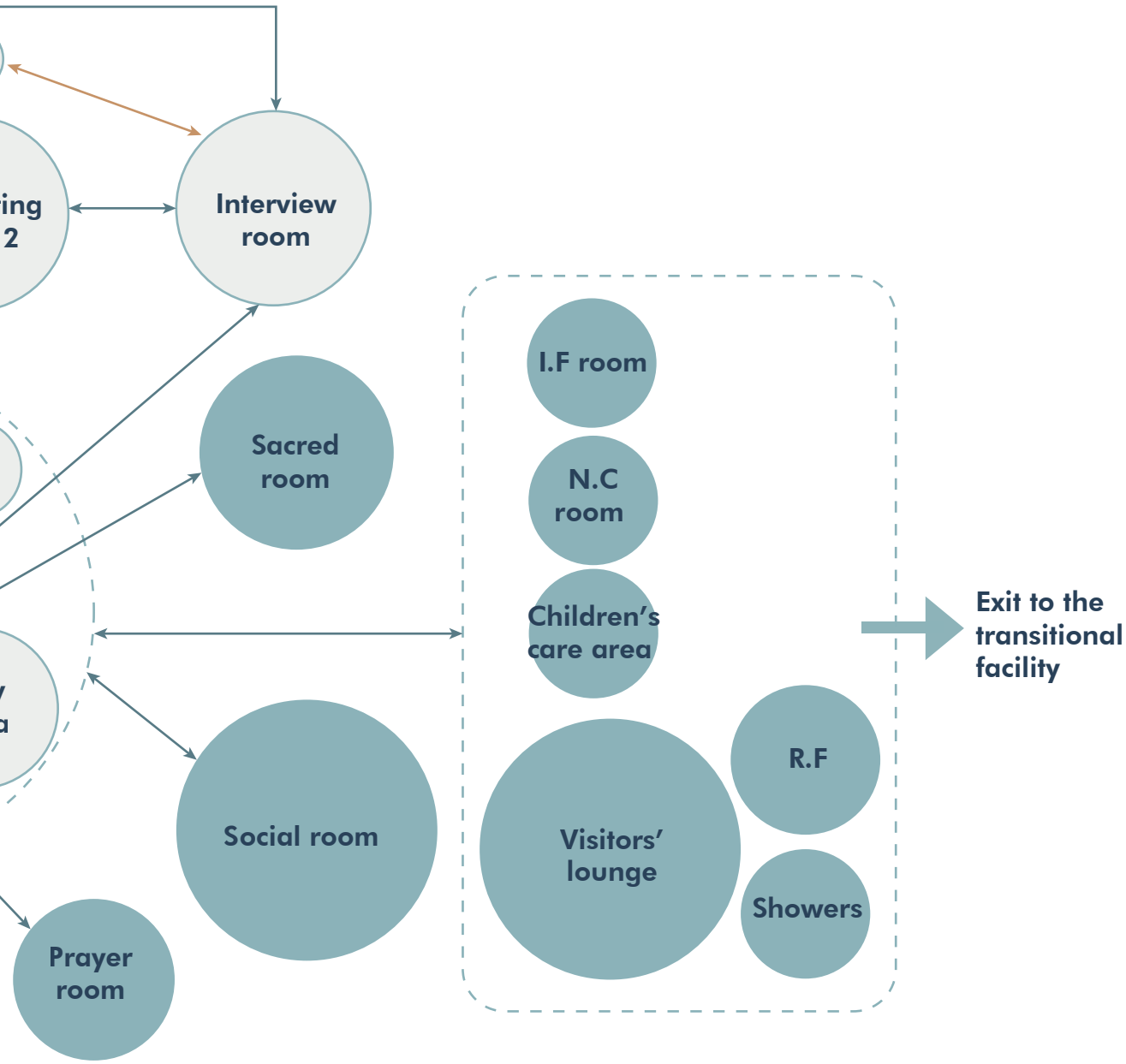
Illus 117.

ORGANISATIONAL PROPOSAL



KEY

Acc. WC: Accesible toilet
I.F room: Infant feeding room
N.C room: Nappy changing room
R.F: Refreshment facilities
V.M: Vending machine
S: Store
Patient Flow
Staff link



/Access 24h

Illus 118.

07.2 Inpatient antenatal and postnatal area

This area is dedicated to inpatient care; however, it is divided into antenatal and postnatal beds because patients require very different care. In addition, neonatal care is an area that also can be integrated into this ward, but it all depends on the level of care in the maternity unit and the medical staff available, as the inclusion of neonatal care requires qualified staff to ensure the care offered to the newborn.

Moreover, regarding the medical needs, it is important to consider that the mothers reside in this area, so it is necessary to create a comfortable and calm environment for them, where relationships among themselves and between the staff are strengthened and fostered.

Within the required medical spaces, it should be considered space for antenatal beds separate from the beds of postnatal care, this division can be created with the dedicated medical staff areas, thus also ensuring that staff can have quick access to both areas. The spaces required are listed as meeting room, staff base, staff rest room, interview room, neonatal care room, and supportive spaces such as ensuite bathrooms, a newborn bathing room, space for mobile equipment, space for general equipment, store space, clean utility room, and dirty utility room.

Direct links:

- The postnatal beds area may have direct access to the neonatal care area.
- The neonatal care area may have direct connection with the formula and feeding room.
- The staff base should be optimally located so that it is easily accessible to postnatal, antenatal, and neonatal care rooms.

Spaces to integrate:

Day lounge:

This space allows the mother to change her environment, it can be conceived in a more homely rather than medical sense. “Mothers can use it flexibly for dining, sitting, or waiting” (NHS, 2021, p. 35).

Common space for mothers:

This room should be set up to provide a safe environment for mothers, where they can socialise, share knowledge, generate additional support and feel accompanied, this last point is important in some cultures, for example in Senegal after childbirth the woman is cared for by a women’s group from her community (Samb, 2021).

Feeding room:

As the name suggests, this room is dedicated to the feeding of newborn babies, a space

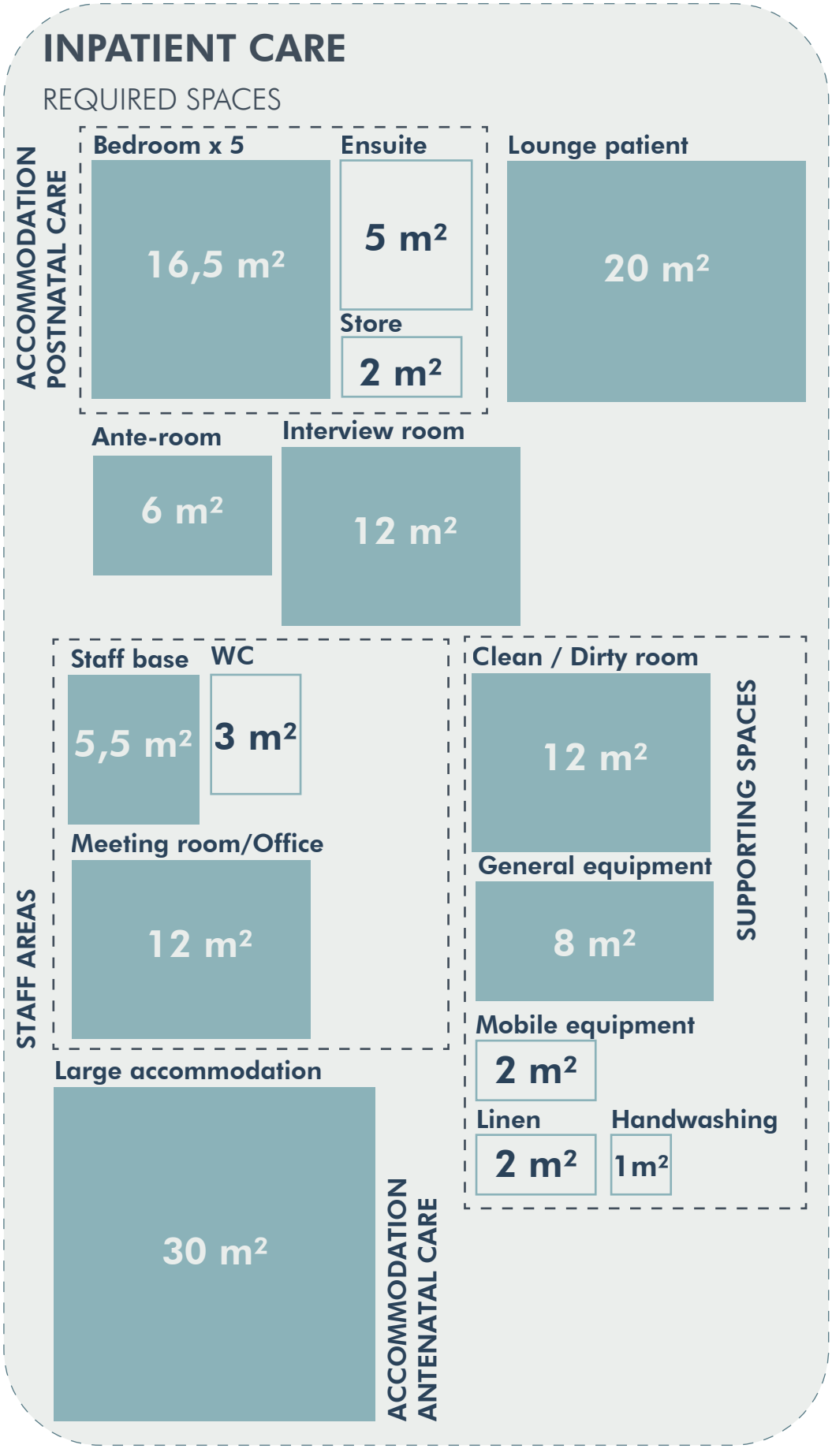
that can provide the mother and baby with privacy and comfort.

Formula room:
It is a space where medical staff can demonstrate the preparation of formula milk and teach mothers how to do it. "This room will include a small refrigerator, a sink with a drainer, storage facilities, and a clinical wash-hand basin" (NHS, 2013, p. 35).

Parental room:
This room can be used for parenting sessions, in other words, a space with educational purposes to sensitise parents and educate them about parenthood, optionally it could be combined with the sitting room.

Sitting room:
This space is especially dedicated to accompanying mothers who are in labour to provide them with a space that gives them privacy, where they can feel relaxed and have facilities such as showers and food bays.

Staff facilities:
In this area it is ideal to offer different services for the staff, from toilets and showers to a lounge area, with space for cooking, laundry, and storage for personal belongings.



POSTNATAL CAR

Bedroom

DIAGRAM O

F REQUIRED SPACES AND SPATIAL ORGANISATION

Illus 119.

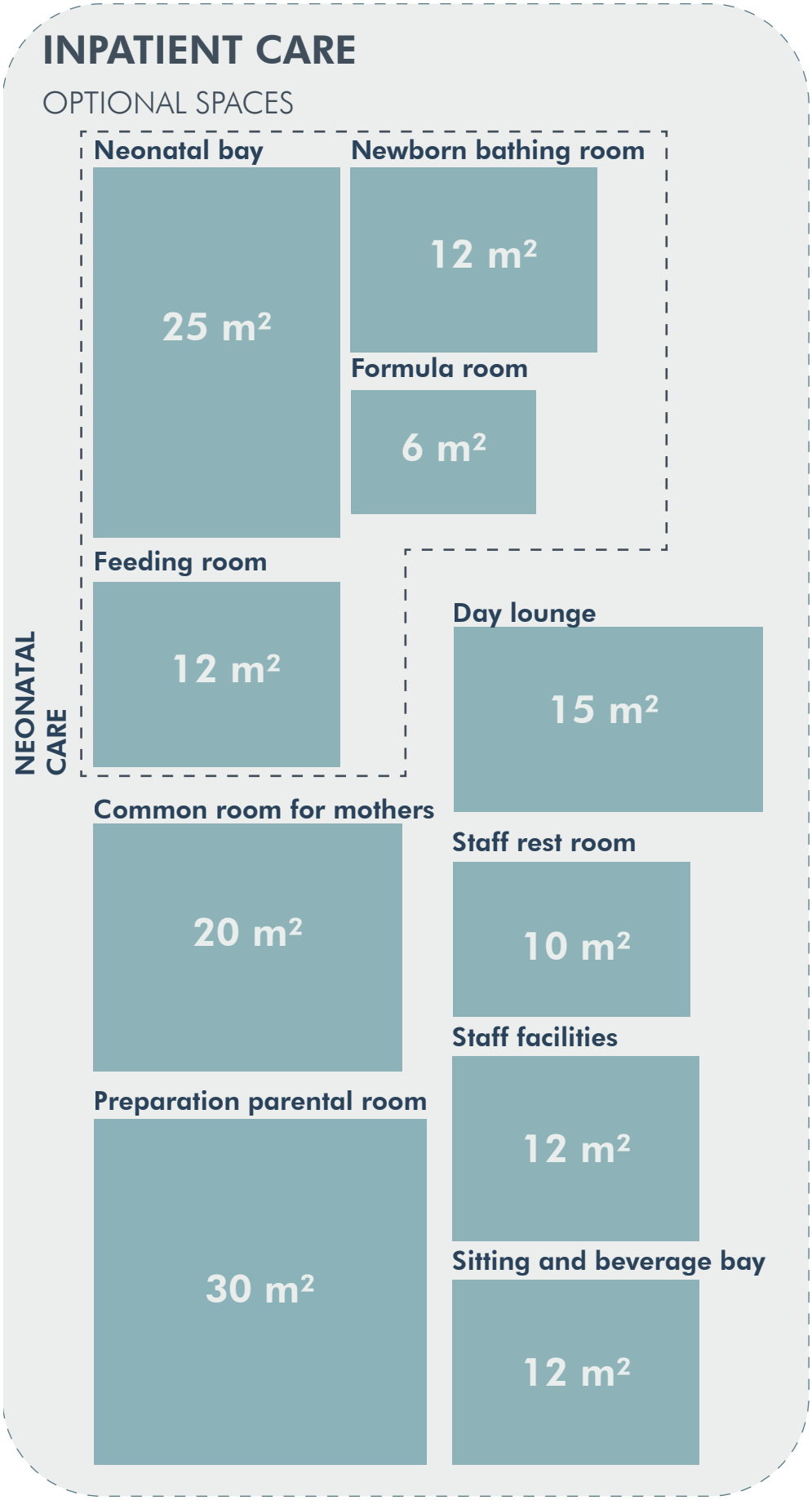


DIAGRAM OF OP
AND SPATIAL OR

POSTNATAL CARE

Ensuite

Storage

Bedro

Meeting room

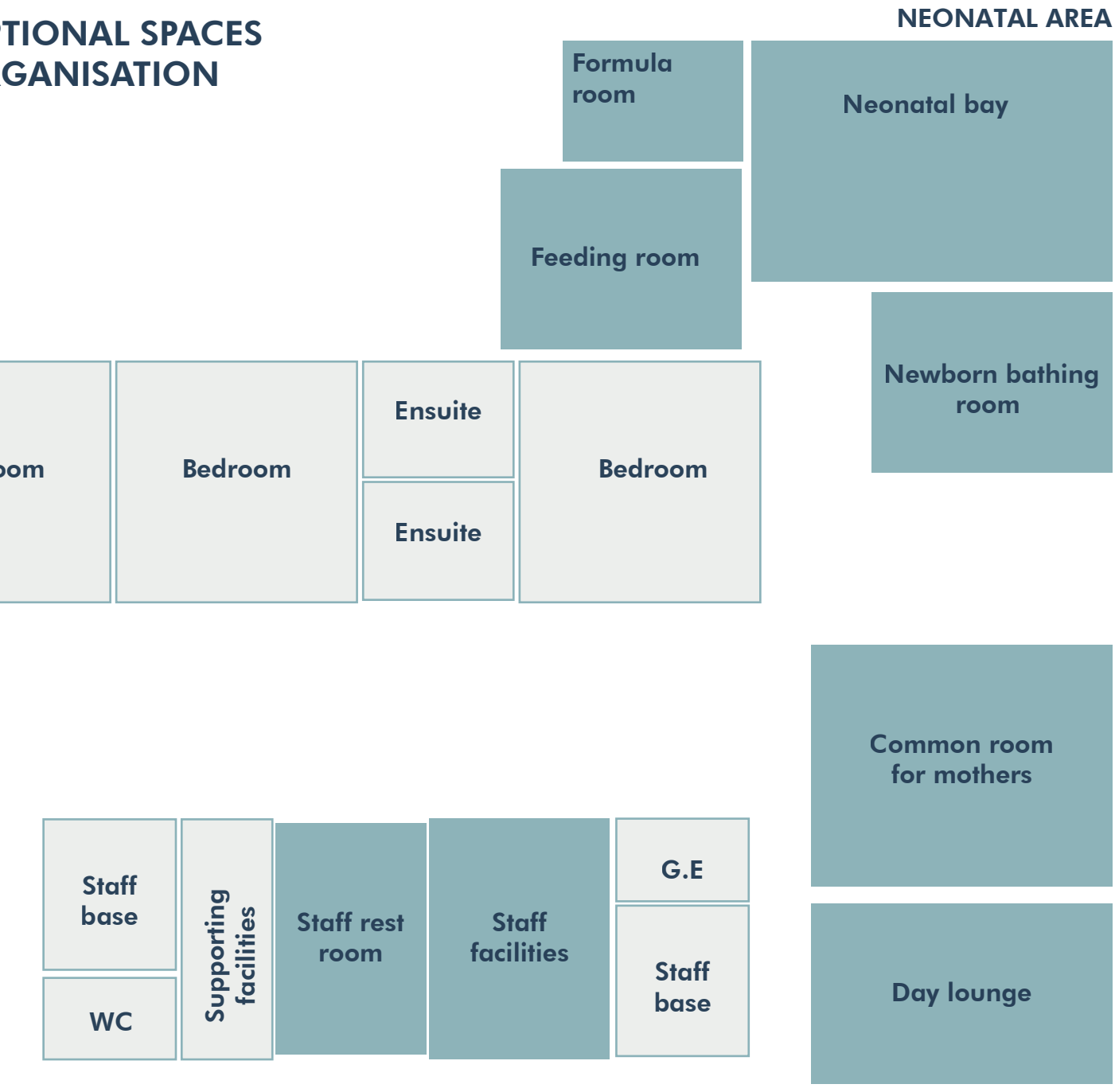
Interview room

ANTENATAL CARE

Large acco
antena

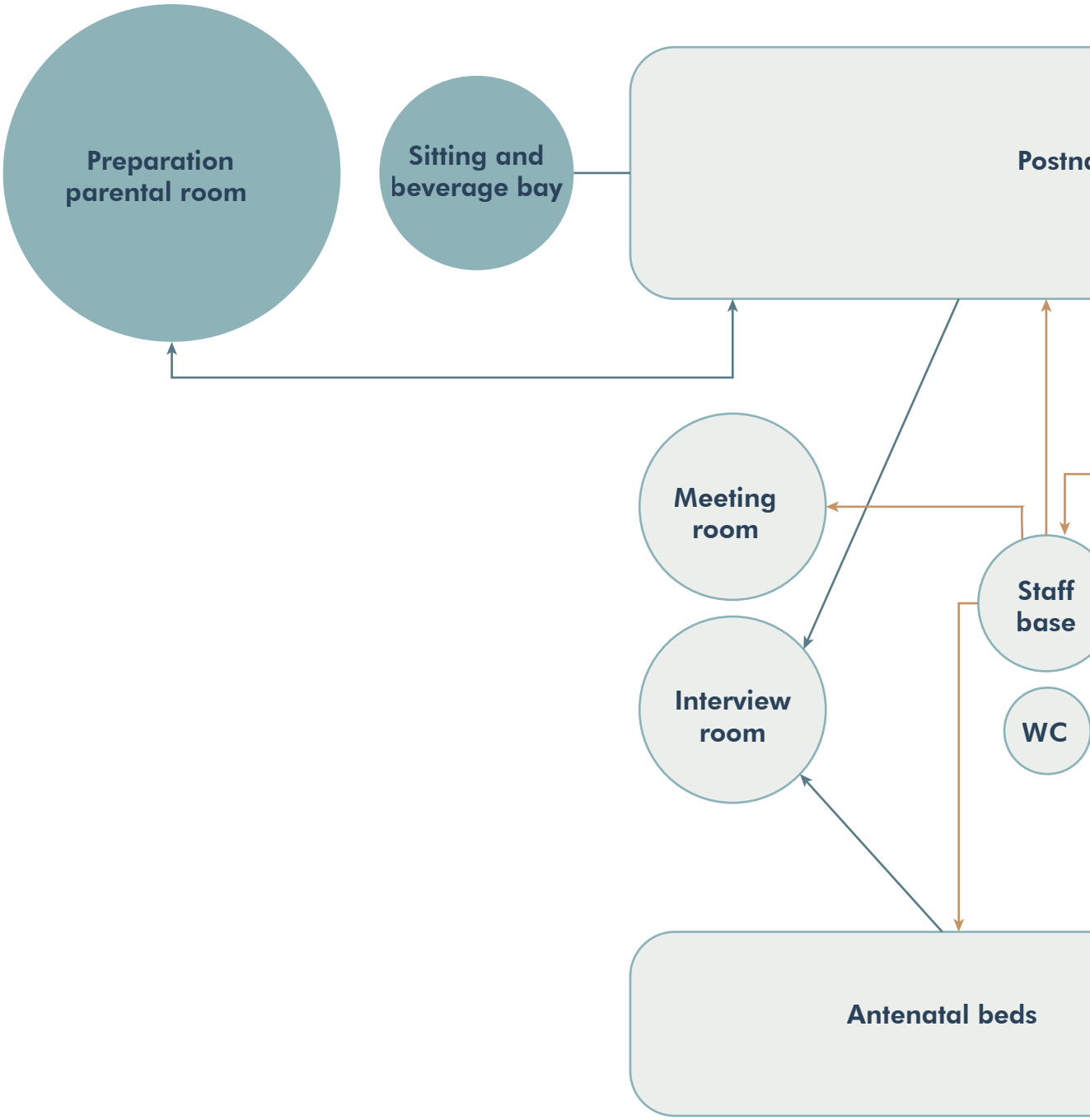
G.E: General equipment

TIONAL SPACES
GANISATION

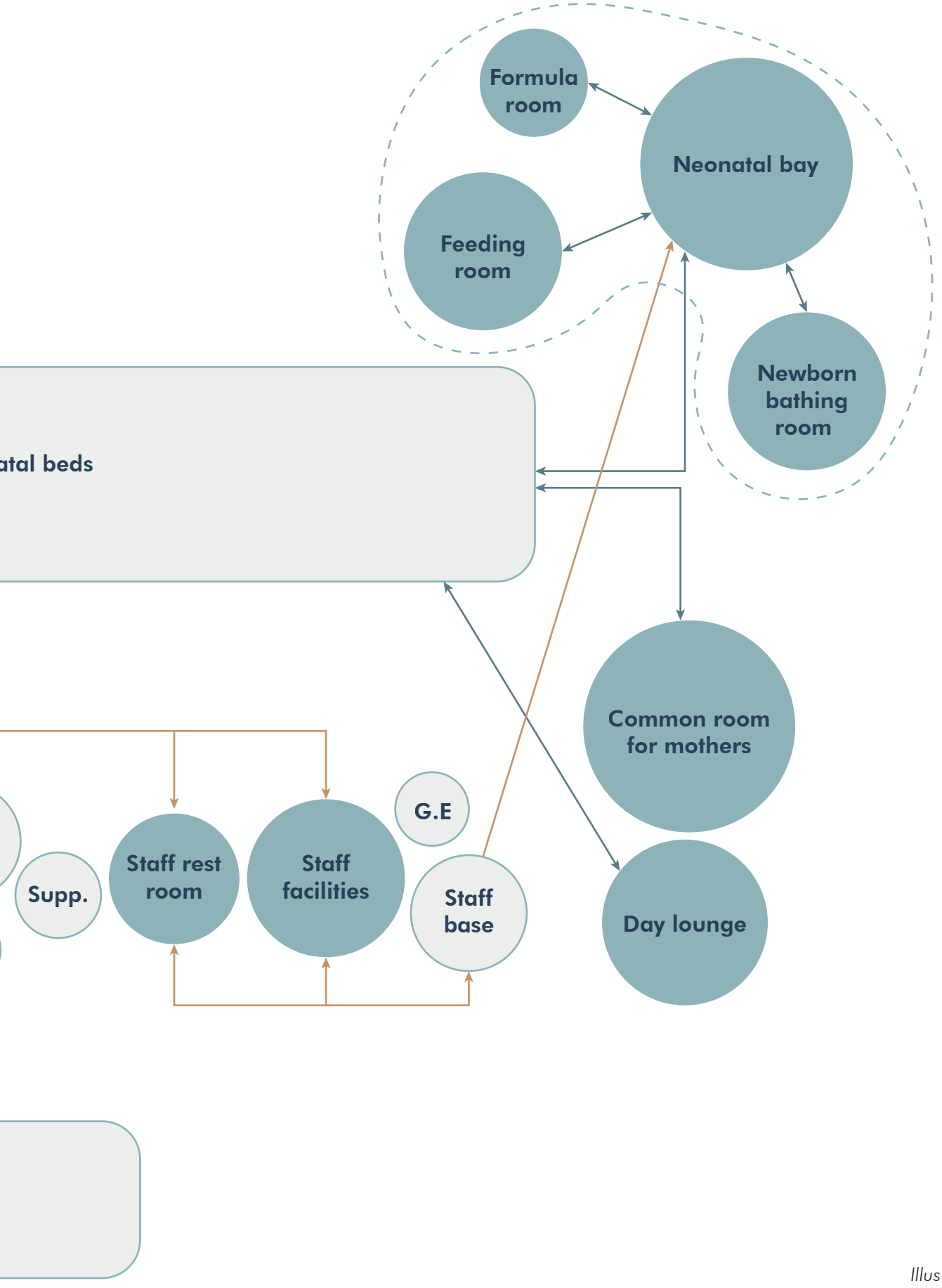


Illus 120.

G.E: General equipment
Supp: Supporing facilities
Patient Flow
Staff link



ORGANISATIONAL PROPOSAL


Formula room
Neonatal bay
Feeding room
Newborn bathing room
atal beds
Common room for mothers
G.E
Supp.
Staff rest room
Staff facilities
Staff base
Day lounge

Illus 121.

07.3 Birth Unit

The birthing unit is the area that needs to be most careful in terms of medical and spatial limitations, as infections and the spread of disease must be avoided as much as possible, and it is also the area that needs the most support space to function properly. Among the spaces required are the birthing rooms which should have their own ensuite and storage space, the triage, the staff base with space for accommodation and a beverage bay, the bereavement suite, and supportive spaces such as clean utility room, dirty utility room, storage, and drug store.

For the proposal there is a preference for a birthing unit more focused on low-risk deliveries, so it is not necessary to integrate highly technical spaces within it, such as a procedure room or resuscitation room, however, such spaces are at the discretion of the developers of the maternity unit within the context in which it is to be implemented.

In cases where the unit offers a higher level of service and is equipped in terms of infrastructure, medical equipment, and medical staff to receive pregnancies of all types, additional spaces such as a blood bank, a testing laboratory, and a resuscitation bay in the birthing room should be included in addition to the operating area.

The operating ward is other area of the unit which depends strictly on the level of care offered by the unit and the infrastructure and equipment available, in the case where the operating area is added, it should be equipped with an anaesthetic room, an operating theatre, a preparation room, a scrub room, a dirty utility room, and a recovery room, among other support spaces.

Direct links:

- Birthing rooms may have direct access to the postnatal beds area, to the neonatal care nursery, and to the operating area.
- The operating area may have a direct connection with the postnatal beds area, and neonatal care nursery.
- The staff base requires direct connection with birth rooms, and operating area.
- Triage room needs direct access to the birth rooms.
- Bereavement room requires isolation and discreet access.

Spaces to integrate:

Alternative medicine room:

Studies such as Hall et al. 2010 show that the use of alternative medicine as massage, various herbal therapies, and relaxation techniques help women in the process of childbirth. At the same time this space will support the recommendation given by WHO

2018, for integration of different relaxation techniques during labour, with the purpose of having a positive childbirth experience.

Room for traditional practices:
Culture and traditions vary according to each specific place; however, to integrate these aspects, it is proposed to include a space where the family, mother, accompanying persons, and staff can perform their traditional rituals or ceremonies according to their conception of birth.

Filter space:
The filter can be considered as a small space or device at the entrance of the delivery room, which provides more privacy to the room. It could also have medical purposes if additionally used as a filter to prevent infection.

Lounge patient / family:
During labour, it is positive to allow mothers to move freely, in that sense, this space is proposed as a kind of living room where mothers can be accompanied by their companions during the process and have at their disposal other types of audiovisual elements that help her to alleviate pain, as well as enjoying the support and company of their companions.

Companions' facilities:
The idea is to provide a service space for the mothers' companions, where they can feel comfortable and have a good experience within the unit, allowing them to access toilets, rest areas, and even a food area.

Accommodation for birth attendants:
If the maternity unit has a focus on midwife-assisted deliveries, it is necessary to include accommodation for midwives or birth attendants within the birthing unit. This arrangement ensures that midwives are always readily available while providing them with a place to rest during periods when their assistance is not required.

BIRTH UNIT

REQUIRED SPACES

M.A room
24 m²

Triage
16 m²

Bay PPE
3 m²

Ensuite birthing room
7 m²

Ensuite standard
5 m²

Ward Pantry
12 m²

Birthing room
34 m²

Birthing room with pool
40,5 m²

STAFF AREAS

Office
9 m²

Cleaner's room
8 m²

Staff Station
12 m²

SUPPORTING SPACES

Clean Utility room
16 m²

Linen
2 m²

R.T
1m²

Clean store
12 m²

General store
8 m²

Disposal room
12 m²

Sterile stock
6 m²

Dirty utility
12 m²

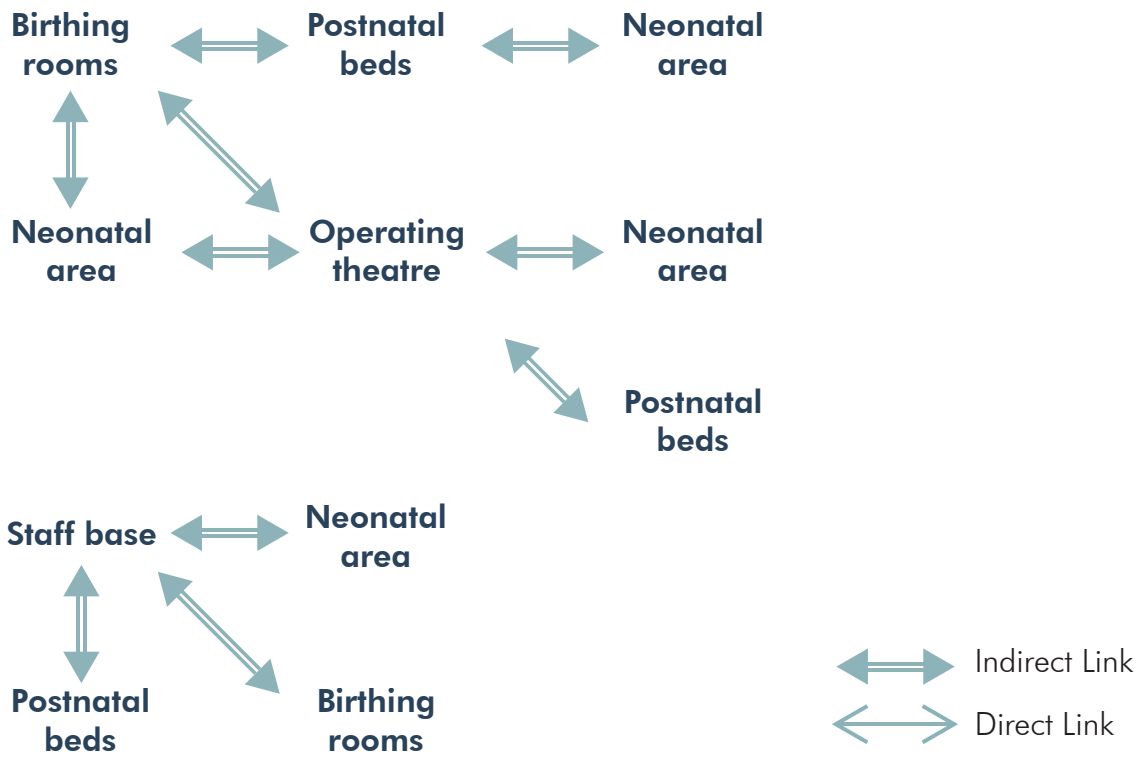
Storage
4 m²

Handwashing
1m²

ME
2 m²

DIAGRAM OF REQUIRED AND OPTIONAL SPACES

LINKS



M.A room: Maternity assessment room
R.T: Resuscitation trolley
Bay PPE: Personal protective equipment
ME: Mobile equipment

OPTIONAL SPACES

Family bereavement room

15 m²

Bay / beverage enclosed

5 m²

Lounge patient / family

12 m²

Reception

10 m²

Illus 122.

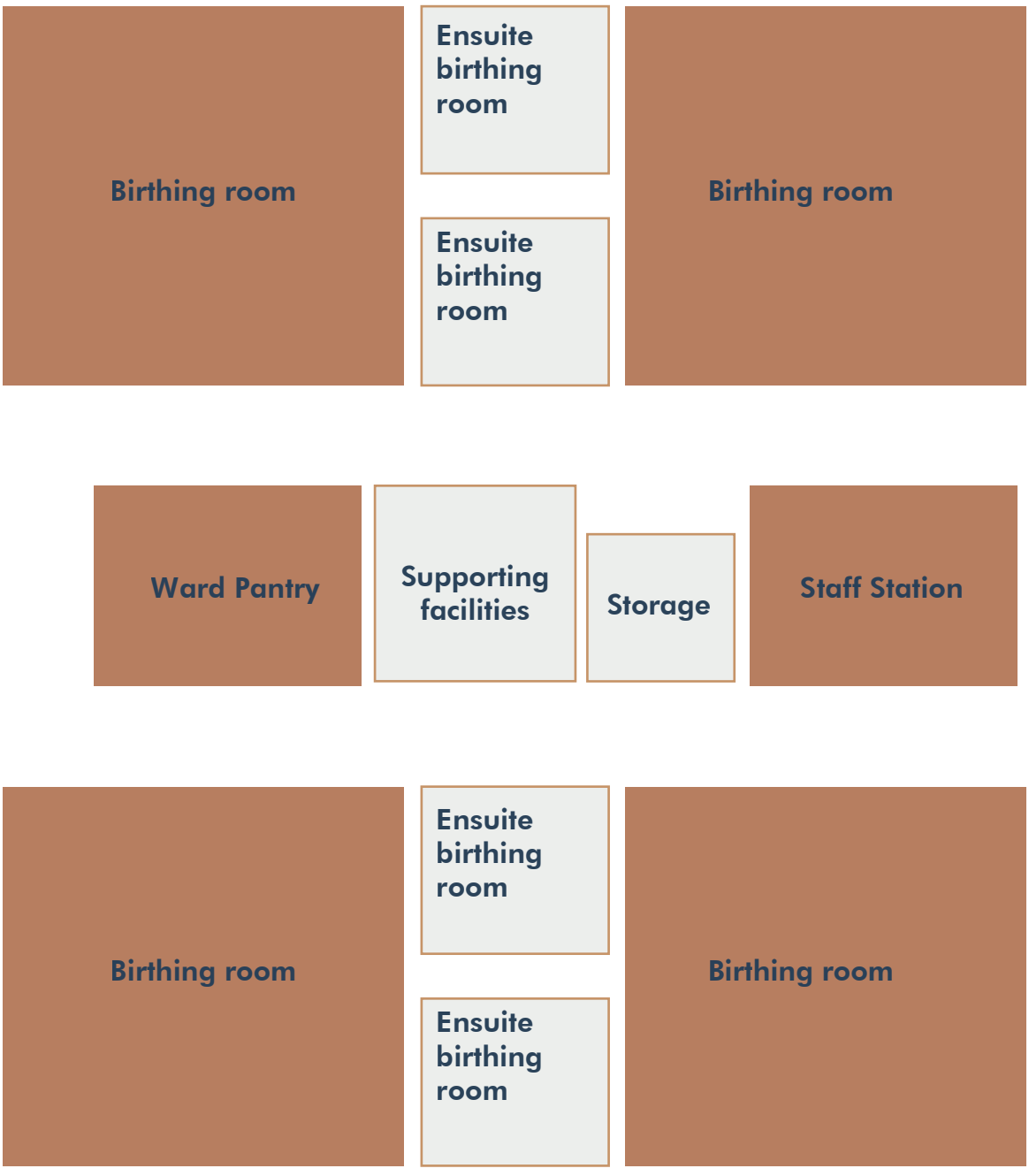
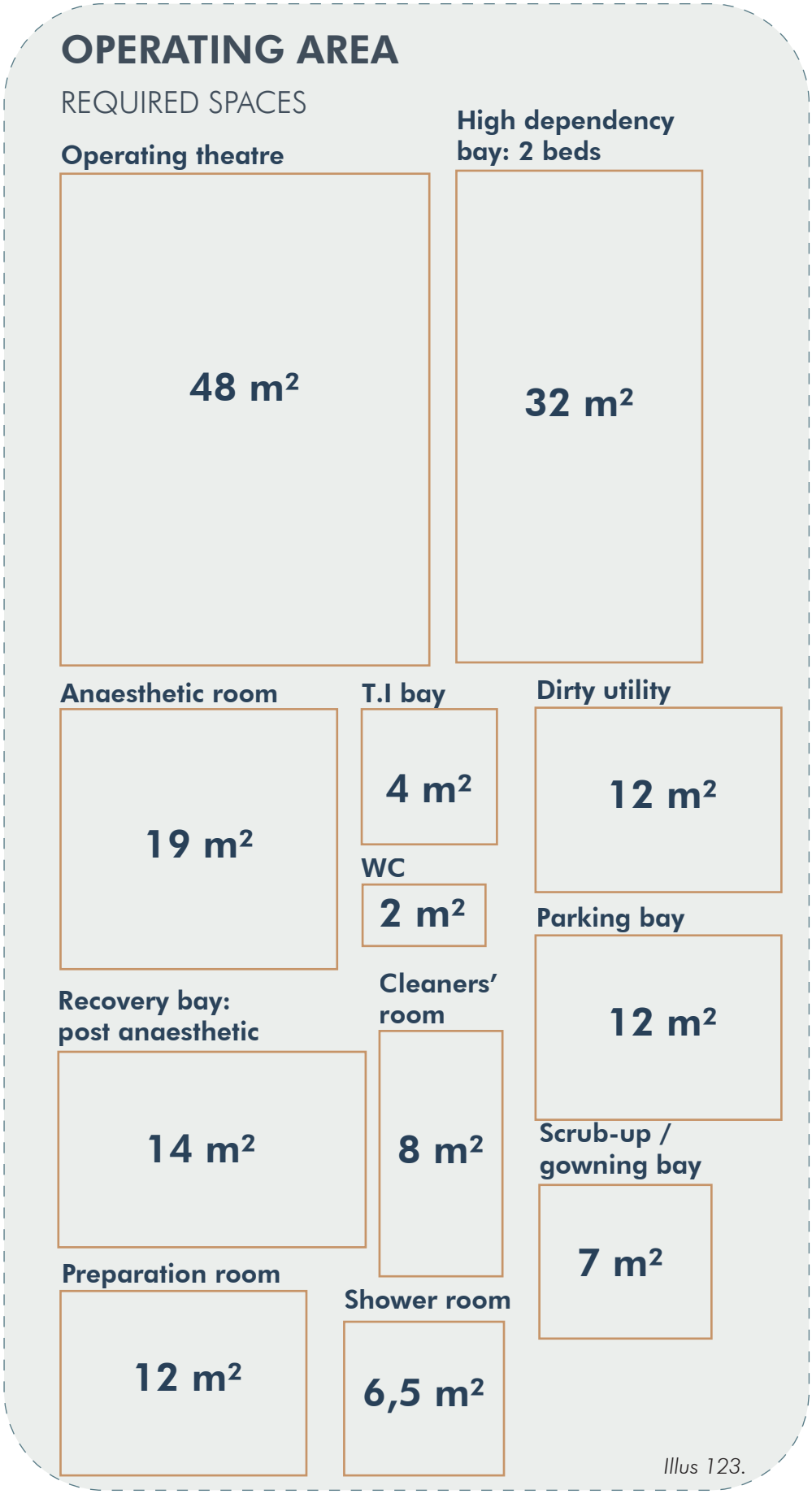


DIAGRAM OF SPATIAL ORGANISATION

OPERATING AREA

REQUIRED SPACES



Illus 123.

Triage

Maternity assessment room

BIRTH UNIT

SPACES TO INTEGRATE

Accommodation for birth attendants

16 m²

Room for traditional practices

12 m²

Alternative medicine room

15 m²

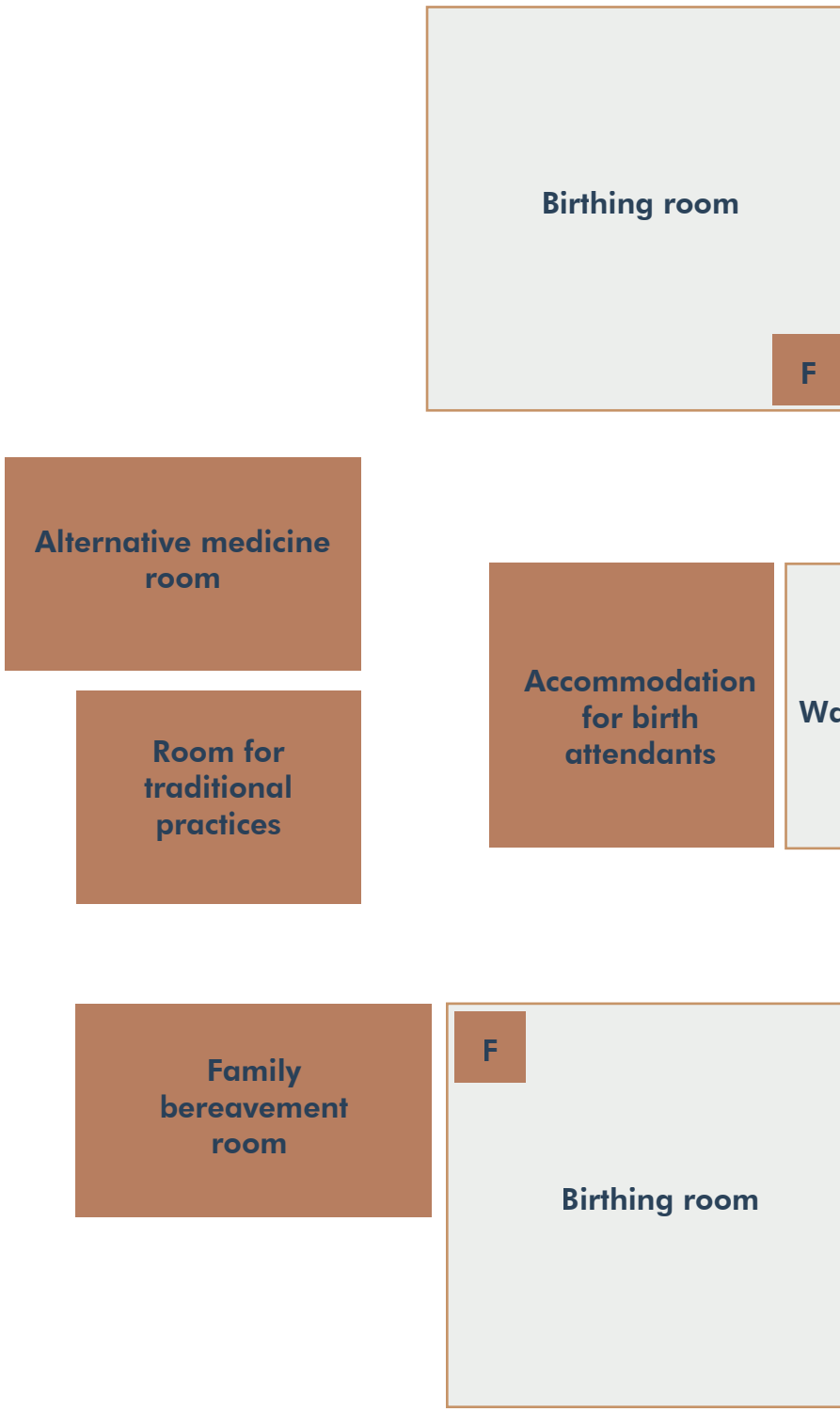
Facilities for companions

20 m²

Filter space

1,5 m²

DIAGRAM OF SPACES TO INTEGRATE

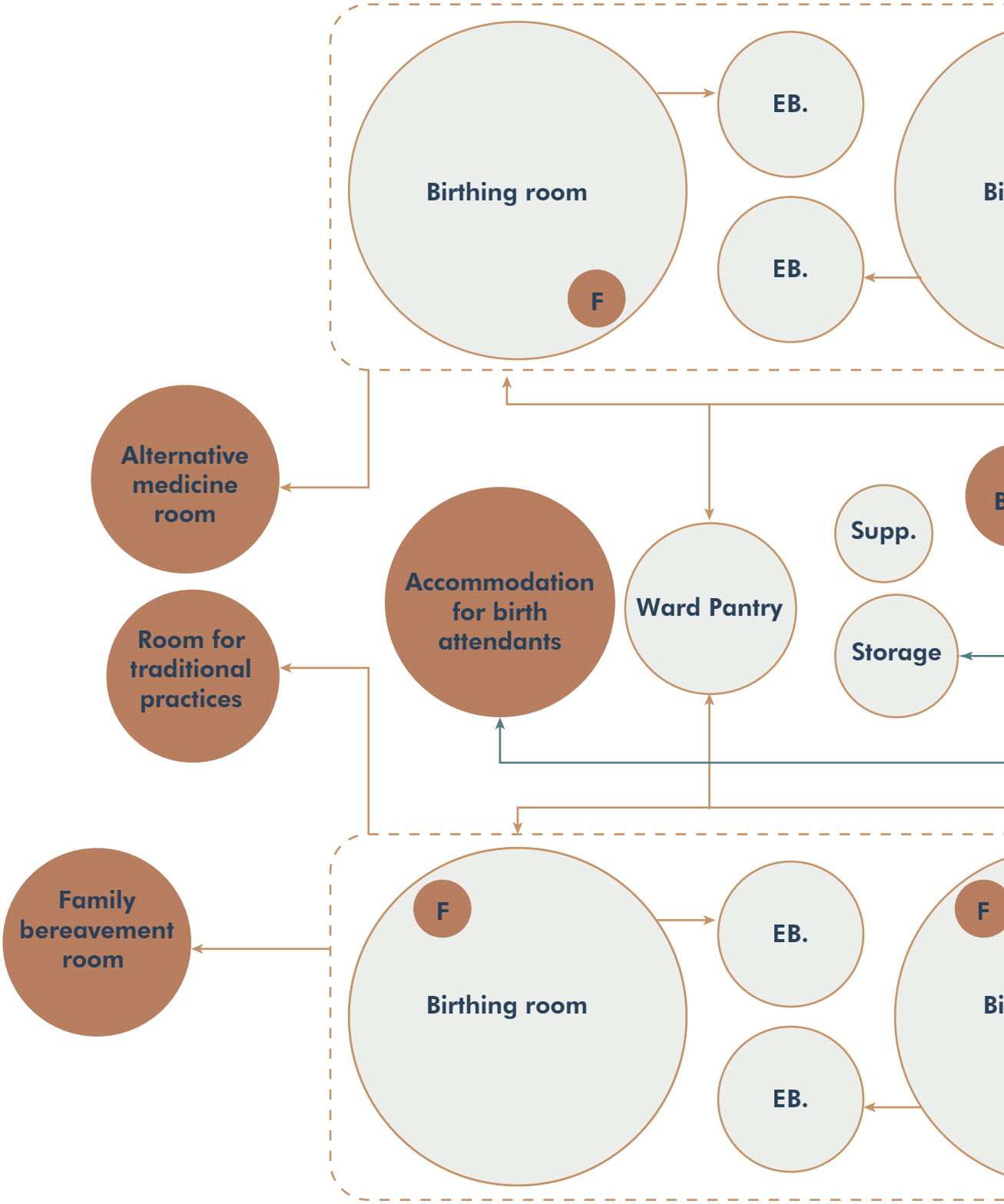


Illus 124.

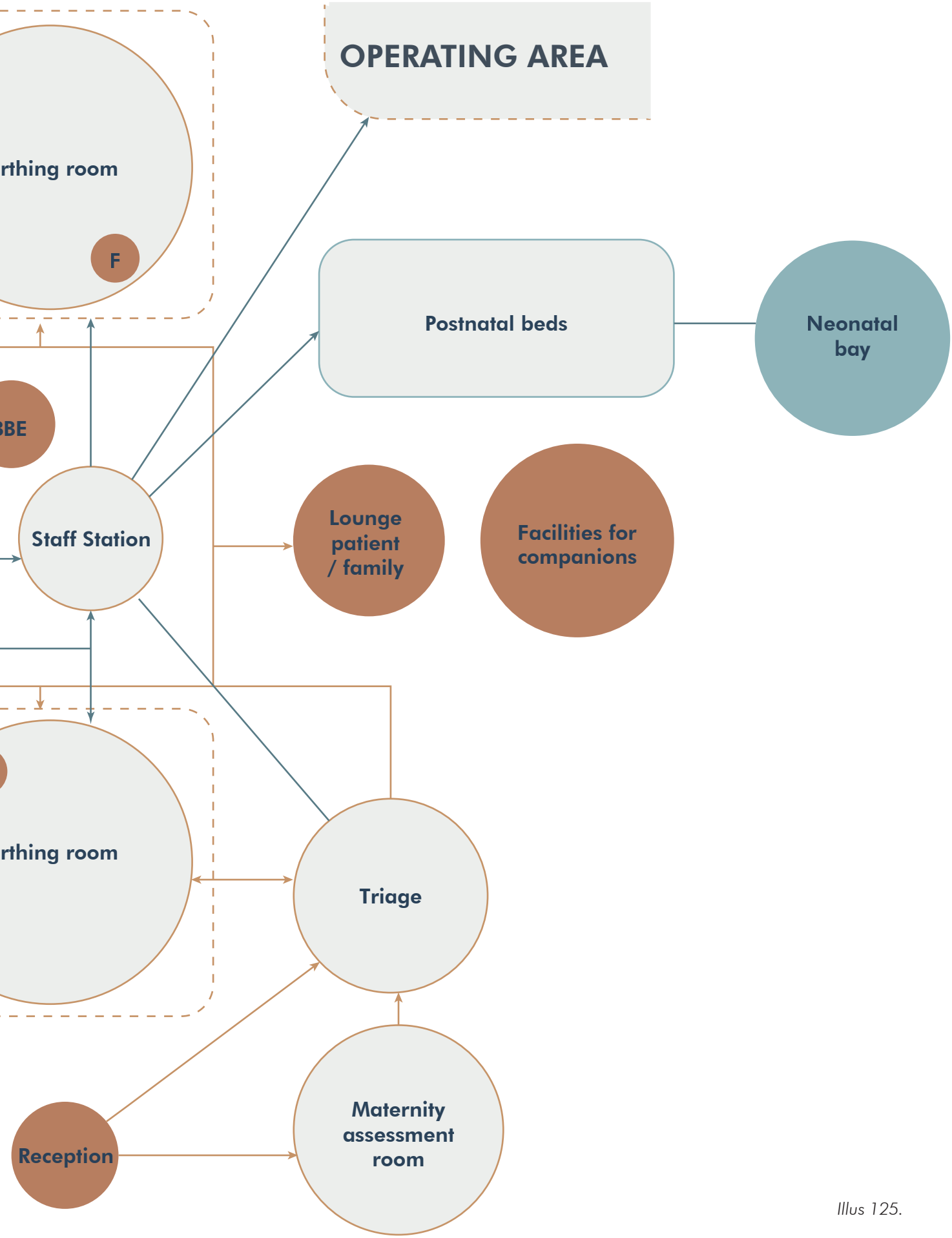
BBE: Bay / beverage enclosed
F: Filter space

E AND SPATIAL ORGANISATION

ORGANISATIONAL PROPOSAL



BBE: Bay / beverage enclosed
F: Filter space
Patient flow
Staff link


OPERATING AREA
rthing room
F
Postnatal beds
Neonatal bay
BE
Staff Station
Lounge patient / family
Facilities for companions
rthing room
Triage
Reception
Maternity assessment room

Illus 125.

07.4 Transitional Facility

During the research of this study, there were several findings on the application of waiting facilities in relation to maternity units. From this point, a transitional facility is proposed that would function as a temporary residence where mothers can stay even up to forty days before their delivery or stay if they have their baby in neonatal care.

This facility is directly related to all the problems that exist in areas of precariousness in relation to access to maternal health care, where due to different limitations in terms of economic resources, road infrastructure, available means of transport, and other factors, many mothers do not have access to adequate maternal health services, preferring to deliver at home, which increases the risk to both the mother and the baby's life.

On the basis of this infrastructure, it allows for more effective procurement of care services provided in the maternity unit, but it can also function as a joint facility to also host medical staff, thus ensuring better conditions for staff transferred to locations with difficult contexts and guaranteeing their well-being while performing their duties, solving another of the problems that influence the crisis of qualified personnel attending to health care facilities.

While these facilities support the maternity unit, they include spaces that do not have any medical requirements. To avoid interfering with the unit's operational functionality or any of the sanitary and hygienic requirements that it must meet, it was determined to be more beneficial to design it independently of the unit.

The spaces that compound this facility are described below:

Social room:
The social room is a space that allows for socialisation between mothers and caregivers and promotes a sense of community, which is very important in different societies and cultures. In addition, it can have different purposes: firstly, it can be a space for knowledge, i.e. a space for the community to teach other generations the different customs, traditions, and knowledge of a culture. Secondly, it could be a space to offer workshops or labour training where different activities are promoted that allow the mother and/or the family to acquire new tools and knowledge, which can later be applied to generate new income. Finally, moreover, to being an educational space for parents, it can also be a space for the promotion of different relaxation techniques during childbirth, such as dance and yoga.

Service area:
This area offers services to mothers, their families, companions, and even staff, as well as being a space that provides more comfort to mothers in their work and stay in the unit, allowing the atmosphere to feel much more familiar and homely, an important aspect to include in the perception of the environment of the maternity unit. The space includes a kitchen, laundry room, and a dining room.

Educational room:
The education room can have different purposes from programs for the promotion of maternal health, family planning, and sexual health, to other types of conferences and workshops on different topics.

Room for traditional practices:
Culture and traditions vary according to each specific place; however, to integrate these aspects, it is proposed to include a space where the family, mother, and accompanying persons can perform their traditional rituals or ceremonies according to their conception of birth.

Overnight rooms for companions:
This type of room is designed for a single bed per person, so that those accompanying a mother who is still in labour can stay close to the maternity unit, without the need to travel long distances and have easier access to the mother and baby.

Overnight rooms for families:
On the other hand, there is the family room, designed to support a family-centred approach to care. This type of room accommodates the presence of immediate family members, typically the mother, children, and father when applicable, fostering a comfortable environment that encourages family involvement and support.

By providing space for family members to stay together, this setting promotes emotional well-being and active participation in the care process.

Care area for children:
This area is designed for childcare, since as seen in the family-centred approach, it should not only include the father, but also the mother's other children, who may become restless with whoever is caring for them or at home in their mother's absence. Providing a space for them allows children to be involved in the process, and helps mothers, considering that in some cultures they have full responsibility for the care of their children.

TRANSITIONAL FACILITY

OPTIONAL SPACES

COMMON AREAS

Social room
20 m²

Kitchen
5 m²

Laundry area
6 m²

Dining room
12 m²

Room for traditional practices
15 m²

Children's care area
4,5 m²

Overnight single room
12 m²

Store
2 m²

Family overnight room
16 m²

WC
6 m²

Store
2 m²

DIAGRAM OF OPTIO

Social room

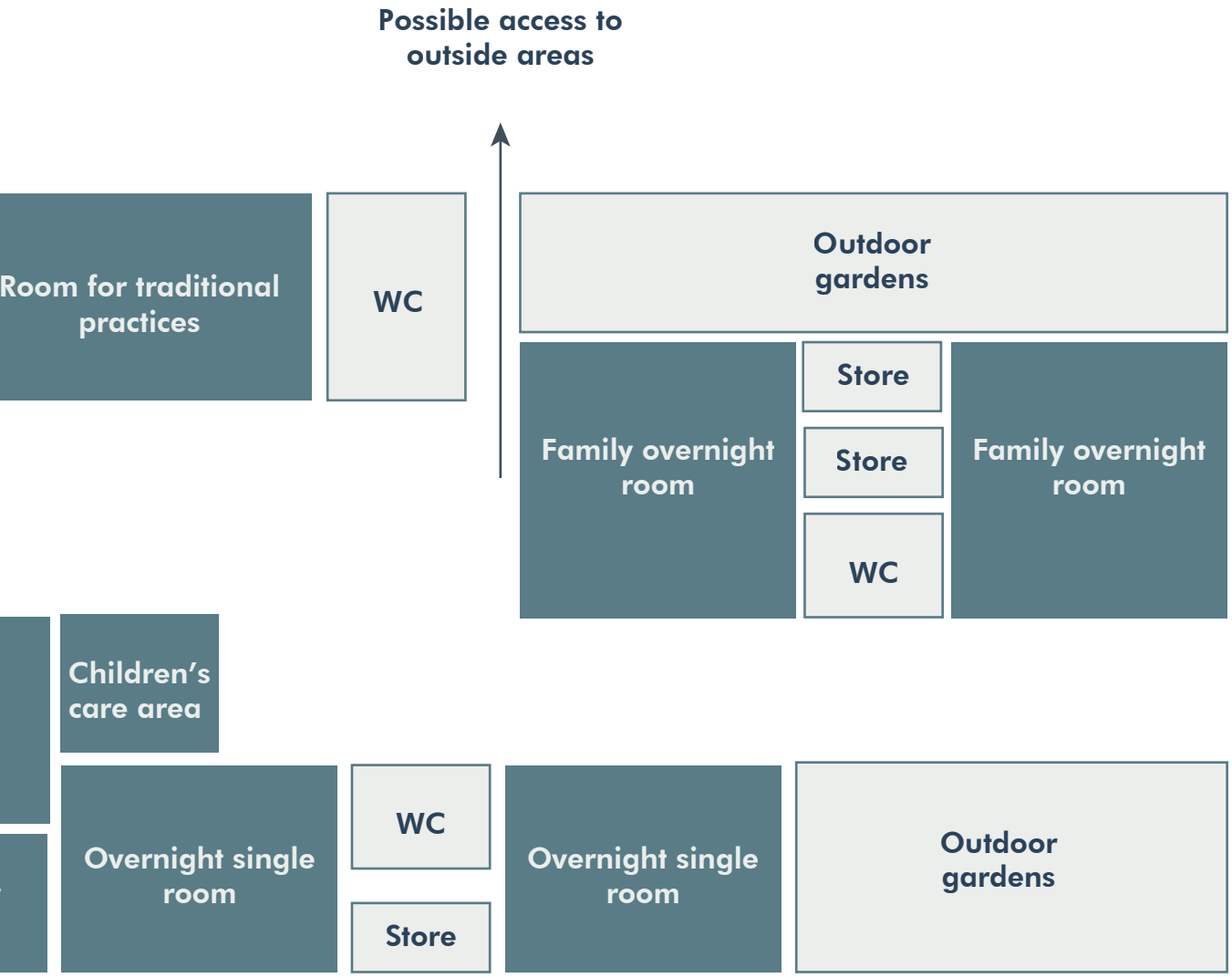
Entrance

Kitchen

Dining room

Laundry area

NAL SPACES AND SPATIAL ORGANISATION



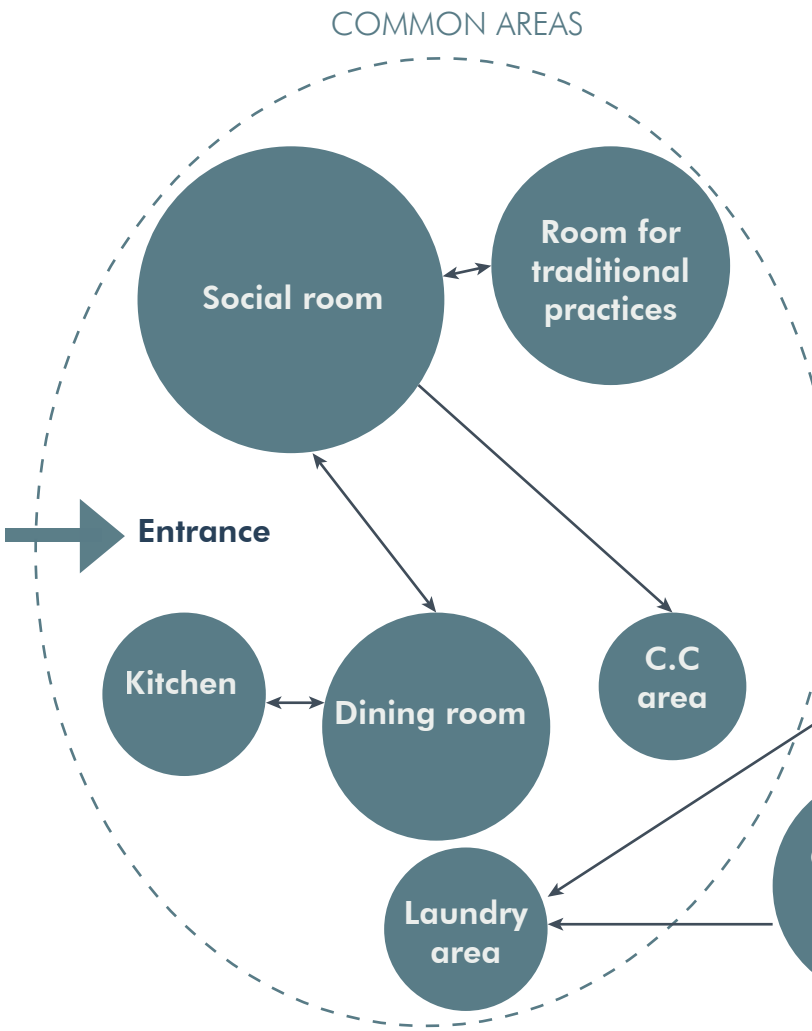
Illus 126.

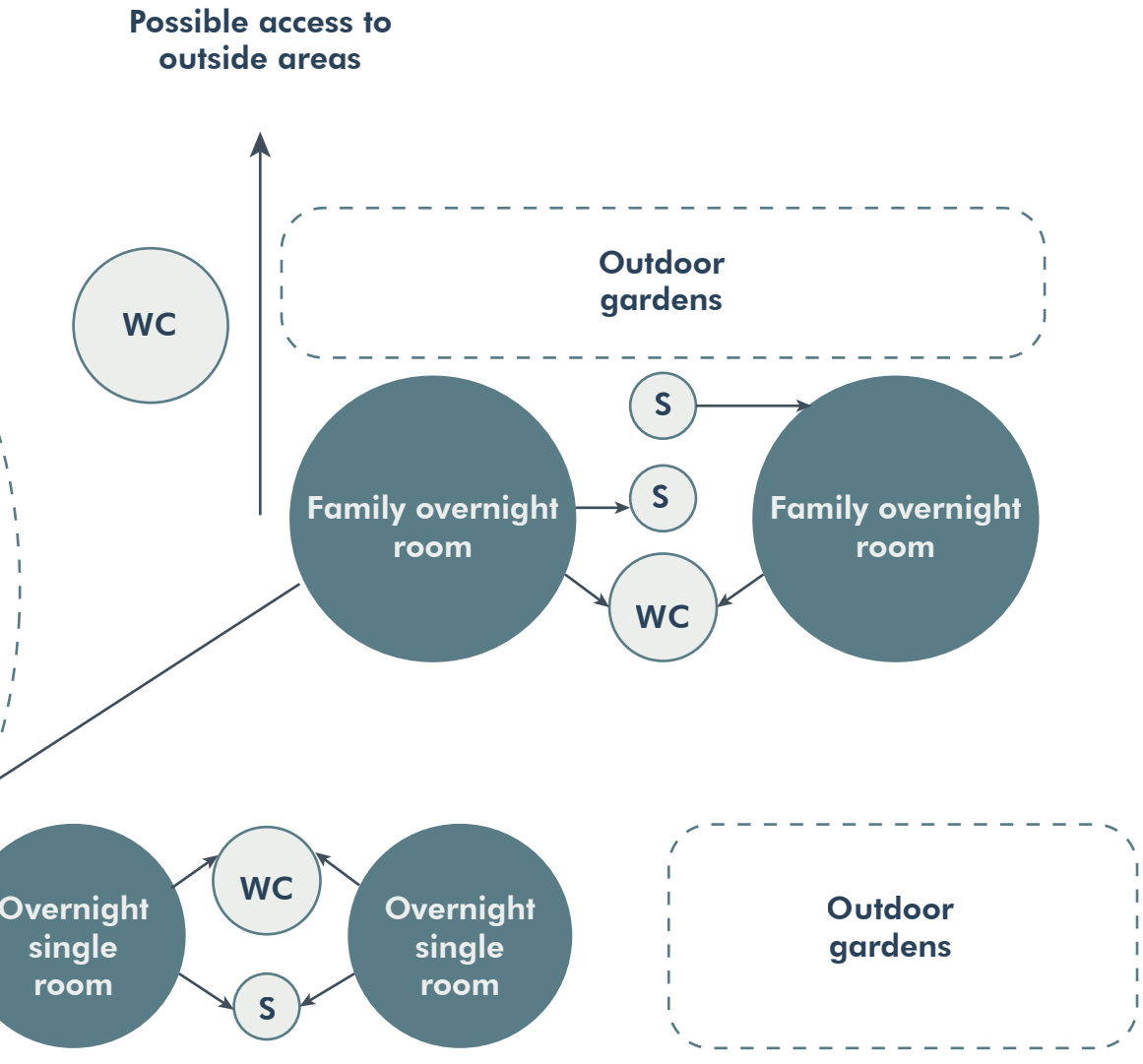
ORGANISATIONAL PROPOSAL

——— Direct connection

S: Store

C.C area: Children's care area




Possible access to outside areas
WC
Outdoor gardens
S
Family overnight room
S
Family overnight room
WC
Overnight single room
WC
Overnight single room
S
Outdoor gardens

Illus 127.

Conclusions

In conclusion, there are several aspects that are worth highlighting after this work has been carried out. Firstly, it is crucial that international guidelines for the design of maternity units are not only aligned with local policies but also consider factors closely related to the users, such as their context, culture, traditions, and beliefs. This approach can lead to more appropriate unit designs, address local challenges related to accessibility and the availability of healthcare infrastructure, and enhance both the user experience and the quality of services provided.

Although international guidelines determine all the requirements that a health infrastructure of this type should have, they must be adapted to the needs of all those involved and respond to other factors beyond medical requirements. In other words, in addition to respecting all the directives for the maternity unit to function properly, it must generate a favourable environment that responds to the physical and psychological needs of the mother, her companions, and the health personnel, thus generating an environment of well-being.

As Balabanoff mentions, there is a lack of research on the design of maternity units and the design of birth environments that support the natural birthing process and generally consider the needs of users.

This creates a global call for not only more research on the topic but also for its applicability to be made effective, especially in resource-limited settings, which present the greatest challenges for access and quality of maternal health. Although there is evidence of a much more humane and holistic approach to maternity unit design, most of the evidence comes from developed countries. Therefore, it is important that all research and new findings on the topic focus on resource-constrained contexts, where maternal and newborn health must be strengthened.

Evidence shows that the application of different approaches to care, involving new practices such as the use of alternative medicine, relaxation techniques during childbirth, among others, practices that translate into unconventional spaces, is scarce or non-existent in low-resource settings. This shows that, in contexts of scarcity and precariousness, where new approaches to care and the application of culture-related interventions are more urgent, these are little considered.

Redesigning maternity units with a focus on the needs of the users and their culture has positive effects on the experience of both, mothers and staff. On the mothers' side, it allows the care offered to rely not only on the skills and treatment of the medical staff, but also on the environment and space in which care is offered. And on the other hand, health personnel can also have better outcomes if their working environment is pleasant and facilitating.

Despite the limited research on culturally sensitive maternity unit design, a methodology was developed to assess diverse contexts. This tool proves valuable as it enables international organizations and local governments to re-evaluate and adapt maternity unit designs, making them more responsive to users' needs and preferences, thereby enhancing the quality of care.

Finally, the importance of this issue should be highlighted, as adopting international directives with a cultural approach to the needs of users and their local context not only represents an improvement in the quality of care, but also increases accessibility to health infrastructures. This last point is consistent with SDG 3, which should ensure access to health and human well-being, as adapting maternity units to local needs, respecting culture, and integrating medical care with traditions, improves the experience and facilitates a more favourable response from mothers, their companions, and medical staff.

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APPENDICES

Assessment tables

INTEGRATION OF NON-CONVENTIONAL SPACES

INDICATOR	Low Importance	Medium Importance	High Importance
Room for the use of alternative medicine			
Overnight rooms for companions and family			
Single occupancy birth rooms			
Room for traditional practices			
Sacred room / spiritual space			
Service Ward			
Common room for mothers			
Social room			
Family room			
Filter space (in birthing room)			
Accommodation for birth attendants			
Transitional care facility			
Sitting room for parents			
Care areas for infants			
Play area for other children in the family			

CHARACTERISTICS OF THE UNIT ENVIRONMENT

INDICATOR	Low Importance	Medium Importance	High Importance
Welcoming environment			
Familiar and calm environment			
Experiencing safety in the space			
Respect and empower environment			
Homely environment			
Friendly environment			
Relax and domestic environment			
Warm and softness environment			
Nonclinical environment			
Enveloping space			

UNIT LAYOUT

INDICATOR	Low Importance	Medium Importance	High Importance
Support privacy within the space			
Availability of facilities			
Allow continuity of the space			
Optimum location of midwives' hub/staff base			
Avoid long corridors			

CHARACTERISTICS FOR THE BIRTH ROOM ENVIRONMENT

INDICATOR	Low Importance	Medium Importance	High Importance
Clean and inviting room			
Central woman's environment			
Individualised space			
Sacred and supportive atmosphere			
Sense of belonging within the space			
Decorated space			
Self-control of room			
Cave-like space			

BIRTH ROOM LAYOUT

INDICATOR	Low Importance	Medium Importance	High Importance
Allow for adaptability of space			
Facilitate freedom of movement			
Ensure a private toilet, bath, and shower			
Use of mobile furniture			
Spacious rooms			
Flexible room			
Change bed position, not in the centre			

PHYSICAL ELEMENTS

INDICATOR	Low Importance	Medium Importance	High Importance
Use of calming items in the room			
Provide comfortable pillows and seating within the birthing ward			
Use of elements that provide physical support in the room			

SUPPORTING ELEMENTS

INDICATOR	Low Importance	Medium Importance	High Importance
Enable connection to natural elements			
Use of sensory channels			
Use of visual elements			
Use of distracting elements			
Use of communicative elements			

MATERIALS AND TEXTURES

INDICATOR	Low Importance	Medium Importance	High Importance
Use of different textures and natural materials			
Avoid using glare-producing surfaces			
Use of rugs on the floors			

LIGHTING

INDICATOR	Low Importance	Medium Importance	High Importance
Soft lighting in the environment			
Allow control of light intensity in the birth room			
Use of natural light			

SOUNDS

INDICATOR	Low Importance	Medium Importance	High Importance
Use of soothing sounds			
Use of soundproofing in the birth unit			
Use of sounds from nature			

SMELLS

INDICATOR	Low Importance	Medium Importance	High Importance
Use of aromas			

COLOURS

INDICATOR	Low Importance	Medium Importance	High Importance
Use of warm colours			

Research findings on new approache

N.	AUTHOR	YEAR	NAME OF ARTICLE
1	Greenless	2024	*On the Margins of Maternity: Low-Income Women's Experiences of Maternity Care in Late Twentieth-Century Glasgow*
2	Maxwell et al.	2024	*Sacred space: a qualitative interpretive meta-synthesis of women's experiences of supportive birthing environments*
3	Feeley	2023	*Supporting Physiological Birth Choices in Midwifery Practice: The Role of Workplace Culture, Politics and Ethics*
4	Vermeiden et al.	2018	*Facilitators for maternity waiting home utilisation at Attat Hospital: a mixed-methods study based on 45 years of experience*
5	Menke et al.	2019	*Is the Birthing Unit Design Spatial Evaluation Tool valid for diverse group*
6	Drglin	2019	*Towards salutogenic birth space*
7	Carlsson et al.	2020	*Place and space in relation to childbirth: a critical interpretive synthesis*
8	Ngotie et al.	2024	*Exploring women's experiences with cultural practices during pregnancy and birth in Keiyo, Kenya: A phenomenological study*
9	McMullen et al.	2024	*A beautiful bush space on Country: Indigenous women's perspectives on the cultural significance of a placenta garden*
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14	Hall et al.	2012	*Midwives' support for Complementary and Alternative Medicine: A literat*
15	Murray-Davis et al.	2023	*Making Space for Midwifery in a Hospital: Exploring the Built Birth Environment of Canada's First Alongside Midwifery Unit*

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	DATA BASE	TYPE OF ARTICLE	PUBLISHER JOURNAL	CONCEPTS AND APPROACHES FOUND
	Open Athens / Oxford Academy	Journal article	Social History of Medicine	Holistic Approach Decision-making
	PubMed / National library of medicine	Journal article	BMC Pregnancy and Childbirth	Holistic Approach Decision-making Healing environment
	ResearchGate	Book's chapter	Routledge Taylor & Francis Group	Holistic Approach Decision-making Individualised Care Humanised Approach Woman Centred-Care Salutogenic Approach
	PubMed / National library of medicine	Journal article	Tropical Medicine and International Health	Maternity Waiting Home Patient Centred-Care
os?	ScienceDirect / Scopus	Journal article	Woman and Birth	BUDSET Tool
	ResearchGate	Book's chapter	Childbirth	Salutogenic Approach Healing environment Holistic health Woman Centred-Care Decision-Making
	PubMed / National library of medicine	Journal article	BMC Pregnancy and Childbirth	Holistically Safe Woman Centred-Care Individualised Care Decision-Making
	ScienceDirect / Scopus	Journal article	International Journal of Africa Nursing Sciences	Holistic Approach (Care) Culturally Sensitive Care Culturally Safe Care Woman Centred-Care Decision-Making
	ScienceDirect / Scopus	Journal article	Women and Birth	Healing environment Culturally Safe Care Cultural Care Decision-Making Woman Centred-Care Person Centred-Care
	ResearchGate	Book's chapter	Lexington Press	Human Centred-Care
nits	ScienceDirect / Scopus	Journal article	Sexual & Reproductive Healthcare	Family Centred-care Decision-Making Individualised Care
	PubMed / National library of medicine	Journal article	Worldviews on Evidence-Based Nursing	Individualised Care Family Centred-care
out?	ScienceDirect / Scopus	Journal article	Journal of Neonatal Nursing	Family Centred-care Decision-Making Human Centred-Care
ture review	ScienceDirect / Scopus	Journal article	Woman and Birth	Holistic Approach Decision-Making
	PubMed / National library of medicine	Journal article	HERD	/

N.	AUTHOR	YEAR	NAME OF ARTICLE
16	Hammond et al.	2017	*Friendliness, functionality and freedom: Design characteristics that support midwifery practice in the hospital setting*
17	Foureur et al.	2010	*Developing the Birth Unit Design Spatial Evaluation Tool (BUDSET) in Australia: A Qualitative Study*
18	Nielsen & Overgaard	2020	*Healing architecture and Snoezelen in delivery room design: a qualitative study of women's birth experiences and patient-centeredness of care*
19	Patel & Rajasingam	2013	*User engagement in the delivery and design of maternity services*
20	Umstead et al.	2023	*Human-centered design in the context of social determinants of health in maternity care: methods for meaningful stakeholder engagement*
21	Crowther & Hall	2015	*Spirituality and spiritual care in and around childbirth. Women Birth*
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27	Nicoletta et al.	2022	*A broad study to develop maternity units design knowledge combining sp analysis and mothers' and midwives' perception of the birth environment*
28	Nilsson et al.	2020	*Effects of birthing room design on maternal and neonate outcomes: A sy review*
29	Kennedy et al.	2018	*Asking different questions: A call to action for research to improve the qu care for every woman, every child*
30	Olza et al.	2018	*Women's psychological experiences of physiological childbirth: a meta-s*

	DATA BASE	TYPE OF ARTICLE	PUBLISHER JOURNAL	CONCEPTS AND APPROACHES FOUND
	ScienceDirect / Scopus	Journal article	Midwifery	Salutogenic Approach Friendliness, functionality and freedom in the birth unit
	PubMed / National library of medicine	Research article	HERD	Holistic Design Salutogenic Design
e	BMC Pregnancy and Childbirth	Research article	BMC Pregnancy and Childbirth	Healing architecture Patient Centred-Care
	ScienceDirect / Scopus	Journal article	Best Practice & Research Clinical Obstetrics and Gynaecology	Patient Centred-Care Family Centred-care Woman Centred-Care Decision-Making Culturally Sensitive Care
	PubMed / National library of medicine	Journal article	International Journal Qualitative Studies on Health and Well-Being	Human Centred-Approach Human Centred-Design Patient Centred-Care Decision-Making
	ScienceDirect / Scopus	Journal article	Women and Birth	Holistic Approach (Care) Woman Centred-Care Person Centred-Care Spiritual Care Culturally Sensitive Care Decision-Making
re in	ScienceDirect / Scopus	Journal article	International Journal of Nursing Studies	Individualised Care Culturally Sensitive Care Decision-Making
ge in	ScienceDirect / Scopus	Journal article	Women and Birth	Woman Centred-Care Decision-Making
es: a	ResearchGate	Journal article	International Journal of Public Health Science	Patient Centred-Care Culturally Sensitive Care Family Centred-care Decision-Making Person Centred-Care
	OCAD University Open Research Repository	Review	Social Sciences and Humanities Research	Holistic Approach (Care) Salutogenic Approach Spiritual Care (Experience) Spirituality related to birth Woman Centred-Care
	PubMed / National library of medicine	Literature Review Article	HERD	Salutogenic Approach BUDSET Tool Patient Centred-Care Decision-Making
patial	PubMed / National library of medicine	Research article	HERD	Woman Centred-Care Human Centred-Care
stematic	PubMed / National library of medicine	Literature review article	HERD	Humanised Environment
ality of	ScienceDirect / Scopus	Commentary on Literature review	Midwifery	Individualised Care
ynthesis	BMJ Open	Research article	BJM Open	Salutogenic Approach Decision-Making Caring Approach