Delivering More

Design Case Studies

Institute *for* Healthcare Improvement

MASS.

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2nd Edition

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The Delivering More project outlines a human-centred process to co-design ideal maternal care from the user perspective - with the aim of developing improved health facility designs that enable safe, respectful Maternal and Newborn Health (MNH) care provision and utilisation in traditionally underserved populations. With support from the Gates Foundation and the Elsa & Peter Soderberg Charitable Foundation, the project was led by the Institute for Healthcare Improvement (IHI), a not-for-profit organisation with a mission to improve health and health care worldwide. IHI partnered on the project with MASS Design Group — a nonprofit design, research, and engineering firm with extensive experience designing and implementing impact-driven health care infrastructure.

Based on learnings from the immersions in Ethiopia and Bangladesh, we have developed a globally-applicable toolkit and a set of guiding principles for improving maternal and newborn facility design.

Project Lead

Institute for Healthcare Improvement

Project Partner

MASS.

Overview

This document provides examples of how the human-centred design process can be applied to specific facilities and contexts.

As one output of the Delivering More project, we assessed and co-designed eight maternal and newborn care units in Ethiopia and Bangladesh, four of which progressed to detailed construction documentation. In collaboration with Jacaranda Health, we also designed three units in Kenya.

While the Design Principles are a globally-applicable resource, these designs are not. Rather, they reflect our efforts to optimize the design principles within a set of existing, inherited spaces. We are sharing these case studies as examples of how design teams must strike a careful balance between what is ideal (the best possible outcome for care) and what is realistic, affordable, and implementable. Each design was informed by a user engagement and technical assessment process conducted by our local technical partners, Fasil Giorghis Consult and icddr,b, and developed with feedback from IHI, Jacaranda Health, Ministry of Health (MoH) representatives, and facility staff. The recommendations respond to the needs of not only mothers, babies, and providers, but also family members and companions, recognizing their importance as part of the caregiving team.

While we believe that the implementation of these designs will significantly improve care experiences at these facilities, it is also important to acknowledge that architecture alone cannot solve systemic challenges like overstretched providers or resource limitations. To effectively improve the quality of maternal-newborn care, space interventions will need to be paired with other systemic initiatives.

PART 1

Ethiopia

Ethiopia has expanded access to maternal and newborn health services over the past two decades through major health system investments. Despite this progress, it continues to face one of the highest maternal mortality rates in the world.

In line with the Ethiopian Health Sector Transformation Plan's focus on improving quality of care, the Ministry of Health (MoH) Infrastructure Directorate has been working to strengthen the quality of infrastructure in public health facilities. These efforts recognize that well-designed facilities are essential to enabling high-quality maternity care and improving the experience of care for women, newborns, and families.

In collaboration with the Institute for Healthcare Improvement (IHI), the Ministry of Health identified Amibara District in the Afar Region and Libo Kemkem District in the Amhara Region as potential sites for the project. These regions were intentionally selected to reflect different geographic and cultural contexts: Afar is primarily pastoralist, while Amhara is largely agrarian. By working in both regions, the ministry sought to better understand how women's experiences of and attitudes toward perinatal care vary across these distinct settings.
Site visits and user engagement sessions were conducted across four facilities in the two regions. Ultimately, two facilities in Amhara were selected for full design: Addis Zemen Primary Hospital and Yifag Health Centre.

YIFAG
Health Centre 11

ADDIS ZEMEN
Primary Hospital 25

Process

We leveraged a range of methods to engage mothers, companions, health workers, and Ministry of Health (MoH) administrators across the sites in Ethiopia.

Our goal was to hear a diverse range of perspectives about how health care environments affect childbirth experiences, identify limitations and opportunities for improvement, as well as understand how spaces need to be contextually and culturally specific.

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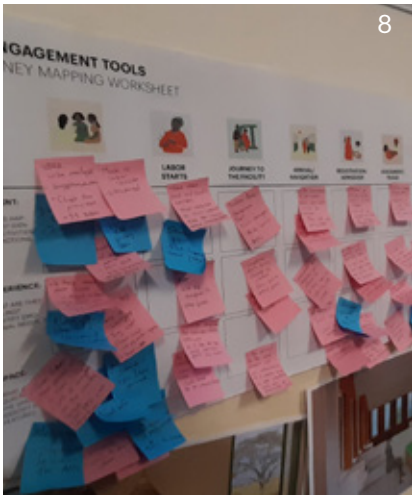


1. Experience simulations and role-playing
2. Co-design workshops with facility administrators and clinicians
3. Clinician shadowing and observation
4. Documentation of current space use and interior room layouts
5. Finding historical records of facility construction and site challenges
6. Interviews with mothers, companions, and family members

7-8. Journey-mapping workshops with health care providers

9. Observing cultural practices and celebrations related to birth

Opportunities

Our engagement process highlighted the following opportunities for improving care experiences across the two facilities in Amhara:

	User Feedback	Design Opportunities
Capacity & Resources	*"The bed number is too small compared to the population."* *"We are highly stressed because of overcrowding."* *"There is an inadequate number of staff, inadequate space and number of rooms."* *"We are unable to save the life of critically-ill babies because of lack of resources."*	**Essential physical resources and sufficient space must be provided in order for facilities to offer safe, effective, and quality care.**
Privacy & Comfort	*"There is no privacy at all because many women are here."* *"The facility would feel more like home, with a proper place for the waiting families. It is comforting to have people in such conditions."*	**Ensuring privacy and comfort in inpatient areas is key to encouraging women not only to seek care at health facilities, but to stay through the recommended postpartum period.**
Sanitation	*"It was not good because no shower and water were available regularly."* *"There is no cooking space and no laundry."* *"The lack of a shower, the distance to the toilet and the lack of a change of sheets for the delivery and PNC beds [felt negative]."*	**Clean facilities, with adequate toilet and shower amenities, are essential to a positive care experience; and to combating the misconception of birth as a dirty process.**

	User Feedback	Design Opportunities
Mobility & Birth Position	"I wanted to walk around [in early labour], but there was no privacy in the waiting [labour ward]. It was too crowded. There is so much heat in there." "The space was not comfortable [to try alternative birth positions]." "Beds should be suitable for any position." "We discourage mothers sometimes [delivering in other positions] because the bed design and equipment may not be appropriate for the preferred position."	**In order to encourage labour mobility and birth position of choice, facilities must provide private and comfortable spaces for mothers to move around in during labour, as well as generously-sized delivery rooms with alternative birth position support equipment.**
Companion Support	"Better if a separate room with adequate space is available near to the woman for companions." "Not enough space, no chairs [for companions]. " "My companions should be allowed to support me at any time. If this is not possible, the health workers should provide me the support I want. They didn't give me the support I needed."	**Companions are a critical part of the care team, providing physical and emotional support to mothers. Labour, delivery, and postpartum spaces need to be more intentionally designed to accommodate companions.**
Cultural Practices	"It [would be] good if the place integrated traditional practicing space since I went home for such thing after giving birth." "Create the opportunity for coffee ceremonies!" "Muslims are praying out in the open. It would be nice to accommodate this and create suitable spaces."	**Cultural and religious practices are key to respectful and dignified childbirth care and encouraging facility utilisation. Spaces for gathering, celebration, and prayer should be included in childbirth facilities.**

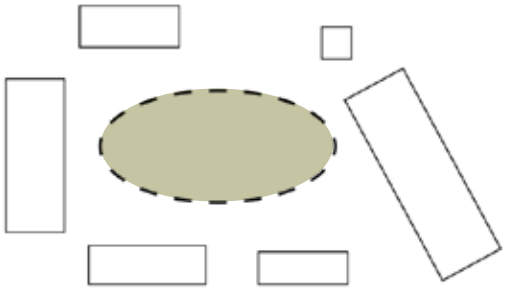
Context

The engagement process also revealed ways that facility designs could respond to existing site conditions and be firmly rooted in the surrounding context.

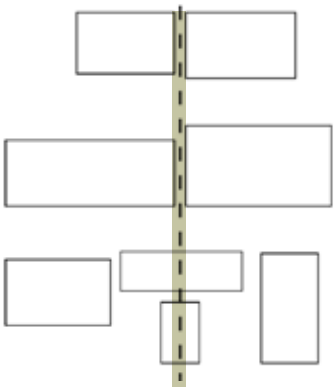
Site Strategy

All the facilities we visited were in fairly rural contexts and consisted of a cluster of single-story buildings. Whereas the health centre buildings were grouped around an open courtyard, the hospital buildings were arranged more linearly, along central circulation spines. The maternity programmemes were housed in one building in each facility.

Generally, we found that maternity units are disproportionately sized for their needs, and that outdoor spaces are often underutilised and not intentionally designed. Due to availability of space on site and the limited layouts of the existing buildings, we ended up recommending mainly new construction.



HEALTH CENTRES
Arranged as a group of programmes around a central courtyard



HOSPITALS
Arranged as a group of programmes along a central circulation spine

Cultural Preferences

In Ethiopia, we found that spaces for cultural and religious practices are not just a 'nice to have' feature, but essential to supporting high-quality maternal-newborn care. Across Ethiopia, coffee ceremonies are an important spiritual and communal practice observed during significant life events such as childbirth and burials. In a recent study exploring dissatisfaction with obstetric services, the lack of a postpartum coffee ceremony was ranked highest, superseding a lack of emergency transport.[1]

As we considered opportunities for improving the design of maternity buildings at the Yifag Health Centre and Addis Zemen Primary Hospital, it became apparent that in order to attract and retain mothers, the facilities would need to accommodate not only standard clinical care spaces, but also community- and family-centred spaces. Our design approaches at both facilities seek to embed a range of interior, as well as exterior, seating areas to support cultural practices like coffee ceremonies; private labour walking areas for mothers; and cooking, laundry, and rest areas for companions.

Local Materials

Our site research revealed an opportunity to highlight traditional stone masonry construction, which is unique to the Amhara and Tigray regions of Ethiopia. As material costs have increased substantially in Ethiopia over the past few years, local sourcing helps to keep the cost of construction low by limiting the need to import costly materials. It also offers added environmental, social, and economic opportunities: reducing the carbon footprint, investing in regional labour, and empowering communities through support of local craftsmanship.

[1] Limperg, Tobias & Verregghen, Maarten & Ridder, Iris & Allsworth, Jenifer & Anderson, Ted. (2021). Traditional Ethiopian coffee ceremony in a rural Ethiopian hospital to increase hospital-based delivery rates: a randomized controlled trial. 13. 1-10.

Design Principles

Based on engagement feedback and contextual research, we articulated a set of design principles for maternal-newborn spaces specific to Ethiopia.

Capacity & Layout

- Consolidate and organise programmes into clear outpatient, inpatient, delivery, OR and NICU areas.
- Reorganise rooms to streamline care flows for improved patient and provider experiences.
- Provide an adequate number of MNH inpatient beds in order to motivate mothers to arrive earlier and stay longer at the facility.
- Pull circulation to the exterior, where possible.
- Establish internal clinical circulation and outdoor public circulation to facilitate greater privacy.

Wayfinding

- Design nurse stations with windows that open out to the exterior of the building to provide an intuitive point of arrival for patients and companions.
- Facilitate better adjacencies between programmes (e.g., position the operating room near the delivery room) to make moving from one programme to the next easy and straightforward.

Climate

- Provide shaded walkways and circulation along the exterior of the building.
- Establish outdoor waiting areas for hot climates.
- Employ better ventilation strategies (via breezeways, cross ventilation or high ceilings with vents).
- Use thermal mass for colder climates. Tuck waiting areas into the building mass, where possible.

Sanitation

- Improve the water supply to the facility by designing localized rainwater harvesting and tap systems.
- Provide sufficient toilets and showers based on the number of inpatient beds.

Provider Oversight

- Position nurse stations in close adjacency to patients and prioritise provider visibility and oversight (specifically for the labour ward, and postpartum ward, if possible).

Labour & Delivery

- Provide uncrowded exterior routes for labour walking with dispersed benches for resting.
- Design labour wards to include space for companion seating and personal storage.
- Provide larger delivery rooms accommodating an appropriate number of delivery beds, with privacy curtains.
- Provide space for alternative birth position support equipment (e.g., balls, slings, stool, etc.).

Postpartum

- Separate postpartum areas from labour areas to establish a greater sense of privacy.
- Provide sufficient space in the postpartum areas for mothers to stay at the facility longer.
- Integrate space for companions as part of the care team (bedside seating at a minimum, but ideally beds or benches for companions, if possible).
- Promote mother-baby bonding by designing postpartum spaces to enable mothers to have visibility of their babies at all times and provide bedside bassinets.
- Include outdoor covered seating for communal gathering/education.

Newborn Care

- Integrate dedicated baby resuscitation areas in delivery rooms, visible from delivery beds.
- Provide space for Kangaroo Mother Care (KMC).
- Keep mothers and babies together in postpartum spaces, as well as small and sick newborn care spaces.
- At the hospital scale, provide a room within the NICU for mothers to stay near their small and sick newborns.

Culture

- Accommodate additional programme spaces for cultural ceremonies (e.g., coffee and genfo ceremonies), as well as cooking and washing.

Yifag Health Centre

Amhara, Ethiopia

Facility Background

Services & Site

Yifag is a Health Centre located in Ethiopia's Amhara Region. It is located on the outskirts of the town of Yifag, approximately 80km northeast of Bahir Dar. It provides basic services, including outpatient antenatal and postpartum care, and sees an average of 266 births a year. Emergency c-sections and NICU cases are referred out to higher-level facilities.

The health centre is located on a mostly flat site at the foothills of the Simien Mountain range, around 1800m above sea level. It features a series of one-story bar-shaped buildings arranged along an open central space.

Challenges & Opportunities

Currently, the maternity programme is housed in a building that was originally built as an operating room block. As a result, care spaces are not proportionately appropriate for their needs, and there is no planned internal circulation, requiring users to pass through rooms to get to other rooms. Per feedback from IHI and Fasil Giorghis Consult, there is a desire to reinstate OR services at this facility.

To allow the existing OR building to be reactivated, a new purpose-built MNH block should be built.

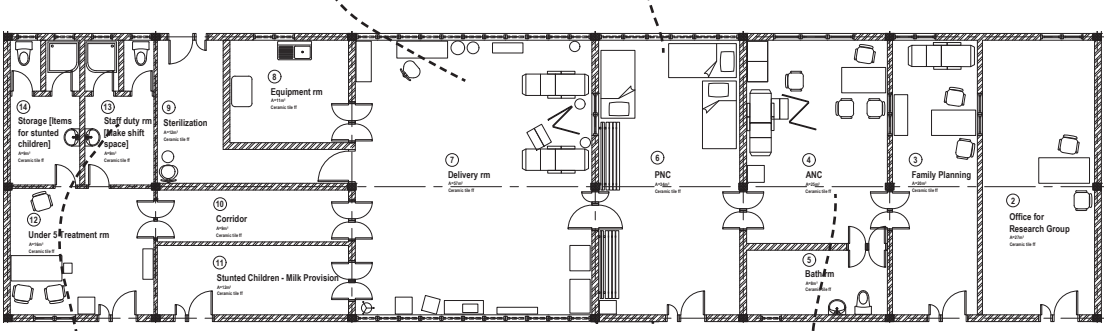
Existing Maternity Block

Delivery Room

Delivery Room is too big, and there is a lack of privacy.

Maternity Inpatient

This space is used for both labour and postpartum. Patient privacy is significantly undermined because the main entrance is located here, causing circulation to cut right through the room.



Toilet Facilities

As a result of water shortages, toilets are currently used as makeshift storage and duty rooms. There are separate pit latrines used as toilets off-site.

Antenatal Room

The room is sufficient for antenatal care. However, there is a problem with privacy, as circulation to the common bathroom moves through the room.

Design Approach

Recommended Site Strategies

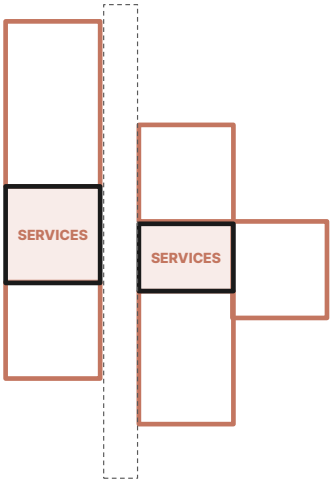
Our recommendation is to locate the new MNH building near the OR to facilitate safe c-section transfers once operating services are reinstated. Rather than a single large building with an internal corridor (which may exacerbate crowding and nosocomial infection), we propose a series of smaller volumes connected by shaded exterior corridors. This layout creates a series of covered semi-outdoor spaces that can accommodate family waiting and gathering, mother-baby bonding, and cultural & religious practices (such as the coffee and genfo ceremonies).

The building is oriented to position the Outpatient Department (OPD) closer to the entrance, establishing a more public space, whilst the private functions of the building are kept in quieter parts of the site.

Conceptual Layout

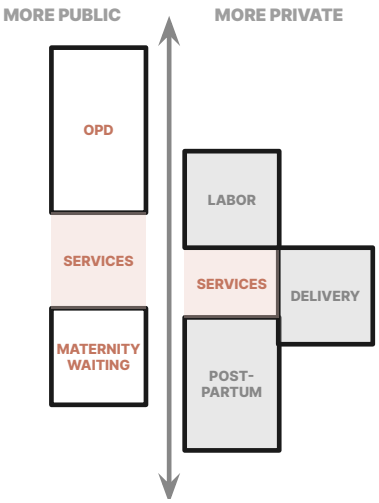
1 Arrange Modules

Programme modules are arranged around central service clusters and are aligned along a shaded exterior corridor.



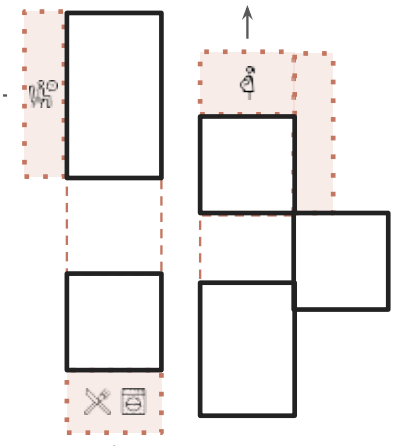
2 Establish Privacy

The two buildings are arranged to allow for greater privacy between the more private inpatient programme and the more public outpatient programme.



3 Programme the Exterior

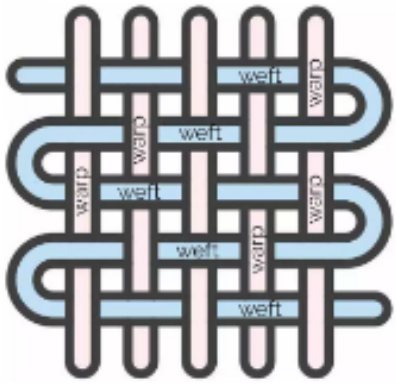
The building nooks are programmemed to allow activity to spill out onto the exterior. The buildings are designed to optimize these exterior spaces for programme that typically are not included at health care facilities, such as spaces for mobility during labour and cultural and religious practices.



Material Approach & Inspiration

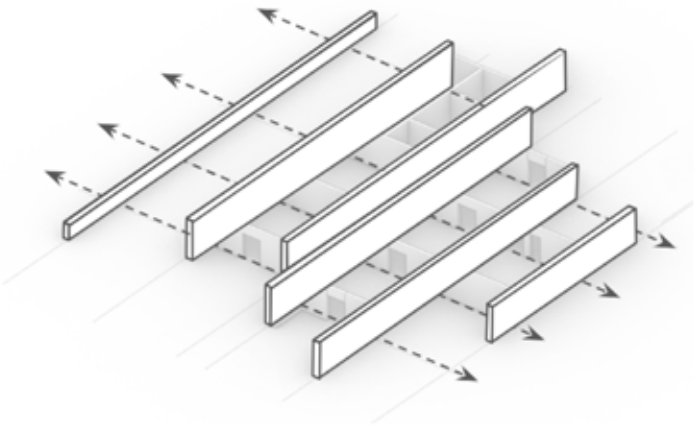
The design takes inspiration from the concept of weaving as a motif for childbirth care. In Ethiopia, babies are wrapped in a traditional woven blanket called a Gabi. A Gabi is often the first garment that a child wears and will follow them through their lives.

Weaving is also a traditional practice among female artisans in Ethiopia and has recently been viewed as a vehicle for female empowerment and social mobility.



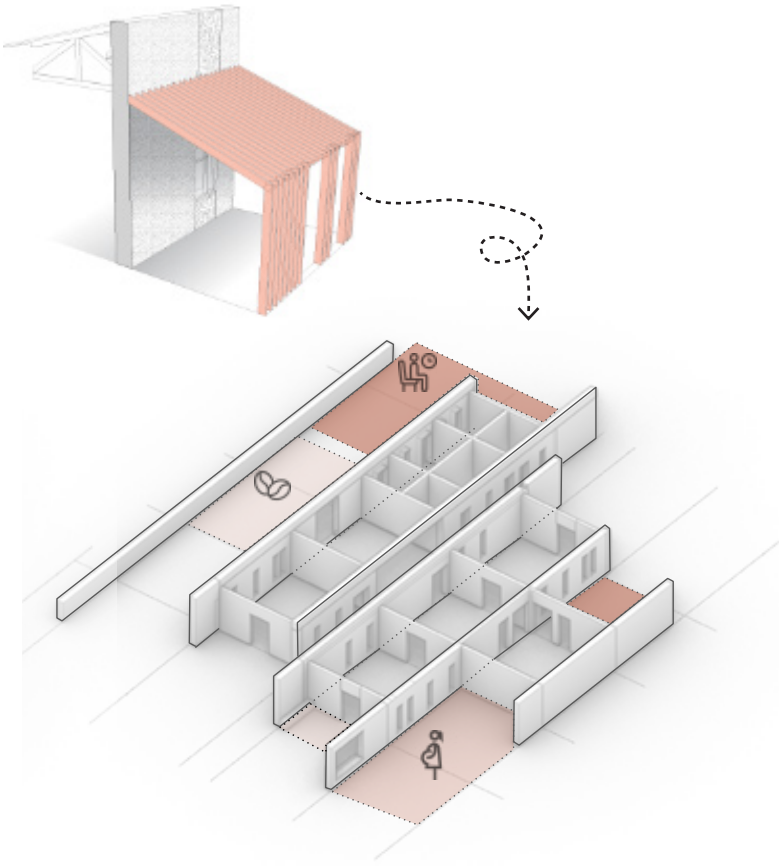
Masonry Walls

The building's plan is designed to resemble a woven fabric. Thick, load-bearing, stone masonry walls are placed in the "warp" direction, with thinner, plastered walls in the "weft" direction. The stone walls, placed on the east and west facades of the building, will help regulate diurnal temperature swings for improved thermal comfort by absorbing insolation during the day, especially when the sun is low on the horizon at sunrise and sunset. The thicker walls will keep the interior environment cool during the day and distribute heat at night. The interior faces of the walls will be rendered with plaster and painted white.



Exterior Screens

A variety of semi-outdoor spaces hug the building, including waiting areas, patios for family members, and a cooking/laundry area. Woven bamboo screens are designed to shade these threshold spaces. Bamboo is plentiful and endemic to the Ethiopian highlands and has been utilised extensively in vernacular architecture. These woven screens will also help to create a sense of privacy for key exterior programmes (such as the labour walk) in order to ensure that these spaces are well utilised.



Design Features

8 Kitchen & Laundry

7 Maternity Waiting Home

1 Outpatient Services

Entrance

2

4 Postpartum Ward

3 Labour Ward

5 Delivery Room

1 **Outpatient Services**

The more public outpatient programme is positioned near the building entrance for access for mothers and companions arriving for antenatal checkups, PNC follow-ups, or family planning. The exterior covered walkway to the left provides private seating space separate from other inpatient areas.

The outpatient area includes four outpatient consultation rooms: ANC/PNC, Family Planning and CAC, "After 5" treatment (pediatric care), and Immunization and Growth Monitoring. These rooms have been generously sized to permit procedures where needed and to accommodate flexible use. Milk provision and storage spaces have also been incorporated. A designated WC for OPD patients and family members is located within this block.

2 **Nurse Station**

The nurse station has been centrally located with close access to the labour and postpartum wards. It also has windows facing onto the central corridor and the waiting/education patio to be able to monitor activity for the unit as a whole.

View of outpatient block from building entrance

ETHIOPIA | YIFAG HEALTH CENTRE

Labour ward

Labour walk

3 Labour Ward

The labour ward accommodates four patient beds and four companion benches. The layout strives to give women as much privacy as possible, while maintaining open sightlines and connectivity for staff caring for patients. To create space for companions and support them as a critical part of the care team, each patient bed is paired with a built-in bench for companions to sit and to sleep. Smaller rural facilities often have fewer options nearby for companion accommodation, and as a result companions often end up sleeping outside. Our intent is to integrate space for one companion per mother within the ward, so they can be present to aid the mother and also have a dignified, safe space to rest. The bench also integrates storage for personal items.

Labouring patients and companions can access a designated WC with a toilet and shower. We placed the door to the WC facing the exterior, rather than directly into the ward, to avoid sanitation challenges and odors entering the ward. While mothers and companions do have to exit the ward to access the bathroom, they are doing so via a private external corridor, which will be sheltered from view.

An outdoor labour walk is positioned adjacent to the labour ward in order to facilitate movement during labour. Handrails have been included for women to lean on, as well as benches for resting.

4 Postpartum Ward

Similar to the labour ward, the postpartum ward accommodates four patient beds and four companion benches. The layout strives to give women as much privacy as possible while maintaining open sightlines and connectivity for staff caring for patients. To create space for companions and support them as a critical part of the care team, each patient bed is paired with a built-in bench for companions to sit and to sleep.

The postpartum ward integrates a small lounge area for mothers and companions, which includes a built-in L-shaped bench and a table. Our understanding is that women in the Amhara Region prefer to stay in a private area after birth, so this lounge could be used for eating or socializing within the ward. A counter with sink is also provided. Additional storage above and below the counter can accommodate medical supplies.

The postpartum ward has access to a mother-baby patio. This space will feature a bamboo screen and will be private and shaded. The intention is that mothers and companions could come out to this space to sit, converse, or eat.

Postpartum patients and companions can access a designated wheelchair-accessible WC with a toilet and shower. Here, we also placed the door to the WC facing the exterior rather than directly into the ward, to avoid sanitation challenges and odor. While mothers and companions do have to exit the ward to access the bathroom, they are doing so via the mother-baby patio, which will be sheltered from view.

5 **Delivery**

The delivery room accommodates two delivery beds. Each has a companion chair and a privacy curtain. A counter space with a sink is located along the far wall, and a newborn care corner with a resuscitation unit is located within view from the delivery beds. A nook for alternative birth position equipment has also been included to support birth positions like squatting, which women indicated was a preference. The delivery room has access to a WC immediately outside the room, as well as a sluice and room for cleaning dirty items.

6 **Waiting & Education**

Family and companions are a critical part of the care team and require adequate space in order to support a positive experience, as well as to keep the inpatient rooms from being overly crowded. A generous, shaded, open-air seating area at the heart of the maternity building will accommodate waiting family members. It can also be used for postpartum education sessions.

Covered waiting area

Kitchen/laundry area

7 **Maternal Waiting Home**

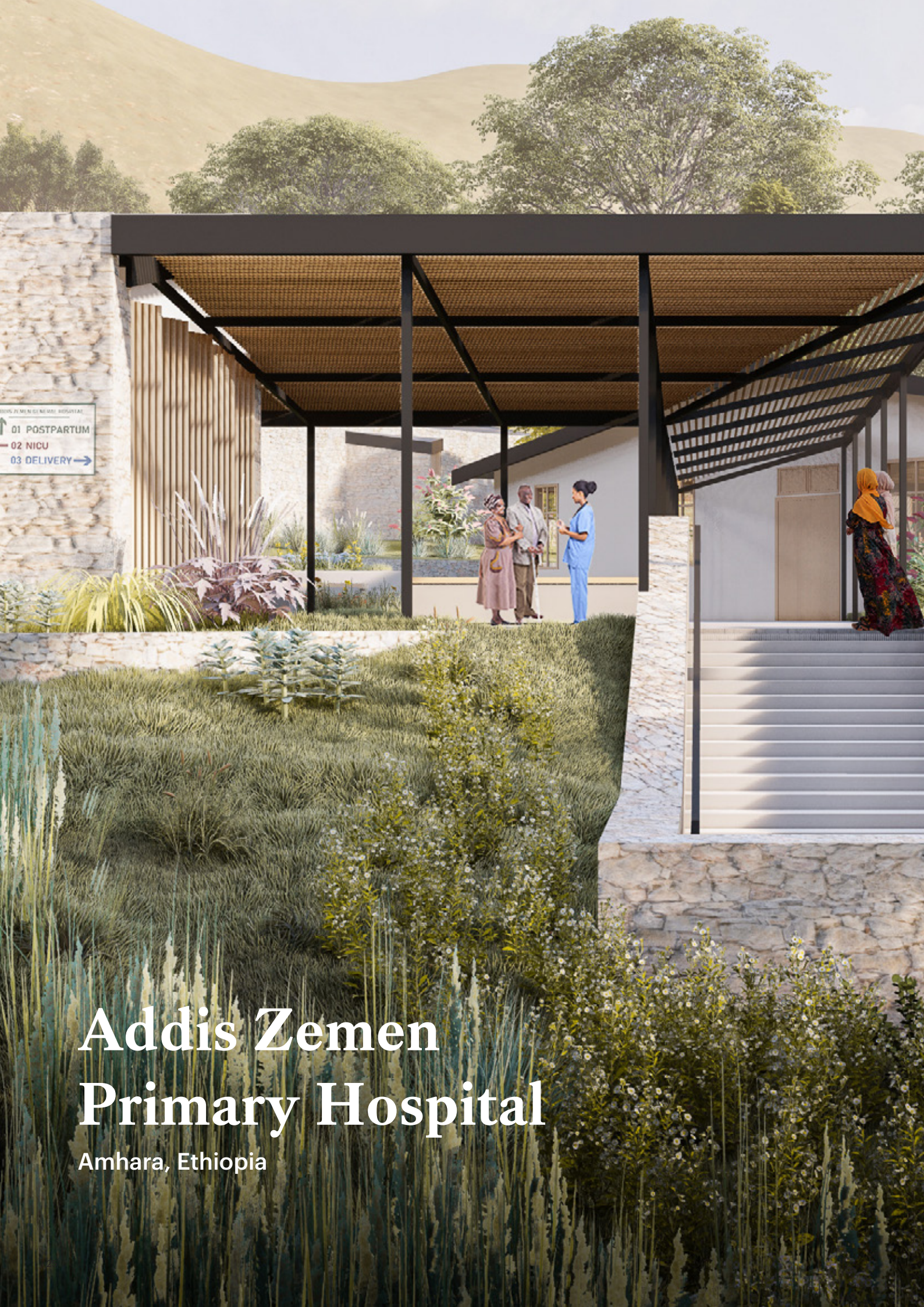
The maternal waiting home (MWH) accommodates four patient beds and four companion benches. To create space for companions and support them as a critical part of the care team, each patient bed is paired with a built-in bench for companions to sit and to sleep. The space integrates a small lounge area for mothers and companions, which includes a built-in L-shaped bench and a table. A TV could also be placed in this area if desired. The MWH has a designated shower and WC, accessed from the outside.

8 **Kitchen & Laundry**

Kitchen and laundry facilities are provided for companions and are designed to be shaded outdoor spaces for communal gathering, as well as cultural and religious practices.

9 **Landscape**

The landscape design is intended to create comfortable, dignified spaces for patients, family, and staff. Communal gathering and patio areas feature benches combined with softscape to create a pleasant ambiance, filter air, and provide a comfortable, controlled climate. The intent is to have a selection of appropriate local planting, chosen for its low maintenance and hardy, climate-adapted qualities.



Addis Zemen Primary Hospital

Amhara, Ethiopia

Facility Background

Services & Site

Addis Zemen is a Primary Hospital located in Ethiopia's Amhara region. It provides general services, including 24/7 emergency care. The maternity unit currently sees an average of 1972 births and cares for 144 small and sick newborns a year.

Addis Zemen was selected as a candidate for recommended maternal and newborn space improvements because the facility design is based on the 2012 MOH standard plan and is reflective of other facilities nationwide. Additionally, authorities in the Amhara Region have expressed a desire to construct more primary hospitals to increase coverage for the population, so we hope that our redesign of Addis Zemen will serve as a framework for the designs of future new facilities.

The hospital is located on a sloped site. It features a series of one-story bar-shaped buildings facing predominantly east, arranged along a central spine. Currently, the maternity, NICU, and OR programmes are all combined into a single building.

Challenges & Opportunities

Our engagement and assessment revealed that maternity and newborn care spaces at Addis Zemen need to be significantly expanded to accommodate the volume of care.

Currently, the maternity unit accommodates 16 total inpatient beds – far too few for a facility which experiences around 2000 births per year. Of these 16 beds, four beds are placed in a corridor due to lack of space. Because of the crowded conditions, mothers only stay at the facility for a few hours after giving birth. There also is a need to significantly expand the NICU. Despite caring for a high volume of small and sick newborns, the NICU programme is currently squeezed into two small rooms.

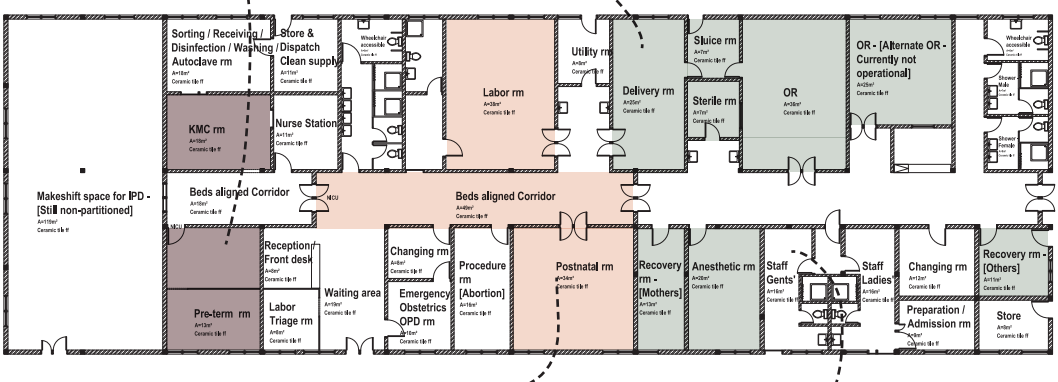
In order to improve the quality and experience of care, and to motivate mothers to stay at the facility for the full 24 hour postpartum care period recommended by the WHO, more beds must be provided, as well as more comfortable and dignified inpatient spaces. IHI provided guidance that informed our recommended sizing for the new facility, which includes 16 labour beds, five delivery beds, 32 postpartum beds, and 10 NICU beds (split between non-critical and critical wards).

Existing Maternity Block

Neonatal Intensive Care Unit (NICU)

Delivery Room

Natural births take place in the delivery room and c-sections in the OR. The delivery room is crowded, with little privacy for mothers.



Maternity Inpatient

This space is used for both labour and postpartum and is crowded with beds, as well as companions.

Toilet Facilities

Due to water shortages, toilets are currently used as makeshift storage and duty rooms. Patients and staff instead use pit latrines outside of the building.

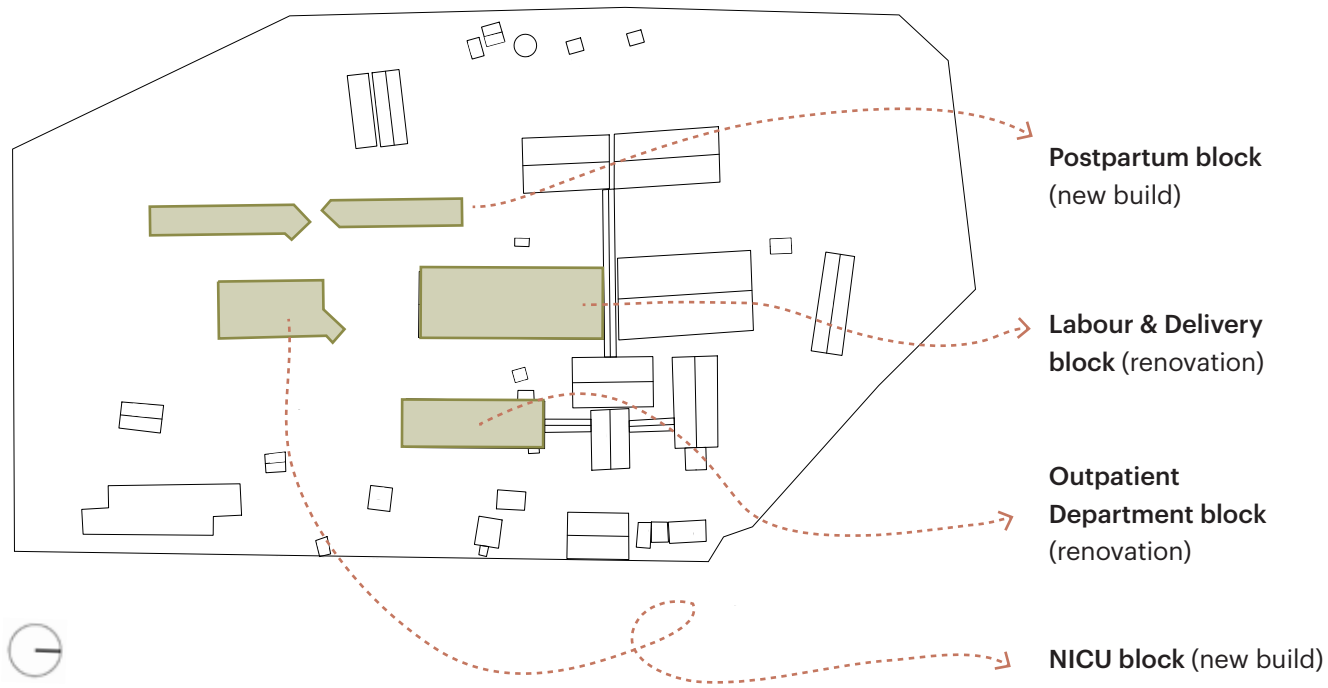
Design Approach

Recommended Site Strategies

To provide sufficient space for care, we recommend renovating the existing MNH block (where OR, labour, and delivery would remain) and adding three new buildings to accommodate the expanded postpartum care and NICU programmes.

The reason why we are proposing the addition of 3 new small buildings (as opposed to a single large one) is due to the steep slope of the site, which requires buildings to be distributed across three terraced levels. Smaller buildings also have the benefit of allowing family, waiting, and circulation spaces to be placed on the exterior and in-between buildings which helps to ensure a better patient experience and greater privacy, as well as infection control. The challenge that this presents is that patients and staff will need to move between buildings.

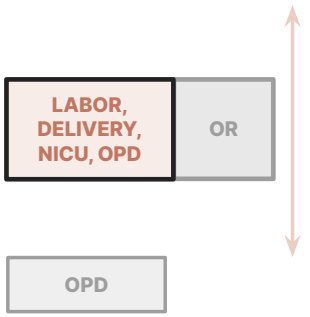
The recommended design locates these buildings along a circulation spine, which links the three site levels where the OPD, labour & delivery, and postpartum blocks are located. This arrangement minimizes travel distances and provides covered pathways for stakeholders to get from programme to programme without being exposed to the elements. It also facilitates the creation of outdoor spaces that can accommodate family waiting and gathering, mother-baby bonding, and cultural and religious practices (such as the coffee and genfo ceremonies that occur in this region).



Conceptual Layout

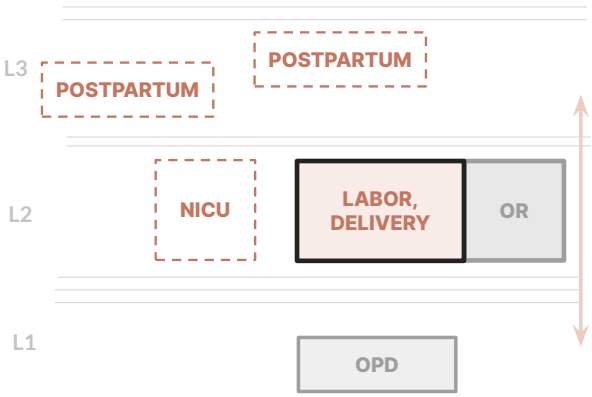
1 Current State

The MNH inpatient block at Addis Zemen is based on the 2012 MoH standard, which includes a labour and delivery programme adjacent to the operating programme, NICU and MNH OPD, all contained in one crowded building.



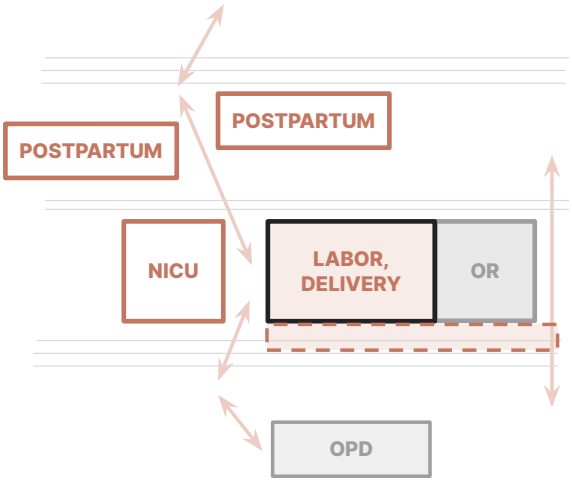
2 Expand

In order to provide sufficient beds for the number of patients, we recommend relocating the NICU and postpartum programmes to new-build blocks. We also propose remodeling the general OPD to include space for the MNH outpatient programme.



3 Circulation Framework

Our circulation strategy sets up a circulation arm adjacent to the existing primary walkway, which patients use to traverse the facility. This framework connects the MNH new-build and existing blocks and sets up a plan for future expansion.



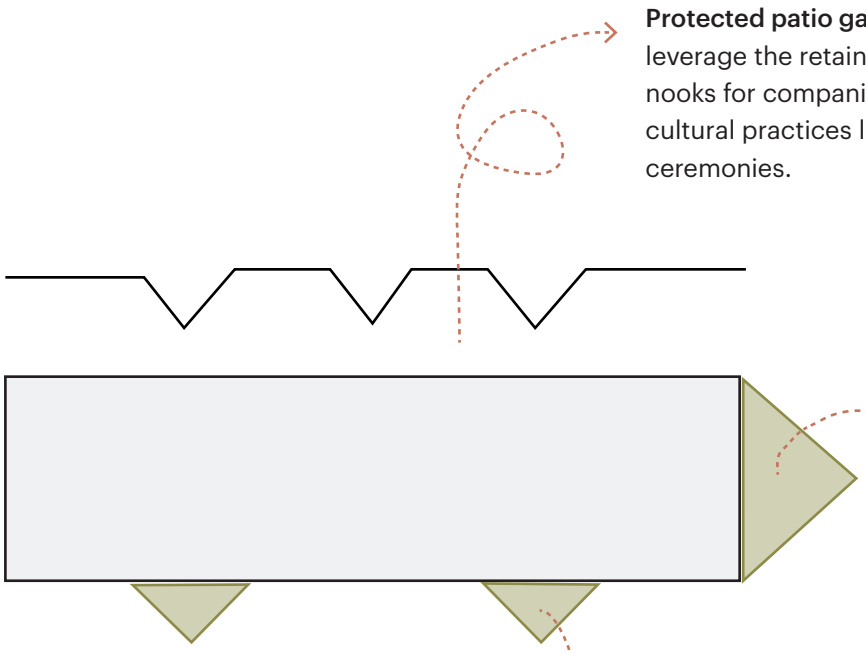
Postpartum Block (New Build)

NICU block (new build)

Labour & Delivery block (renovation)

Material Approach & Inspiration

Similar to the design for Yifag Health Centre, we took inspiration from the concept of weaving as a motif for childbirth care. However, the Addis Zemen design also incorporates triangular spaces that are a reference to the triangular weaving patterns found locally, called Tilet.



Protected patio gathering areas leverage the retaining wall to create nooks for companions and important cultural practices like coffee ceremonies.

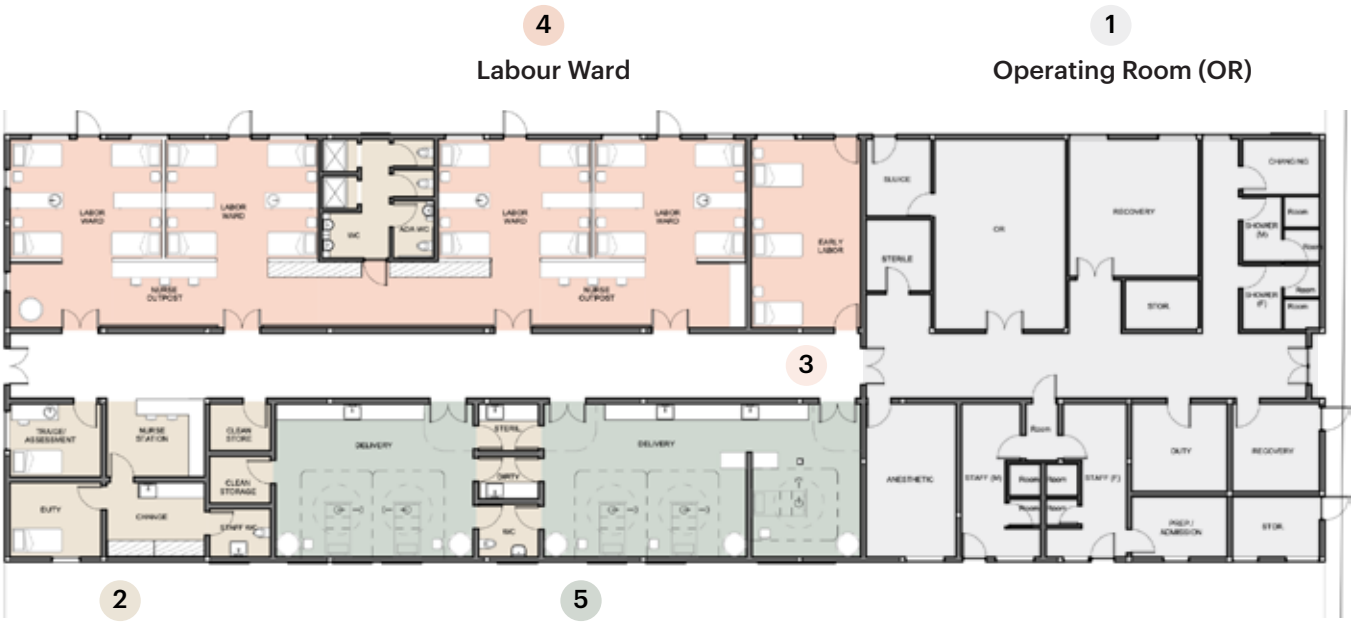
Shared support areas, such as a centralized nurse station or mothers room, make use of space between buildings.

Interior seating nooks extends postpartum area to provide private spaces for eating, sitting, and connecting within the ward.

Design Features

Labour & Delivery Block

(renovation)



1 **Operating Room**
Because the operating programme serves the entire hospital, we preserved this portion of the building and did not alter its layout or design.

2 **Staff Area**
The nurse station has been centrally located with close access to the labour ward and delivery room. It is also located close to the building entrance in order to enable patients and companions to easily locate a provider on arrival.

3 **Early Labour Room**
The early labour room contains three beds and is located in close adjacency to the labour ward. This space is intended for women in early labour who are not ready to be admitted to the labour ward but who shouldn't be sent home. Chairs have been positioned next to each patient bed for family/companions.

4 Labour Ward

The labour ward accommodates 16 patient beds, divided into smaller clusters of four beds. The layout strives to give women as much privacy as possible while maintaining open sightlines and connectivity for staff caring for patients. To create space for companions and support them as a critical part of the care team, each patient bed is paired with a chair for companions to sit alongside mothers. While it would have been ideal to integrate a companion bench for sleeping alongside each patient bed (as was included in the Yifag Health Centre design), due to space constraints, this was not possible in Addis Zemen.

The counters positioned between labour beds are designed to integrate storage for personal items on either side. One handwashing sink is provided for each cluster of four beds. Labouring patients and companions can access a central WC block containing two standard toilets, one toilet designed for persons with disabilities, and two showers. The internal circulation space spanning the labour wards is intended to serve as a labour walk. Handrails are included, where possible, for women to lean on. Some benches are also included for mothers to stop and rest as they walk, or to be used by companions for resting. Space is also allocated at either end of this passage for labour support equipment, which could include a birthing ball or Swedish bars. Two nurse station desks provide decentralized outposts from which nurses can monitor and care for labouring patients.

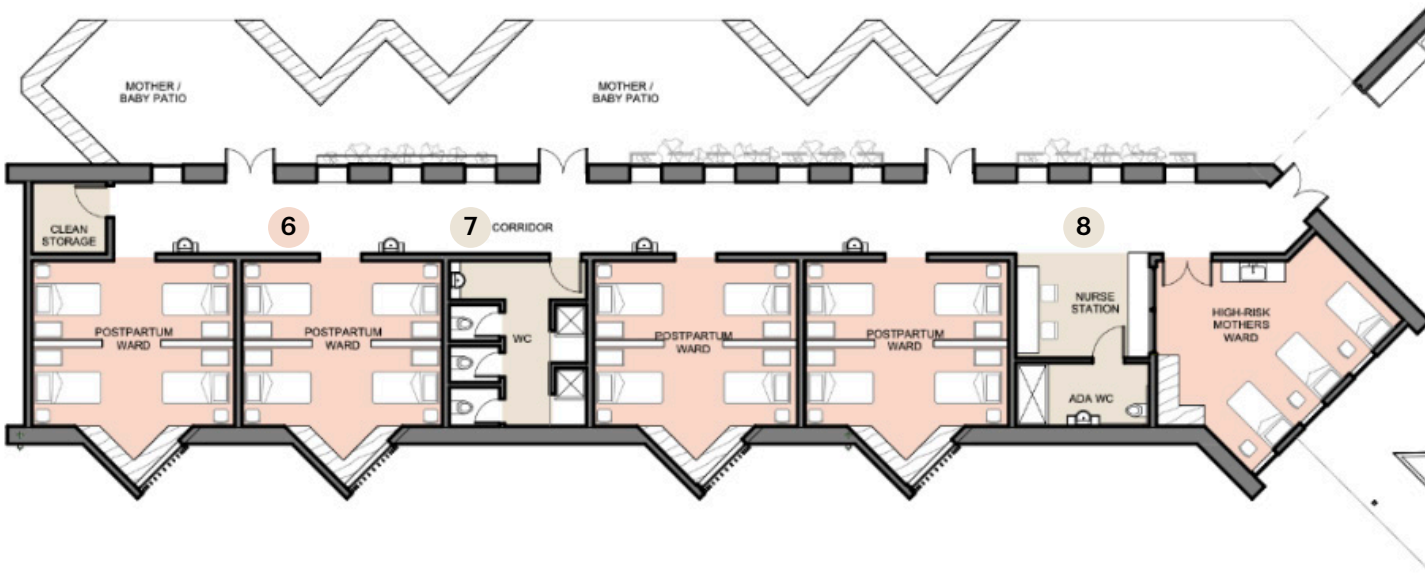
Labouring patients also have access to a private exterior corridor at the back of the labour & delivery block, as well as a hardscape courtyard space between the NICU and labour & delivery blocks. This could be used as an alternative labour walk or by family members and companions.

5 Delivery Room

The delivery room accommodates five delivery beds. Each has a companion chair and a privacy curtain. Counter space with embedded sinks is located along the wall, and resuscitation units are located within view from the delivery beds. Space for alternative birth position equipment has also been included to support birth positions like squatting, which women indicated was a preference. Examples of labour support equipment include birth stools and slings. The delivery room has access to a WC in the middle of the delivery room, as well as a sluice and room for cleaning dirty items, and a sterile room for an autoclave.

Postpartum Block

(new construction)

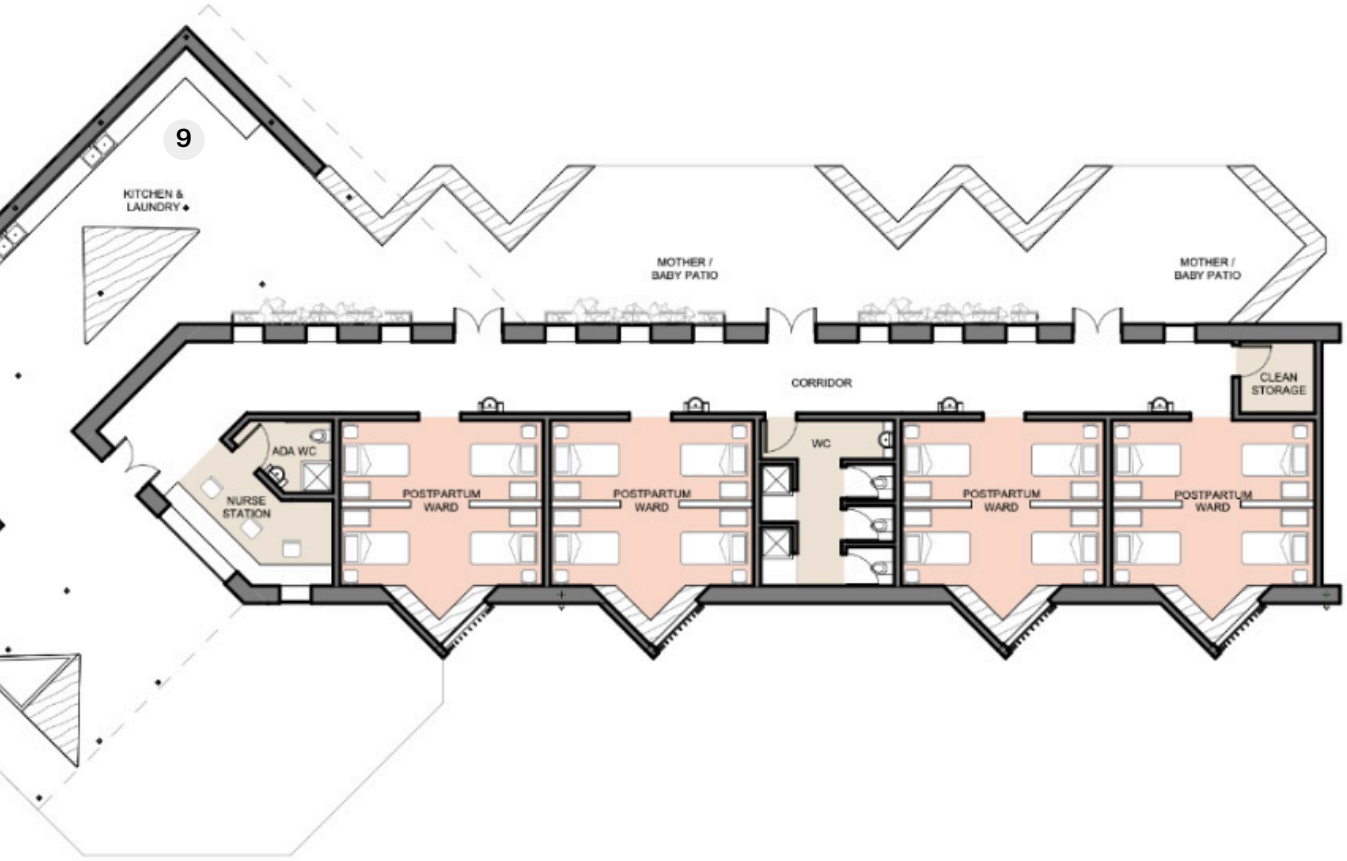


6 Postpartum Ward

The postpartum care area is split between two new-build structures at the top of the site. In total, the postpartum area accommodates 32 beds, split into clusters of four beds. Each building contains 16 beds. The layout strives to give women as much privacy as possible while maintaining open sightlines and connectivity for staff caring for patients. To create space for companions and support them as a critical part of the care team, each patient bed is paired with a chair for companions to sit alongside mothers. Newborn bassinets are also located next to mothers to promote mother-baby bonding.

The postpartum ward integrates triangular nooks within the wards. Our understanding is that women in the Amhara Region prefer to stay in a private area after birth, so by creating a more homelike environment, this ward design will encourage women to stay longer during the postpartum period. The nook features a built-in bench that could be used for mothers and companions to sit and socialize; or if paired with a small table, could serve as an area for eating and relaxing. With a motivation to encourage mothers to spend more time in postpartum care, spaces like these V-shaped nooks and the exterior patios make the postpartum ward a more comfortable environment for mothers and companions.

The postpartum ward has access to programmemed mother-baby patios at the back of the postpartum block, which are intended for patient and family respite. The intention is that mothers and companions could come out to this space to sit, converse, or eat. It could also be a space for the cultural and religious ceremonies surrounding birth.



7 **Toilets & Showers**

A WC block is located in each of two buildings. The south block contains four toilets and two showers for patients and families; a toilet and shower designed for persons with disabilities and for staff use is located adjacent to the nurse station at the entrance of the block. The north block containsfour toilets and two showers; a toilet designed for persons with disabilities is located at the end of the corridor.

8 **Nurse Station**

The nurse station has been centrally located for close access to the postpartum wards. It also has windows facing onto the central covered courtyard to enable patients and companions to easily locate a provider on arrival.

9 **Kitchen & Laundry**

A covered kitchen and laundry area is located at the back of the postpartum wards and is connected to the central courtyard. Patients and family members indicated it was a needed amenity in this context. Our design carves out space for heating up food and washing a few items of clothing. This is intended to be a smaller cooking and washing space and is not intended to be used by the rest of the facility.

NICU Block

(new construction)

10 NICU Wards

The NICU programme is located in a new-build structure adjacent to the existing labour and delivery block. Per IHI's recommendation, we have included a larger non-critical NICU with seven beds and a smaller critical NICU with four beds. Each NICU ward incorporates a nurse outpost for staff to be able to maintain direct oversight of babies, as well as a counter with sink. Because research indicates the importance of keeping mothers and babies together, the non-critical ward has been designed to include seven beds for mothers next to newborns.

11 Kangaroo Mother Care (KMC)

The KMC includes four mother-baby beds. Ideally, these beds should have an adjustable back so mothers can lay flat or sit reclined with the baby on their chest. If adjustable beds are not available, reclining zero-gravity chairs (also called infinity chairs) could be provided for this purpose. The KMC should also include bedside tables and some storage for personal belongings. A private mother-baby patio is accessible from the KMC.

12 **Don/Doff**

A donning/doffing area has been provided at the entrance to the NICU block. This features a built-in bench, as well as shelves, lockers, and/or hooks for changing shoes and putting on medical gowns upon entering the unit. It also includes a hand-washing sink.

13 **Milk Prep & Expression**

The milk prep area features a refrigerator for storing milk, as well as a counter and sink for milk preparation. A private breastfeeding/ pumping room for mothers is located adjacent to the milk prep area. This includes comfortable seating and a small side table for milk pumping equipment.

View of mother-baby patio adjacent to NICU block

Site circulation pathways and NICU block approach

Mother-baby patios located at the back of the postpartum block

Landscape

The landscape design is intended to connect the buildings as efficiently as possible, while creating comfortable, dignified spaces for patients, family, and staff. Staircases and ramps are placed between levels for accessibility. Communal gathering and patio areas feature benches combined with softscape to create a pleasant ambience, filter air, and provide a comfortable, controlled climate. The intent is to have a selection of appropriate local planting, chosen for its low maintenance and hardy, climate-adapted qualities.

In the postpartum level, a covered communal space is positioned between the buildings for mothers to sit together and socialize, while maintaining a private and intimate environment. Modular seating and planters are used to encourage gathering, as well as create a green and pleasant atmosphere, and a covered corner for cooking and laundry is positioned adjacent to the central circulation pathway.

A series of postpartum patios are positioned along the west elevation of the postpartum block and provide an intimate space for mothers to bond with their newborns, celebrate cultural and religious practices, and engage with companions outside of the clinical ward space. Triangular bench planters are positioned at 45-degree angles to the retaining walls to separate this larger corridor into smaller, more private nooks. A stepped retaining wall is suggested to allow for well-lit postpartum patios and to help dissolve the built intervention into its surroundings.

The NICU block is connected to the renovated labour & delivery block through an exterior covered walkway. Linear benches/planters are located along the entrance of the NICU for waiting family members, and a small mother-baby patio is positioned at the end of the NICU block for mothers. Benches are positioned along the perimeter, and planters provide a reprieve from the interior clinical environment.

PART 2

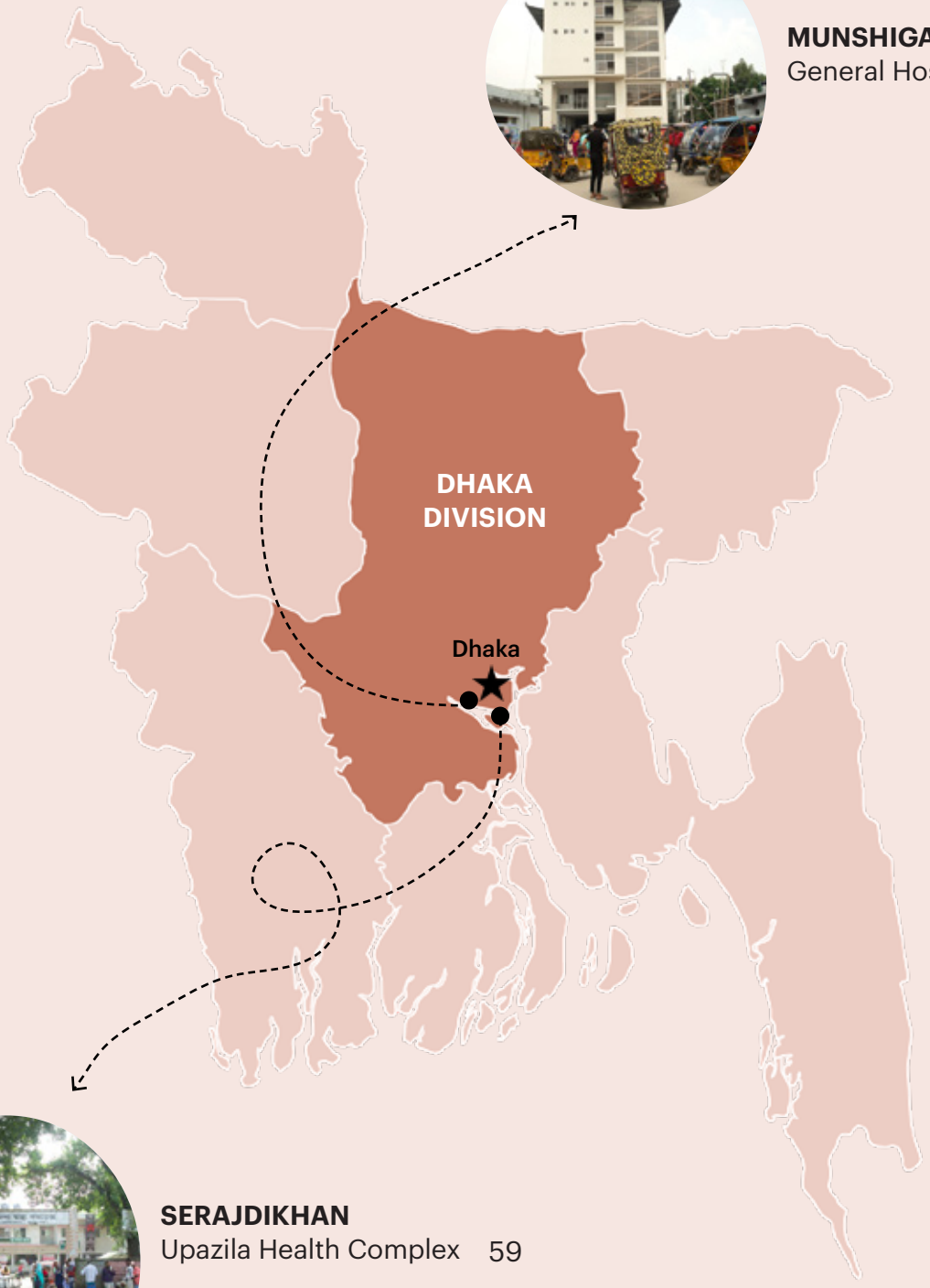
Bangladesh

Bangladesh has prioritized expanding access to maternal and newborn care across its public health system. A key focus has been increasing the availability of Comprehensive Emergency Obstetric and Newborn Care (CEmONC) services to ensure women and newborns can receive lifesaving treatment when complications arise.

This priority is reflected in the government's Health, Nutrition, and Population Sector Programme strategies. Over the past two decades, Bangladesh has developed maternal and newborn health standards and standard operating procedures, with a strong emphasis on emergency obstetric care. National efforts have also focused on increasing facility-based deliveries within the public health system. The Bangladesh National Strategy for Maternal Health aims to address coverage gaps, improve the allocation of human resources, and expand access to and utilisation of care across the country.

Despite these advances, the facilities visited in Munshiganj District were not spatially equipped to provide care for the current number of patients. Stakeholders emphasized the importance of supporting family-centred childbirth, designing facilities that accommodate companions as part of the care team, and improving care flows to reduce overcrowding and strengthen the overall care environment.

MUNSHIGANJ
General Hospital 49



SERAJDIKHAN
Upazila Health Complex 59

Process

We leveraged a range of methods to engage mothers, companions, and health workers across the sites in Bangladesh and also held workshops with regional and national Ministry of Health and Family Welfare (MOHFW) representatives.

Our goal was to hear a diverse range of perspectives about how health care environments affect childbirth experiences, identify limitations and opportunities for improvement, and understand how spaces need to be contextually and culturally specific.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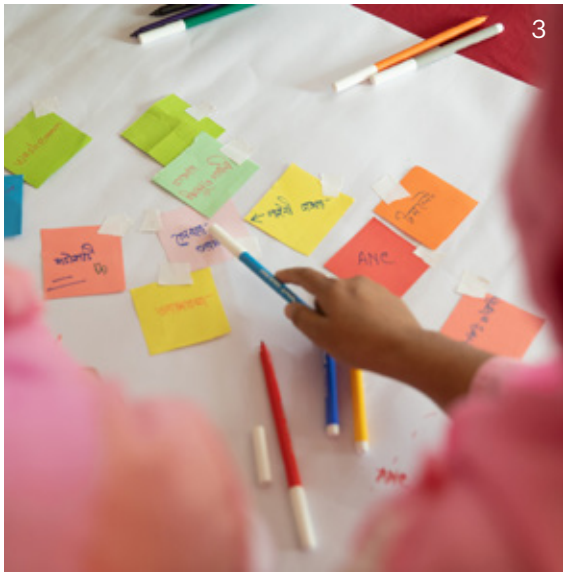
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5

1. Co-design workshop with facility staff
2. Semi-structured interviews of recently-delivered mothers
3. Creating improved conceptual space layouts with stakeholders
4. Interviewing postpartum mothers
5. Clinician shadowing and observation of care processes
6. Journey-mapping workshops in community
7. Technical assessment of existing health infrastructure
8. Design review workshop with MOHFW representatives
9. Simulations and role-playing

Opportunities

Our engagement process highlighted the following opportunities for improving care experiences across the two facilities in the Munshiganj District:

	User Feedback	Design Opportunities
Privacy & Comfort	*"Lack of privacy for the delivery patient. There is no curtain outside the delivery room. That is why outsiders can see. It is very insulting for us."* *"One mother is delivering in front of another mother. I felt uncomfortable."* *"It would have been better to stop the entry of men in the ward."*	Addressing crowding is essential to ensure a greater sense of privacy and provide respectful and dignified care. Interventions should prioritise private delivery spaces.
Sanitation	*"All the places in the hospital are dirty. There is a bowl under the bed, but it is kept very dirty by vomit, water, and dirt."* *"There is no cooking space and no laundry."* *"The washrooms are not clean. Beds are dirty."* *"Bed sheets must be washed after one person has used them; it is not right to give one to another."*	Clean facilities are essential to how patients perceive their care experience. A lack of cleaning staff has resulted in facilities that can feel unwelcoming and undignifying. Sanitary conditions embolden the false perception of the birth process as a dirty and unclean experience.
Essential Physical Resources	*"There is no food facility for companions. There is no fridge to keep food brought from home."* *"There are no arrangements for cooking food. Most food has to be brought from outside. I have no idea whether there are any arrangements for washing clothes."*	Providing facilities for cooking/heating food and laundry could improve the care experience for stakeholders and could encourage mothers to delay discharge.

	User Feedback	Design Opportunities
Mobility & Birth Position	*"They walk in the veranda inside the room due to lack of space, and they feel uncomfortable."* *"I ask if they want to deliver in another position, but I don't encourage because I don't have the required instruments to deliver in another position."* *"I would prefer a separate corridor with privacy to walk. This passage should have supportive railing for a weak person."*	In order to encourage labour mobility and birth position of choice, facilities must provide private and comfortable spaces for mothers to move around in during labour, as well as generously-sized delivery rooms with alternative birth position support equipment.
Companion Support	*"It is good to have a chair for us. We can stay there at night if we have a separate bed to stay."* *"As the delivery room is very small, it is difficult for the mother's companions to stay close to the mother."* *"If there were separate chairs for companions, they could sit down and take little rest. Then they could have spent more time with me."*	Companions are a critical part of the care team, providing physical and emotional support to mothers. Labour, delivery, and postpartum spaces need to be more intentionally designed to accommodate companions.
Cultural Practices	*"It would have been better to stop the entry of men in the ward."* *"It would be better if there is curtain with the bed of the mother and there is a prayer room for women."*	Cultural and religious practices are key to respectful and dignified childbirth care and encouraging facility utilisation. Spaces for gathering, celebration, and prayer should be included in childbirth facilities.

Design Principles

Based on engagement feedback and contextual research, we articulated a set of design principles for maternal-newborn spaces specific to Bangladesh.

Capacity & Layout

- Consolidate inpatient maternity programme, on a single floor if possible.
- Maternal-newborn care requires distinct services and accommodations, necessitating separation of these spaces from general female wards.
- Provide an adequate number of MNH inpatient beds to reduce crowding in order to motivate mothers to arrive earlier and stay longer at the facility.

Wayfinding

- Design floor layouts, entries, and thresholds to ensure that moving from one programme to the next is an intuitive process.
- Ensure that wayfinding signage is clear and visible to help families locate maternity programmes.

Climate

- Employ better natural ventilation strategies (via breezeways, cross ventilation, or high ceilings with vents).
- Establish covered waiting areas with operable windows.
- Provide shaded patios or porches for inpatient wards, if possible, along the exterior of the building.

Arrival

- Reduce bottlenecks and waiting times by designating separate rooms for triage & assessment, ANC, and PNC follow-up.
- Create uncongested spaces for ticketing and queuing out of the way of major circulation paths.
- Make sure that waiting areas have adequate ventilation and thermal comfort.
- Provide sufficient seating for patients and companions and toilets in close adjacency.

Sanitation

- Provide sufficient toilets and showers based on the number of inpatient beds. High-commode toilets are preferred for mothers in labour.

Labour & Delivery

- Design labour wards to include space for companion seating and personal storage.
- Provide larger delivery rooms accommodating an appropriate number of delivery beds, with privacy curtains.
- Provide space for alternative birth position support equipment (e.g., balls, slings, stool, etc.).
- Provide uncrowded routes for labour walking with dispersed benches for resting.

Provider Oversight

- Position nurse stations in close adjacency to patients and prioritise provider visibility and oversight (specifically for the labour ward, and postpartum ward, if possible).
- Provide staff rooms for providers to take breaks.

Newborn Care

- Integrate dedicated baby resuscitation areas in delivery rooms, visible from delivery beds.
- Provide space for Kangaroo Mother Care (KMC).
- Keep mothers and babies together, both in postpartum spaces and in small and sick newborn care spaces.

Culture

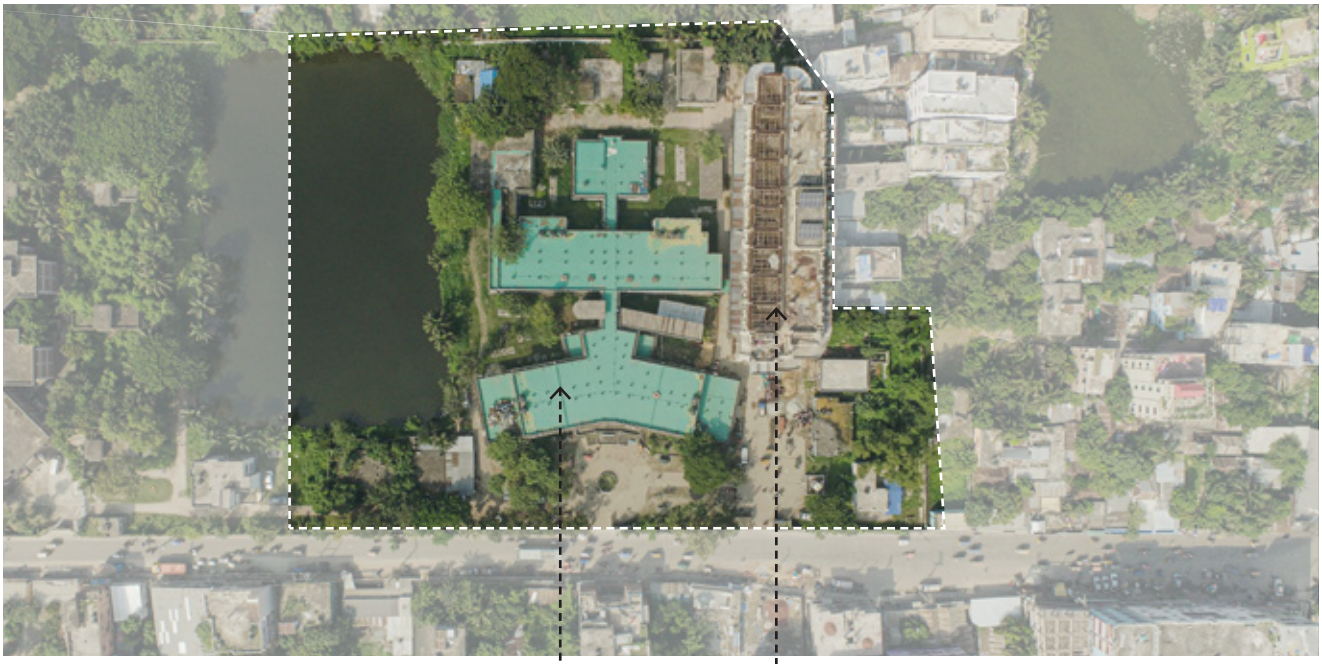
- Accommodate spaces for cultural and religious practice (i.e., separate prayer rooms for males and females, corners for families within inpatient wards), as well as cooking and washing.

Munshiganj General Hospital

Munshiganj District, Bangladesh


"মুজিববর্ষে স্বাস্থ্য খাত
এগিয়ে যাবে অনেক ধাপ"
মুজিববর্ষ
সফল ও স্বার্থক হোক
জেনারেল হাসপাতাল, মুন্সীগঞ্জ।
হাসপাতাল, মুন্সীগঞ্জ
NO PARKING

Facility Background



Services & Site

Munshiganj General Hospital is located in Bangladesh's Munshiganj District. The facility is approximately 42km southeast of the capital city, Dhaka. The facility experiences a total of 1269 births per year (778 natural vaginal deliveries and 491 cesarean sections). High-risk mothers and newborns who the facility cannot provide care to are referred out to higher-level facilities in Dhaka.

The general area is low lying (close to sea level) and flat. The hospital site is approximately 600m from the Dhaleshwari River and 400m from a smaller canalized river.

The site features two main buildings: an older two-story building with a large footprint that was built in 1985 and a recently-constructed seven-story building that has a more condensed footprint. The older building has 150 beds, and the recently-constructed expansion increases this number to a total of 250 beds. The majority of the site is utilised, and there are no further opportunities for new-build construction.

Challenges & Opportunities

Our engagement and assessment revealed that maternity and newborn care spaces at Munshiganj General Hospital are spatially constrained. However, ongoing expansion provides opportunities to consolidate and expand the maternal-newborn programme. The MoHFW is in the process of completing the new building on the Munshiganj site for the purpose of relocating the existing hospital programme. The new building provides an opportunity to achieve the maternal-newborn standards and guidelines that are recommended but often not achieved in built outcomes.

In the Bangladeshi context, SCANU (Special Care Newborn Unit) is the term used to refer to newborn care spaces. OT (Operating Theatres) refers to OR (Operating Room) spaces.

Munshiganj General Hospital was selected as a candidate for Schematic Design development because the new building under construction is better laid out and constructed to a higher quality in comparison to other existing district hospitals. The building also has the potential for vertical expansion, which we could leverage in our efforts to expand the maternity programme. In the current plan of the new hospital building, labour and postpartum beds are located on the 4th floor, mixed in with general inpatient spaces. Delivery and the operating theatre (OT) currently occupy half of the 3rd floor, along with a one-room SCANU area.

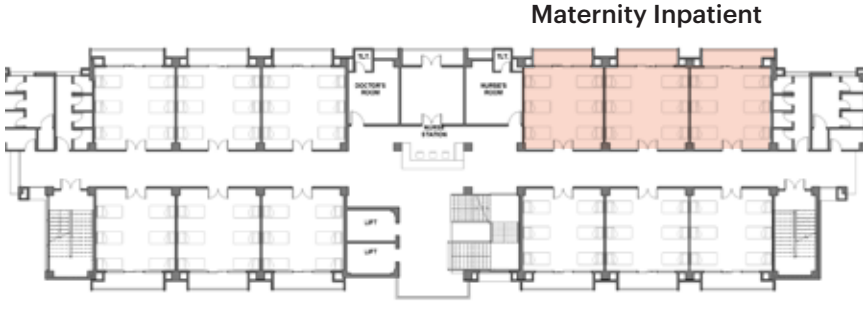
Based upon our engagement, it became clear that more space would be needed to support high quality maternal and newborn service, and that maternal-newborn care should be offered in a more dedicated, consolidated area, rather than be combined with other general inpatient care.

THIRD FLOOR

(Existing)

FOURTH FLOOR

(Existing)



Design Features

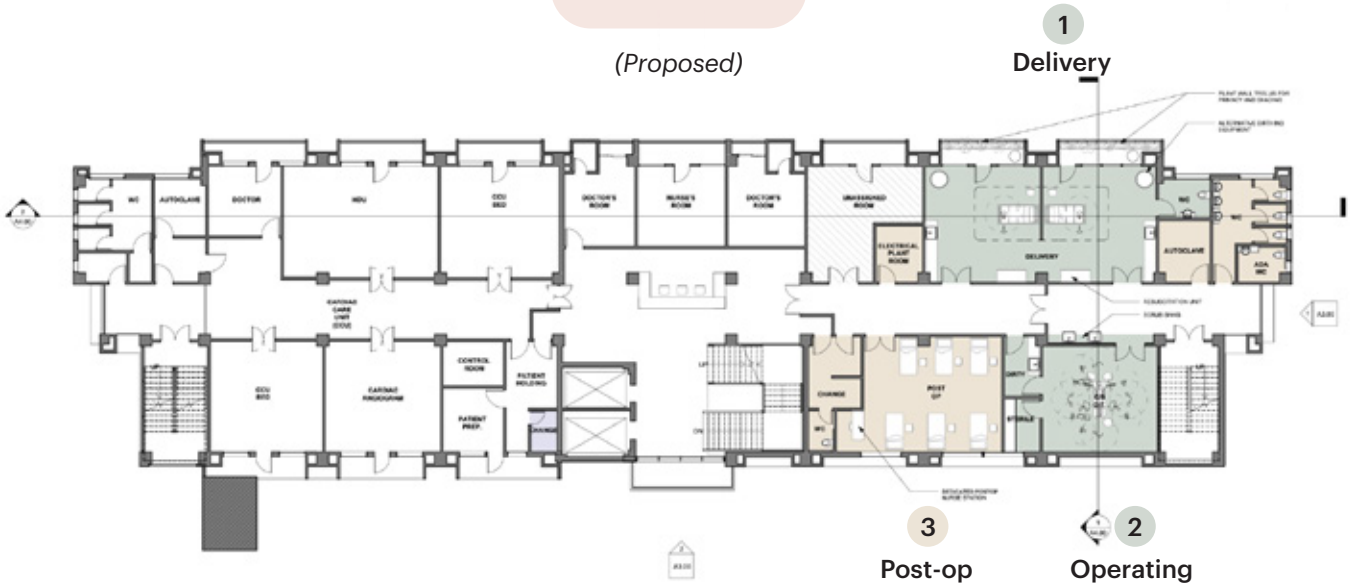
Due to the full build out of the site, only renovation of the newer building was a consideration. We recommended consolidating the maternal-newborn programme in the 3rd and 4th floors of the new building and shifting other inpatient wards (surgical, medicine, and pediatric) up to a new 7th floor (not shown). The Health Engineering Department (HED) and Public Works Department (PWD) confirmed that the new building at Munshiganj General Hospital has an eight-storied foundation (G+7), which would permit this addition.

This approach retains delivery/OT spaces on the 3rd floor, as those services have already been placed, and it would be costly to move these programmes. Instead, we have provided recommendations for improving these spaces. Taking over the 4th floor for the maternity and SCANU inpatient programme provides more spacious and private labour and postpartum wards separate from other general inpatient spaces. While this scenario would require relocation of surgical, medicine, and pediatric wards to the yet-unbuilt 7th floor, it is in keeping with the intent expressed by the MoHFW to pursue long-term improvements to raise the bar for maternal-newborn care.

This design approach was developed with feedback from facility administrators, as well as regional and national MoHFW representatives.

THIRD FLOOR

(Proposed)



FOURTH FLOOR

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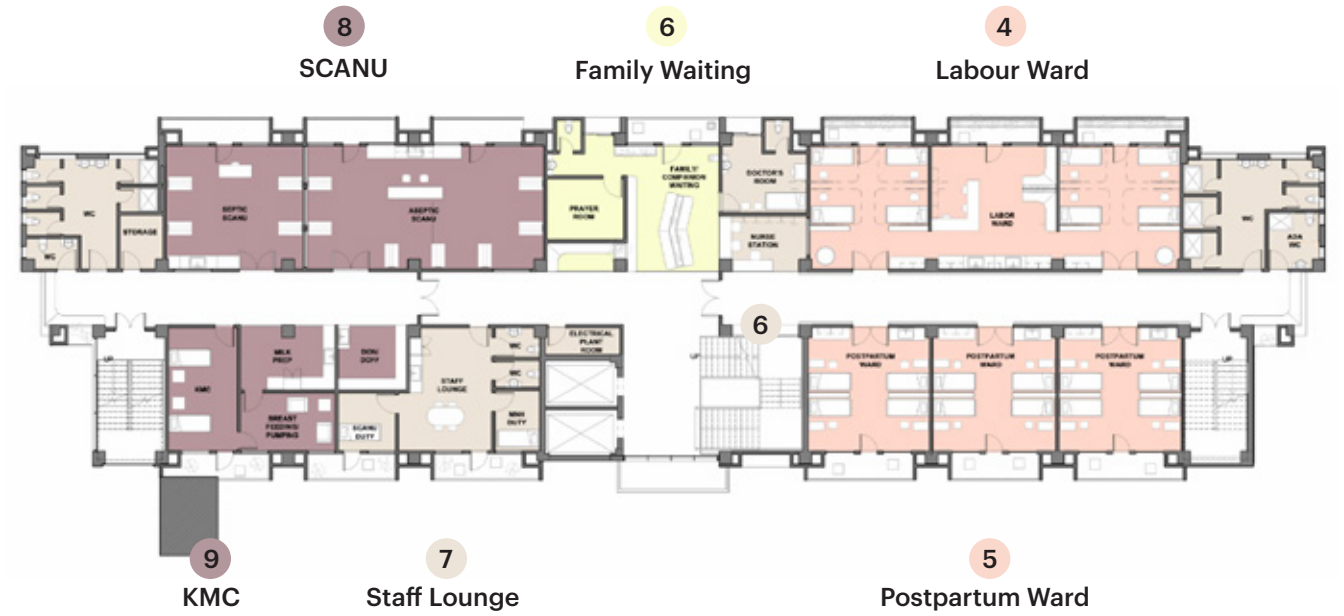

Third floor nurse station

Fourth floor family/companion waiting area and nurse station

Third Floor

1 **Delivery Room**
The proposed layout retains delivery on the 3rd floor, but includes generous, expanded space for two delivery beds. Each has a companion chair and a privacy curtain and is faced perpendicular to the door for greater privacy. A baby resuscitation unit is located with visual connection to each bed, and a counter with a sink serves each delivery bay. Each bed also has a corner for alternative birth position support equipment, such as a birthing chair and ball. Patios with planted vine trellises for privacy can also be accessed from each delivery bay. The delivery bays are internally adjacent to a WC designed for persons with disabilities, which is directly accessible from the delivery room.

2 **Operating Theatre (OT)**
We have recommended minimal alterations to the OT, Post-op, and autoclave spaces on the 3rd floor, which serve the entire facility (not only maternity services). The OT will remain in place, with a six-bed post-operative ward and dedicated nurse station. The main change would be to integrate the dirty and sterile rooms between the OT and post-op, rather than having them stick out into the corridor, which impedes circulation. The autoclave room is being kept in its current location.

Fourth Floor

3 **Family Waiting**
Located in the centre of the maternity floor is a family waiting area that includes a prayer room for cultural and religious practices. Seating gives companion a space to rest in order to support a positive experience and to keep the inpatient rooms from being overly crowded. The intention is that the space would be very open and well-ventilated, with views to the outside. Built-in benches and planters are recommended to bring greenery inside and create different seating nooks. While this is an urban area, and family members would be encouraged to find accommodations nearby, we've kept the bench sections long enough to sleep on, in case that becomes necessary. The family area also includes a counter with a sink, a private prayer room for female companions, and a patio.

4 **Labour Ward**

The labour ward features three interconnected, but distinct, spaces. Two four-bed rooms are on either end. The layout strives to give women as much privacy as possible while maintaining open sightlines and connectivity for staff caring for patients. Curtains around each bed could be included for greater privacy. Each bed should have a seat for a companion next to it, as well as a small bedside table. Personal items could be stored in the bedside table or within the storage cabinets along the wall, which also feature a counter with hand-washing sinks. The storage cabinets should also be used to store clean supplies (accessed by staff). A nook to accommodate labour support equipment has been included in each room. Examples of labour support equipment include Swedish bars, birth balls, and slings, which can be used to help with pain management and to encourage the natural progression of labour.

The middle space includes an embedded nurse station dedicated to caring for labouring patients, as well as built-in benches for companions. The benches are primarily intended for seating, but they may also be used for companions to sleep if they are not able to leave mothers during labour. The internal corridor connecting the three spaces can be used as a private labour walking area. Labouring patients also have access to private, shaded patios that could be used for labour movement or for companions to rest.

Labour ward

5 **Postpartum Ward**
Three postpartum rooms accommodate four beds each. Each bed has space next to it for a companion chair and a bassinet. Half-height partitions have been placed between beds for privacy, but curtains could be considered for additional privacy. Secure storage space for personal belongings is also provided through bedside tables, as well as lockable cabinets at the front of the room.

6 **Nurse Station**
The main nurse station on the 4th floor is centrally located. Staff will be able to greet incoming patients and engage with waiting family members over a built-in reception desk.

7 **Staff Lounge**
For staff to provide the best possible care, they also need spaces for breaks and rest. We have incorporated a staff lounge, duty (on-call) rooms, and male and female WCs that will serve both maternity and SCANU staff. The staff space also includes access to private patios.

8 **SCANU**
The southern portion of the 4th floor is dedicated to small and sick newborn care. Per IHI's recommendation, we have included a larger aseptic SCANU with seven beds and a smaller septic SCANU with four beds. Each SCANU room incorporates a nurse station for staff to be able to maintain direct oversight of babies, as well as a counter with sink. Emerging research indicates the importance of keeping mothers and babies together. Unfortunately, there is not enough space to incorporate mothers' beds within the SCANU wards, but this should remain a consideration for the future.

A donning/doffing area has been provided at the entrance to the SCANU wing. This features a bench, shelves, lockers, and hooks for changing shoes and putting on medical gowns upon entering the unit. It also includes a hand-washing sink. An adjacent milk prep area has a refrigerator for storing milk, as well as a counter and sink for milk preparation. A private breastfeeding/pumping room for mothers offers comfortable seating and a side table for pumping equipment.

9 **KMC**
The Kangaroo Mother Care (KMC) room includes two beds and a private patio. Ideally, these beds should have an adjustable back so mothers can lay flat or sit reclined with the baby on their chest. If adjustable beds are not available, consider including reclining zero-gravity chairs (also called infinity chairs). The KMC should also include bedside tables and some storage for personal belongings.

Serajdikhan Upazila Health Complex

Munshiganj District, Bangladesh


GAZI
GAZI
উপজেলা স্বাস্থ্য কমপ্লেক্স
সিরাজদিখান, মুন্সীগঞ্জ।
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Facility Background

Services & Site

Serajdikhan Upazila Health Complex is located in Bangladesh's Munshiganj District. The facility is approximately 33km southeast of the capital city, Dhaka. The facility has 50 total beds and experiences around 124 births per year. Complicated births and cesarean deliveries are referred to Munshiganj General Hospital or to higher-level facilities in Dhaka.

The general area is low lying (close to sea level) and flat. The site is approximately 600m from the Dhaleshwari River and 400m from a smaller canalized river. The facility is reported to have flooded twice, in 1988 and 1998, due to rising river waters. The surrounding area has many large ponds for surface water management.

The main two-story building was built in two parts. The older, original part was constructed in 1968. This was extended in 2013 with the construction of a new building. A second floor was recently constructed on top of the new building.

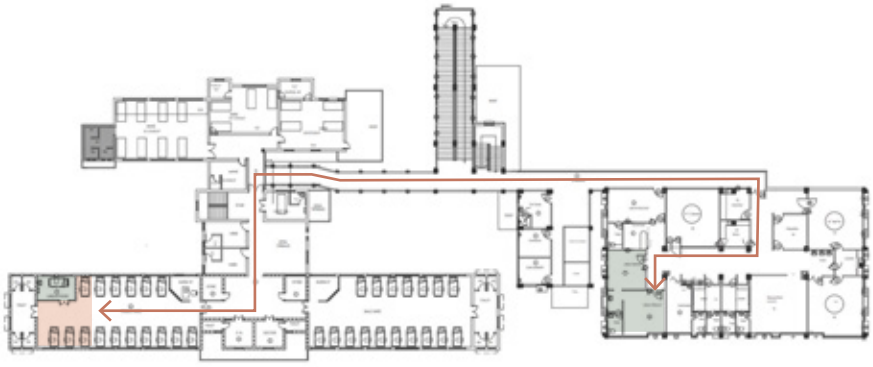
Challenges & Opportunities

Our engagement and assessment revealed that maternity and newborn care spaces at Serajdikhan Upazila Health Complex are significantly spatially constrained. Maternity patients share space with general female patients and are required to traverse the facility to get from the inpatient ward (located in the older building) to the delivery and OT spaces in the newer building. As a result of the fact that many delivering mothers are not able to make it to the delivery room in time, a small delivery alcove was created within the female ward. However, this setup does not support an ideal care experience.

The facility has small floor plates and disconnected layouts, which are challenging to remodel and reprogramme. There is little underutilised and unused space at this facility scale, but Serajdikhan has been expanded, which provides an opportunity to consolidate the maternity programme. The older buildings in the Serajdikhan Upazila Health Complex are not appropriate for renovation and may be demolished in the future. However, the newer building can accommodate an additional floor, in which the maternity programme could be relocated and consolidated in the long term.

FIRST FLOOR

(Existing)

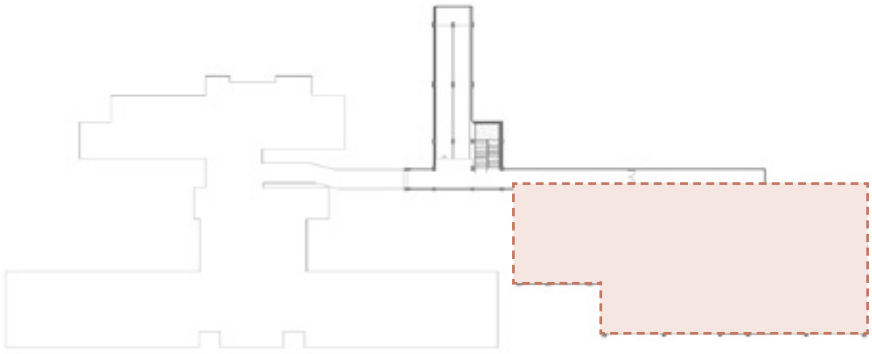


Maternity inpatient

Delivery & OT

SECOND FLOOR

(Existing)

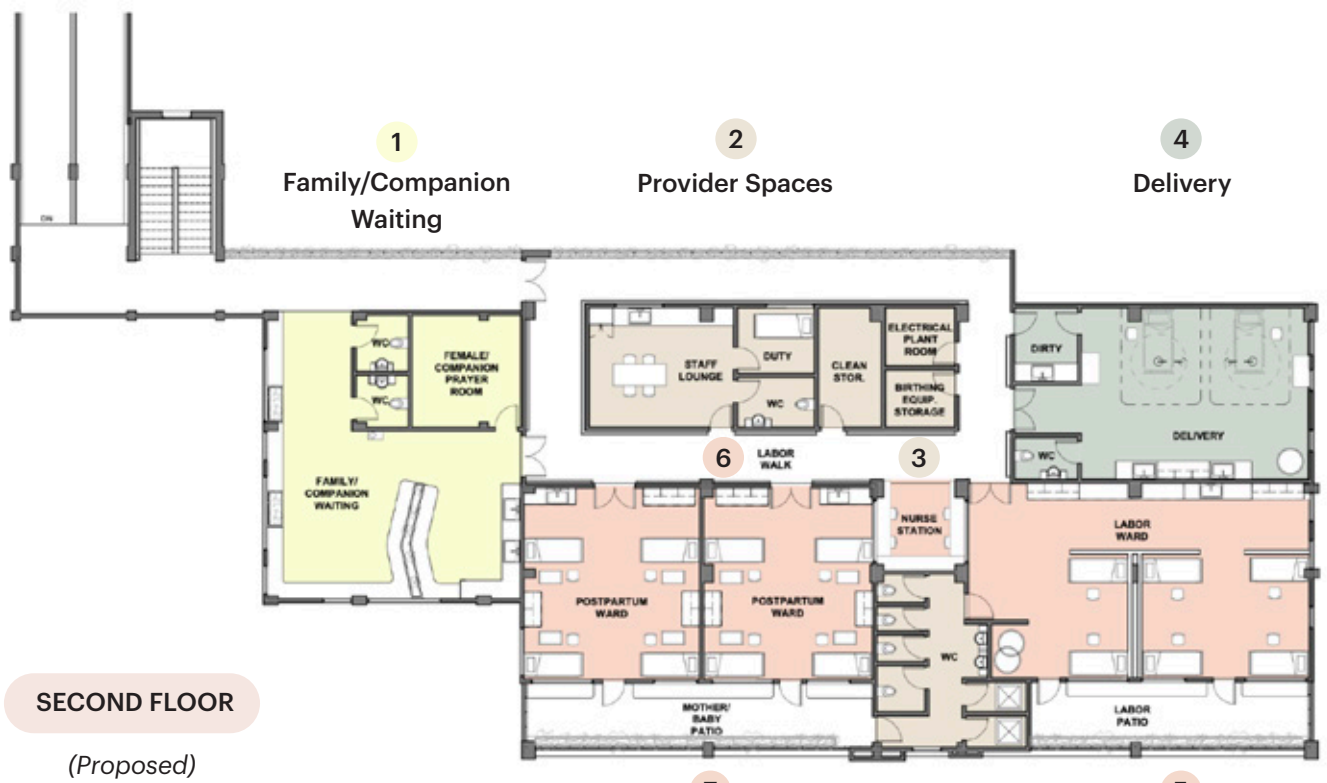


Newly-constructed second floor

Design Features

Due to the full build out of the site, only renovation of the newer building was a consideration. Designing a purposeful space for the maternity programme recognizes that maternity patients require a different level of care than other services at the facility. Our intervention focuses on reprogrammeming and completing the partially-constructed second floor of the new building to consolidate the maternity programme. This consolidation seeks to improve care and efficiency by enabling patients and staff to move from programme to programme without having to traverse the facility.

As part of the remodeling, we are proposing that the programmes temporarily located on the second floor (the Coronavirus ward, GeneXpert, Pathology rooms, and Freedom Fighter's corner) be relocated elsewhere in the facility. These are spaces that should be kept slightly separate from other inpatient programmes for infection control and privacy.



SECOND FLOOR

(Proposed)

1 **Family/Companion Waiting Area**

Family and companions are a critical part of the care team. The design carves out a generous space for family and companions to wait and rest, with the aim of supporting a positive experience and keeping the inpatient rooms from being overly crowded. This area is located immediately proximate to, but slightly separate from, the rest of the inpatient maternity spaces on the 2nd floor.

The intention is that the space would be shaded but very open and well-ventilated, with views to the outside. Built-in benches are interspersed with planters to bring greenery inside and create different seating nooks. While this is an urban area, and family members should be encouraged to find accommodations nearby, the bench sections are long enough to sleep on, in case that becomes necessary. The family area also includes a designated corner for heating up food, as well as a private prayer room for female companions. Male companions have access to the mosque adjacent to the hospital.

Family/companion waiting area

2 **Provider Spaces**
For staff to provide the best possible care, they also need spaces for breaks and rest. Our recommended layout for Serajdikhan UHC includes a centralized staff lounge, duty (on-call) rooms, and staff WCs, alongside additional staff support and storage spaces.

3 **Nurse Station**
The nurse station has been located with direct visual sightlines to the labour ward. It also has visual access to one of the postpartum wards.

4 **Delivery Room**
The delivery room accommodates two delivery beds. Each has a companion chair and a privacy curtain. A counter space with two sinks is located along the far wall, and two baby resuscitation units are located within view from the delivery beds. A nook for alternative birth position equipment (such as a birthing stool) has also been included to support birth positions like squatting. The delivery room has direct access to a WC, as well as a dirty utility room.

5 **Labour Ward**
The labour ward accommodates a total of six beds. The layout strives to give women as much privacy as possible while maintaining open sightlines and connectivity for staff caring for patients. The design of the ward layouts allows for curtains around each bed. Each bed has been designed with a seat for a companion next to it, as well as a small bedside table. The bedside table is a place for storage of personal belongings. Storage cabinets along the wall are located in the ward for personal or provider storage and also feature a counter with a hand-washing sink. A nook to accommodate labour support equipment has been included. Examples of labour support equipment include Swedish bars, birth balls, and slings, which can be used in labour to help with pain management and to encourage the natural progression of labour.

Labouring patients also have access to a private shaded patio. The patio gives space for mothers to use for labour movement or for companions to rest. Built-in benches are placed for seating, but may also be used for companions to sleep if they are not able to leave mothers during labour.

6 **Labour Walk**

Walking encourages the natural progression of labour. The ring-shaped corridor will be used for circulation, but will also be wide enough to serve as a walking route for labouring women. Handrails are included all the way around this circuit for women to lean on.

7 **Postpartum Ward**

Two generously-sized postpartum rooms accommodate four beds each. There is enough space next to each bed for a companion chair and bassinet. The design of the ward layouts allows for curtains around each bed for additional privacy. Secure storage space for personal belongings is provided in the form of a small bedside table, as well as lockable cabinets located near the room entrance.

Each room has access to a mother-baby balcony. This space will be private and shaded. The intention is that mothers and companions will use this space to sit, converse, or eat. Built-in benches along the wall need to be built with a slightly-reclined back, so that mothers can sit holding babies on their chest. A built-in planter creates a slight separation between the patio space for each room. Another linear planter is placed along the outside edge, with vines growing up a trellis for shading and privacy. Patients will access the WC via the patio.

Mother-baby patio

PART 3

Kenya

Kenya has made important gains in maternal and newborn health over recent years, supported by national policies and expanded access to services. However, access to high-quality care remains uneven across the country, with persistent disparities affecting rural and underserved communities.

The government has invested in programs aimed at reducing maternal and neonatal mortality, promoting skilled birth attendance, and expanding access to essential health services. Despite this progress, gaps in facility infrastructure continue to limit the quality and utilisation of childbirth care. More than 7,700 women die each year in Kenya due to pregnancy-related complications[2], and only 55.3% of health facilities have basic sanitation[3].

In Kakamega County, Jacaranda Health is leading a maternal-newborn Service Delivery Redesign (SDR) initiative across key hospitals to strengthen the quality and organization of care. As part of this effort, improving maternity care environments is an important component of supporting safer, more effective service delivery.

MASS Design Group partnered with Jacaranda Health to apply the Delivering More Toolkit, engaging end users and designing infrastructure improvements tailored to the needs of three sub-county hospitals in western Kenya. These improvements aim to strengthen the safety, functionality, and experience of maternity care environments.

Beyond the SDR initiative, MASS Design Group has also explored model spaces for Group Antenatal Care (G-ANC) in partnership with the Jhpiego team in Machakos County.

[2] Ministry of Health Kenya. NRM Maternal Health Guidelines.
[3] Njung'e, Dennis M. (2020). WASH in Healthcare Facilities in Africa: The case of Kenya. University of Oxford

MATUNGU
Sub-County Hospital

93

LIKUYANI
Sub-County Hospital

79

NAVAKHOLO
Sub-County Hospital

101

KAKAMEGA COUNTY

MACHAKOS COUNTY

Nairobi

KANGUNDO
Sub-County Hospital

109

Process

We leveraged a range of methods to engage mothers, companions, healthcare providers, and members of the County Health Management Team (CHMT) across multiple sites in Kakamega County, Kenya.

Our goal was to gather a diverse range of perspectives on how healthcare environments influence childbirth experiences, to identify limitations and opportunities for improvement, and to understand how spaces can be designed to be contextually and culturally appropriate.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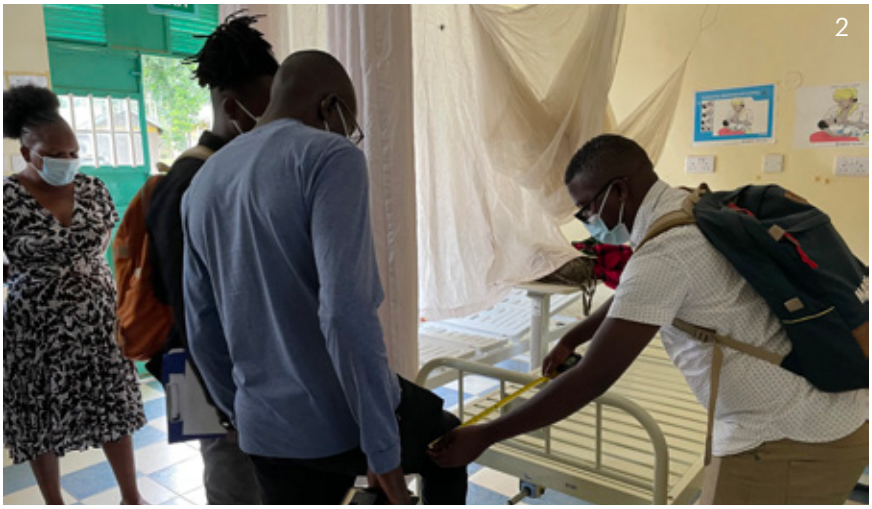
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2


4

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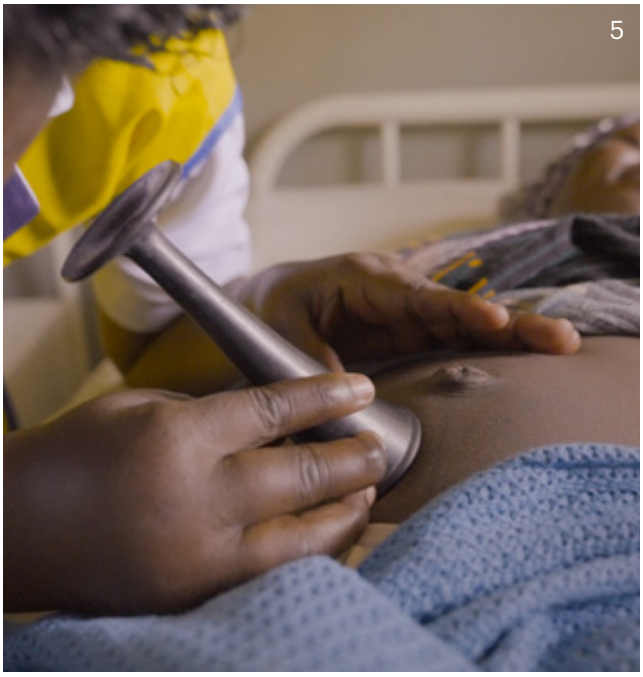
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6

1. Semi-structured interviews with mothers, companions, and family members.
2. Facility walkthroughs with healthcare providers.
3. Journey mapping sessions with health care providers.
4. Co-design workshops with facility administrators and clinicians.
5. Shadowing and observation.
6. Site and infrastructure assessments.
7. Workshops with the County Health Management Team (CHMT).


7

Opportunities

Our engagement process highlighted the following opportunities to improve care experiences across the three facilities in Kakamega County:

	User Feedback	Design Opportunities
Space & Capacity	*"The space between the beds is too tight."*	The quality and adaptability of spaces within a healthcare facility are essential for delivering high-quality maternal and newborn care.
Privacy & Comfort	*"There is not enough privacy. The curtains are only covering the corridor but not the space in between the beds."* *"It is quite cold at night and the blankets are not thick enough. Some windows are missing glazing."* *"There are a lot of mosquitoes at night and problems with termites. I didn't feel that my wife and child were safe to stay longer, so we checked out of the hospital shortly after."*	Consider installing partitions and ensuring adequate spacing between beds. Operable windows should be provided to improve thermal comfort. Additionally, incorporating mosquito nets for each bed, particularly in Likuyani, is recommended.
Sanitation	*"There was no running water, and no hot water when we wanted to help the mother bathe."* *"There is only one washroom for the entire ward, which is not sufficient. Plus, it is not clean as many people use it."*	Increase the number of clean washrooms and give priority to rainwater harvesting.

	User Feedback	Design Opportunities
Staffing	*"Staffing limitations: There are only a few staff members per facility."* *"We need dedicated centralized support spaces. There is not enough staff."* *"We don't have enough changing rooms, and the ones we have are shared by both males and females, which is not ideal."*	**Centralized support spaces, such as staff washrooms, duty rooms, and gender-segregated changing rooms and washrooms, should be easily accessible.**
Newborn care	*"We are concerned about infection control when C-sections take place in the same operating theatre as other departments, especially in cases of sepsis."* *"We still need a dedicated NBU for most facilities."*	**Spaces for stabilising newborns should be provided at all facilities, with a clear separation from other areas.**
Companion support	*"Young mothers, those with their first child who are still learning how to care for their baby, want their companion to sleep near them, but this is not possible."*	**Companions are a critical part of the care team, providing physical and emotional support to mothers. MNH spaces need to be more intentionally designed to accommodate companions.**

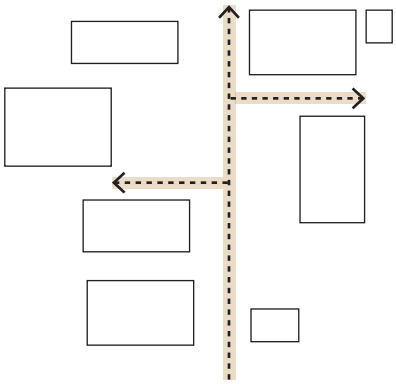
Context

The engagement process also revealed ways in which facility designs could respond to existing site conditions and be firmly rooted in the surrounding context.

Site Strategy

Most of the buildings visited are single-storey structures. However, the flow of care within these facilities often poses challenges for users, as some spaces are not well connected, making navigation difficult. In many cases, there is also no clear conceptual rationale behind how the buildings were arranged on the site or how they relate to the surrounding landscape.

Across different contexts, the facilities share common spatial challenges. They are undersized for the high volume of users and face significant obstacles to expansion. These challenges are largely shaped by constraints in the existing master plan, the disruptions that expansion would cause to the established flow of care, and the limited space created by the proximity of surrounding buildings, all of which restrict opportunities for growth and adaptation.



HOSPITALS
Arranged as a group of programmes along a central circulation spine.

Cultural Preferences

In Kakamega County, closely knit communities place a strong value on family and communal connections. A central objective of the project is to encourage deliveries at Sub-County Hospitals, particularly within these communities where collective support plays a vital role. Insights from user-engagement studies highlight the importance of community presence during the perinatal phase, underscoring the need for spaces that welcome both mothers and their birth companions. Purposeful design can strengthen these experiences and enhance perceptions of care.

Childbirth practices here emphasise communal and familial involvement, with three to four companions commonly accompanying the mother to provide emotional and physical support. Cultural traditions also hold significance, such as the expectation for mothers to drink tea soon after birth, symbolising comfort, nourishment, and hospitality. These practices point to the importance of incorporating community-oriented spaces into the design concept, including dedicated areas for companions and generous outdoor waiting spaces to accommodate visitors who gather to celebrate and support.

Local Materials

Stone masonry is widely used in construction projects across Kenya, serving applications from wall construction to landscape features and retaining walls. In regions near Kakamega County, locally available materials such as Nairobi blue stone and Njuru sandstone can be sourced within 100 km, making them practical and accessible options.

When prioritised as a locally sourced material, stone can also be an environmentally responsible choice. This approach not only helps reduce the embodied carbon footprint of a project but also generates meaningful social and economic value by supporting regional labour and strengthening communities through investment in local craftsmanship.

Design Principles

The assessment and engagement process revealed ways in which facility designs could respond to existing site conditions and be firmly rooted in the surrounding context.

Capacity & Layout

- Expand the MNH programme to provide adequate space for patient volumes.
- Develop a modular design using a kit of parts that can be adapted to the specific needs of each facility. These blocks should be arranged flexibly on site to allow future growth and expansion while connecting to existing infrastructure.
- Provide a sufficient number of MNH inpatient beds to encourage mothers to arrive earlier and remain longer at the facility.
- Prioritise the flow of care by arranging buildings on site to connect ANC, labour, delivery, PNC, and NBU seamlessly.

Culture & Privacy

- Accommodate spaces for cultural and religious practices, as well as cooking and washing.
- Provide gender-segregated WCs, as both providers and patients prefer separate facilities.
- Design small to medium sized wards to enhance privacy and safety for users.

Climate

- Provide shaded outdoor areas for patients, as access to nature and well-designed open spaces supports healing and improves perceptions of care.
- Incorporate outdoor spaces for providers and companions to use as areas of respite.
- Specify thick (300 mm) stone masonry walls to improve climate performance and cost-effectiveness.
- Use gable-pitched roofs to enable rainwater harvesting and achieve cost efficiency.
- Position openings on the north façade to capture prevailing winds and enhance natural ventilation.
- Integrate solar control on all sides of the building, as the sun is generally overhead near the equator. Strategies include extended roof eaves, covered verandas and porches.

Provider Spaces

- Centralise provider support spaces, as staff shortages are a recurring challenge. Locate staff WCs, duty rooms, and related facilities in accessible, shared areas.
- Position nurse stations in close proximity to patients and prioritise visibility and oversight, particularly in labour and postpartum wards.
- Provide staff rooms to enable providers to rest and take breaks.

Massing

- Design buildings with narrow floorplates (approximately 10–12 m wide) to optimise cross-ventilation, daylighting, and cost-efficient construction.
- Avoid massing with re-entrant corners; instead, use simple rectangular forms that perform better in seismic zones.
- Incorporate courtyards and patios to provide natural light, airflow and communal gathering spaces.

Labour & Delivery

- Provide sufficient labour beds to meet current demand, with flexibility for future expansion.
- Separate antenatal care (ANC) wards from labour wards to enhance privacy and comfort.
- Design labour wards with approximately six to eight beds to balance user privacy with provider oversight.
- Support mobility during labour by improving outdoor areas, such as levelling walking paths and adding handrails and benches.
- Allocate space for alternative birthing equipment, including squat bars, birthing balls, slings, and stools.
- Equip delivery rooms with large sinks, overhead storage and adequate circulation space.

Postpartum

- Establish smaller postpartum wards with approximately four beds to balance privacy with staff visibility.
- Provide separate wards for mothers recovering from vaginal deliveries, caesarean sections, and those with newborns in the NBU.
- Incorporate a dedicated cooking area to support cultural practices around food and recovery, and to encourage longer stays.

Newborn Care

- Establish a consolidated, fully functional NBU at larger facilities. In smaller facilities, provide a stabilisation space for small and sick newborns to enable safe transfer or referral.
- Provide a clear donning and doffing area at the entrance to separate clean and dirty zones.
- Include essential provider support spaces, such as a central nurse outpost, sluice/dirty room, and clean store room..
- Design a Kangaroo Mother Care (KMC) ward with four to six reclining beds or chairs.
- Provide separate bathrooms for staff and patients.


LIKUYANI
MATERNITY
UNIT

Likuyani Sub-County Hospital

Kakamega County, Kenya

Facility Background

Services & Site

Likuyani Hospital is situated in Likuyani Sub-County, Kakamega County. The hospital provides a range of essential healthcare services, including both outpatient and inpatient care. However, it experiences a high patient volume and faces capacity challenges. Patient numbers are expected to increase from approximately 130 to 300 deliveries per month over the next three years.

The main maternity building currently accommodates the ANC/PNC wards, delivery rooms, and a Newborn Unit (NBU). This building, however, is severely undersized and in poor condition, showing signs of structural settling due to its proximity to a swampy area. Additionally, the building becomes extremely cold at night, further exacerbating the difficulties faced by patients and staff. Consequently, there is an urgent need to construct a new maternity building as part of the facility's development.

The hospital site comprises a series of single-storey buildings surrounded by open landscapes. The facility relies on borehole water, which is reported to be adequate for current needs. However, challenges occur during power outages, as the water supply depends on an electric pump.

Challenges & Opportunities

Our engagement and assessment revealed that the maternity and newborn care areas at Likuyani urgently need to be relocated and substantially expanded. This is essential to prevent further deterioration due to the swampy conditions and to adequately accommodate the increasing patient volume. Currently, the facility has 15 beds shared between the ANC and labour wards, with only one delivery bed. However, there is no recovery room, and the NBU is too small to meet projected future demand.

Design Approach

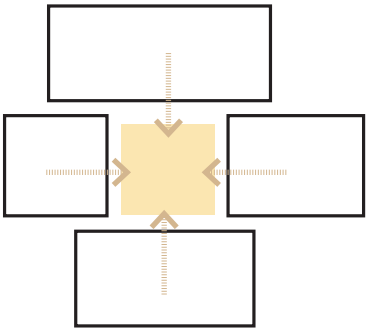
Recommended Site Strategies

The existing maternity building houses the ANC/PNC wards, delivery rooms, and the NBU. However, it is severely undersized and in poor condition, as it is gradually settling into a swampy area. Its location also causes the spaces to become very cold at night, which is uncomfortable for patients. We recommend constructing a new maternity building in a different area of the site and demolishing the existing structure. Likuyani comprises the full module of buildings, whereas the other facilities are adapted to include only the programmed spaces they require.

Conceptual Layout

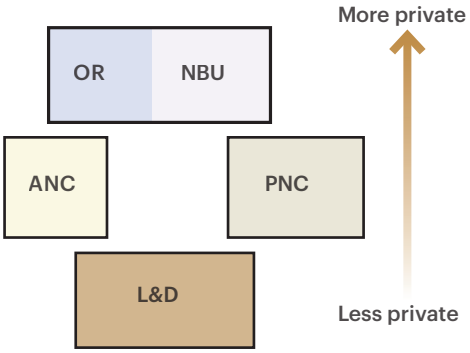
1 Arrange Modules

Programme modules are organised around a central courtyard, with all areas connected by exterior circulation.



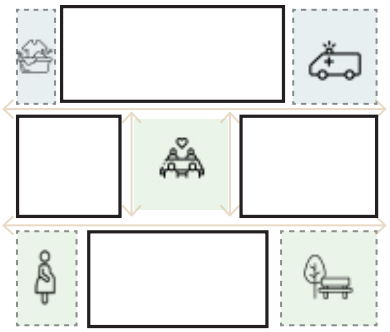
2 Establish Privacy

Programmes requiring higher privacy and strict infection control, such as the NBU and operating room, are located furthest from public and shared areas.



3 Programme the Exterior

Building nooks are designed to allow activities to extend into exterior spaces. These outdoor areas are optimised for programmes not typically included in healthcare facilities, such as mobility exercises during labour, and spaces for cultural and religious practices.



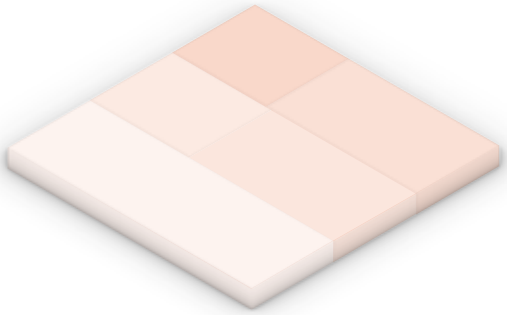
Modular Approach

Our design is guided by a modular approach. We developed a flexible, scalable “kit-of-parts” system that can be adapted to diverse site conditions and evolving programme needs. This forward-thinking approach allows for customisation to meet the unique priorities of each facility, balancing efficiency and adaptability while optimising cost and supporting long-term planning. It is designed to anticipate future needs and accommodate advancements over time.

The form and layout of our designs prioritise climate performance, resilience, and structural efficiency. Narrow floorplates maximise cross-ventilation and natural daylight, reducing energy reliance while fostering a comfortable environment.

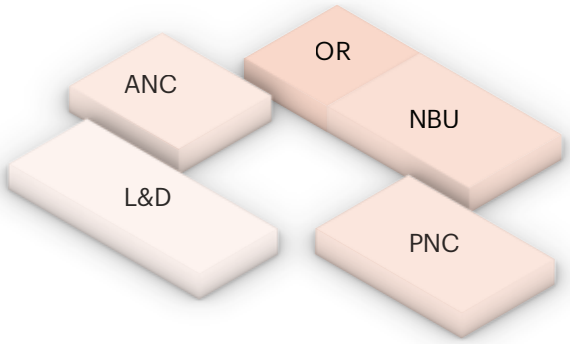
The Block

This single, large block represents the total square metres required by the MNH programme to meet current demand and provide adequate space for future growth. By dividing this large block into multiple structures, the design can more effectively optimise environmental comfort, construction cost efficiency, and access to nature, natural daylight, and ventilation.



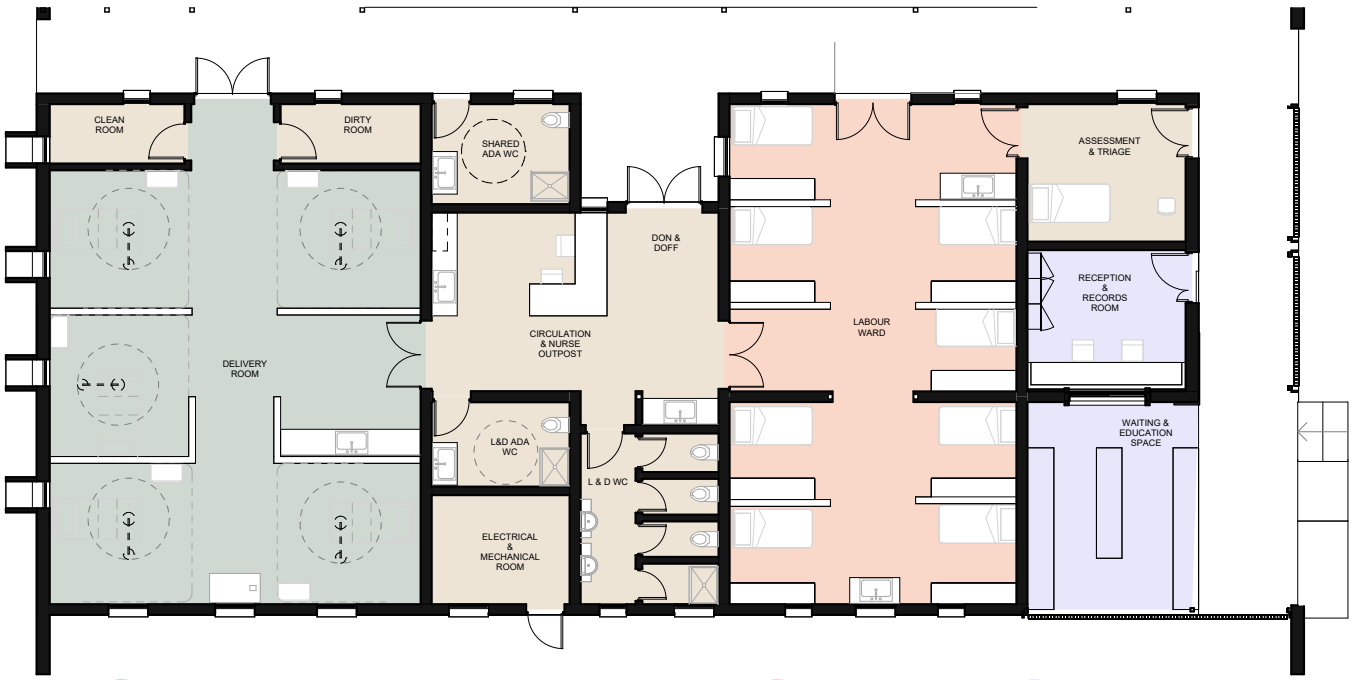
Modular Blocks

The design breaks the programmes into five distinct blocks: Antenatal Care (ANC), Labour and Delivery (L&D), Postnatal Care (PNC), the Newborn Care Unit (NBU), and the Operating Theatre (OT). Narrow modular blocks are arranged around a central private courtyard. This “kit-of-parts” system forms a prototypical design that can be adapted to a variety of sites while responding to the specific needs and constraints of each healthcare facility.



Design Features

Labour & Delivery Block



2 **Delivery Room** 3 **Labour Ward** 1 **Arrival and Registration**

1 Arrival and Registration

A reception and records room is positioned at the entrance of the MNH intervention. It includes a window, allowing mothers and families to receive clear directions and immediate attention. Adjacent to this is a shaded waiting and education area, designed to provide comfort while patients wait for care. A private assessment and triage room is located next to the reception.

2 Delivery Room

The delivery room accommodates five delivery beds. Each bay has space for a companion chair and a privacy curtain and is demarcated with half walls for privacy. A counter with an embedded sink is located centrally, and resuscitation units are visible from the delivery beds. Space for alternative birth equipment has also been included to support birth positions such as squatting, which women indicated was a preference in the immersion findings. Examples of labour support equipment include birth stools and slings. The delivery room has direct access to a WC located next to its entrance, along with dedicated clean and dirty rooms.

3 **Labour Ward**

The labour ward accommodates eight patients, partitioned by half walls for privacy. The layout strives to give women as much privacy as possible while maintaining open sightlines and connectivity for staff caring for patients.

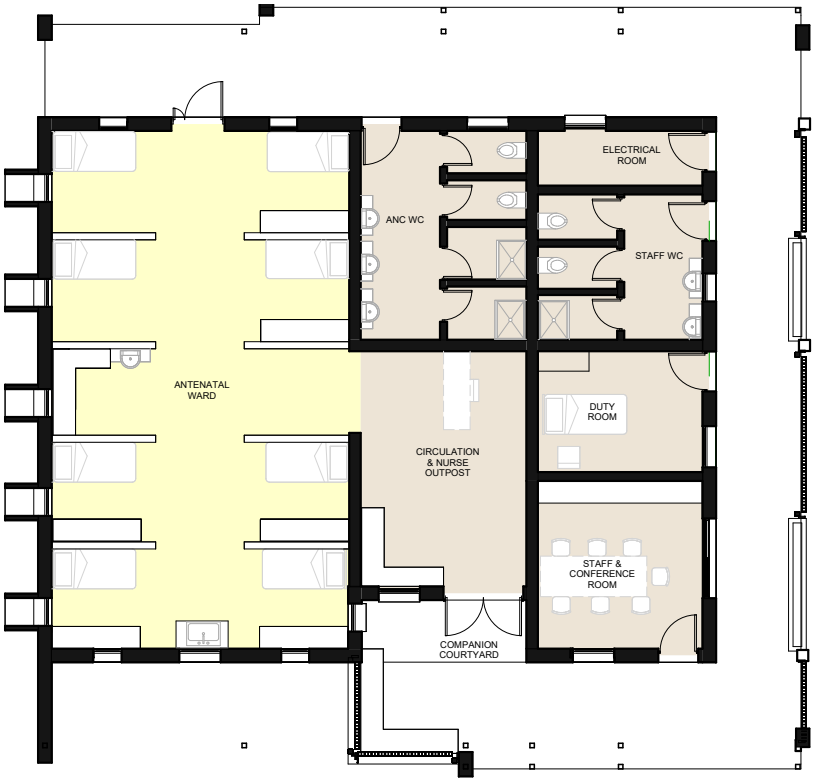
To create space for companions and support them as a critical part of the care team, each patient bed is paired with a built-in bench for companions to sit and sleep. The existing maternity block has no options for companion accommodation, and as a result, companions often end up sleeping outside. The bench also integrates storage for personal items.

A central nurse outpost is positioned between the labour ward and delivery room, providing nurses with easy access and clear visibility to monitor and care for labouring patients. Labouring patients and their companions have access to a shared WC equipped with a toilet and shower.

An outdoor labour walk is located next to the labour ward block to support movement during labour. Smooth walls and handrails are provided for support, and benches are placed along the path to allow mothers to rest as needed.

Labour Walk

Antenatal Care Block



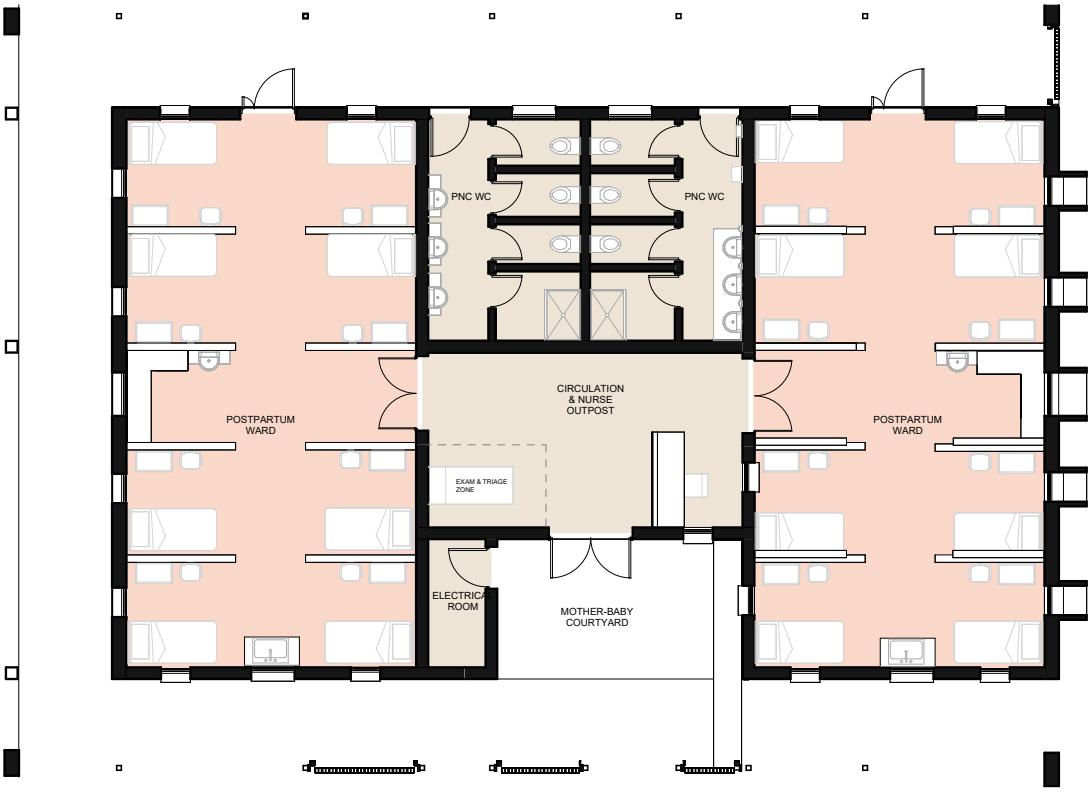
4 Antenatal Care **5** Duty Room

4 **Antenatal Care Ward**

This ward is situated in its own separate block to provide additional privacy for mothers who arrive early at the facility. It accommodates nine beds, each separated by half walls to balance privacy with provider visibility and oversight. A dedicated nurse outpost ensures efficient monitoring and care.

The design includes built-in benches next to each bed, and a companion courtyard offers a comfortable space for family members to rest while supporting the mother. Antenatal patients and companions have access to a designated WC with a toilet and shower. The WC door faces the exterior rather than the ward to prevent sanitation issues and odours from entering. While mothers and companions exit the ward to use the bathroom, they do so via a private, covered external corridor, maintaining both privacy and convenience.

Postpartum Block



6 **PNC** 7 **Nurse station**

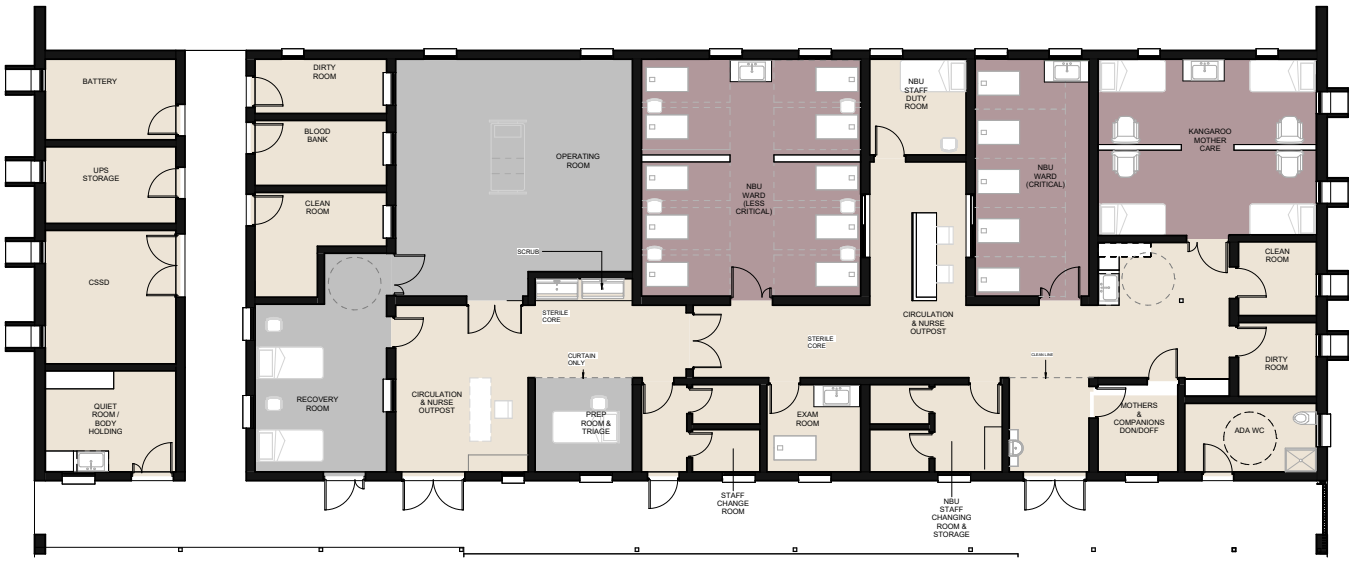
6 Postpartum Ward

The postpartum block accommodates 16 beds in total, split between two wards with eight patient beds each. The layout is designed to give women as much privacy as possible while maintaining open sightlines and connectivity for staff caring for patients. To create space for companions and support them as a critical part of the care team, each patient bed is paired with a chair so companions can sit alongside mothers. Newborn bassinets are also placed next to mothers to promote the mother–baby dyad and keep newborns close.

Culturally, women prefer to stay in a private area after birth. By creating a more homelike environment, this ward design encourages women to remain longer during the postpartum period. An exterior mother–baby courtyard and interior nooks within each ward provide spaces for bonding, supporting families to delay discharge while receiving critical care. Patients and companions have access to designated toilets and showers. The WC door faces outside rather than the ward to reduce sanitation and odour issues. Though mothers and companions exit the ward to reach it, they use a private, screen-sheltered door.

OR& NBU Block

(renovation)



8 **C/S OR** 9 **NBU**

8 Cesarean Section Operating Room

The redesigned C-Section Operating Room (C/S OR) programme improves efficiency and care flows between the operating and newborn care spaces. The OR includes a single operating bed and is supported by dedicated lighting and mechanical systems tailored to surgical needs. Just outside, scrub sinks are provided to support hand hygiene and efficient waste management.

Adjacent to the operating room is a two-bed recovery room for immediate postoperative care. Nearby, a series of exterior-access rooms serve specialised functions, including a blood bank, clean room, and dirty room. Each is connected to the OR through a service window to streamline workflow and maintain sterile conditions. At the centre of the unit, a centralised nurse station provides clear visibility and coordination across all areas.

9 **Newborn Unit**

The Newborn Unit is located adjacent to the postpartum ward to keep mothers of small and sick newborns close to their babies. It includes a larger, non-critical NICU with 10 baby cots for stable newborns requiring general care, and a smaller, critical NICU with five incubators designed to provide intensive care for newborns in critical condition. A KMC unit with four beds supports mothers in providing skin-to-skin contact to promote bonding and recovery. At the centre of the NBU, a centralised nurse station ensures efficient monitoring and coordination across all areas, while each ward also incorporates a nurse outpost for direct oversight of newborns, along with a counter and sink to support essential care practices.

Landscape

Access to nature and thoughtfully designed outdoor spaces fosters healing and promotes positive perceptions of care. Outdoor spaces can also provide space for provider and companion respite. The landscape design is intended to create comfortable, dignified spaces for patients, family, and staff. Communal gathering and patio areas feature benches combined with soft landscaping to create a comfortable, controlled climate. Planting is selected from appropriate local species, chosen for their low maintenance and resilience to the climate.


MATUNGU
MATERNITY
UNIT

Matungu Sub-County Hospital

Kakamega County, Kenya

Facility Background

Services & Site

Matungu Sub-county Hospital is located in Matungu Sub-county, approximately 43 kilometres from Kakamega Town. Set within a predominantly rural, agricultural landscape, the hospital occupies relatively flat terrain and consists of a series of single-storey, bar-shaped buildings connected by pathways.

The hospital offers a range of essential healthcare services, including both outpatient and inpatient care. However, the high patient volume has created an urgent need for a new Maternal and Newborn Health (MNH) facility to address capacity constraints.

The existing maternity building includes antenatal and postnatal care wards, delivery rooms, and a newborn unit. With deliveries projected to increase from 140 to 280 per month, the planned expansion will ensure the facility can accommodate growing demand and continue providing comprehensive care.

Challenges & Opportunities

Currently, the paediatrics, female, and male wards are overcrowded and housed within a single building, which limits privacy and the provision of respectful and dignified care. Constructing a new MNH building will not only address future MNH needs but also relieve current capacity pressures, allowing the existing MNH building to be repurposed as a dedicated female ward.

The site already has a master plan, but there is flexibility to relocate certain buildings to optimise the design and enhance both environmental sustainability and user comfort for the new MNH facility. At present, the facility has 16 beds serving both the ANC and labour wards, with only one delivery bed. Additionally, the NBU is too small to accommodate projected future patient volumes.

Design Approach

Recommended Site Strategies

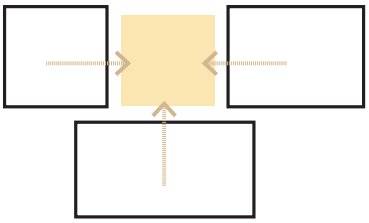
In the existing master plan, the proposed location for the morgue is highly visible on the site, which is not ideal. We recommend relocating it to a more secluded area, away from the maternity and OPD expansions. Additionally, reorienting the MNH building will improve environmental comfort and allow it to integrate more effectively within the site.

Given that single-storey buildings are more cost-effective than multi-storey designs, the MNH facility is organised as three interconnected single-storey blocks around a shared courtyard. The design emphasises external circulation where possible and provides seamless connections to nature and the new OT.

Conceptual Layout

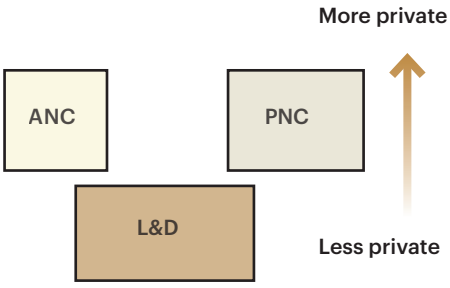
1 Arrange Modules

Programme modules are organised around a central courtyard, with all areas connected by exterior circulation.



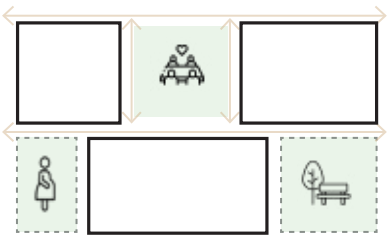
2 Establish Privacy

Programmes requiring higher privacy and strict infection control, such as the NBU and operating room (OR), are located furthest from public and shared areas.



3 Programme the Exterior

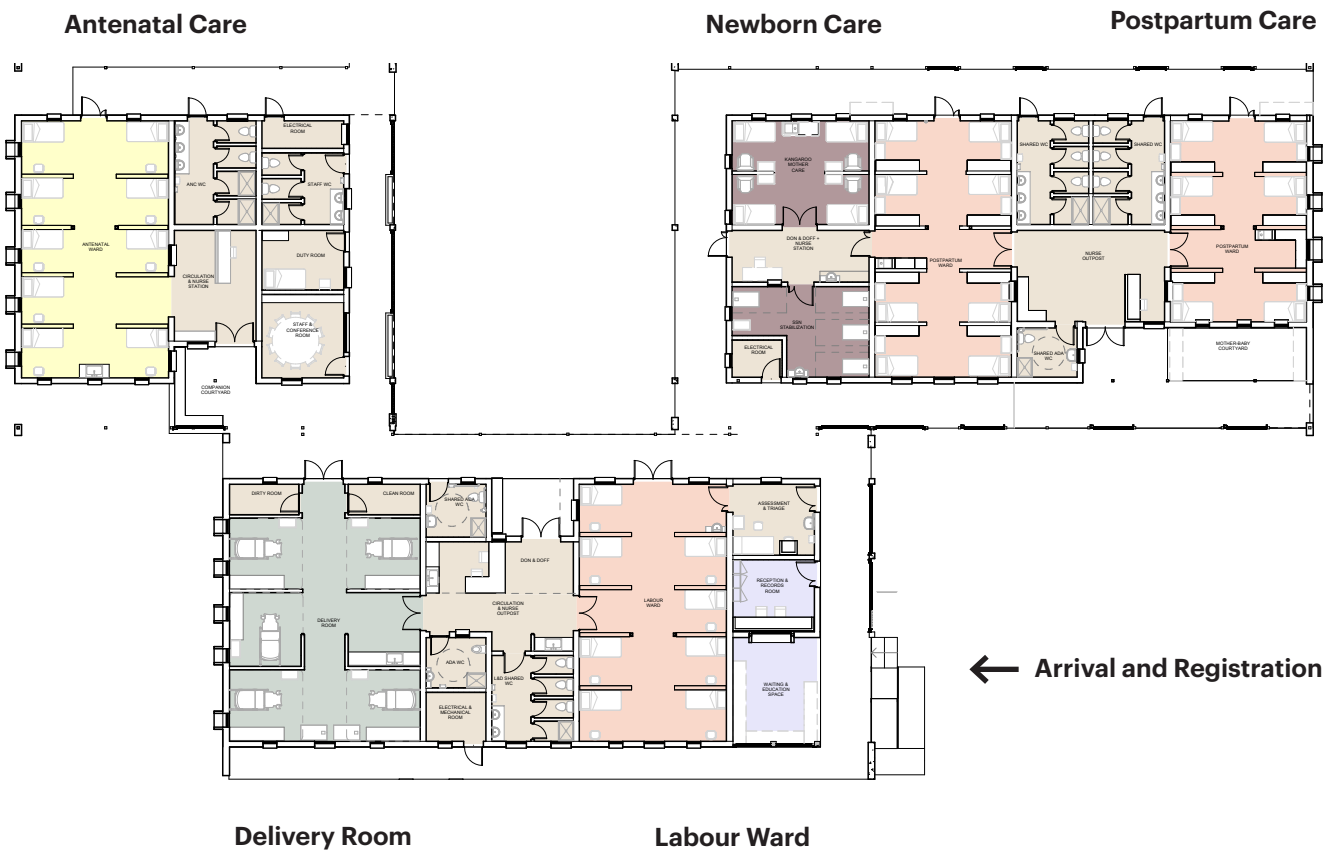
Building nooks are designed to allow activities to extend into exterior spaces. These outdoor areas are optimised for programmes not typically included in healthcare facilities, such as mobility exercises during labour, and spaces for cultural and religious practices.



Modular Approach

Our design is guided by a modular approach. We developed a flexible, scalable “kit-of-parts” system that can be adapted to diverse site conditions and evolving programme needs. This forward-thinking approach allows for customisation to meet the unique priorities of each facility, balancing efficiency and adaptability while optimising cost and supporting long-term planning. It is designed to anticipate future needs and accommodate advancements over time.

The form and layout of our designs prioritise climate performance, resilience, and structural efficiency. Narrow floorplates maximise cross-ventilation and natural daylight, reducing energy reliance while fostering a comfortable environment.



Labour and Delivery Block

Antenatal Care Block

Postpartum Care Block

Covered walkway to Operating Threatre

Adaptation

The design proposal for Matungu adapts our modular approach to the specific needs of the facility and the constraints of the site. Matungu Sub-County Hospital already has a newly built Operating Theatre, eliminating the need for an additional OT block. Instead, we propose a covered connecting pathway linking the new MNH intervention to the existing OT, allowing seamless patient movement while protecting staff and patients from the elements.

For newborn care, an SSN stabilisation room and Kangaroo Mother Care space are located adjacent to the Postpartum Care ward, ensuring close proximity for mother–baby care. The newborn care areas have separate entrances to support infection control, safeguarding vulnerable newborns from cross-contamination while remaining easily accessible to mothers and caregivers.


NAVAKHOLO
MATERNITY
UNIT

Navakholo Sub-County Hospital

Kakamega County, Kenya

Facility Background

Services & Site

Navakholo Hospital provides a range of essential healthcare services, including both outpatient and inpatient care. The facility currently faces high patient volumes and capacity challenges, with deliveries expected to increase from approximately 150 to 350 per month.

The existing maternity building includes ANC and PNC wards, a delivery room, a general operating theatre, and supporting spaces. To meet growing demand, a new MNH building is needed to expand ANC and PNC wards, provide a larger delivery room, and accommodate a new newborn unit.

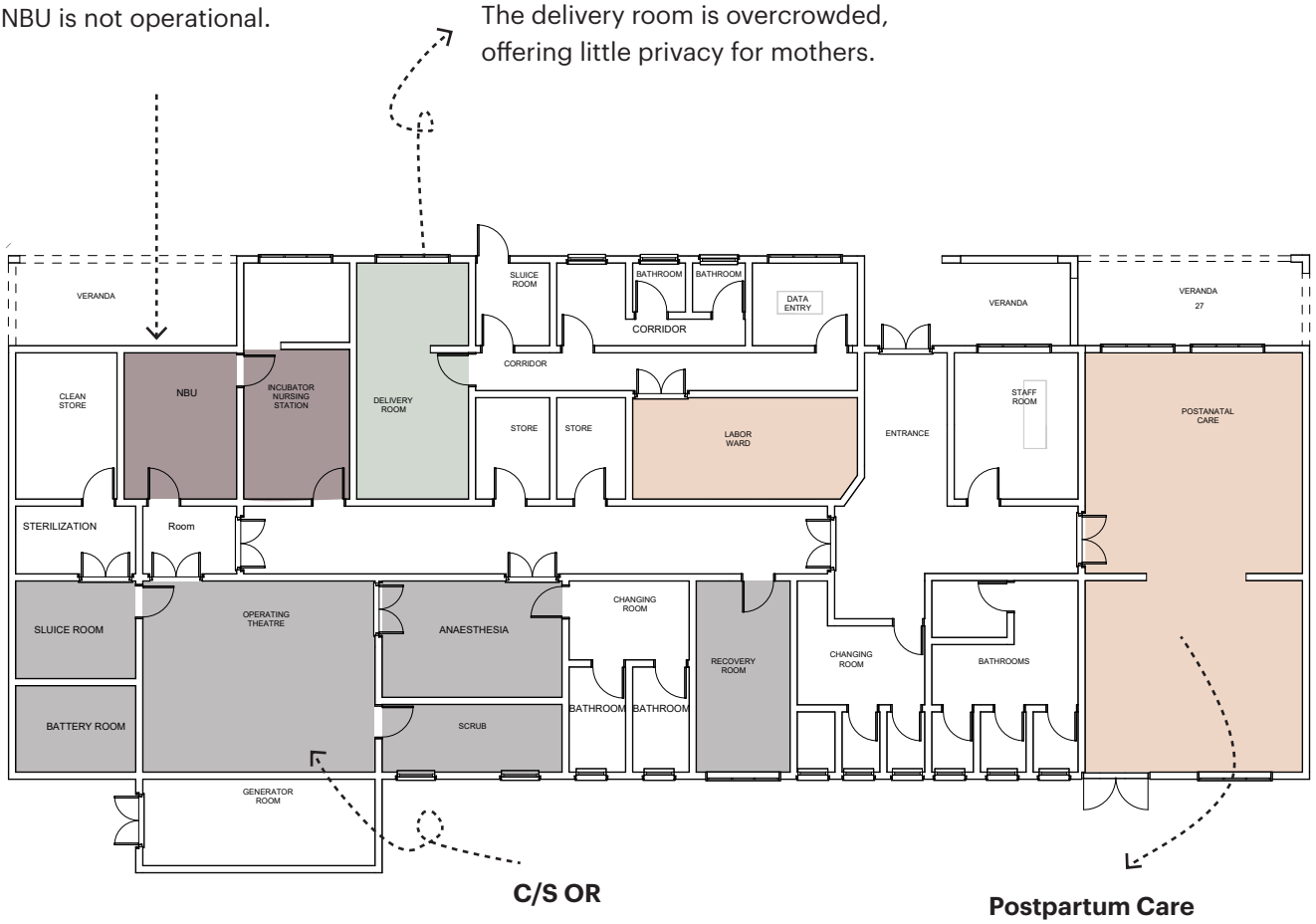
The Navakholo site offers ample space for future expansion, allowing flexibility for growth. In addition, the site is home to numerous mature trees, which should be preserved and carefully integrated into the design during the expansion process.

Challenges & Opportunities

Our assessment revealed that the maternity and newborn care facilities at Navakholo are insufficient and require significant expansion. Currently, the facility has six beds serving both the ANC and labour wards, with two delivery beds. The NBU is not yet operational and is too small to accommodate projected future patient volumes.

Newborn Unit
Currently, the available newborn care space is inadequate for the facility's needs, and the existing NBU is not operational.

Delivery Room
The delivery room is overcrowded, offering little privacy for mothers.



Design Approach

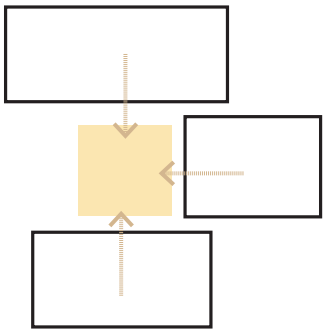
Recommended Site Strategies

To address long-term needs, expansion of the MNH programme should be prioritised. A site adjacent to the existing building has been selected for this purpose. The facility can adopt a hybrid approach, renovating the current building to improve care flows and optimise space utilisation, while constructing new buildings to expand the MNH programme and meet growing patient needs.

Conceptual Layout

1 Arrange Modules

Programme modules are organised around a central courtyard, with all areas connected by exterior circulation.



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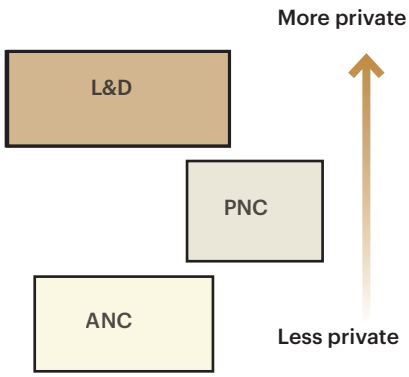

3 Programme the Exterior

Building nooks are designed to allow activities to extend into exterior spaces. These outdoor areas are optimised for programmes not typically included in healthcare facilities, such as mobility exercises during labour, and spaces for cultural and religious practices.

Modular Approach

Our design is guided by a modular approach. We developed a flexible, scalable “kit-of-parts” system that can be adapted to diverse site conditions and evolving programme needs. This forward-thinking approach allows for customisation to meet the unique priorities of each facility, balancing efficiency and adaptability while optimising cost and supporting long-term planning. It is designed to anticipate future needs and accommodate advancements over time.

The form and layout of our designs prioritise climate performance, resilience, and structural efficiency. Narrow floorplates maximise cross-ventilation and natural daylight, reducing energy reliance while fostering a comfortable environment.

Labour and Delivery Block
(Renovation)

Antenatal Care Block
(New build)

Postpartum Care Block
(New build)

Adaptation

Navakholo has an existing MNH building, which we propose renovating to optimise space utilisation and improve care flows. This building could accommodate labour, delivery, and the OT, reducing the need for extensive new construction and allowing resources to focus on targeted improvements. In addition, two new blocks will be constructed: one for Postpartum Care and another for Antenatal Care.

The landscape strategy at Navakholo will include dedicated green spaces for patient recovery and shaded outdoor seating, fostering a calm and supportive environment. Privacy will be maintained by separating patient pathways from public and staff circulation routes, with screening elements and landscape buffers enhancing discretion. Exterior circulation will be carefully designed to ensure efficient movement between the existing and new blocks.

Kangundo Sub-County Hospital

Machakos County, Kenya

Facility Background

Existing MNH Building

Proposed G-ANC space

Planned expansion

Context

Kangundo Sub-County Hospital, located in Machakos County about 35 kilometres from Machakos Town, has been the site of a Group Antenatal Care (G-ANC) study led by Jhpiego, fully implemented in early 2022. G-ANC is a comprehensive, women-centred model that combines physical assessments, educational sessions, skills development, and peer support to improve health outcomes for mothers and babies. In some cases, mothers also attend group postpartum follow-ups after delivery.

The programme has been well-received, attracting expectant mothers from diverse backgrounds across the region. IHI and MASS Design Group worked closely with Jhpiego to integrate G-ANC design principles into the Delivering More Toolkit. Building on these principles, the project team developed a concept design for a dedicated G-ANC space at Kangundo Sub-County Hospital, demonstrating how a purpose-built group care area could be adapted to the hospital's specific site conditions.

Challenges & Opportunities

Previously, G-ANC sessions were held in a waiting area outside one of the hospital's non-maternity blocks, but they are now conducted in a tent. The tent is divided into two sections: a large group area and an examination area, which includes a desk for the nurse, a wooden examination bed, and a scale, separated by a sheet.

There are several opportunities to improve the space to better support the G-ANC programme and enhance user experiences of care. A long-term priority is the development of a well-designed, ventilated semi-outdoor pavilion situated close to other MNH programmes.

Currently, the examination and assessment area is crowded, with three nurses performing exams and recording data in the same space. Privacy is limited; ideally, enclosed examination rooms should be provided for assessments, check-ups, and record-keeping. These spaces could also include storage cupboards to better organise supplies.

Existing G-ANC space

Design Approach

Existing MNH building *Proposed G-ANC space*

Space Features

The Group Antenatal Care (G-ANC) pavilion at Kangundo Sub-County Hospital is designed as a simple, open pavilion that provides protection from sun and rain while maintaining visual and acoustic privacy from surrounding areas of the facility. The central gathering space supports group activities for approximately 8–12 mothers, allowing women to participate comfortably in facilitated discussions and care sessions.

Recognizing that many women attend antenatal visits with children, the pavilion also includes a designated area where young children can sit safely and, ideally, play quietly while mothers participate in group care programmes. Supporting elements within the pavilion include secure storage for materials and equipment, a table for educational resources, and a handwashing station to support hygiene during care sessions.

A screened assessment area is located in one corner of the pavilion, allowing providers to conduct brief physical examinations or private consultations when needed. Screening elements along the pavilion's perimeter, combined with surrounding landscaping, help create a space that feels intimate, protected, and distinct from the busier clinical areas of the facility.

Sustainable Construction

Using locally available materials and climate-resilient construction technologies can reduce the facility's environmental footprint while lowering long-term maintenance costs.

The proposed G-ANC space features a lightweight timber structure that is cost-effective and easy to construct. Its open-air design is integrated into the natural surroundings, creating a welcoming, home-like space in contrast to conventional clinical environments that can sometimes discourage families from seeking facility-based care. The design emphasises natural ventilation and cooling, ensuring user comfort without reliance on air conditioning or HVAC systems. In addition, natural daylighting minimises the need for artificial lighting, further supporting energy efficiency.

Interior