MATERNITY OASIS, 50 Bedded

Sundarbasti, Budhanilkantha

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A Thesis Submitted in Partial Fulfilment
of the Requirements For the
Degree of Bachelor of Architecture

Purbanchal University
KHWOPA ENGINEERING COLLEGE
DEPARTMENT OF ARCHITECTURE
Libali, Bhaktapur, Nepal

AUGUST 2025

An Undertaking of Bhaktapur Municipality

KHWOPA ENGINEERING COLLEGE

(Affiliated to Purbanchal University)

Estd. 2001

PAN No. 201382918

CERTIFICATE

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ABSTRACT

This thesis investigates the development of a maternal wellness center that utilizes the amalgamation of health care, emotional healing, and community to provide holistic care to women pregnant or postpartum. Characteristically, maternity services in Nepal typically only include clinical interventions. While pregnancy is an exciting time for many families, there is a lack of spaces for mothers that engage all of their physical, emotional, psychological, etc. needs — especially working women. Many women struggle to obtain rest, emotional support, and social engagement during this vulnerable period. More humane, all-encompassing, and engaging environments are warranted for maternity care.

Maternity Oasis, the name of the proposed project, offers an interdisciplinary architectural response to conventional maternal care by developing a spectrum of help through alternatives to the "found" environments of maternal care. In doing so, a nurturing, restorative atmosphere both physically, emotionally, and socially can be made for women to engage, heal, and build community. The center includes coordinated spaces such as birthing suits and postnatal suites, healing gardens and wellness therapy spaces, and communal spaces. As a whole, the project emphasizes an intuitively organized spatial experience, sensitivity to the environment, a calming material palette, and consideration of material forms that build comfort and dignity.

By avoiding typical clinical and sterile models of architectural responses to healthcare, Maternity Oasis offers tranquillity and a welcoming atmosphere aligned with the needs of contemporary mothers. The program emphasizes flexibility, accessibility, and emotional support systems for mothers to heal and reconnect with themselves and others. Lastly, extensive research, user surveys, and analysis of existing gaps in maternity services in Nepal provide a foundation for a new lens through which to envision architecture as an agent for women's healing, care, and community

Keywords: Maternal wellness, postpartum care, healing architecture, biophilic design, community-centered design, maternity care in Nepal.

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DECLARATION

I hereby declare that the work presented in this thesis report titled *"Maternity Oasis"* is the result of my own independent research and design effort, carried out under the guidance of my academic supervisors. This thesis has not been submitted, either wholly or in part, for any other degree or academic title in any university or institution.
All sources of information, case studies, images, and references used in the preparation of this report have been duly acknowledged. I take full responsibility for the originality and authenticity of the content presented in this document.

Ronista Manandhar

ACKNOWLEDGEMENT

I extend my sincere gratitude to Khwopa Engineering College for providing me with the platform to conduct this research. I would like to express my deepest appreciation to my supervisor, Ar. Archana Bade Shrestha, for her invaluable guidance, constructive feedback, and unwavering support throughout this journey. Without her insights and encouragement, this research would not have been possible.

I am also deeply grateful to my friends and family for their unwavering encouragement and patience, which have been a constant source of motivation. Furthermore, I would like to acknowledge the professionals, hospital staff, and individuals who generously assisted me during my case studies by sharing their expertise and experiences. Their valuable input has greatly contributed to my understanding of maternal and neonatal healthcare environments. Lastly, I appreciate the support and camaraderie of my peers and faculty members, who have made this research journey both enriching and inspiring.

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Chapter 1 | INTRODUCTION

1.1 Introduction

The transition to motherhood is a profound and transformative experience, yet the demands placed on modern working mothers often leave them feeling overwhelmed and unsupported. Traditional maternity care frequently focuses primarily on the physical aspects of childbirth, often neglecting the crucial emotional, psychological, and social well-being of mothers during the prenatal and postpartum periods. This report introduces the "Maternity Oasis," a proposed holistic postpartum care center designed to address this gap by providing a nurturing, supportive, and healing environment specifically tailored for working mothers in Budhanilkantha. The project seeks to integrate wellness amenities, therapeutic spaces, and community support within an architectural framework that promotes overall maternal well-being.

1.2 Background

Maternal care is an essential aspect of healthcare, with practices varying based on cultural beliefs, traditions, and medical advancements.

National Context

In Nepal, traditional prenatal and postnatal practices are deeply rooted in cultural and spiritual beliefs. These include dietary restrictions, rituals like *Dhau Baji* (consuming curd and beaten rice for strength), the *Sutkeri* system (a confinement period for postpartum recovery), and *Nwaran* (a baby's naming ceremony). Additionally, postnatal care includes practices such as oil massages and dietary changes aimed at restoring a mother's health.

Global Context

On the global scale, postpartum care integrates modern healthcare services with holistic wellness approaches. Countries in Asia focus on structured maternal recovery through professional services such as lactation guidance, childcare support, counseling, aromatherapy, and body work. These services emphasize both physical and emotional well-being, ensuring a smoother transition into motherhood.

1.3 History

Maternity healthcare in Nepal has undergone significant transformations, evolving from traditional home births to modern institutional maternity care. Historically, childbirth in Nepal was managed primarily at home, with the assistance of Dhais (traditional birth attendants) and family members. These practices were deeply rooted in cultural beliefs, with postpartum rituals such as the Sutkeri system, dietary restrictions, and purification ceremonies like Nwaran playing a vital role in maternal recovery.

1. Establishment of Nepal's First Maternity Hospital

The foundation of Paropakar Maternity and Women's Hospital marked a milestone in Nepal's maternity healthcare system. Established in 1959, it was the first specialized maternity hospital in Nepal, aiming to provide institutionalized maternal and neonatal care. This shift from home-based deliveries to hospital-based maternity care introduced medical interventions, better hygiene, and improved maternal and child survival rates.

2. Expansion of Maternity Services

Ali, S., Thind, A., Stranges, S., Campbell, M. K., & Sharma, I. (2023) Over the years, maternity healthcare services expanded, with over 60% of hospitals in Nepal now offering maternity care. This increase in healthcare facilities has improved access to maternal care, particularly in urban areas. However, rural regions still face challenges such as inadequate infrastructure, lack of skilled professionals, and cultural barriers preventing institutional deliveries.

3. Rising Trends in C-Section Deliveries

In recent years, private healthcare facilities in Nepal have reported a surge in C-section deliveries, accounting for 68% of total births, while only 32% of deliveries are normal. This shift raises concerns about over-medicalization, affordability, and the necessity of C-sections in non-complicated pregnancies. The preference for C-sections is influenced by multiple factors, including medical recommendations, financial incentives, and patient choices. (K. C., A., Bhandari, B., Dhungel, B., & Rahman, M.,2020).

1.4 Project Justification

In Nepal, as in many parts of the world, working mothers face significant challenges in balancing their professional lives with the demands of motherhood. Existing healthcare facilities often lack the resources and infrastructure to provide comprehensive postpartum care that extends beyond basic medical needs. This can lead to increased stress, anxiety, and even postpartum depression among working mothers. The

"Maternity Oasis" is justified by the pressing need for a dedicated space that prioritizes the holistic well-being of this demographic, offering a sanctuary where they can recover, rejuvenate, and connect with a supportive community. By providing access to wellness programs, therapeutic interventions, and social support networks, the "Maternity Oasis" aims to empower working mothers to thrive during this critical life stage.

Objectives

This report aims to:

- Explore the various physical, emotional, and psychological challenges that working women in Nepal encounter during pregnancy and after childbirth. These challenges include insufficient familial support, difficulties in balancing work and life, inadequate maternity care facilities, and societal pressures, emphasizing the critical need for specialized maternal wellness environments. –
- Assess global standards and successful practices in the creation of maternal wellness centers that incorporate therapeutic design principles, nurturing environments, and inclusive care models, which cater to both physical recovery and emotional health.
- Develop a conceptual design framework for the Maternity Oasis that comprises wellness-oriented spaces, such as postpartum villas, yoga and hydrotherapy areas, and counseling rooms, alongside community features that foster shared experiences and empowerment among new mothers.
- Recommend architectural solutions that emphasize privacy, relaxation, and restorative care, while also encouraging social interaction and community engagement, thereby establishing a supportive and nurturing environment for mothers, infants, and caregivers.
- Promote a sustainable and culturally sensitive design strategy that reflects the local traditions, landscape, and social dynamics of Budhanilkantha, ensuring that the center is contextually appropriate and environmentally conscientious, while honoring Nepalese maternal care practices.

Scope

The scope of this report encompasses the conceptual design and programming of the "Maternity Oasis." It includes:

- Provide a one-stop solution for maternal care, education, and emotional support, offering all necessary resources in a single space, including wellness services, counselling, and health education.
- A review of relevant literature on maternal wellness, postpartum care, and healing architecture.
- An analysis of case studies of successful maternal wellness centers around the world.

- The development of a detailed program for the "Maternity Oasis," including space allocation, functional requirements, and service offerings.
- Preliminary architectural design concepts, including site planning, spatial organization, and material selection.
- Consideration of environmental sustainability and accessibility.

Limitations

This report is subject to the following limitations:

- The design is conceptual and does not include detailed structural, mechanical, or electrical engineering plans.
- The project budget is not within the scope of this report.
- The report relies on existing research and case studies, and does not include original empirical data collection.
- While the design aims to be culturally sensitive, further community consultation would be beneficial in refining the design to meet the specific needs of the local population.

This report serves as a foundation for the development of a comprehensive and innovative maternal wellness center that will empower working mothers in Budhanilkantha to embrace motherhood with confidence and well-being.

1.5 Research Question and Analysis

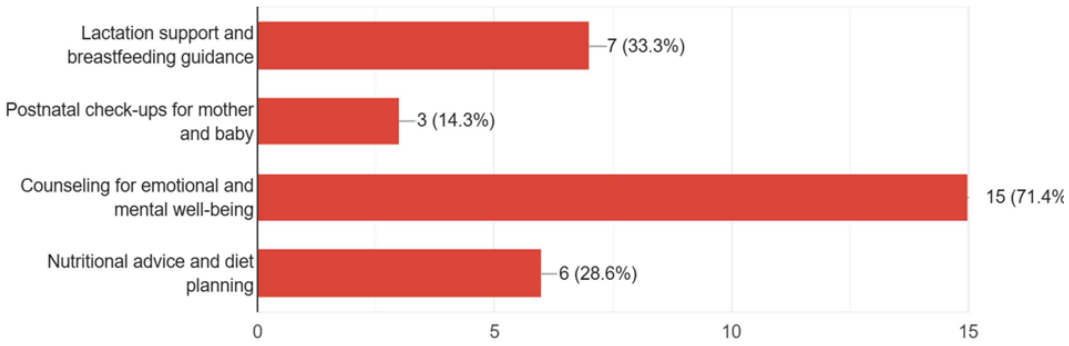


Figure 1: Chart showing Challenges Faced During Postnatal Recovery

Challenges Faced During Postpartum Recovery

Emotional and mental well-being support was the most significant challenge, affecting 71.4% of respondents. Lactation and breastfeeding guidance were needed by 33.3%, while 28.6% sought nutritional advice and diet planning. Postnatal check-ups were a concern for 14.3%. These findings emphasize the necessity of comprehensive postpartum care.

Sources of Pregnancy-Related Information

The survey shows that pregnant individuals seek information from multiple sources. 38.1% rely on doctors, 19% on family, and the largest portion, 42.9%, use online sources and books. This indicates a strong preference for digital and written knowledge alongside professional medical advice.

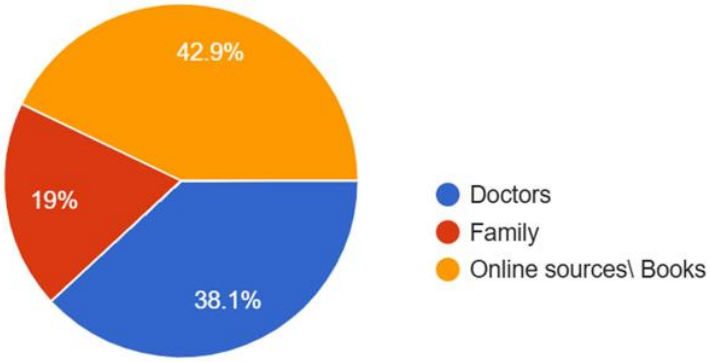


Figure 2: Chart Showing Sources of Pregnancy Related Information

Interest in Prenatal Workshops

A significant majority, 85.7%, expressed interest in attending prenatal workshops on lactation and newborn care, while 14.3% were uncertain. This highlights the demand for educational programs that support expectant mothers in preparation for childbirth and infant care.

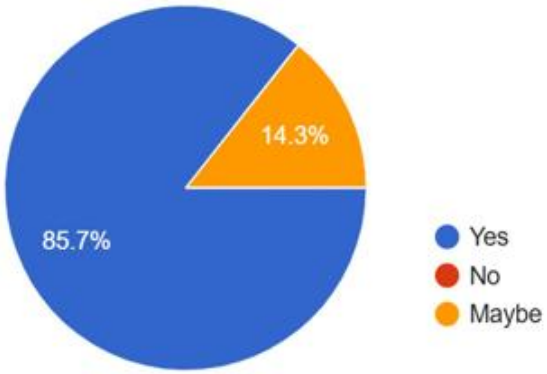
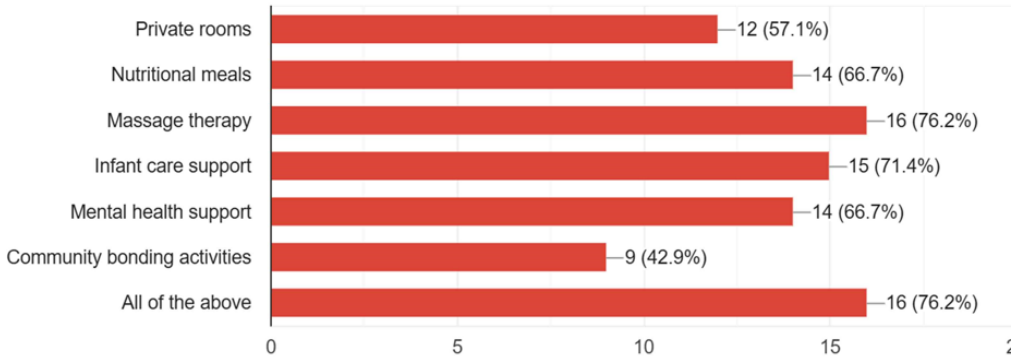


Figure 3: Chart Showing People who Wanted Prenatal Workshops on Lactation & Newborn Care

Expected Facilities in a Maternity Oasis

Facilities expected in a maternity wellness center include massage therapy and infant care support (76.2% and 71.4%, respectively), followed by mental health support and nutritional meals (both at 66.7%). Private rooms were preferred by 57.1%, and 42.9% wanted community bonding activities. A notable 76.2% selected "All of the above," reinforcing the need for holistic maternal care.



Interest in Confinement Centres

GA majority, 76.2%, showed interest in experiencing a confinement center for postpartum recovery, while 23.8% did not. This suggests a growing awareness of structured postpartum care facilities.

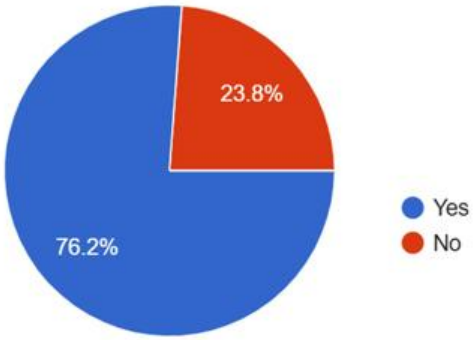


Figure 4: Chart Showing No. of People who Wanted to Experience Confinement Center

Healing Amenities Preferences

Among healing amenities, gardens or open courtyards were the most preferred (90.5%), followed by soft lighting (52.4%) and water elements (47.6%). Soundproofing was also valued by 38.1%. These preferences indicate a desire for a serene and calming environment in maternity centers.

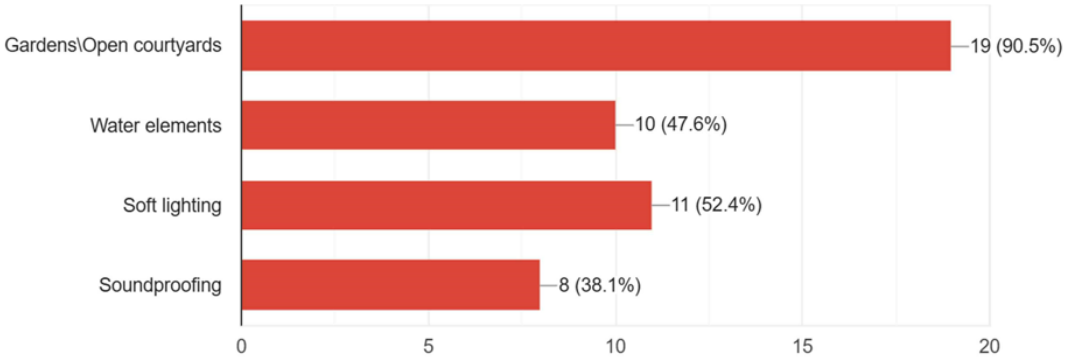
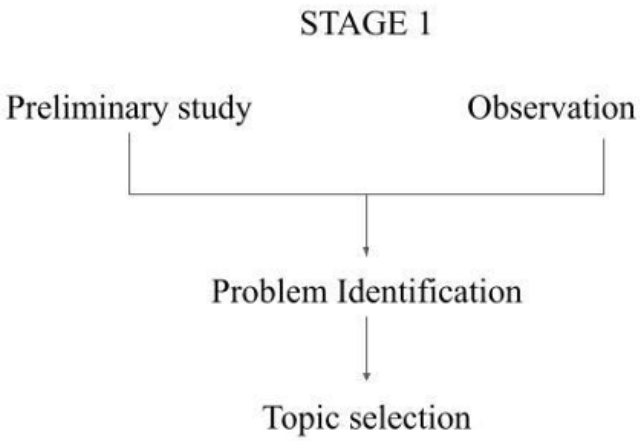


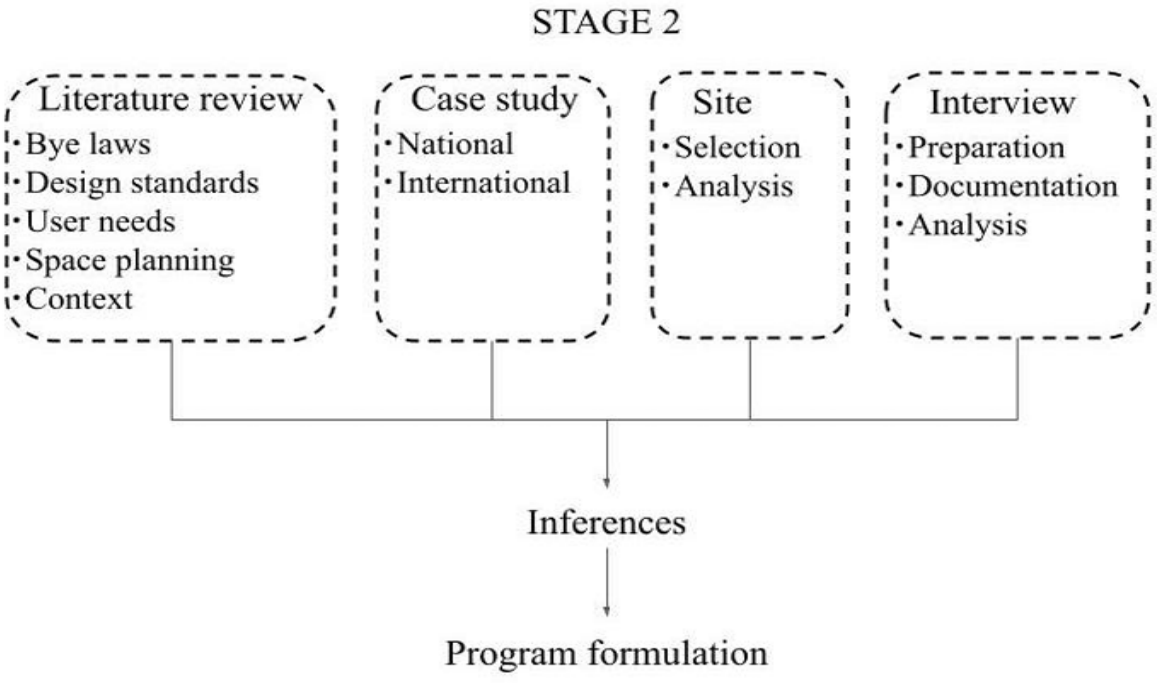
Figure 5: Chart Showing Healing Elements during pregnancy

1.6 Methodology

The methodology for the maternity hospital architecture thesis is divided as:



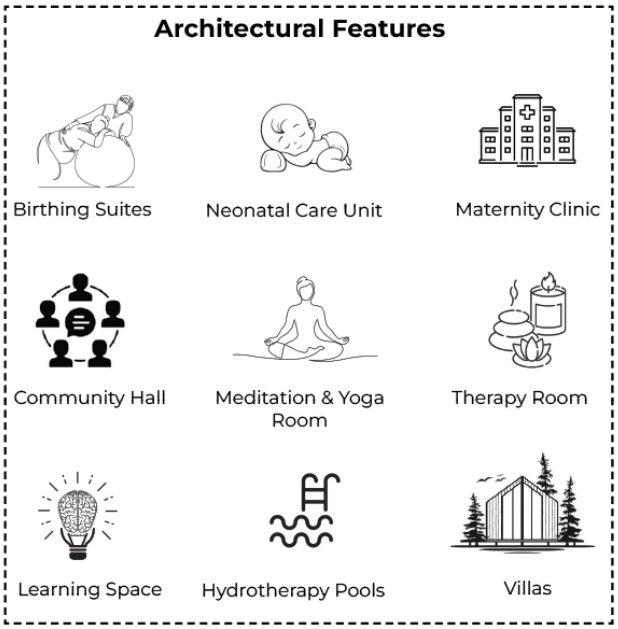
My research began by observing the built environment and identifying gaps in healthcare infrastructure, particularly in postnatal care for mothers. This led me to focus on the challenges faced by working mothers during the postpartum period, inspiring the concept of a "Maternal Oasis" as the core of my thesis. To deepen this inquiry, I conducted a literature review of relevant bylaws, design standards, and user needs, along with national and international case studies to extract best practices. Site selection was based on contextual and functional suitability, while interviews with healthcare professionals, architects, and users enriched the study with qualitative insights. These efforts culminated in a comprehensive design program outlining the spatial and functional requirements of the proposed project.



Chapter – 2 | Literature Review

2.1 Maternity Oasis

The Maternity Oasis is a nurturing environment designed to support mothers through pregnancy, childbirth, and postpartum recovery. It provides a calm, healing, and educational space for mothers to relax, heal, and connect with experts and other mothers. The key users include mothers and newborns, medical and wellness professionals, and support staff, ensuring comprehensive care and assistance.



2.1.1 Health Facilities & Architectural Features

The Maternity Oasis integrates several specialized healthcare and wellness facilities to cater to the physical, emotional, and mental well-being of mothers:

1. Maternity Health Service– Comfortable, well-equipped spaces for labor and delivery, promoting a stress-free birthing experience. Including a dedicated area for newborn care, ensuring medical attention and monitoring for infants.
2. Community Hall – A space for workshops, social interactions, and bonding activities among mothers and families.
3. Meditation & Yoga Room – A serene environment promoting relaxation, mindfulness, and physical well-being.
4. Therapy Room – Dedicated to mental health counselling, lactation support, and other therapeutic sessions.
5. Learning Space – An educational hub for mothers, offering prenatal and postnatal workshops on infant care, lactation, and nutrition.

6. Hydrotherapy Pools – Water-based therapy for relaxation, pain relief, and postnatal recovery.
7. Villas – Private accommodations designed for mothers seeking a peaceful and homely recovery space.

2.1.2 Maternity Healthcare Services

Maternity hospitals offer a range of services aimed at ensuring maternal and neonatal well being. These include:

• Antenatal Care (ANC): Regular monitoring of pregnancy through check-ups, ultrasounds, nutritional counselling, and high-risk pregnancy management.

• Labour & Delivery Services: Facilities for normal delivery, caesarean sections (C sections), water births, and assisted deliveries.

• Postnatal Care (PNC): Support for new mothers, including breastfeeding guidance, mental health support, and post-surgical recovery.

• Neonatal Care: Specialized newborn care, NICU (Neonatal Intensive Care Unit), human milk banks, and immunization programs.

• Family Planning & Fertility Services: Contraceptive counselling, IUI (Intrauterine Insemination), IVF (In Vitro Fertilization), and other assisted reproductive technologies.

• Oncology & Screening Services: Regular screenings for cervical cancer, breast cancer, and early detection of reproductive health disorders.

2.1.3 Psychology of Users in Maternity Healthcare

Pregnancy and childbirth bring significant biological, psychological, and social changes, which can make women psychologically vulnerable, requiring increased support. Lack of support or strained partner relationships can negatively affect maternal health and family dynamics.

Antenatal Psychological Conditions:

- Antenatal Depression: Characterized by sadness, irritability, loss of interest, changes in appetite, and feelings of guilt or hopelessness. Risk factors include unplanned pregnancies, financial stress, and lack of social support.
- Antenatal Anxiety: Persistent worrying, irritability, and muscle tension, associated with adverse fatal outcomes like impaired development and preterm birth.
- Fear of Childbirth (Tokophobia): A pathological fear of childbirth, often linked to personal trauma, leading many to choose caesarean sections.

Postnatal Psychological Conditions:

- Postpartum Depression (PPD): Affects 10-15% of new mothers, typically emerging within the first six weeks postpartum. Symptoms include profound sadness and difficulty bonding with the baby.
- Postpartum Anxiety and OCD: Includes excessive worry, intrusive thoughts, and compulsive behaviours aimed at protecting the child.
- Postpartum Psychosis: A rare condition affecting 0.1-0.2% of new mothers, marked by delusions, hallucinations, mania, and confusion. Immediate medical attention is required.

2.1.4 Impact of Mental Health Challenges

Perinatal mental health issues affect maternal health, pregnancy outcomes, and child development. Women experiencing perinatal depression are at increased risk of adverse neonatal outcomes, including low birth weight, preterm birth, and developmental delays (Burger, et al., 2020; Dadi, et al., 2020).

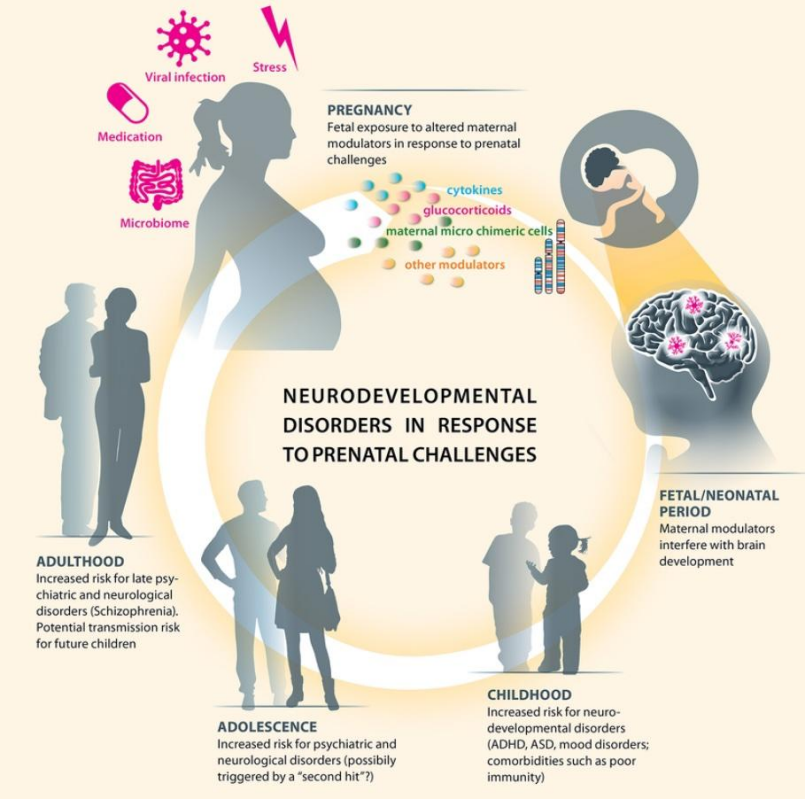


Figure 6: Mental Health during different phases

2.2 Wellness and Spa Treatment for Pre and Postnatal Maternity Care

The journey of motherhood, from pregnancy to postpartum recovery, is a transformative phase that demands physical, emotional, and mental well-being. Wellness and spa treatments play a crucial role in supporting expectant and new mothers by offering holistic care that nurtures both body and mind. Prenatal spa

therapies focus on relaxation, stress relief, and alleviating pregnancy-related discomforts such as back pain, swelling, and fatigue. Meanwhile, postnatal treatments aid in healing, restoring energy levels, and addressing physical changes that occur after childbirth. Integrating wellness practices, including hydrotherapy, massage, aromatherapy, and mindfulness techniques, creates a sanctuary for maternal care, ensuring a balanced and rejuvenating experience for mothers as they transition into their new roles.

The diagram represents the spatial organization and functional zoning of a wellness resort, integrating public, semi-public, private, and service zones for smooth accessibility and user experience. Below is a breakdown of how different areas are interconnected:

2.3 Therapy for body - Antenatal Services

2.3.1 Antenatal Massage

Antenatal massage involves specialized therapeutic techniques designed to support the physical and emotional well-being of pregnant individuals. The primary objectives include reducing muscle tension, easing joint pain, and promoting overall relaxation.

Benefits:

- Alleviates common discomforts such as lower back and pelvic pain, especially during the second and third trimesters.
- Enhances blood and lymphatic circulation, thereby reducing swelling in the extremities.
- Reduces anxiety, stress, and insomnia by stimulating the parasympathetic nervous system.

Technique & Safety Considerations:

- Massage is administered in side-lying positions using bolsters for comfort and safety.
- Only light to moderate pressure is applied, with careful avoidance of specific acupressure points that may trigger uterine contractions.

2.3.2 Antenatal / Lactation Class (Physical)

These classes combine physical preparation with psychological counseling to equip expectant mothers for labor, delivery, and postpartum care.

Focus Areas:

- Breathing techniques and prenatal exercises to prepare for labor.
- Education on breastfeeding, including latch methods and milk production guidance.
- Psychological support through peer interaction and emotional preparedness.

Outcomes:

- Enhanced self-confidence and reduced childbirth anxiety.
- Increased rates of successful breastfeeding initiation.
- Lower risk of postpartum depression and improved maternal mental health.

2.3.3 Hydrotherapy

Water therapy is highly effective in relieving pregnancy-related discomfort and promoting postpartum healing

- Reduces swelling & water retention by improving blood circulation.
- Supports weightless movement, relieving joint pain and pressure.
- Eases muscle stiffness through warm water immersion.
- Encourages deep relaxation, reducing stress and anxiety.

2.3.4 Prenatal Aromatherapy

- Reduces nausea and morning sickness (Ginger & Lemon Oil).
- Promotes relaxation and better sleep (Lavender & Chamomile Oil).
- Eases muscle pain & headaches (Peppermint & Eucalyptus Oil).

◇ *Safe Oils for Pregnancy:* Lavender, ylang-ylang, sandalwood, and citrus oils.

2.4 Therapy for body - Postnatal Services

2.4.1 Full Body Massage

Postnatal full-body massage addresses recovery by relieving muscle tension, managing hormonal fluctuations, and reducing emotional stress after childbirth.
Physiological Benefits:

- Promotes circulation and lymphatic drainage, aiding in the reduction of postpartum swelling.
- Helps in muscular realignment and spinal correction resulting from pregnancy-related postural shifts.
- Regulates hormonal levels by reducing cortisol and increasing oxytocin, promoting emotional well-being.

Recommended Frequency: Once or twice weekly, starting one to two weeks after a normal delivery, or post-scar healing for C-section cases.

2.4.2 Lactation Massage

This targeted therapy is designed to support breastfeeding by addressing common lactation challenges.

Therapeutic Focus:

- Relieves breast engorgement and clears blocked milk ducts.
- Stimulates the release of oxytocin to enhance milk let-down.
- Reduces tenderness and anxiety during nursing.

Implementation:
Performed gently with the use of warm compresses before and after the massage, often in conjunction with guidance from a lactation consultant.

2.4.3 Herbal Sauna

A traditional method of postpartum recovery involving herbal-infused steam.

Health Outcomes:

- Opens skin pores and promotes detoxification through sweat.
- Alleviates body aches and supports uterine contractions and internal cleansing.
- Common herbs used include lemongrass, turmeric, and basil for their antiseptic and anti-inflammatory properties.

Duration:
Typically administered in 30-minute sessions, two to three times per week during the first postpartum month.

2.4.4 Tangas (Herbal Steam Therapy)

Tangas involves seated herbal steaming directed at the pelvic region.

Postpartum Healing Goals:

- Cleanses and firms the vaginal canal.
- Promotes uterine involution and elimination of lochia.

Cultural Integration:
Practiced widely in South Asian and indigenous cultures as part of confinement care, often alongside perineal massage and abdominal binding techniques.

2.4.5 Ayurvedic Treatments (Optional, Cultural)

Ayurvedic postpartum care offers a comprehensive, holistic approach focusing on restoring physical and emotional balance.

Key Therapies:

- *Abhyanga:* Daily warm oil massages to calm the nervous system and enhance blood circulation.

- *Shirodhara:* A therapeutic technique involving continuous pouring of warm oil on the forehead to relieve stress and mental fatigue.
- *Dietary Guidance:* Emphasizes warm, digestible meals and herbal teas to restore digestive fire (*Agni*).

Expected Benefits:

- Encourages tissue regeneration and hormonal equilibrium.
- Enhances sleep quality, emotional health, and maternal satisfaction.
- Facilitates detoxification and supports postnatal womb healing.

2.4.6 Sound Therapy

Vibrational sound therapy can reduce stress, balance emotions, and enhance relaxation for both prenatal and postnatal women.

- Calms the nervous system, reducing anxiety.
- Regulates breathing, improving oxygen flow to the baby.
- Enhances deep sleep and relaxation.
- Boosts emotional well-being, reducing postpartum blues.

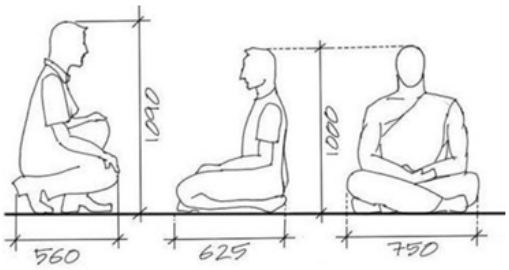
Room Type	Minimum Size (ft)	Ideal Size (ft)	Ceiling Height	Capacity	Key Considerations
Individual Therapy Room	10 x 12 (3m x 3.6m)	12 x 14 (3.6m x 4.2m)	9-10 ft (2.7-3m)	1 client + 1 therapist	Cozy, quiet, good acoustics
Small Group Therapy Room	14 x 16 (4.2m x 4.8m)	16 x 20 (4.8m x 6m)	10-12 ft (3m-3.6m)	2-4 people	Enhanced sound diffusion, comfortable seating
Large Group Therapy Room	20 x 24 (6m x 7.2m)	24 x 30 (7.2m x 9m)	12+ ft (3.6m+)	5-10 people	Balanced acoustics, spacious, natural materials

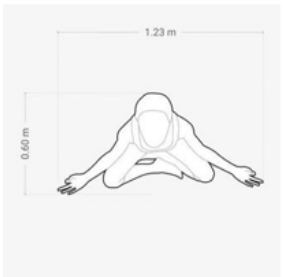
Massage Room Type	Minimum Size (ft)	Ideal Size (ft)	Ceiling Height	Capacity	Key Considerations
Standard Massage Room	10 x 12 (3m x 3.6m)	12 x 14 (3.6m x 4.2m)	9-10 ft (2.7-3m)	1 client + 1 therapist	Compact but functional; space for massage table and movement
Luxury Massage Room	12 x 14 (3.6m x 4.2m)	14 x 16 (4.2m x 4.8m)	10+ ft (3m+)	1 client + 1 therapist	More comfort; seating area, storage for oils/towels
Couples Massage Room	14 x 16 (4.2m x 4.8m)	16 x 20 (4.8m x 6m)	10+ ft (3m+)	2 clients + 2 therapists	Spacious; two massage tables, relaxation space
VIP/Signature Massage Room	16 x 20 (4.8m x 6m)	18 x 24 (5.4m x 7.2m)	10-12+ ft (3m-3.6m)	1-2 clients + therapist(s)	Luxury features like private shower, lounge, natural materials

Sizes:

- Small Boutique Studio: Size: 600 square feet
- Medium size studio: 1000 square feet
- Large Urban studio: 1800 square feet

Spatial Requirement
2.5’-3’ between mats for free circulation
Yoga mat size: 24” x 68”
Per person area for meditation: 8 sq. ft
Per person area for yoga: 16-27 sq. ft
Fire safety: 1 fire exit for 30 people



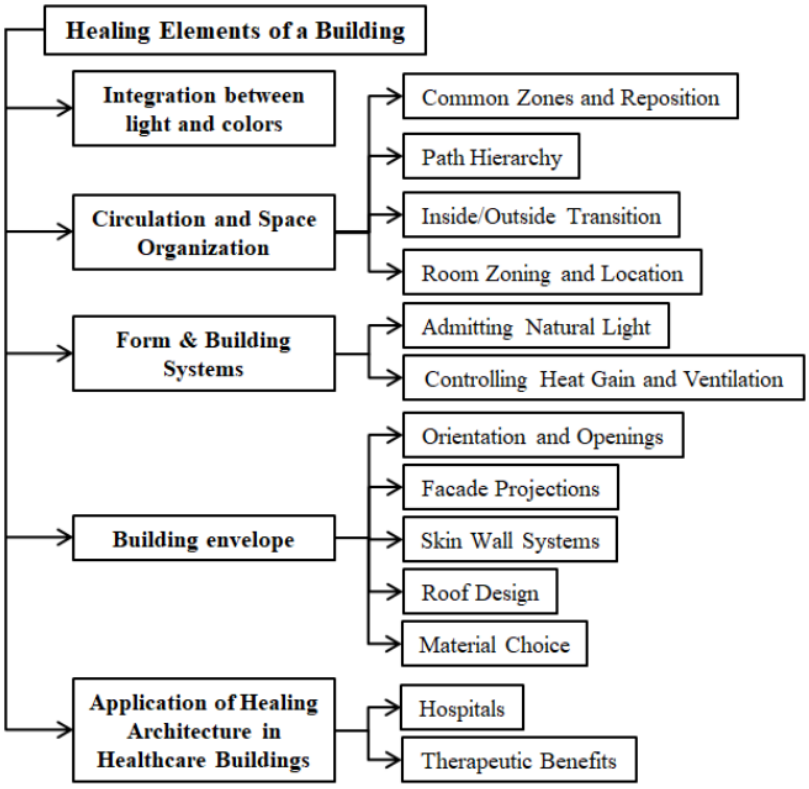


Healing Architecture

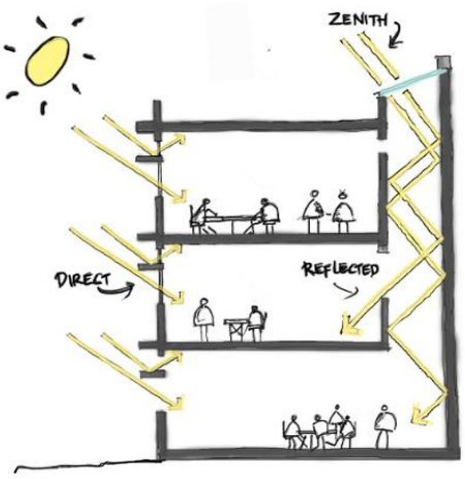
The process of restoring harmony to the organism is called healing. A loss of this equilibrium and the necessity of reintegrating with the body's innate capacity for healing and regeneration are implied by illness. Relieving someone's pain or suffering is also healing. Restorative care includes reducing emotional strain, enhancing coping skills, and cultivating a positive outlook. Healing is a return to balance among all these elements rather than a process of curing or fixing (Krokowska, 2021).

2.5 Healing Elements of a Building

Figure shows the architectural healing elements, including the fusion of light and color, circulation and space organization, form and building system, building envelope, and finally the application of healing architecture in medical buildings.



2.5.1 Integration between Light and Colours



Light is a main element in the healing environment concept. The amount of the sunlight that is getting inside any building to make it more alive. Also, the artificial type of the lighting in the place makes the user awake and active. The amount of lighting should be controlled to avoid harming the eye. Therefore, the amount of this lighting should be less and it is better to use an indirect lighting scheme.

2.5.3 Form & Building Systems

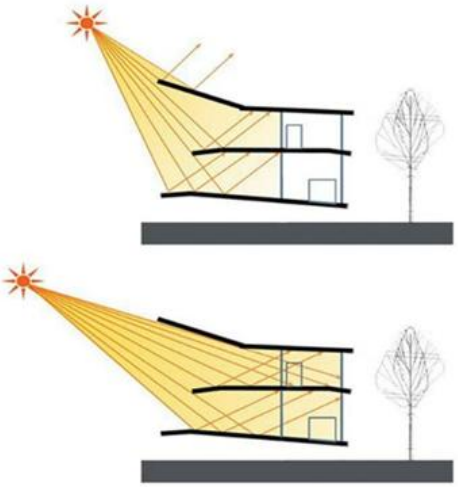


Figure 8: Integration lights in Building

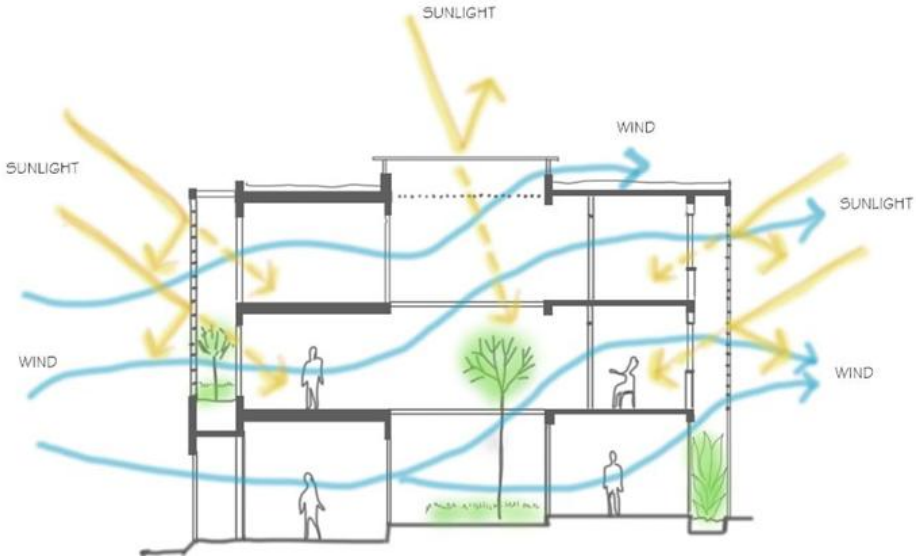


Figure 8: Heat gain through Sunlight

2.5.4 Admitting Natural Light

Buildings can use a mix of strategies to fulfill certain criteria, but they should all incorporate reflective light strategies where sun angels are mostly vertical, as glare is proved to have harmful effects to occupant's mental and physical health.

2.5.5 Controlling Heat Gain and Ventilation

Form can be oriented to overshadow surfaces and outdoor spaces which make it absorb less heat. This also creates a difference in pressure between shaded and unshaded areas, which in turn enhances natural ventilation and wind speed through these areas. The form of the building can also be shaped to create stack-ventilation systems and inlets, outlets for natural ventilation and cross ventilation when needed.

2.5.6 Building envelope

Healing environments must first achieve human comfort. The envelope should be designed to allow natural light, facilitate ventilation, and reflect heat. When an architect works with these forces, it can result in the creation of spaces that are not only useful, but are also comfortable and alive, and therefore healing. Failing to achieve these criteria, results in a sick building which can affect user's health negatively. This section states several methods to achieve these purposes through envelope design.

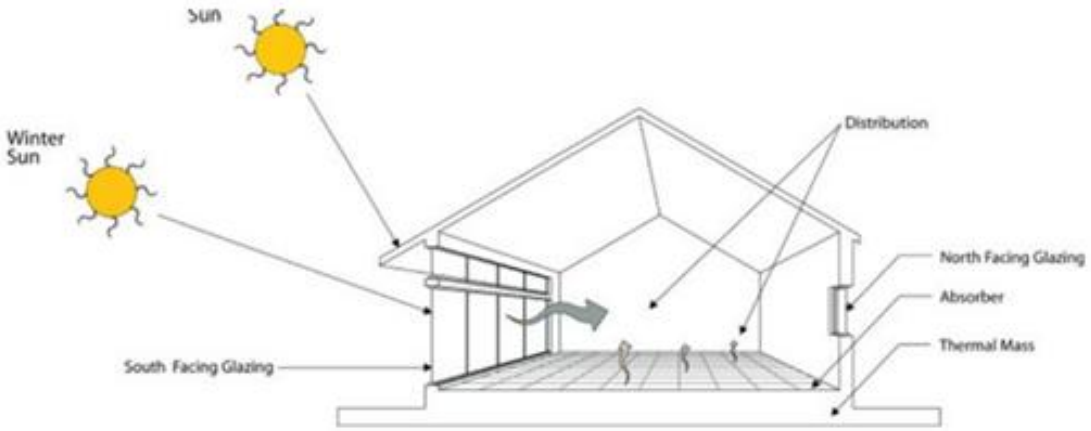


Figure 9: Direct Solar Gain

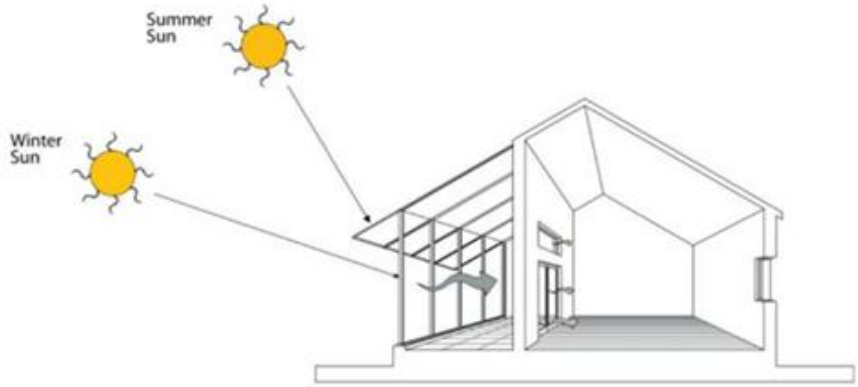


Figure 10: Isolated Solar Heat Gain

2.5.7 Orientation and openings

The surfaces and orientation is the key in attracting prevailing wind and adequate sunlight. However, the most important elements of the envelope are openings and windows. They should be located to admit light without heat or glare, and designed in relation to room depth to satisfy its function.

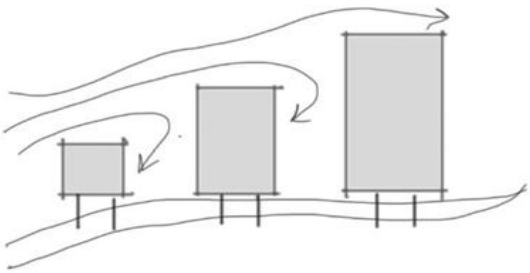


Figure 12: Buildings are arranged in ascending order of their height with slits in between for ventilation.

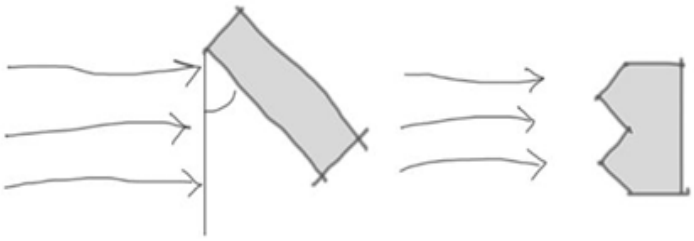


Figure 12: An angle of 30–45-degree angle to direction of wind for enhanced ventilation.

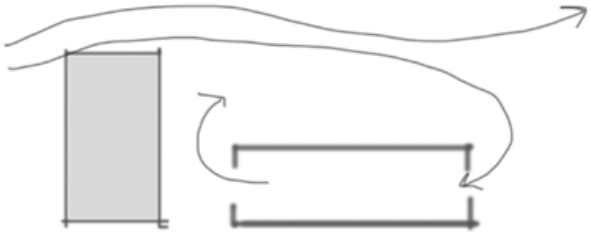


Figure 14: Taller forms in the wind direction can alter the wind moment pattern for low lying building

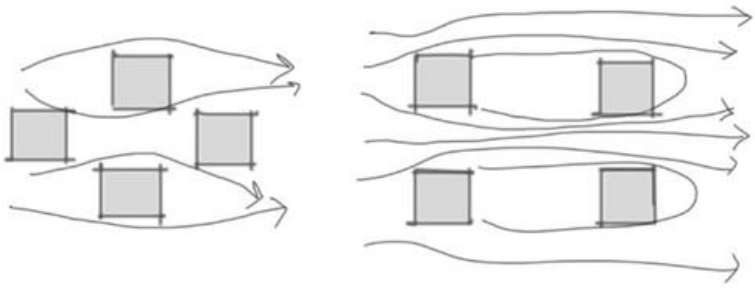


Figure 14: Scattered layouts for accentuating wind movement

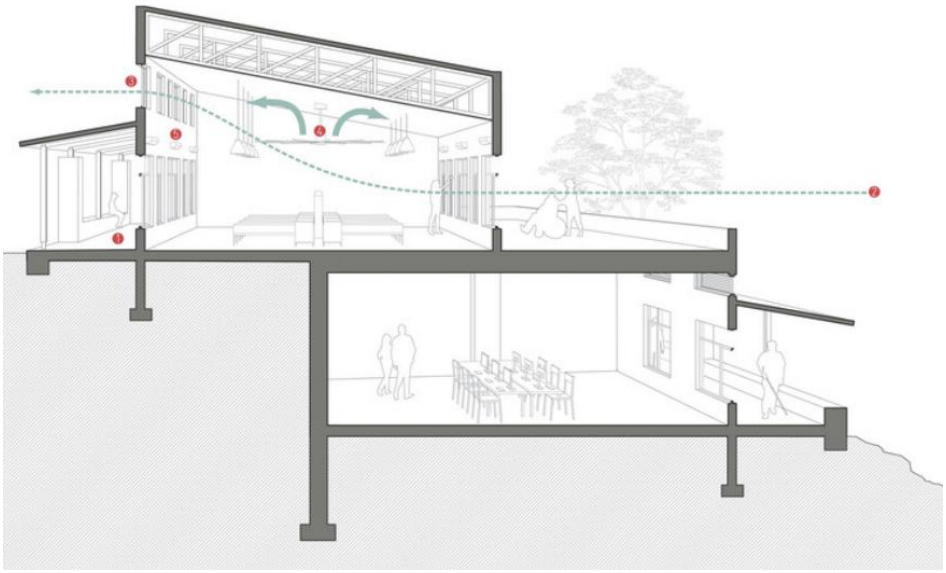


Figure 15: Cross Ventilation Illustrated of Butaro Hospital

2.5.8 Simple and Easy-to-Clean Layouts

Designing spaces with easy-to-clean surfaces and minimal crevices reduces the risk of cross-contamination. Strategies and Considerations (C. Ceccarelli, et.al.,2024):

Materials Selection

- Seamless Surfaces: Incorporate materials like solid surfaces (e.g., Corian, Avonite), seamless flooring (e.g., sheet vinyl, epoxy, rubber), and large-format wall panels (e.g., high-pressure laminate or glass).
- Non-Porous Materials: Use moisture- and stain-resistant options like stainless steel for equipment, glass for partitions, and solid surfaces for countertops and sinks.

- Durable Finishes: Select finishes that resist moisture, stains, scratches, and chemicals. Examples include antimicrobial ceramic tiles, solid phenolic panels, and fiberglass-reinforced plastics.

Design Details

- Seamless Surfaces: Incorporate materials like solid surfaces (e.g., Corian, Avonite), seamless flooring (e.g., sheet vinyl, epoxy, rubber), and large-format wall panels (e.g., high-pressure laminate or glass).
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-

Additional Considerations

- Colours Selection: Light colours make dirt and spills more visible, aiding cleaning, while darker shades may hide scratches and wear.
- Lighting Design: Provide adequate lighting in all areas, including corners and under furniture, to support effective cleaning.
- Maintenance Planning: Choose materials with manageable long-term maintenance needs to ensure durability and functionality over time

2.5.9 Decentralized Handwashing Stations

The availability of handwashing stations is critical in maternity hospitals. Handwashing facilities should be available in each area where physical contact between medical staff and patients takes place, and a hand-washing fixture with hands-free controls (elbow or pedal operated) must be provided inside the delivery room (Guilherme C,2013). According to the WHO (2019), hand hygiene is the most effective measure for preventing HAIs.

Strategies and Considerations (C. Ceccarelli,et.al.,2024):

- colour Selection: Light colours make dirt and spills more visible, aiding cleaning, while darker shades may hide scratches and wear.
- Lighting Design: Provide adequate lighting in all areas, including corners and under furniture, to support effective cleaning.
- Maintenance Planning: Choose materials with manageable long-term maintenance needs to ensure durability and functionality over time.

2.5.10 Spatial Planning and Zoning

Proper zoning ensures segregation of clean and contaminated areas, reducing the risk of cross-contamination.

Strategies and Considerations (C. Ceccarelli,et.al.,2024):

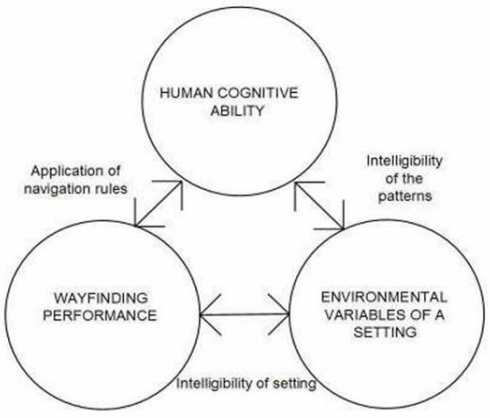
- Isolation Rooms and Separate Circulation Paths: Design dedicated spaces for patients with infections and create distinct pathways for staff, patients, and visitors. Inpatient care for newborns requires dedicated ward space, staffed by health workers with specialist training and skills (Moxon, et.al., 2015).
- Delivery Suites and Operating Theatres: Locate these in controlled zones with restricted access to maintain sterility. Provision of a changing room in the department is recommended, allowing staff to change clothes before and after entering the delivery room(Guilherme C,2013).
- Flexible Design and Clear Signage: Use movable partitions to adapt spaces as needed and implement intuitive signage to guide traffic flow.
- Air Pressure Control: Maintain negative pressure in isolation rooms to prevent airborne pathogen spread.
- Zoning for Infection Control: Divide the facility into distinct zones based on function (e.g., patient care, staff, and public zones) to reduce unnecessary traffic and cross-contamination.

2.5.11 Waste Management

Efficient waste disposal is crucial to prevent the spread of infection. Strategies and Considerations(C. Ceccarelli,et.al.,2024):

- Color-Coded Bins and Dedicated Disposal Areas: Facilitate waste segregation at the source and designate well-ventilated rooms for waste storage and sorting.
- On-Site Sterilization Units: Use autoclaves for safe handling of infectious waste.
- Chutes and Conveyors: Incorporate systems for safe waste transport from upper floors to designated collection areas.
- Access Control and Durable Surfaces: Limit access to waste storage areas to authorized personnel and use easy-to-clean materials for walls, floors, and fixtures.
- Signage and Training: Provide clear signage to indicate waste segregation procedures and comprehensive training to all staff on proper waste management protocols.

2.6 Wayfinding in Healthcare



Wayfinding is a concept that describes the dynamic relationship people have to space, incorporating all the cognitive, perceptual, problem-solving and decision-making processes that are required to orient oneself within and navigate through a space (International Health Facility Guidelines,2023

2.6.2 Advantages of Good Wayfinding

- Improved Patient/Guest Experience
- Enhanced Safety and Accessibility
- Reduced Stress and Anxiety
- Efficient Movement
- Optimized Space Usage
- Cost Efficiency

2.6.3 Design Strategies for effective Wayfinding

- Signage: Clear directional, identification, and informational signs help guide people through spaces. Symbols and multilingual signs ensure accessibility and understanding.
- Color Coding: Consistent colors distinguish different areas (e.g., blue for emergency zones) and provide visual cues for wayfinding. High contrast improves visibility, especially for people with visual impairments.
- Floor Markings: Pathways, arrows, and floor symbols direct people along specific routes, especially in large spaces like hospitals or hotels.
- Lighting: Proper illumination ensures visibility of signs and pathways, while accent lighting highlights key areas without overwhelming the space.
- Landmarks: Unique features such as sculptures or artwork serve as visual reference points to help people orient themselves.
- Maps and Directories: Static maps and interactive kiosks provide an overview of the space, helping users understand the layout and find their way.
- Environmental Design: Logical space layouts with clear pathways and strategic furniture placement help guide movement through the space.
- Tactile Elements: Braille on signs and textured surfaces like floors or handrails provide additional guidance for visually impaired individuals.

2.7 Infection control and hygiene in Maternity Hospitals

Infection control encompasses the policies, procedures, and practices aimed at preventing and managing infections within healthcare settings. According to the World Health Organization (WHO), Infection prevention and control (IPC) is " a practical, evidence-based approach preventing patients and health workers from being harmed by avoidable infections”.

2.7.2 Need for Infection Control in Maternity Hospitals

In maternity hospitals, infection control is particularly vital to safeguard the health of both mothers and newborns. Overcrowding in hospitals, inadequate ventilation systems, and poor waste management practices can contribute to the spread of infections (C. Ceccarelli,2024). According to Guilherme C (2013), asepsis should be a major determinant of design, especially in spaces like delivery rooms where the risk of infection transmission is heightened. Infection control measures not only mitigate the spread of infections but also contribute to the overall safety and efficacy of healthcare

delivery.In maternity hospitals, IPC measures are critical to preventing infections such as neonatal sepsis, surgical site infections, and postpartum infections, which can have life-threatening consequences for mothers and newborns. (Watts,1992)

The reasons for the need for infection control in maternity hospitals are as follows:

• Vulnerability of Patients Mothers and newborns are particularly susceptible to infections due to their compromised immune systems. The Centres for Disease Control and Prevention (CDC, 2020) highlights that maternal and neonatal infections account for a significant portion of global morbidity and mortality rates. Caesarean sections carry a risk of infection 5 to 20 times that of normal delivery. It is the single most important risk factor for postpartum maternal infection which accounts for approximately 10% of pregnancy related mortality (Kelemu A.G, 2017). Thus, designing healthcare spaces that minimize infection risks is paramount.

• Risk of Hospital-Acquired Infections HAIs in maternity hospitals can result from contaminated equipment, inadequate hand hygiene, poor air quality, and suboptimal cleaning practices. Pregnant women are at risk of infection during labour and delivery. Among surgical patients in obstetrics;
Surgical Site Infections (SSIs) are the most common nosocomial infections, accounting for 38% of hospital acquired infections (quoted in Kelemu A.G, 2017;Watts DH,1992).It is more prominent in low-resource settings, often due to inadequate infection control.

• Impact on Healthcare Outcomes Failure to implement infection control can lead to increased healthcare costs, prolonged hospital stays, and higher mortality rates(Kelemu A.G, 2017). Proper architectural measures can reduce these risks, improving healthcare outcomes and fostering trust in the healthcare system.

2.7.3 Architectural Measures for Infection Control

Natural Ventilation

In Hospitals adequate ventilation that provides the natural chemical balance of air is necessary for aeration comfort and reducing risks from infectious bio-aerosols in hospital wards. In today's highly mechanized hospital buildings, achieving this using mechanical ventilation has carbon and energy implications (Adamu Z., 2014). Natural ventilation has proven to be a viable method for supply of fresh air in hospital buildings. Natural ventilation is often limited to window-based designs whose dilution and mixing effectiveness are subject to constraints of wind speed, deep plan designs, interior partitions, and in the case of hospital wards, proximity of patients to peripheral walls. (Adamu,2014)

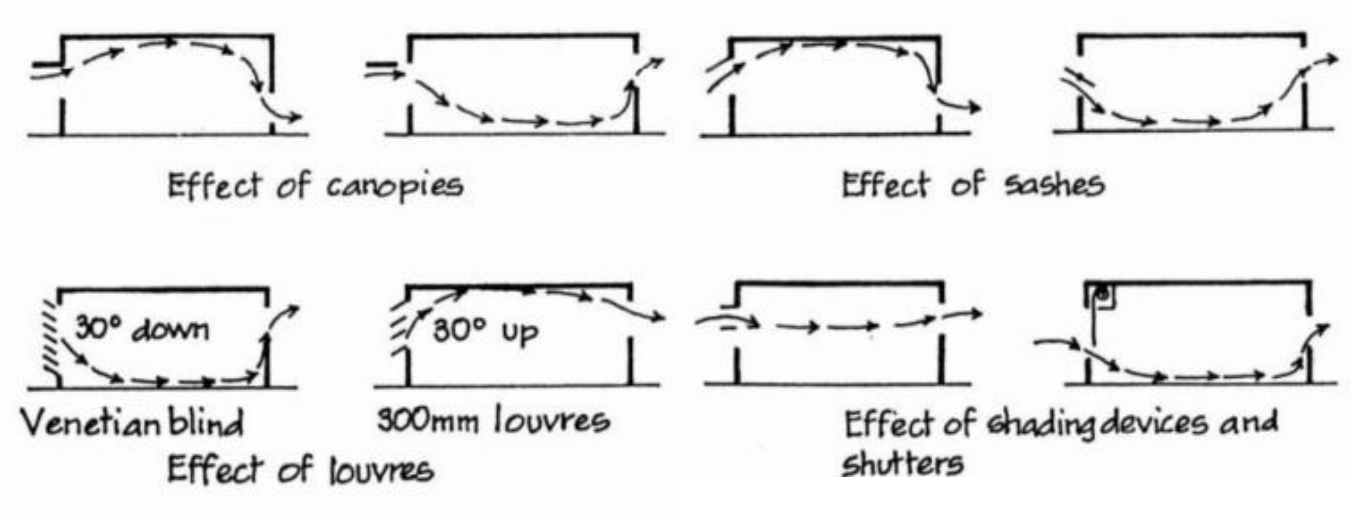


Figure 16: Effects of window component on air flow

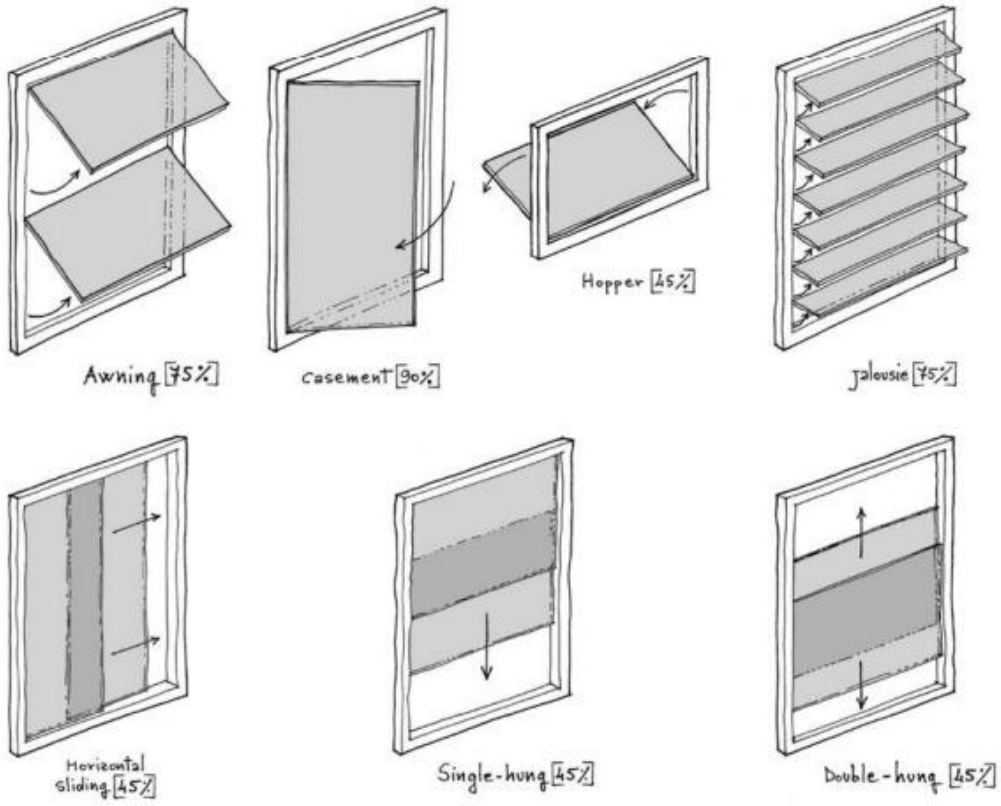


Figure 17: Different window types; the effective open area (permeability) as percentage of opening area position of openings. (Butera, Adhikari, & Aste, 2014).

Passive Ventilation in Maternity Hospital

Turbulent mixing airflow ventilation system

A type of mixing ventilation system known as turbulent mixing airflow ventilation introduces

clean air to the surroundings through ceiling or vertical diffusers, where it mixes with the ambient air to produce a turbulent flow. Figure shows the schematic illustration of an indoor mixing ventilation system in an operating room. It is shown that air is supplied through mixed ventilation along the space's perimeter, and it is afterward withdrawn by the perimeter outlets. Changes in temperature and momentum flow from the output diffusers generate the air movement.

Benefits associated with turbulent mixing airflow ventilation systems:

- It can reduce airborne diseases and the risk of respiratory diseases in medical facilities.
- Simple to program, numerically reliable, and roughly accurate

Displacement ventilation

Displacement ventilation refers to a ventilation system where fresh air is supplied at floor level, displacing warmer, potentially contaminated air upwards towards the ceiling to be exhausted, creating a natural air flow that helps minimize the spread of airborne pathogens and improve indoor air quality, particularly beneficial in patient rooms and operating theaters where infection control is crucial; essentially, it pushes contaminated air away from the breathing zone by utilizing the principle of buoyancy based on temperature differences.

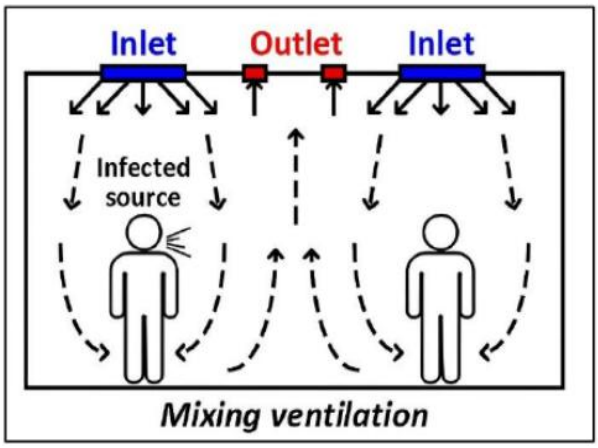


Figure 19: Mixing ventilation system practiced

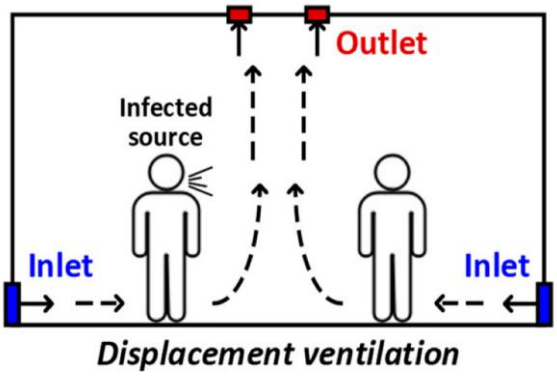


Figure 19: Displacement ventilation system practiced

2.8 Standards for Operating Health Institutions, First Amendment 2077

The design and planning of a 100-bed specialty hospital require adherence to specific spatial and functional criteria. These guidelines, as detailed in the "Standards for Operating Health Institutions, First Amendment 2077" (स्वास्थ्य संस्था सञ्चालन सम्वन्धी मापदण्ड, पहिलो संशोधन २०७७), provide a structured framework for essential spaces and associated standards:

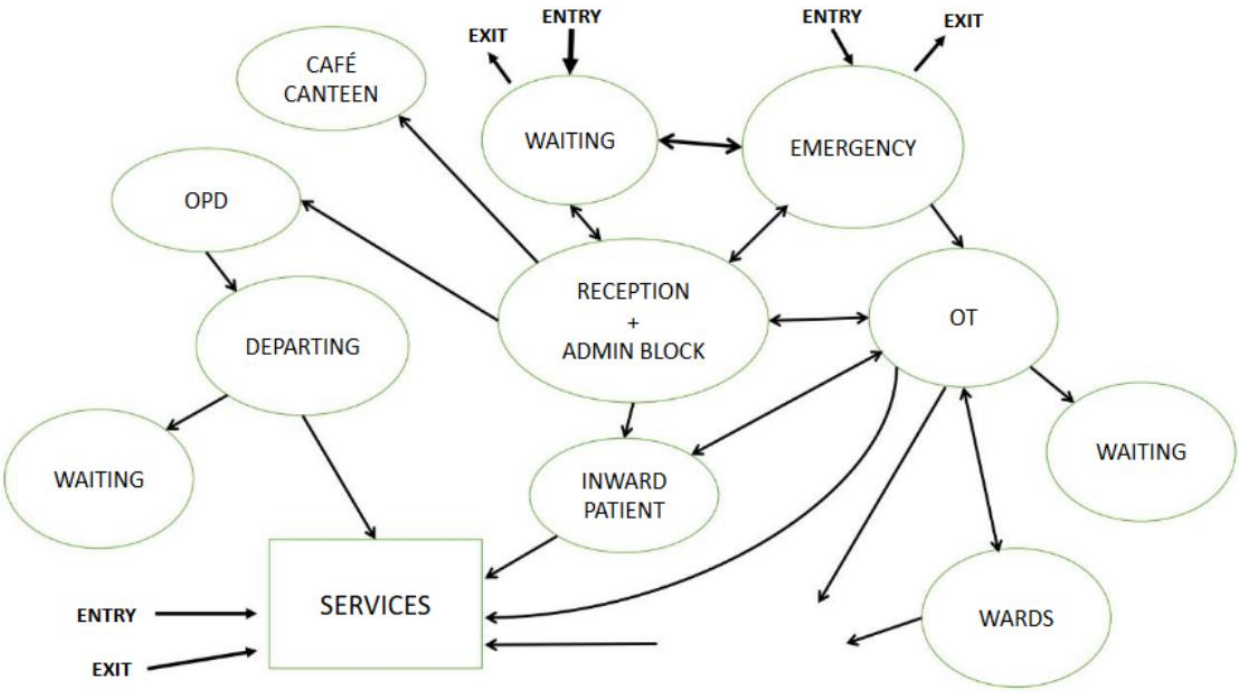
- Laundry: Dedicated laundry services to maintain hygiene standards for linens and uniforms.
- Central Sterile Supply Department (CSSD): Responsible for sterilizing medical instruments and equipment, ensuring infection control within the hospital.
- Canteen: A minimum capacity equivalent to 20% of the total number of hospital beds is recommended.
- Mortuary: Includes a waiting room for the relatives of the deceased and adequate space for performing rituals.
- Blood Bank: Must be included as a critical facility.
- Parking: The hospital should allocate parking space at the rate of 1 parking spot per 3 beds or reserve 25% of the total site area for parking. Separate parking facilities must be provided for ambulances and mortuary vehicles.
- Radiology/Imaging Room: It is recommended to have rooms without windows and with self-closing doors to maintain safety and privacy.
- Laboratory: A minimum area of 400 sq. ft. is designated for laboratory services.
- Pantry and Utility Room: A pantry should be provided for staff, along with a utility room for operational needs.
- Maximum of 6 beds per cubicle.
- Site Area: The site should have an area of minimum 55 sq. meters per bed, with 5% of the total site area allocated as a green belt.
- Access and Circulation: The hospital must feature separate entry and exit gates for efficient circulation.
- Ward Design:
  Wall-to-bed distance: Minimum 2 feet.
  Bed-to-bed distance: Minimum 5 feet.

2.9 Department spatial and functional relationships

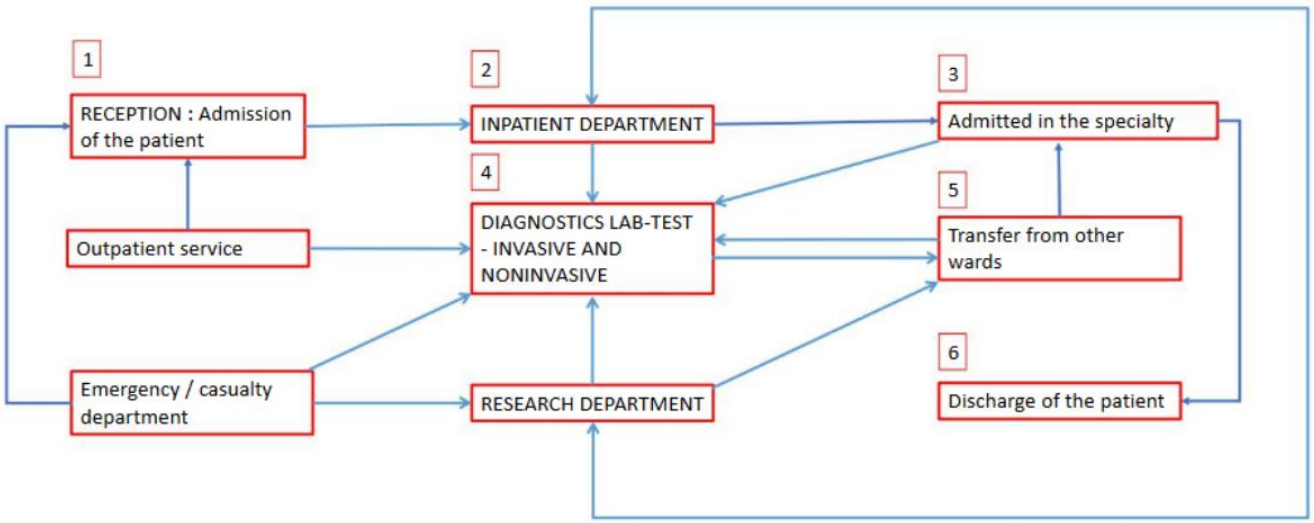
In the design of healthcare facilities, efficient spatial arrangements are critical for smooth patient movement and operational functionality. The Outpatient Department (OPD) should be located away from the hospital's general traffic flow to minimize congestion and ensure patient comfort. Efficient connections between the OPD and key services such as the laboratory (for sample collection), pharmacy (dispensary), and imaging (X-ray) facilities are crucial, as these areas are frequently utilized by outpatients. Additionally, seamless accessibility between the OPD, Emergency Department, and Inpatient Department must be prioritized since patients are often transferred between these. This design consideration helps ensure swift transitions, reducing delays in care and improving overall efficiency in hospital operations. The proximity matrix provided further emphasizes the importance of prioritizing interconnections between these critical areas based on the nature of hospital workflows. (Guilherme C, 2013)

Matrix of proximity	**Outpatient Department**	Emergency Department	Operating Department	Obstetrics Department	Inpatient Department	Neonatal Unit	Sterilisation room	Laboratory Unit	Pharmacy dispensary	Imaging (X-ray)	Kitchen	Laundry	Mortuary
Outpatient Department	**-**	**2**	**3**	**2**	**3**	**3**	**2**	**1**	**1**	**2**	**3**	**3**	**3**
Emergency Department	**2**	-	1	2	2	2	2	1	3	1	3	2	2
Operating Department	**3**	1	-	1	2	2	1	2	3	2	3	2	2
Obstetrics Department	**2**	2	1	-	2	2	1	2	3	2	3	2	2
Inpatient Department	**3**	2	2	2	-	2	2	2	3	2	2	2	2
Neonatal Unit	**3**	2	2	2	2	-	2	2	3	2	2	2	2
Sterilisation room	**2**	2	1	1	2	2	-	3	3	3	3	2	3
Laboratory Unit	**1**	1	2	2	2	2	3	-	3	3	3	3	3
Pharmacy dispensary	**1**	3	3	3	3	3	3	3	-	3	3	3	3
Imaging (X-ray)	**2**	1	2	2	2	2	3	3	3	-	3	3	3
Kitchen	**3**	3	3	3	2	2	3	3	3	3	-	3	3
Laundry	**3**	2	2	2	2	2	2	3	3	3	3	-	3
Mortuary	**3**	2	2	2	2	2	3	3	3	3	3	3	-

2.9.1 Space Relationship Flowchart



Ward Management Flowchart



The ward management flowchart in a maternity facility would function as follows:

1. Reception: Admission of the Patient
    - Expecting mothers or postpartum patients arrive at the maternity facility.
    - They are admitted for labor, delivery, or postnatal care.
    - Patients may also visit for outpatient services such as prenatal checkups, consultations, or minor procedures.
    - Emergency cases, such as high-risk pregnancies or complications, are directed to the Emergency/Casualty Department for immediate care.
2. Inpatient Department
    - Patients needing further care, such as labor and delivery, are admitted to the Inpatient Department.
    - Here, they may be monitored before delivery, provided with postnatal care, or treated for any pregnancy-related complications.
3. Admitted in the Specialty Ward
    - Based on their condition, patients are placed in appropriate wards, such as:
        - Labor and Delivery Ward for childbirth.
        - Postnatal Ward for mothers recovering after delivery.
        - Neonatal Care Unit (NCU/NICU) for newborns requiring special attention.
4. Diagnostics Lab-Test (Invasive and Non-Invasive)
    - Patients undergo essential medical tests, including:
        - Ultrasounds and fetal monitoring (Non-Invasive).
        - Blood tests, amniotic fluid tests, and genetic screenings (Invasive).

5. Transfer from Other Wards
    - If a patient's condition changes, they may be transferred between departments.
    - Example: A mother with postpartum complications might be moved from the postnatal ward to intensive care.
    - A newborn with health concerns may be shifted to NICU.
6. Discharge of the Patient
    - After a stable recovery, the mother and baby are discharged.
    - Patients receive postnatal care instructions, including breastfeeding guidance, neonatal care, and follow-up schedules.

2.9.2 Outpatient Service

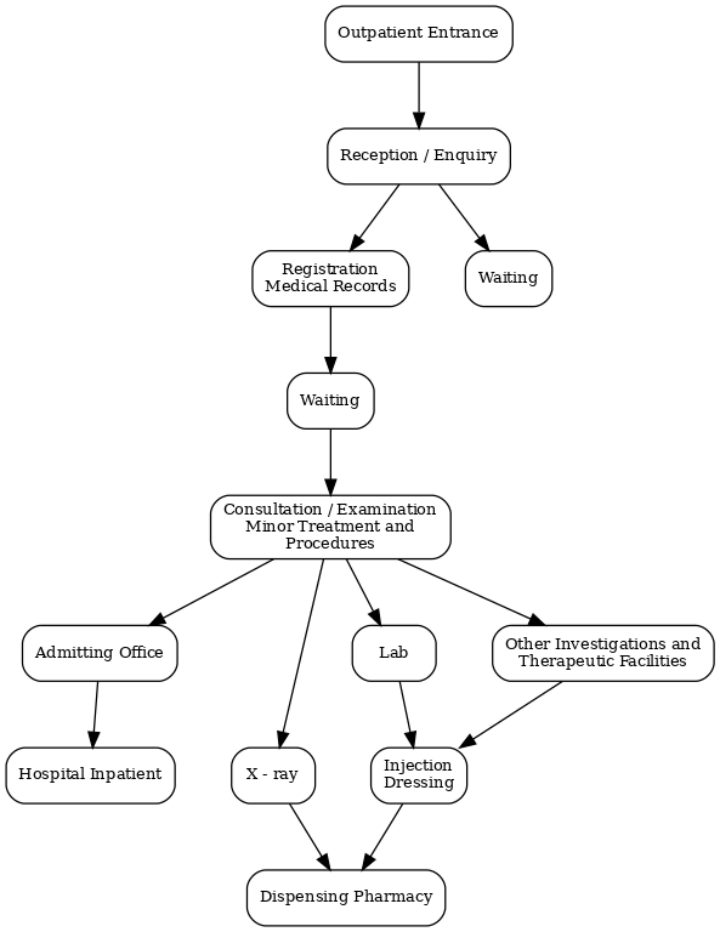


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Figure 20: Flow Diagram - OPD

An OPD enables a hospital to deliver the following functions:

- Investigate and screen cases to confirm whether or not hospitalization is required.
- Control disease by early diagnosis and timely treatment.
- Facilitate screening and investigations for admission to hospital.
- Provide effective treatment on an ambulatory basis.
- Provide follow-up care to discharged patients and their rehabilitation.
- Provide a facility for training of medical, para-medical and nursing staff. It may also provide an avenue for epidemiological and social research.

Design Consideration:

- OPD should be designed either as a centralized polyclinic or decentralized specialty clinic.
- Patients have different degrees of physical and mental abilities. Patient accessibility should accordingly be designed.
- Design should cater for future expansion.
- Educational resource areas for patients' education should be integrated in the lobby and waiting areas.
- Design of individual functional areas should not allow extraneous traffic to penetrate any work area. Design should be such that the flow of patients and visitors is unilateral.
- Waiting areas and public spaces should be large enough to accommodate patients and accompanying friends and family without causing congestion. Sub-waiting areas should be provided adjacent to various clinics. Space recommended is 0.8m2 per patient for one-third of the average daily number of the patients attending OPD in one session.

2.9.3 Emergency Services

Hospital emergency departments (EDs) often cater to more than just acute medical cases. While hospitals define emergencies as life-threatening situations, patients may visit for less critical issues due to accessibility or timing, making EDs responsible for both basic care and full trauma services. Increasingly, EDs serve as accessible, round-the-clock healthcare points, leading to growing demand. Efficient planning is crucial to balance high costs and low utilization during off-peak hours, and a well-managed ED can be a revenue-generating asset.

Location

The ED should be on the ground floor, easily accessible from the street with a separate, well-marked entrance. It should be close to key hospital departments like admitting, medical records, radiology, labs, and the operating theatre to save time and enhance efficiency. Proximity to elevators is essential for critical patient transfers.

Design Consideration

Sheltered entrances, paved access, and adequate parking for ambulances and staff are key. Clear traffic control is necessary to manage emotionally charged situations and avoid congestion. Good layout design promotes operational efficiency, public satisfaction, and rapid staff access to patients and resources.

- Trauma Room
  Equip the room with life support equipment, medical gas outlets, and an examination table. Include procedure lights and storage for orthopaedic supplies. Provide a plaster sink and traction hooks.

- Examination/Treatment Rooms:
  Install examination tables, lighting, counters, and wash basins. Include medication storage and medical gas outlets. Add X-ray film illuminators.

- Scrub Stations:
  Place scrub stations near trauma and orthopaedic rooms for easy access.

- Flexible Space:
  Design extra space for triage, treatment, and observation during disasters.

- Staff Work Area:
  Provide counters, cabinets, and dictation facilities for managing patient records.

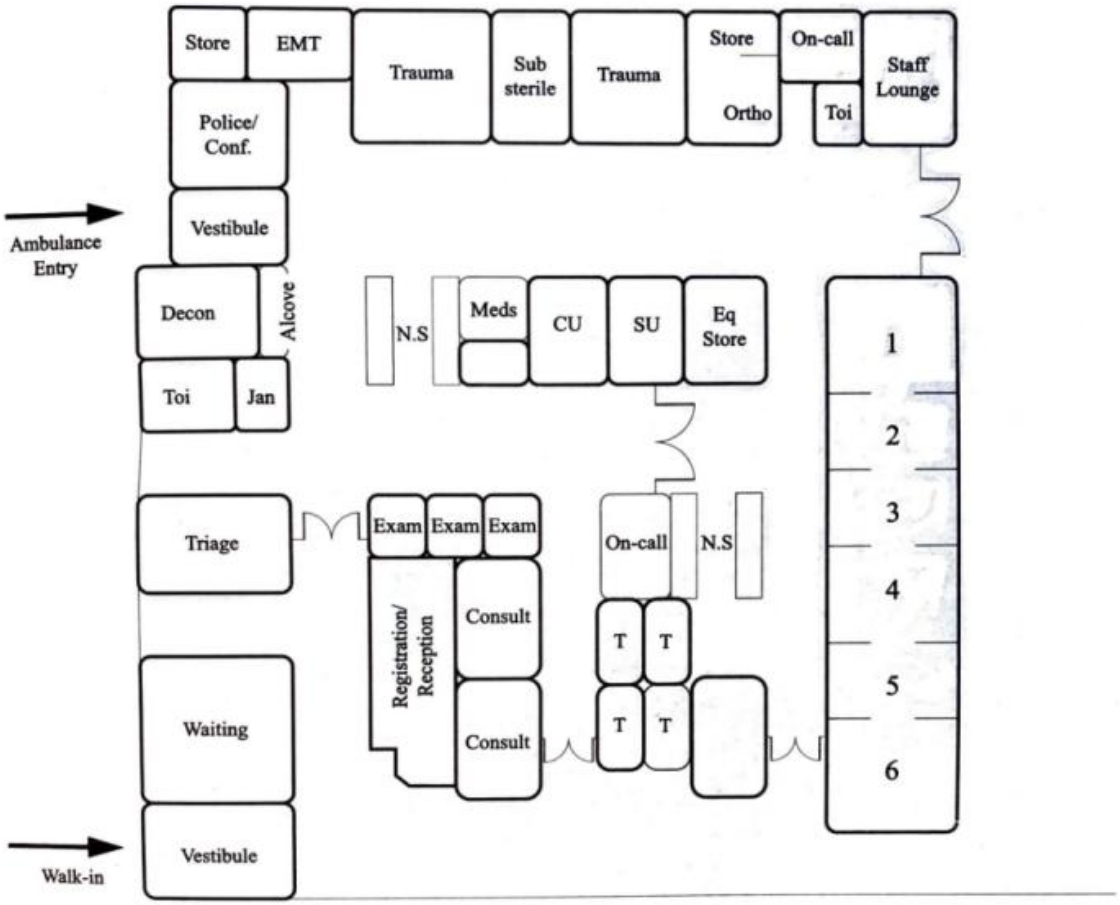
- Storage Areas:
  Include accessible storage for portable X-ray machines and crash carts.

- Utility Rooms:
  Separate clean and soiled utility rooms to maintain hygiene.

- Public Amenities:
  Provide public toilets and a janitor’s closet for convenience.

- Doctor’s Rooms:
  Include sleeping and shower facilities for on-call doctors, separated by gender.

- Secure Staff Storage:
  Provide locked cabinets for staff personal belongings



2.9.4 Clinical Laboratories

Clinical laboratories play a vital role in assisting medical staff by conducting tests in fields like bacteriology, biochemistry, histology, serology, hematology, and cytology. These tests help in diagnosing, confirming, and treating diseases, making laboratory examinations an essential part of modern healthcare.

- Anaesthesia Workroom: A dedicated space for cleaning, testing, and storing anaesthesia equipment should be provided, with work counters and sinks.

- Equipment Storage Room: A designated room for storing essential medical equipment is necessary for efficient operations.

- Staff Clothing Change Area: Separate clothing change areas with lockers, toilets, and hand-washing facilities for doctors, nurses, technicians, and orderlies should be provided, allowing easy access to recovery rooms.

- Staff Lounge and Toilet Facilities: A lounge and toilet area for staff, preferably separated for doctors and nurses, should be designed to allow convenient access to recovery rooms.

- Dictation and Report Preparation Area: A space for dictation and report preparation should be easily accessible from the doctors' lounge.

- Storage for Equipment and Materials: Storage for portable X-ray equipment, stretchers, and other medical items should be included, along with a janitor's closet for housekeeping supplies.

- Refrigerated Blood Bank: A refrigerated blood bank should be incorporated into the design for easy access to blood supplies.

- Consultation and Conference Room: A room for consultations and meetings with medical staff should be designed for privacy and convenience.

- Administrative and Clerical Area: A dedicated space for administrative tasks, scheduling, and clerical work should be included in the design.

- Family Waiting Room: A private waiting room should be designed outside the operating room complex to ensure privacy for families.

- Recovery Lounge: A recovery lounge should be designed for patients who don't require post-anaesthesia care but need time to stabilize, with a control station, family space, and toilet facilities.

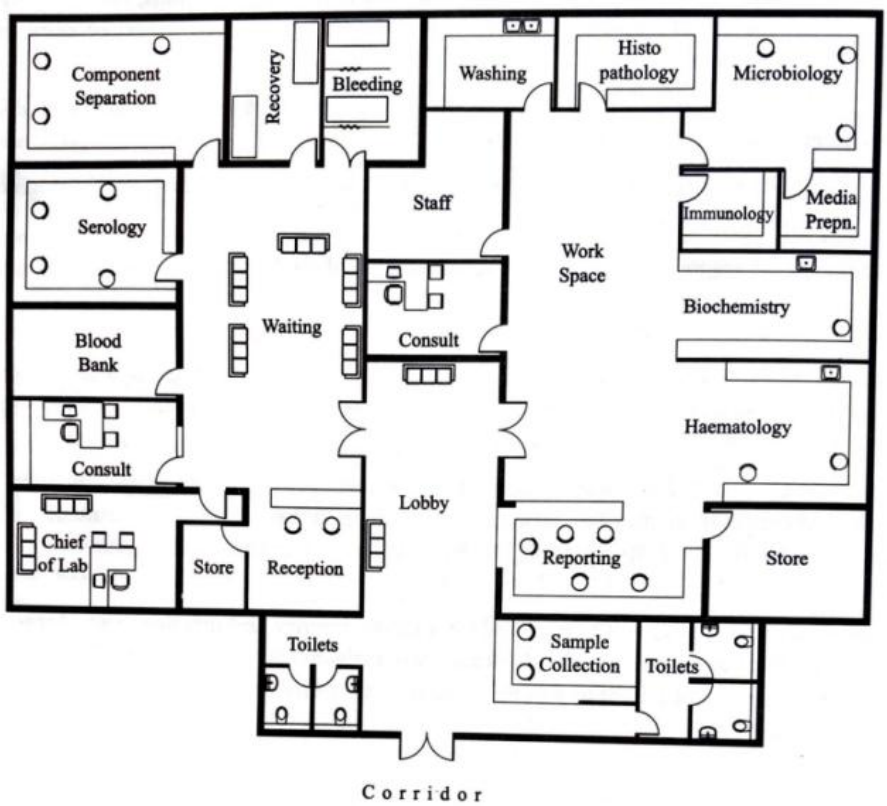


Figure 22: Layout of Clinical Laboratory & Blood Bank

2.9.5 Labour & Delivery Suite

Obstetrics focuses on safe care for mothers and newborns, with patients often housed in a separate wing to reduce infection risks. The obstetrics department includes patient accommodation (private, semi-private rooms, and wards) and clinical facilities (preparation rooms, labor rooms, delivery rooms, and nurseries), supported by clinical labs, X-ray, and ultrasound.

Location

The obstetrics section should be conveniently located but secluded for privacy, with labor and delivery suites easily accessible from the entrance. Proximity to the nursery, obstetrical nursing units, and vertical transport is essential. If no dedicated operating room is available, it should be near general operating rooms. The department's layout should facilitate patient movement and staff observation.

In smaller hospitals, the delivery suite may be next to the surgical suite, sharing similar needs like isolation and sterilization, though cross-contamination risks must be controlled.

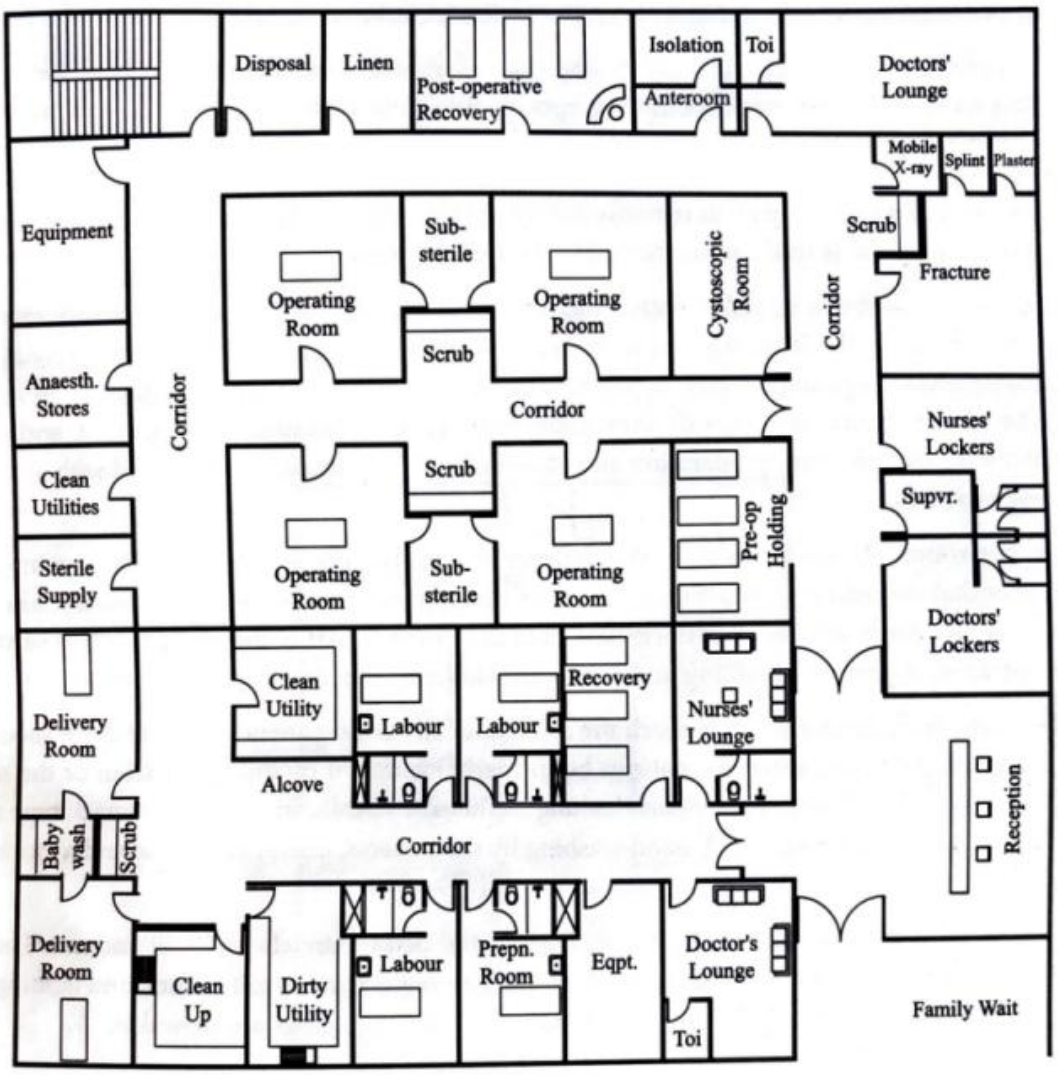


Figure 23: Labour-Delivery Suite & Surgical Suited connected in one unit

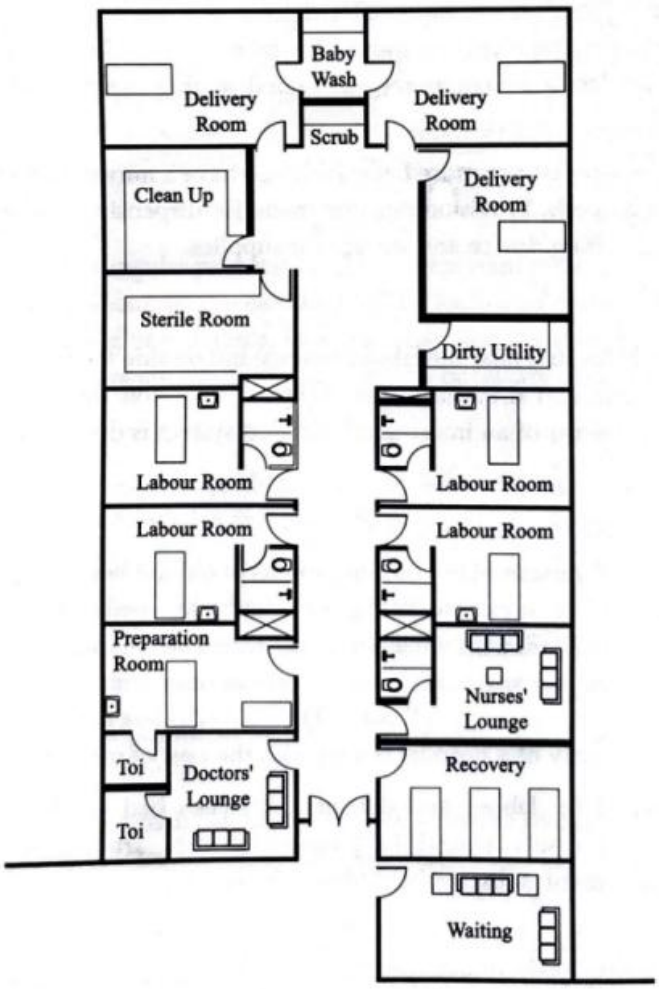


Figure 24: Labour-Delivery Unit

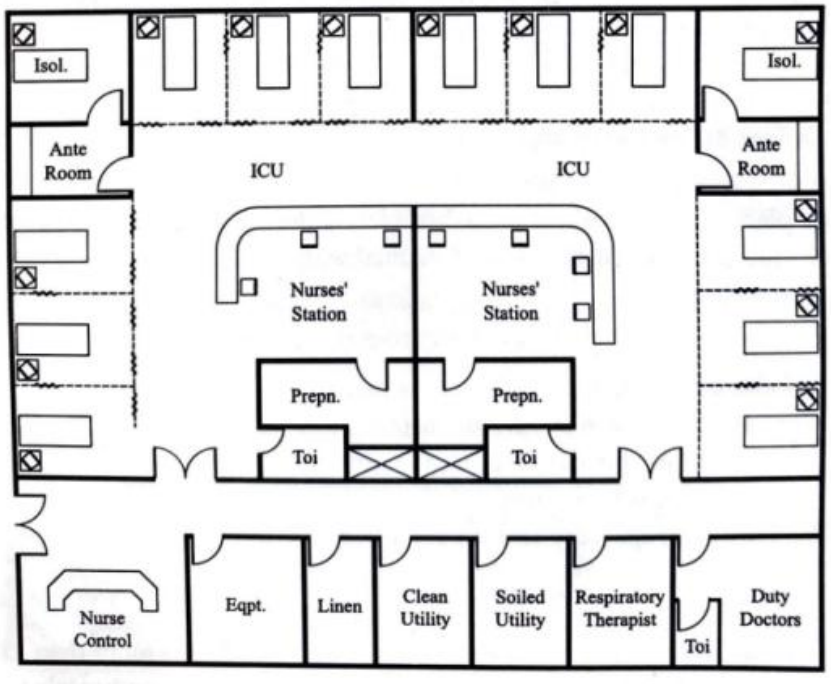


Figure 25: Layout of Intensive Care Unit

2.9.5 Intensive Care Unit

Intensive Care Units (ICUs) are specialized units designed to care for critically ill patients requiring advanced treatment and equipment. These units are staffed with specially trained personnel and equipped with sophisticated electronic devices to monitor and manage the patients' physiological functions, including temperature, blood pressure, and respiration. ICUs are often centralized into a complex that may include a surgical-medical ICU, coronary care unit (CCU), and specialty units for conditions such as renal failure and burns. This centralization allows for multidisciplinary care and efficient use of space and resources. The nurse-to-patient ratio in ICUs is typically higher than in other hospital wards, with a 1:1 or 3:1 ratio considered ideal for effective monitoring and care.

Establishing an ICU complex can be costly due to the need for specialized space, equipment, and staffing. Not all hospitals are equipped to provide every type of intensive care. Some may operate small, combined units, while others have more advanced, specialized facilities. This section provides comprehensive guidance for hospitals to establish ICUs, based on their capacity and needs.

Functions

The primary functions of an ICU include:

- Centralizing critically ill patients in one area for close observation and specialized care.
- Enhancing the physician's ability to treat acutely ill patients with the support of skilled personnel and advanced equipment.
- Providing constant, monitor-assisted surveillance to ensure real-time access to patient data, facilitating timely diagnosis, treatment, and evaluation.
- Utilizing specialized equipment and trained staff effectively, allowing for better care of patients on the main floors by relieving the burden on less critical patients in other wards.

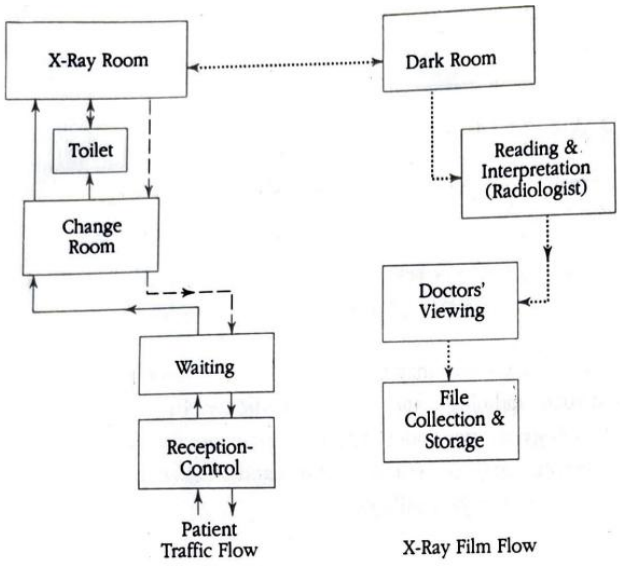


Figure 26: Flow chart of X-Ray Department

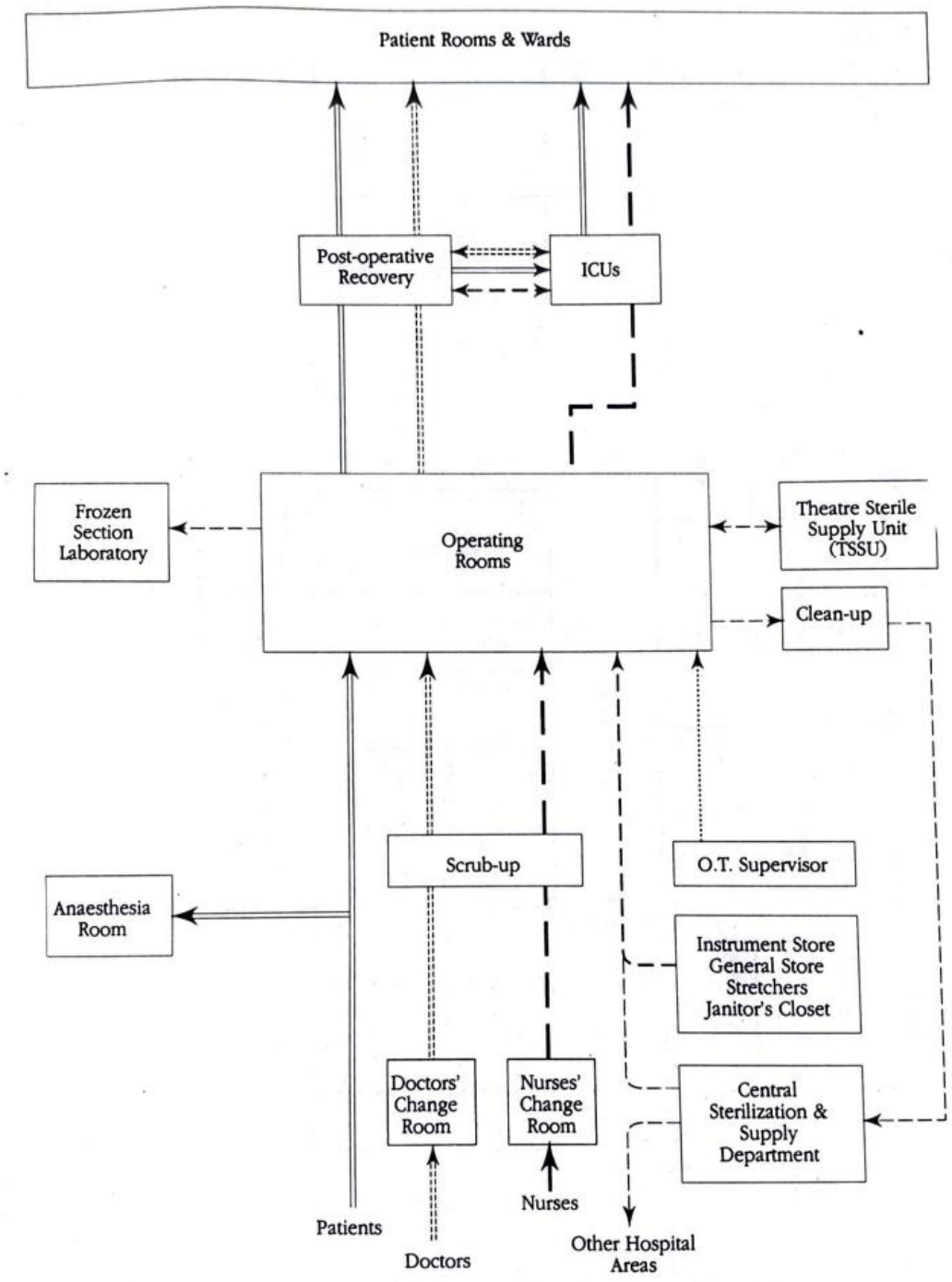


Figure 27: Flow chart of Surgical Suite

2.9.6 Inpatient Service

The prime function of the Inpatient Maternity Unit is to provide appropriate accommodation for the delivery of health care services for women in the process of childbirth. This unit may be used for the period before and after the childbirth. Gynaecology may also be included in the Unit.
The Unit must also provide facilities and conditions to meet the needs of patients, newborn babies and visitors as well as the workplace requirements of staff.

The Maternity Unit provides facilities for:

- Antenatal care of mothers with complications during pregnancy
- Assessment, management of labour, delivery and immediate post-delivery observation of mothers
- Postnatal care of mothers following birth including complicated or uncomplicated deliveries Neonatal care by mothers under supervision from nursing and midwifery trained staff
- Neonatal care of newborns requiring special care from specialist neonatal medical and nursing staff

The Maternity Unit may incorporate:

- Inpatient accommodation - Antenatal
- Inpatient accommodation - Postnatal
- Birthing Unit
- Nurseries:
- General Care
- Special Care (SCN)- Which may be collocated with NICU
- Intensive Care Nursery (NICU)- which may be collocated with other Intensive Care Units and may be physically separate from the Maternity Unit

Title	Alternative Titles
Maternity Unit	Obstetrical Unit
Birthing Unit	Delivery Suite, Delivery Unit, Birth Suite, Birth Centre, Mothercraft
General Care Nursery (GCN)	Well Baby Nursery Newborn Nursery Baby Holding Nursery
Special Care Nursery (SCN)	Special Care Unit (SCU) Special Care Baby Unit (SCBU) Neonatal High Dependency Unit (NHDU) Continuing Care Nursery

The fully integrated model provides for all components of the Maternity unit located in close juxtaposition. The General Care Nursery, Special Care Nursery, NICU are accessible from the Postnatal Inpatient Unit with close access to the Birthing Unit. Access to NICU is also available via a staff/ service corridor for admissions directly from Birthing or Emergency Units. The main advantage of this model is maximum convenience for patients and staff, where neonatal care is clustered in one area better utilising specially trained staff.
External relationships outlined in all the diagrams include:

- Clear Goods/ Service/ Staff Entrance

- Access to/ from key clinical units associated with patient arrivals/ transfers via service corridor and lifts
- Access to/ from key diagnostic facilities via service corridor and lifts
- Entry for staff via the public or service corridor
- Close access to staff support areas that may be shared with adjacent areas
- Access to/ from Supply, Housekeeping, Catering and Waste Units via service corridor and lifts

- Clear Public Entrance

- Entry for ambulant patients and visitors directly from dedicated lifts and public corridor
- Access to/ from key public areas, such as the main Entrance, Parking and Outpatients Units from the public corridor and lifts

Optimum internal relationships outlined in the diagrams include the following:

- Bed Room(s) on the perimeter arranged in a racetrack model (although other models are also suitable) ▪ Staff Station and staff support areas are centralised for maximum patient visibility and access; a sub staff station may be located close to the General Care Nursery for supervision and security of babies
- Clinical support areas located close to Staff Station(s) and centralised for ease of staff access
- Patient Lounge located conveniently to patient beds within the unit allowing communal space for patients
- Reception located at Visitor Lifts and corridor for control over entry to all areas – Inpatient Unit, Birthing Unit, Nurseries
- Personal Protective Equipment Bays located at entry for both Staff and Visitors for infection control during unit isolation

2.9.7 Central Sterilization and Supply Department (CSSD)

Central Sterilization and Supply Department (CSSD), a systematic process that involves cleaning, disinfecting, and sterilizing medical equipment and supplies to prevent infections caused by pathogenic microorganisms.
Functions

The CSSD performs several critical functions to maintain aseptic conditions within the hospital:

- Receiving and sorting soiled materials used in the hospital.
- Conducting decontamination or disinfection before sterilization.
- Inspecting and testing instruments, equipment, and linens.
- Assembling treatment trays, instrument sets, and linen packs.
- Sterilizing and Packing equipment and supplies.
- Labelling and dating sterilized materials.
- Storing and controlling inventory.
- Issuing and distributing sterilized materials to relevant departments.

Location

The location of the CSSD is vital for efficient operation, requiring easy access to elevators, dumbwaiters, and stairs for smooth material transport. It should be close to departments that use its services frequently, such as the surgical department and nursing units, ideally within the hospital's "service core" area. In modern hospitals, the CSSD is often positioned on a lower floor beneath the surgical suite, connected by dedicated dumbwaiters for sterile and soiled items. This arrangement ensures contamination-free transportation and maintains optimal aseptic conditions, especially in critical areas like surgical suites.

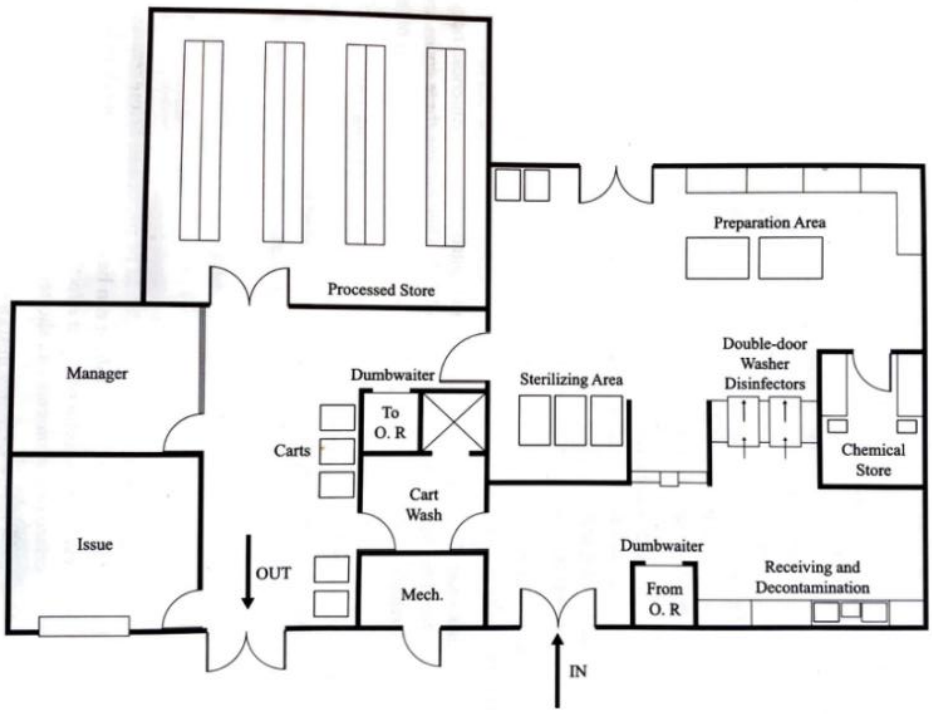


Figure 28: Layout of CSSD Department

2.9.8 Food Service Department

The food service department plays a crucial role in patient care and overall hospital operations. It is typically led by a professional food service manager or chief dietitian. Food quality and cleanliness are often key factors in patient and visitor satisfaction. The department's service quality, including the coffee shop, can significantly influence the public's perception of the hospital. Properly managed food service is essential to avoid common complaints about food quality

Functions of the Food Service Department:

- Provide high-quality food at a cost consistent with the hospital's budget.
- Handle the purchase, receipt, quality check, and storage of food supplies.
- Establish standards for menu planning, food preparation, and meal service.
- Plan and implement patient dietary therapy, including counseling patients and their families on special diet issues.
- Train dietetics interns and provide education to nurses, medical students, and residents on nutrition and diet therapy principles.

Location

The food service department should be located on the ground floor to ensure adequate light, ventilation, and accessibility. Kitchens should not be placed in basements, as they can negatively impact food quality and operational efficiency. The department should be near the materials management department, with easy access to unloading docks and vertical transportation to facilitate meal delivery.

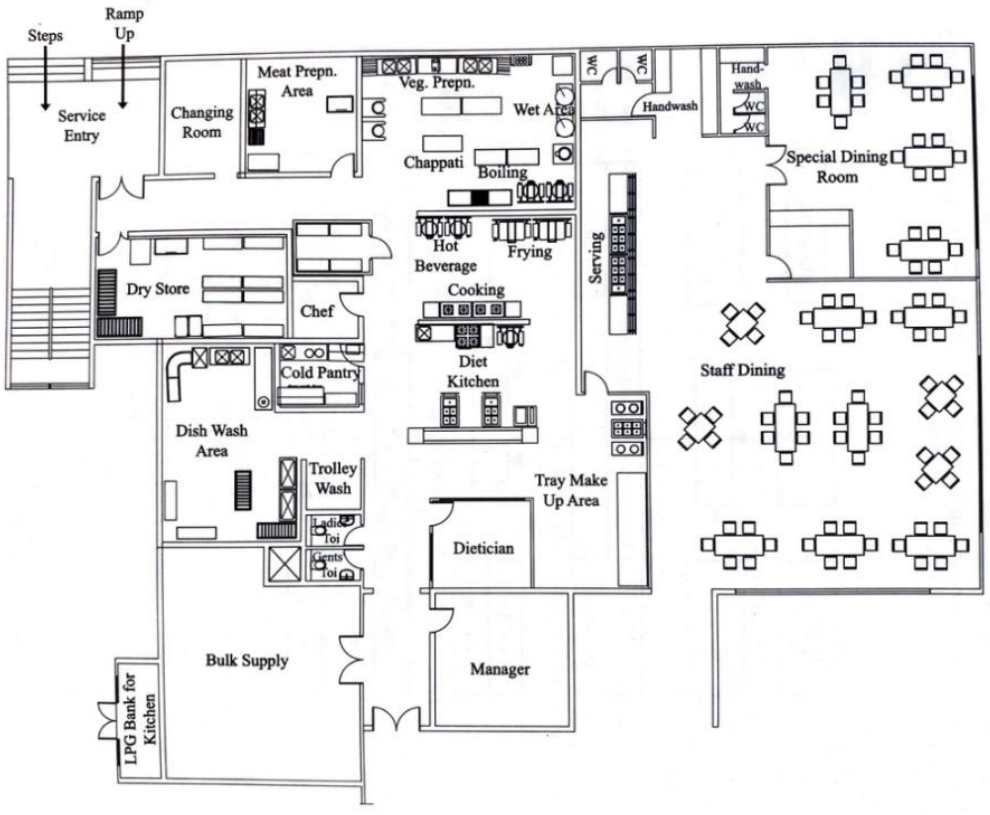


Figure 29: Typical Food Service Department

2.9.9 Laundry and Linen Service

The laundry and linen service is a vital department in hospitals, supporting patient care and maintaining cleanliness. A reliable laundry service ensures an adequate supply of clean linen, which is crucial for patient comfort, safety, and overall care. Frequent linen changes and proper maintenance are essential for both patient satisfaction and hygiene.

Functions of Laundry and Linen Services:

- Collect and receive soiled and infected linen.
- Process soiled linen (sorting, washing, disinfecting, ironing, and folding).
- Inspect, repair, and replace damaged items.
- Pack and sterilize specialty items and linen packs.
- Distribute processed linen to user departments.
- Maintain and control active and backup inventories.

Location:
The laundry should be located on the ground floor with ample daylight and ventilation, ideally near the power plant due to high water, steam, and power usage. The department should be close to service elevators, and a direct route to departments is essential to minimize time and effort.

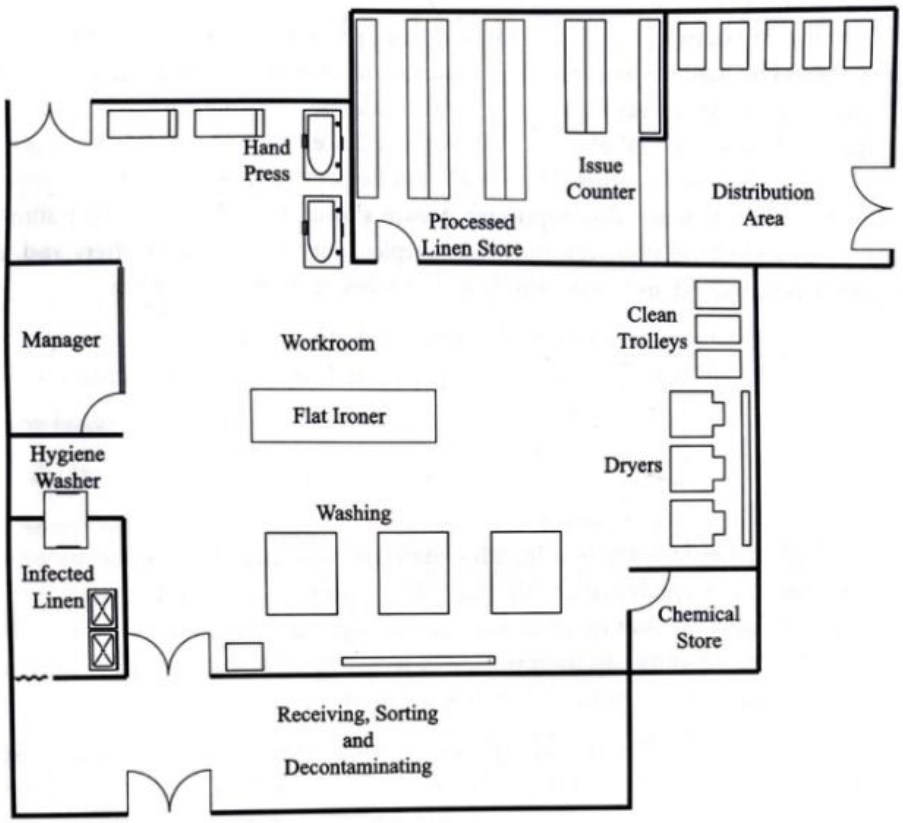


Figure 30: Typical Plan of Laundry

Department and Their Connections

1. Examination room

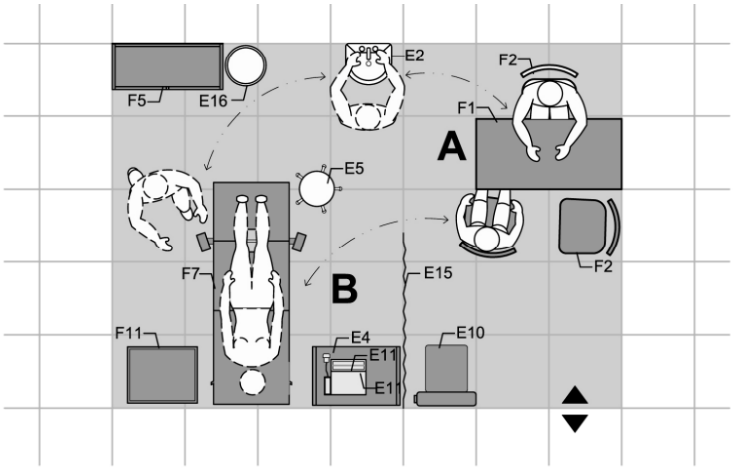
The examination room might also be used for minor procedures such as insertion of intrauterine devices or contraceptive implants after delivery or abortion.

Floor Area: Minimum 9.00 m² (12.00 m² recommended).
Examination Table Spacing:

- 1.20m between the foot of the table and the opposite wall.
- 0.80m between the sides of the table and adjacent walls (except at the head).

Patient Privacy:

- High windows or opaque glass to prevent visibility from outside.
- Cubicle curtains for additional discretion.
- Lock on the door for security during examinations.



Activities
A - Consultation
B - Examination / procedures

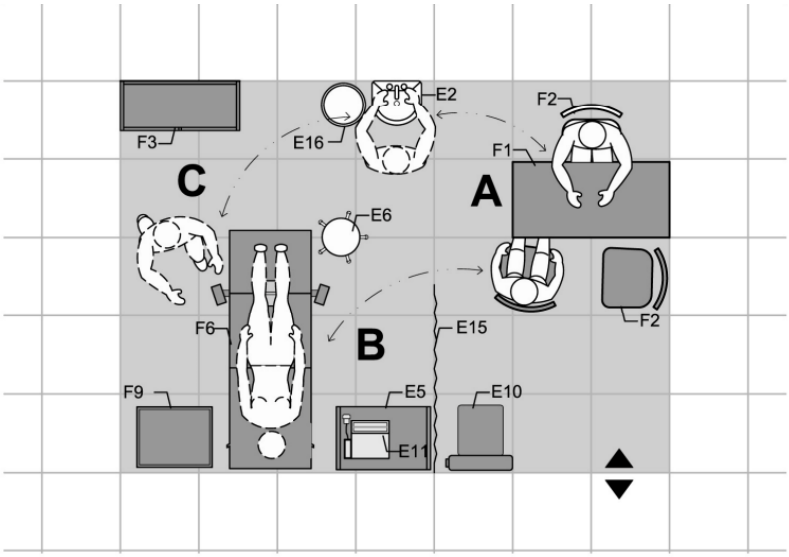
Furniture
F1 - Desk
F2 - Chair
F5 - Cupboard
F7 - Examination table (gynaecological)
F11 - bedside table

Equipment/Fixture
E2 - Hand basin
E4 - Trolley
E5 - Stool
E10 - Scale - measure
E11 - Ultrasound
E15 - Curtain
E16 - Plastic container

Location

2. Gynaecology consultation room

The gynaecology and reproductive health consultation room is designed for education, assessment, and treatment while ensuring privacy and comfort for patients. Minimum area should be 9.50m² (12.00m² recommended).



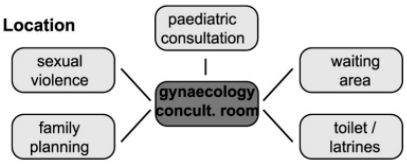
Activities
A - Consultation
B - Examination
C - Medical supply

Furniture
F1 - Desk
F2 - Chair
F3 - Cupboard
F6 - Examination table (gynecologic)
F9 - Bedside table

Equipment/Fixture
E2 - Hand basin
E5 - Trolley
E6 - Stool
E10 - Scale-measure
E16 - Ultrasound

E15 - Curtain
E16 - Plastic container

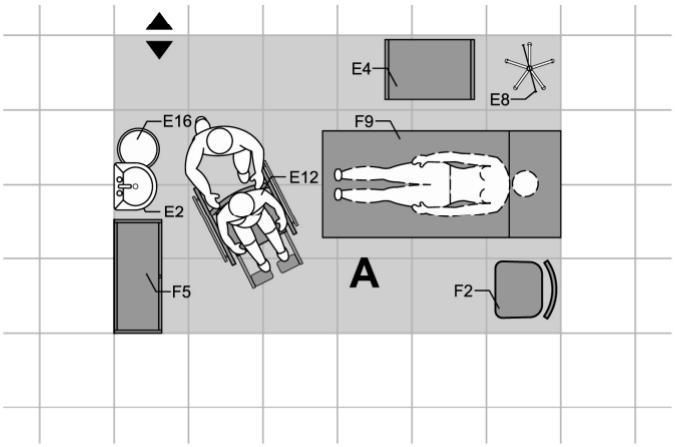
Location



Area where women in labour are admitted and monitored until delivery. It is important to provide sufficient space around the bed to accommodate patient caretakers/relatives, who are usually present, and also to allow the patient to move around.
Toilets and a shower area for patients must be provided, preferably accessed directly from the labour room.

Floor Area:

- Single-bed room: Minimum 9.00 m².
- Multi-bed room: +6.50 m² per extra bed (7.50 m² recommended).
- Maximum: 4 beds per room.
- Cubicle curtains should be provided for patient privacy.



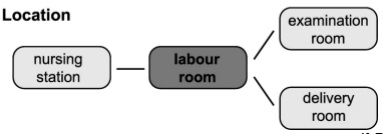
Activities
A - Labour

Furniture
F2 - Chair
F5 - Cupboard
F9 - Hospital bed

Equipment/Fixture
E2 - Hand basin
E4 - Trolley
E8 - Infusion stand
E12 - Wheelchair

E16 - Plastic container

Location



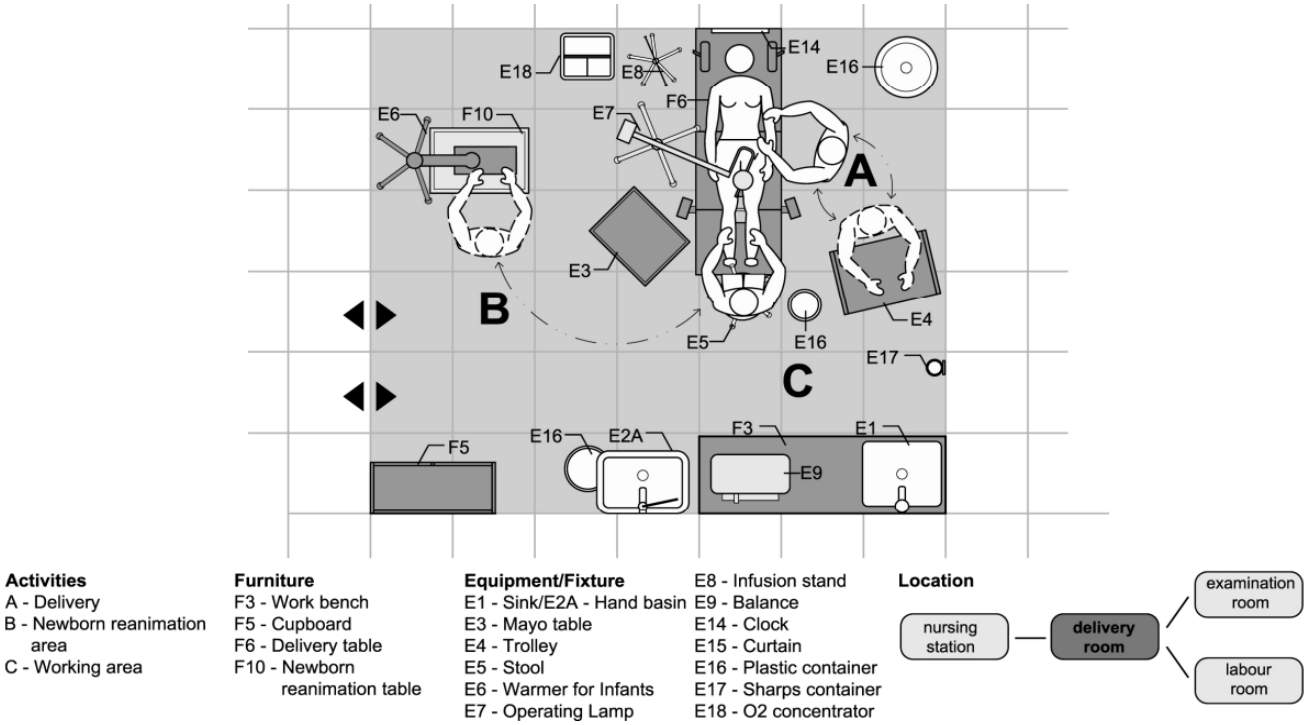
4. Delivery room

Room used to perform normal deliveries. Depending on the setting, the delivery room may also be used for complicated deliveries (vacuum extraction, manual removal of placenta, etc.) and intra-uterine procedures, such as manual vacuum aspiration for incomplete abortion. The room should allow for alternative positions for delivery, such as squatting.
Minimum Floor Area:

- Single delivery table: 12.00m²
- With newborn reanimation table: 16.00m² (minimum dimension of 3.40m)
- Additional delivery tables: +10.00m² per table (12.00m² recommended)
- Max delivery tables per room: 3

Spacing Requirements:

- Delivery table to opposite wall: 1.20m (except at the head)
- Between tables in multi-bed rooms: 2.00m (recommended 3.00m)
- Ceiling height: Recommended 3.00m, minimum 2.70m



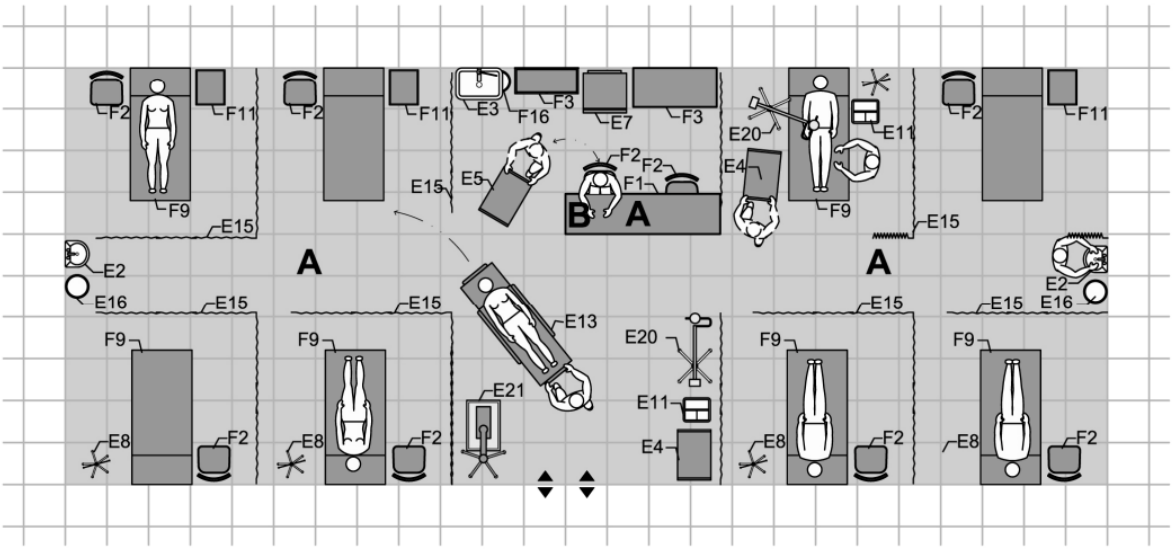
5. Intensive care ward (ICU)

This is an area for patients in critical or unstable condition who need a higher than usual intensity of medical care and monitoring.

Bed Capacity: 6 to 12 beds per ward.
Minimum Floor Area: 55.50 m² for 6 beds (including nursing station).
Additional Area: +7.50 m² per extra bed (9.00 m² recommended).

Nursing Station Requirements:

- Minimum 9.00 m² for 2 nurses.
- Desk, chairs, work surface, locked cupboard, shelves, hand basin.
- X-ray film viewer (if possible).

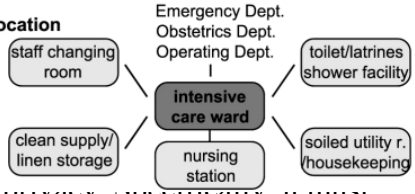


Activities
A - Hospitalization
B - Nursing station

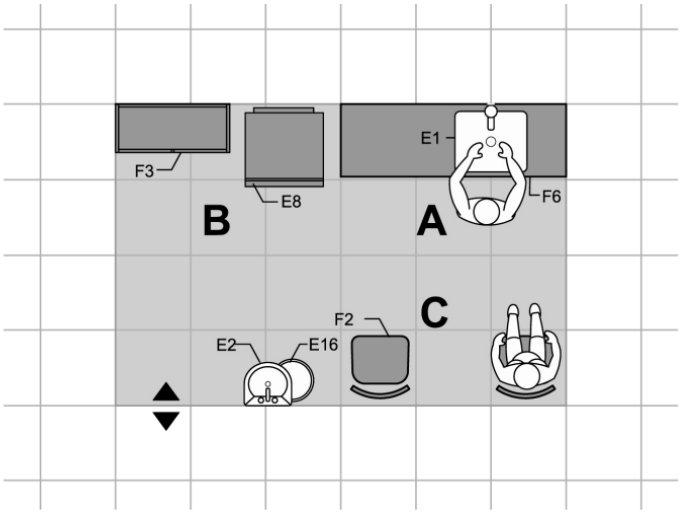
Furniture
F2 - Chair
F3 - Cupboard
F6 - Work bench
F9 - Hospital bed
F11 - bedside table

Equipment/Fixture
E2 - Hand basin
E3 - Hand basin (hands-free control)
E4 - Trolley
E7 - Fridge/freezer
E8 - Infusion stand
E11 - O2 concentrator
E13 - Stretcher
E15 - Curtain
E16 - Plastic container
E20 - Operating Lamp
E21 - Warmer for Infants

Location



collect breast milk. The room should provide comfort and privacy. Specifically, it must be set up so that the collecting areas/chairs occupied by mothers cannot be seen from outside the room.



Activities
A - Working area
B - Storage/supply
C - Collecting area

Furniture
F2 - Chair
F3 - Cupboard
F6 - Working bench

Equipment/Fixture
E1 - Sink
E2 - Hand basin
E8 - Fridge/freezer
E16 - Plastic container

Location

Specific features
Minimum Floor Area: 35.00 m² for 8 cots.

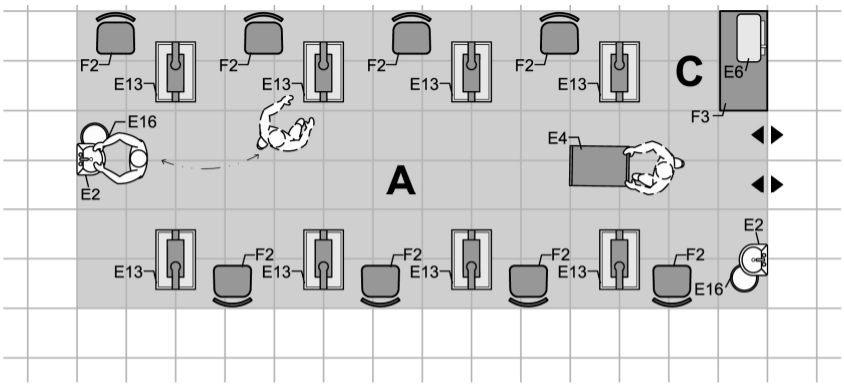
Additional Area: +3.75 m² per extra cot (4.50 m² recommended), max 16 cots.
Chair Space: Beside each cot.
Mosquito Net: Required per cot (if applicable).
Oxygen Supply: 1 concentrator + 1 wall-mounted source per 4 cots.
Spacing:

- 1.20m from cot foot to opposite wall.
- 1.00m from cot sides to adjacent walls (except head side).
- 2.00m between cots.

7. Neonatal intensive care nursery

This is an area for stabilisation, treatment and monitoring of critically ill or medically unstable newborns, requiring constant nursing care, and special equipment, including a full range of physiological monitoring and resuscitation devices. Newborns in the intensive care nursery are too sick to sleep with the mother, and should be nursed in an open care system or locally-made cot.

Minimum Floor Area: 40.00 m² for 5 beds.
Additional Area: +6.50 m² per extra bed (7.50 m² recommended), max 8 beds.
Examination/Procedure Area: 3.00 m² (can also be used for resuscitation).
Privacy: Cubicle curtains required.
Lighting & Ventilation: Natural illumination & airflow required.

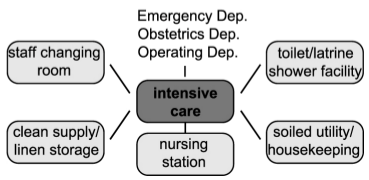


Activities
A - Open Care System
B - Nursery area

Furniture
F2 - Chair

Equipment/Fixture
E2 - Sink
E4 - Trolley
E6 - Balance
E13 - Open care system
E16 - Plastic container

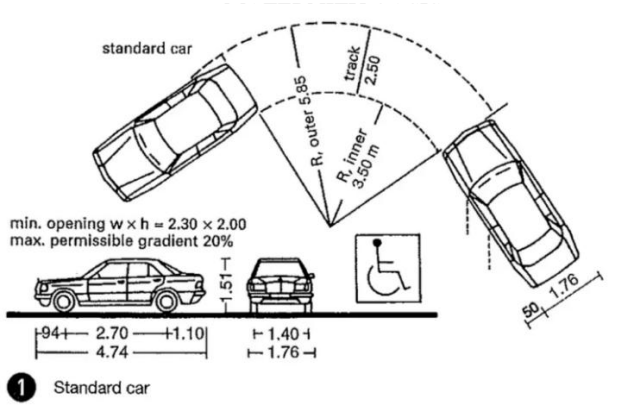
Location



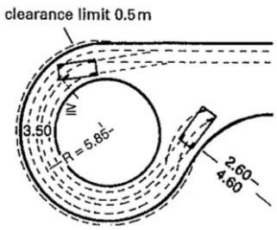
Parking

Parking Arrangement

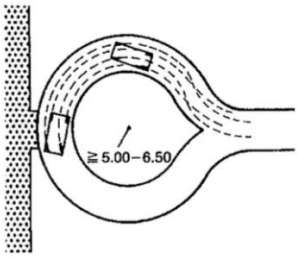
Parking arrangement	Space requirement per place incl. access (m^2)	No. places in 100 m^2 area	No. places on 100 m of road (one side only)
→ ❶ 0° parallel to road. Difficult parking and exiting – good for narrow roads	22.5	4.4	17
→ ❷ 30° oblique to road. Simple parking and exiting. Area busy	30.8 (27.6)	3.2 (3.6)	20 (21)
→ ❸ 45° oblique to road. Good parking and exiting. Area per place relatively low. Normal type of layout	24 (21.7)	4.2 (4.6)	29 (31)
→ ❹ 60° oblique to road. Relatively good parking and exiting. Area per place low. Frequently used layout	22.5 (20.5)	4.4 (4.9)	34 (37)
→ ❺ and ❻ 90° right angle to road. Low area per place. Considerable turning of vehicle necessary	20 (19.0)	5 (5.3)	40 (44)



❶ Standard car

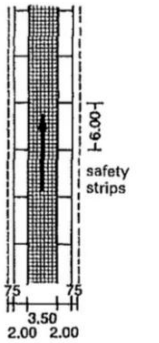


❷ Turning circle of a car

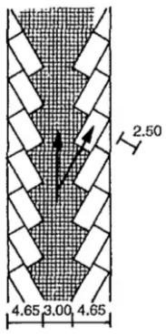


❸ Entrance drive, car turning circle radius ≧5–6.50 m

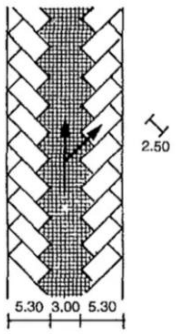
All structural elements (ceilings, walls, columns, reinforcements) of multi-storey car parks must be fire resistant. The recommended clear access height for car parks above and below the ground is 2.20 m. An addition of 25 cm is practical for the direction signage for cars and pedestrians, plus a further 5 cm for later resurfacing. This gives a total height of 2.50 m plus construction over the access ways, thus a storey height of 2.75-3.50 m, depending on the chosen method of construction. A relatively close spacing of columns can reduce building cost without impairing function if the construction height is carefully chosen. Wide-spanning column-free constructions have 7-12% less column area on plan.



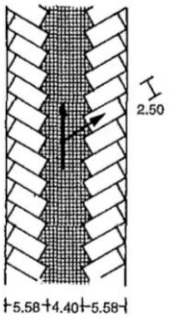
❶ Parking parallel to the road



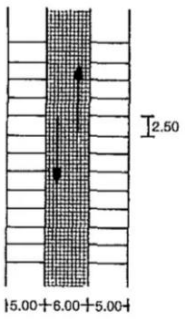
❷ 30° oblique parking and exiting is simple, but one-way traffic only



❸ 45° oblique parking, one-way traffic only



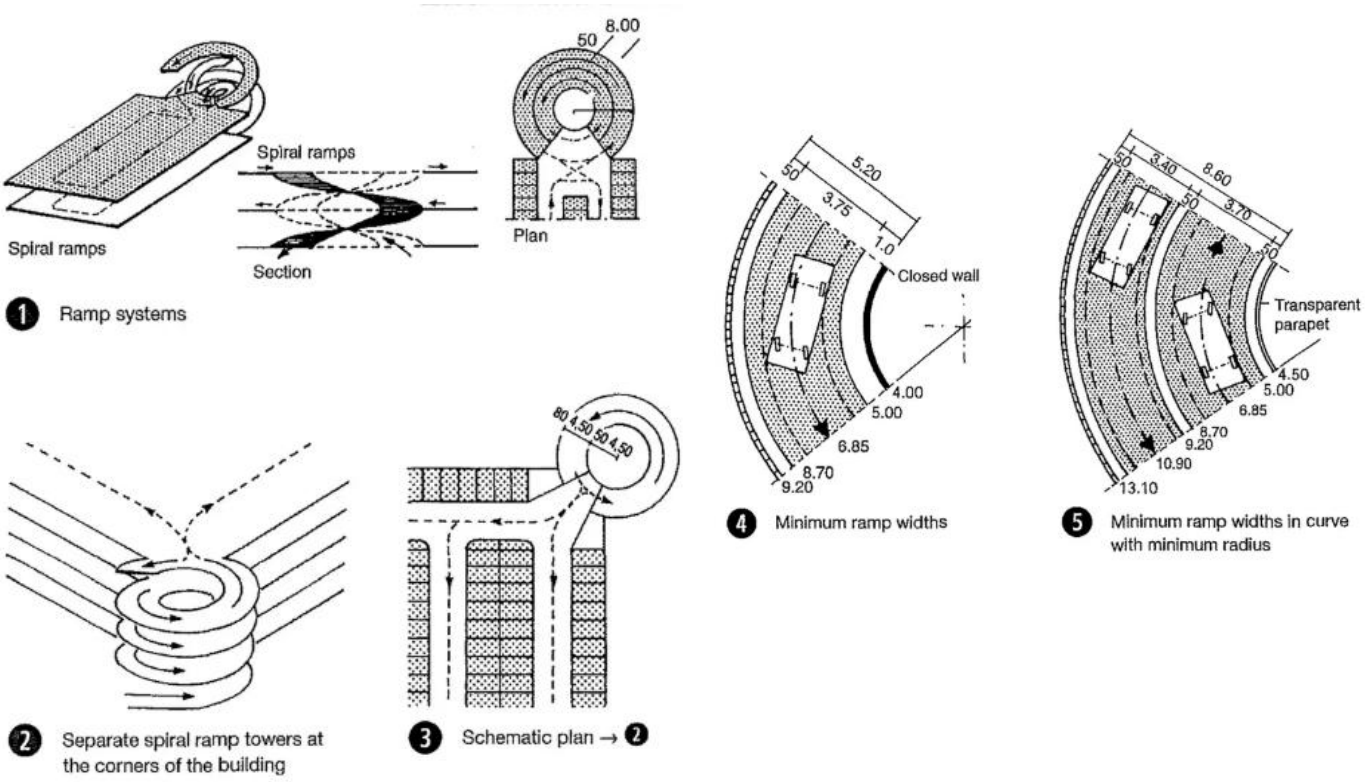
❹ 60° oblique parking, one-way traffic only



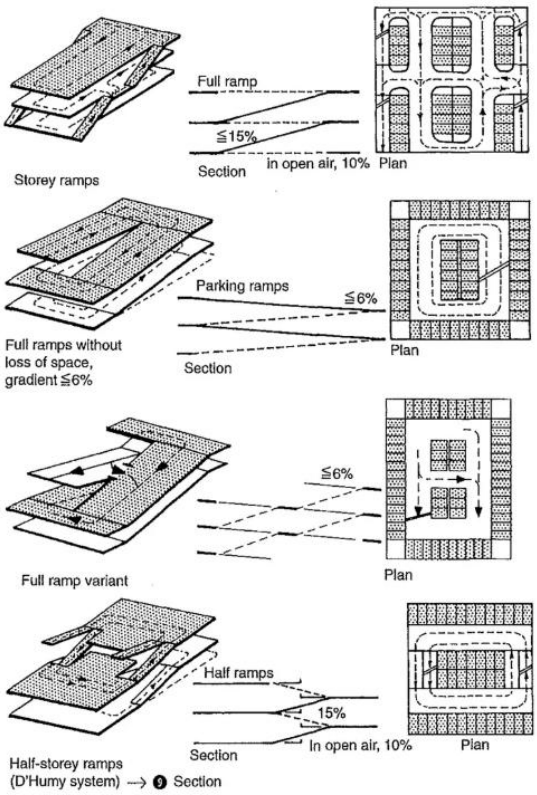
❺ 90° parking and exiting is possible in both directions. Access width 5.50 m for increased manoeuvring

There are various systems of ramps to overcome height differences and to access the various storeys of multi-storey car parks. The gradient of ramps should not exceed 15%, for small car parks 20%. Between public roads and ramps with more than 5° gradient, there must be a horizontal run of ≥5 m length, or in the case of ramps for cars the run should be ≥3 m long, with ramps at up to 10% gradient. Possible arrangements of ramps can be divided into four groups: Straight, parallel and continuous multi-storey ramps with intermediate landing, access and exit opposite

Spiral ramps



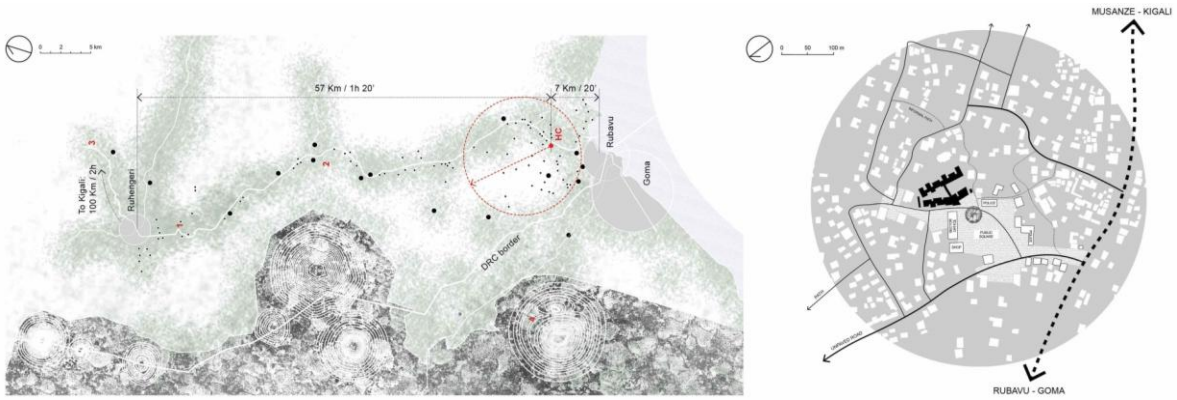
This system is relatively expensive yet has poor visibility, and the circular form leads to residual areas, which are hard to exploit →0-0. The spiral ramps must have a transverse gradient of ≥3%. The radius of the inner road edge is ≥5 m. In large multi-storey car parks, ramps also used by pedestrians must have a ≥80 cm wide raised pavement, unless routes for pedestrians are provided elsewhere.



Chapter 3

3.1 Case Study I: Rugerero Health Centre

Location: Rugerero Sector, Rubavu District, Rwanda
Architect: ASA Studio
Size: 2800 sqm (building) | 5600sqm (plot)
Year: 2017-2018



The Rugerero Health Center was built in 2018 designed by Active Social Architecture and is located in the Rubavu District in Rwanda. The health centre was designed to be the first health center in Rugerero, and was designed in order to serve 45,000 people. The design concept rests on the idea to offer a long lasting improved health facility involving the community through design and construction while adopting locally sourced materials and traditional techniques. "Upon completion, the health centre was created in order to contribute to the infant mortality reduction, the mothers wellbeing, the spread of education in nutrition, and the reduction of infections and diseases transmission.
The entrance of the new Health Center is in front of a big tree, currently used by the local communities for gathering.The tree is a symbol for the community and traditionally is identified as space to meet and exchange oral history

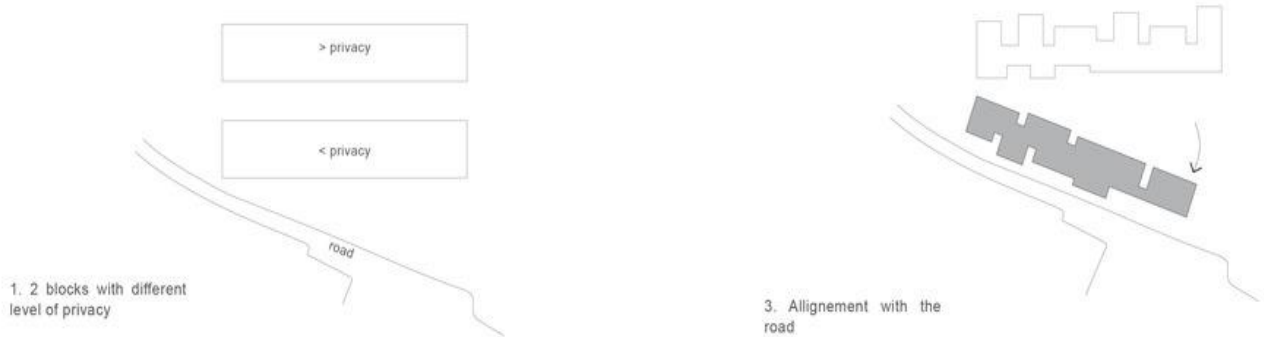


Figure 31: Zoning and massing of Health center

Within the maternity ward at Rugerer, there is a 6-bed pre-delivery room, 3 single-bed private delivery rooms, and a 10-bed post-delivery room. There is a centralized nurse station, to accommodate all of the patients, along with multiple restrooms, two family planning/antenatal rooms, and storage rooms in the hall, and the pre-delivery and post-delivery rooms for things like linens.
ithin the part of the health centre where the maternity ward is located, the laundry area is also located, allowing for easy access, and separate area to do laundry.

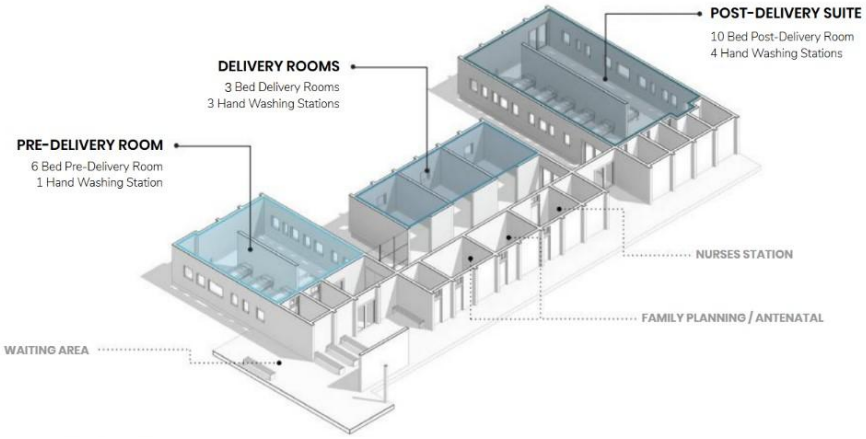


Figure 32 Circulation and programme

Patient & staff circulation
The patient circulation path is laid out along a main central corridor that allows for patients to move sequentially down the hall, depending on what stage of the labour process they are in. By having the rooms in the hallway laid out sequentially, the patients just keep moving down the hall, and never have to cross paths with other patients in other areas, in order to minimize cross contamination and address infection control within the maternity w

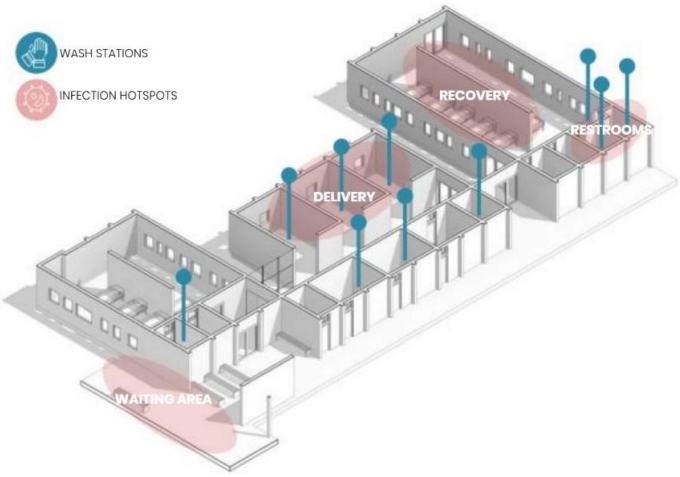


FIGURE 15: WASH STATIONS AND HOT SPOTS

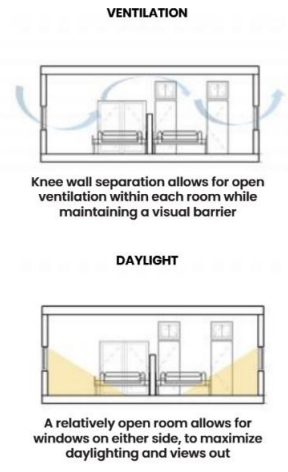


FIGURE 16: VENTILATION + DAYLIGHTING

Hot Spots for Infection
The layout of the maternity ward within Rugerero is spaced out so that each room is separated, and laid out sequentially so patients travel in one direction down the main circulation corridor. While this layout reduces hot spots for infection efficiently, there are possible areas like the waiting area, the delivery rooms, and the recovery room

restrooms inside it that would be the biggest hot spots for infections. While these are the spaces that have the relative highest probability of a patient acquiring an infection, figure 15 above shows that in these spaces, with the exception of the waiting area, there are plenty of wash stations to further reduce the possibility of a patient acquiring a nosocomial infection.

Ventilation + Daylighting

As for the ventilation and daylighting, figure 16 above shows the sectional diagrams through the pre-delivery and post-delivery rooms. These rooms are relatively open, but have a knee wall in the center to create a visual barrier between patients on either side to increase privacy. By implementing a knee wall, the natural ventilation that can take place in these spaces is much better than that of a double loaded corridor. The windows on either side allow not only for double the natural daylighting and more views to the exterior for the patients, but allow for air to flow in the room and out the other side. The rooms also have more ventilation strategies than just the windows, as shown in figure 17 below. These openings in the walls allow for even more ventilation to happen.

Low-cost architecture meant transformation of minimal budget into maximum space: flexibility and exterior sheltered circulation enabled visual connections, control, space capacity enhancement, and link to the immediate context. Rainwater collection and reuse is enabled by two underground water tanks that collect 70.000L of rain, which is filtered and distributed to toilets, fountains, showers and sinks.

Figure 34: Bamboo reed walls

Figure 33: Building is single storey and has adequate open space

3.2 Case Study II : MizMedi DEAR'ONE Postpartum Care Center

Location: Gangseo-gu, South Korea
Architect: Yeonhan architects
Size: 807 sqm (building) | 1001 sqm (plot)
Year: 2000-2024

Site Constraints and Design Solutions
The site is a site that has been used as a ground-level parking lot for a long time, and is long and narrow, facing east-west on a 12m road to the south, and is adjacent to an apartment complex to the north. Therefore, the placement of the maternity room and the parking and evacuation routes have become important design issues.
The placement of the maternity room and the connecting corridor was a critical choice between the busy road conditions in the south and the privacy issues with the apartment complex in the north. In order to provide postpartum care and stability, it was necessary to block out the untidy external environment and direct sunlight on the southern road as much as possible, while ensuring privacy from the adjacent apartment complexes.

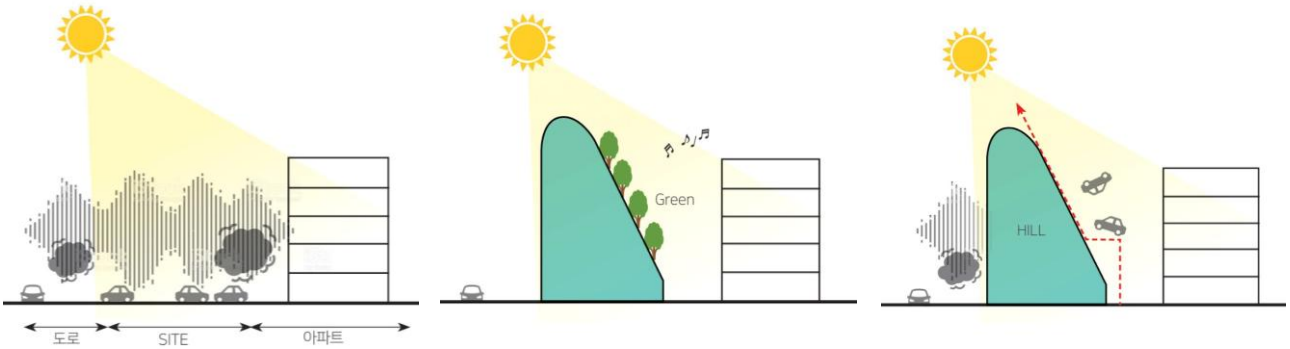


Figure 35: Site responsive

Concept of a Vertical Village
Although it is a densely populated city, the Architect designed terraces and planned landscaping on the slope created by the sunlight so that both the mothers and the apartment complex residents could look out onto a small green garden rather than a gray building. Thus, he decided to place the maternity room on the north side and the corridor on the south side, and fortunately, the client also sympathized with this solution.

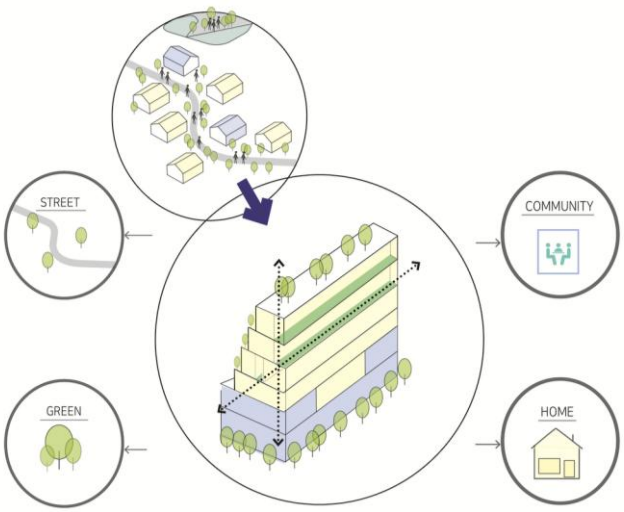


Figure 36: Concept of vertical village

The arrangement of parking and evacuation routes significantly influenced the design. The site's limitations necessitated a mechanized parking system to ensure efficient parking and ample waiting space. For quick and intuitive evacuation, fire escapes were placed at both ends of the building. Two elevators divide the building into three sections for user convenience while also serving a structural role.

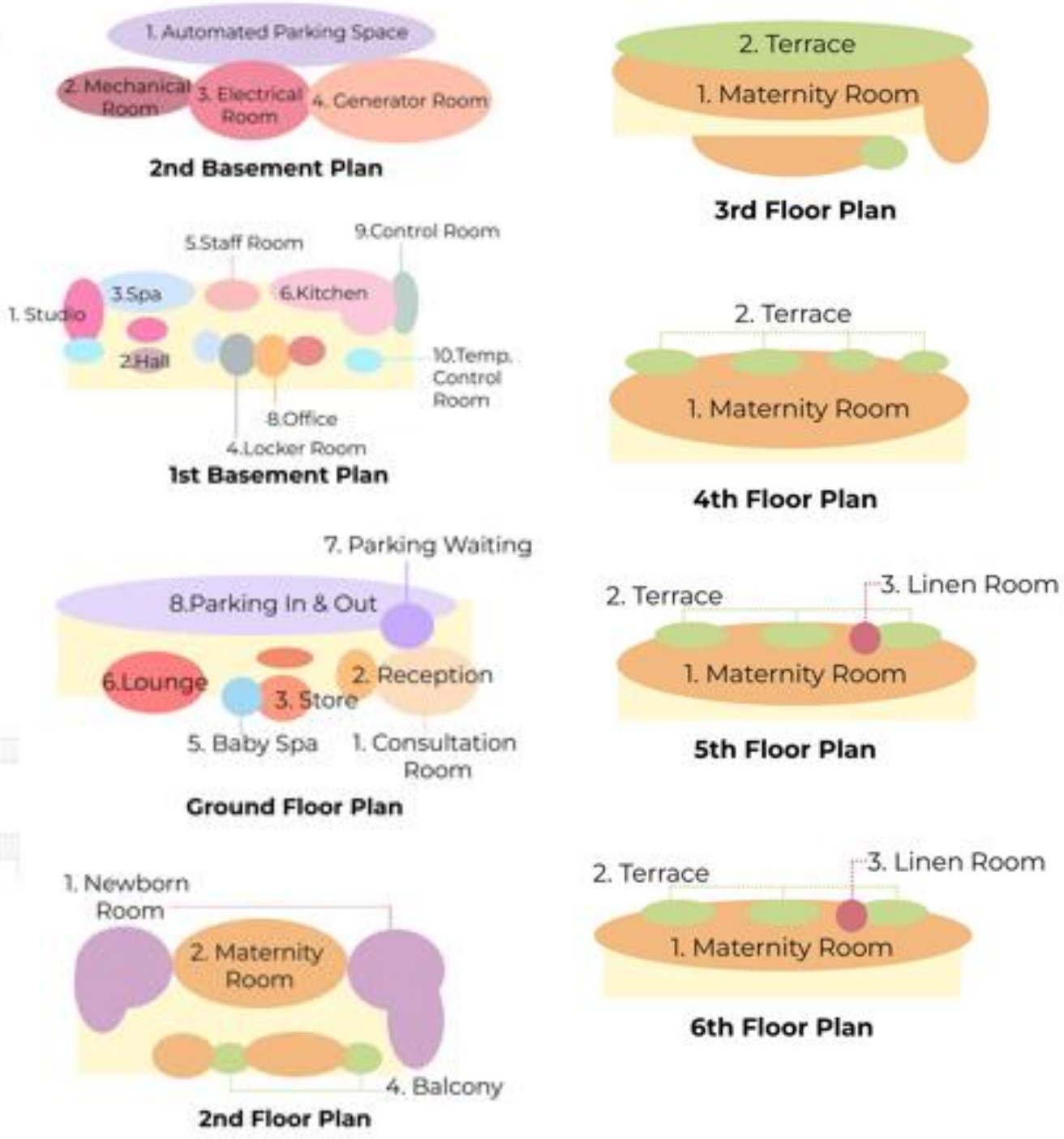
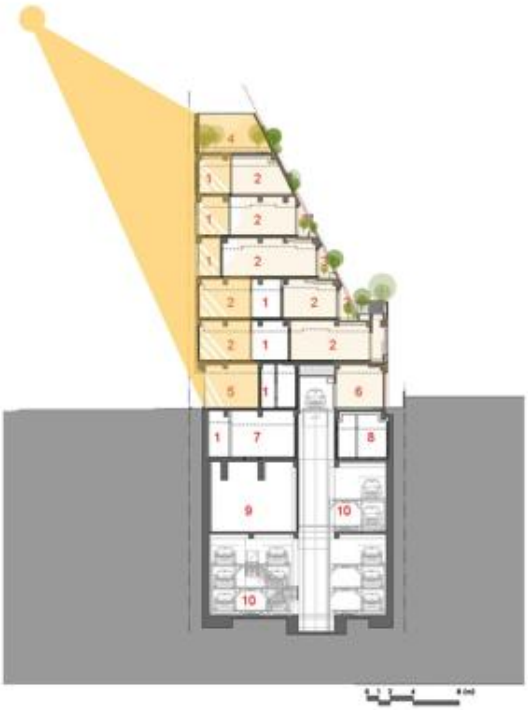
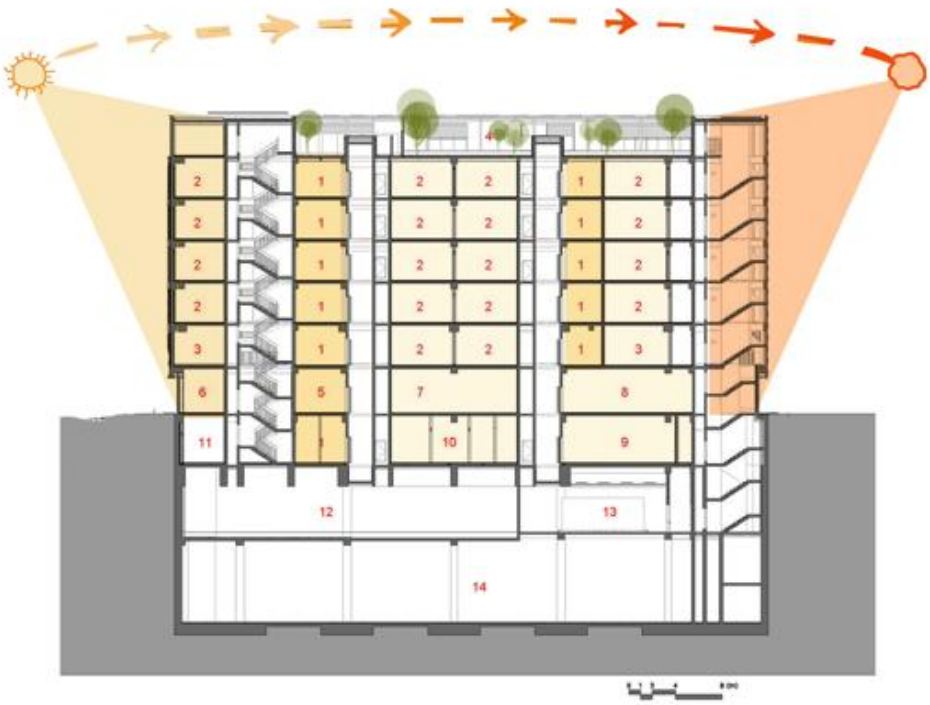


Figure 37: Floor Zoning



LONGITUDINAL SECTION

1. Corridor
2. Maternity Room
3. Terrace
4. Rooftop Garden
5. Reception



CROSS SECTION

3rd Basement: Automated Parking
2nd Basement : Mechanical & Electrical
1st Basement : Canteen, Hall & Locker Room
Ground Floor : Lounge, Reception,Store
1st Floor: New Born Room, Maternity Room
2nd, 3rd, 4th, 5th : Maternity Room
6th Floor : Rooftop Garden

Figure 38: Sectional Deatil

Climate Responsive Design

- Sunlight Filtering Facade – Textured brickwork reduces glare and creates dynamic light patterns.
- Strategic Orientation – Postpartum rooms face a quiet, green courtyard, minimizing heat and noise.
- Landscaped Terraces – Green spaces enhance thermal comfort and promote well-being

Inferences

- Holistic Postpartum Care – Combines medical, emotional, and wellness support for mothers.
- Private & Communal Spaces – Individual recovery suites with shared lounges and therapy areas.
- Healing-Oriented Design – Uses natural materials, soft lighting, and ergonomic furniture.
- Medical & Alternative Therapies – Integrates modern healthcare with lactation support, physiotherapy, and traditional healing.
- Sustainability Focus – Likely incorporates eco-friendly materials and passive design strategies.
- Hospitality Experience – Provides hotel-like services, enhancing comfort and relaxation

The vertical layout encourages movement through the building, creating opportunities for casual socialization, relaxation, and moments of rejuvenation.

- Pattern Brick Facade
- Communal spaces promote relaxation and community
- Facade act as lantern illuminating the street

Fig : Maternity Room with Private Balcony

Fig : Patterned Brick Screen Casting Shadow

Fig : Green Plants in Balcony used as Sound Barriers.

Fig : New Born Room

3.3 Case Study III : Raga Svara Wellness Cent

Location: Rajkot, India
Architect: Shanmugam Associates
Size: 75000 sqm (plot)
Year: 2022

Figure 39: Location Map

Raga Svara is a serene retreat dedicated to holistic well-being, ecological sustainability, and aesthetic harmony. Designed with a biophilic approach, it seamlessly integrates with the natural landscape, offering a space for reflection and rejuvenation while preserving the site's essence.

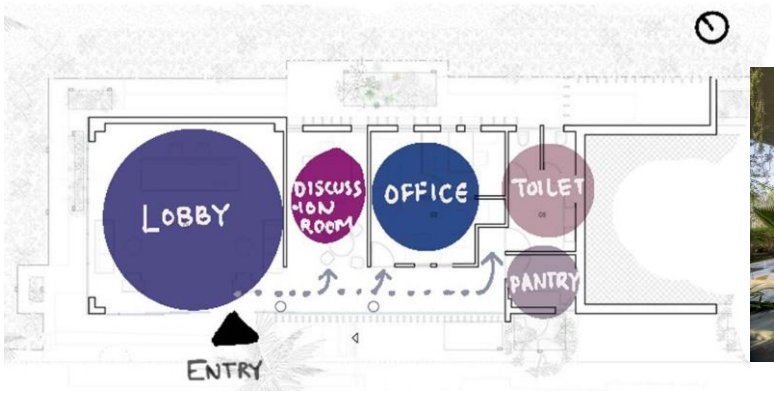
Figure 41: Elongated Masterplan

Figure 40: Existing Landscape

Design Concept

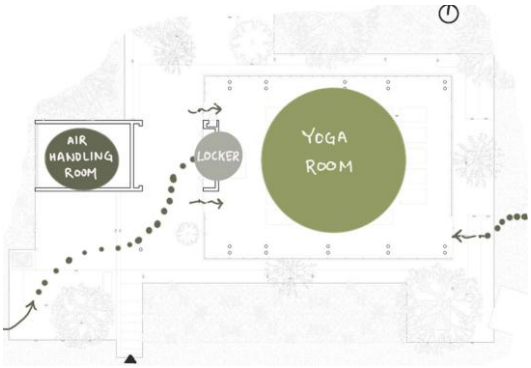
The linearity of the site, old trees with huge canopies, agricultural land, location adjacent to the Rajkot- Bhavnagar highway, and natural site terrain were primary factors that steered the architects to take a biophilic approach to design. Zoning was done with relevance to huge banyan and peepal trees at the site.

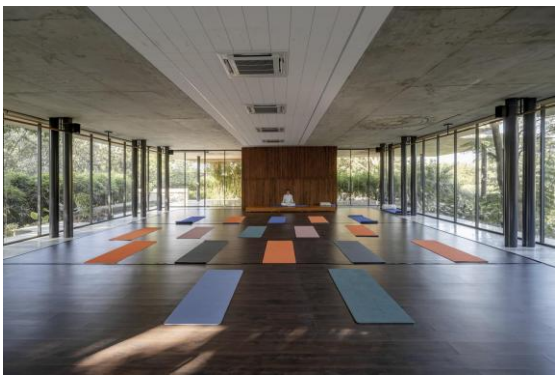
Reception



The reception at the entry welcomes a landscape extending to the roof, inviting one to take a walk and have a glimpse of the entire property.The entire roof is hidden with hanging curtain creepers which is literally a green curtain while entering the lobby, hoping to set the initial tone.

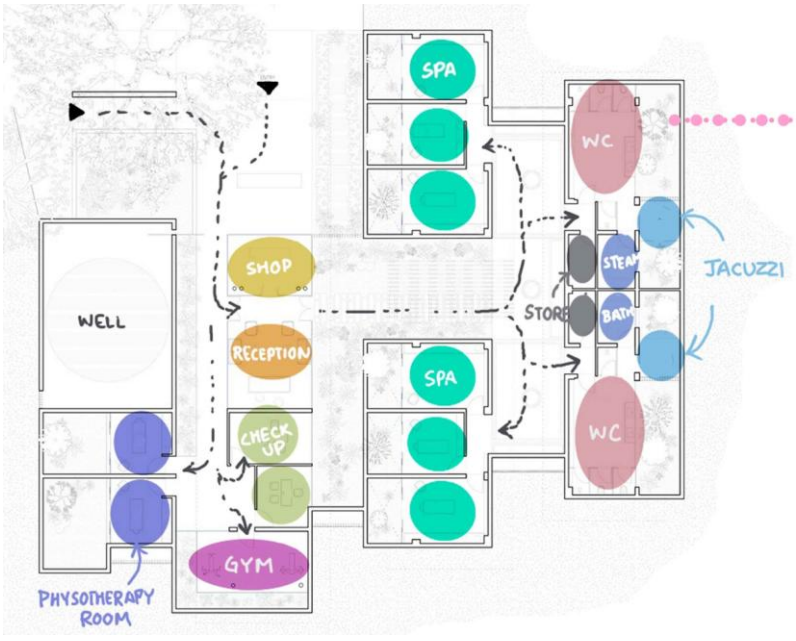
Yoga Room



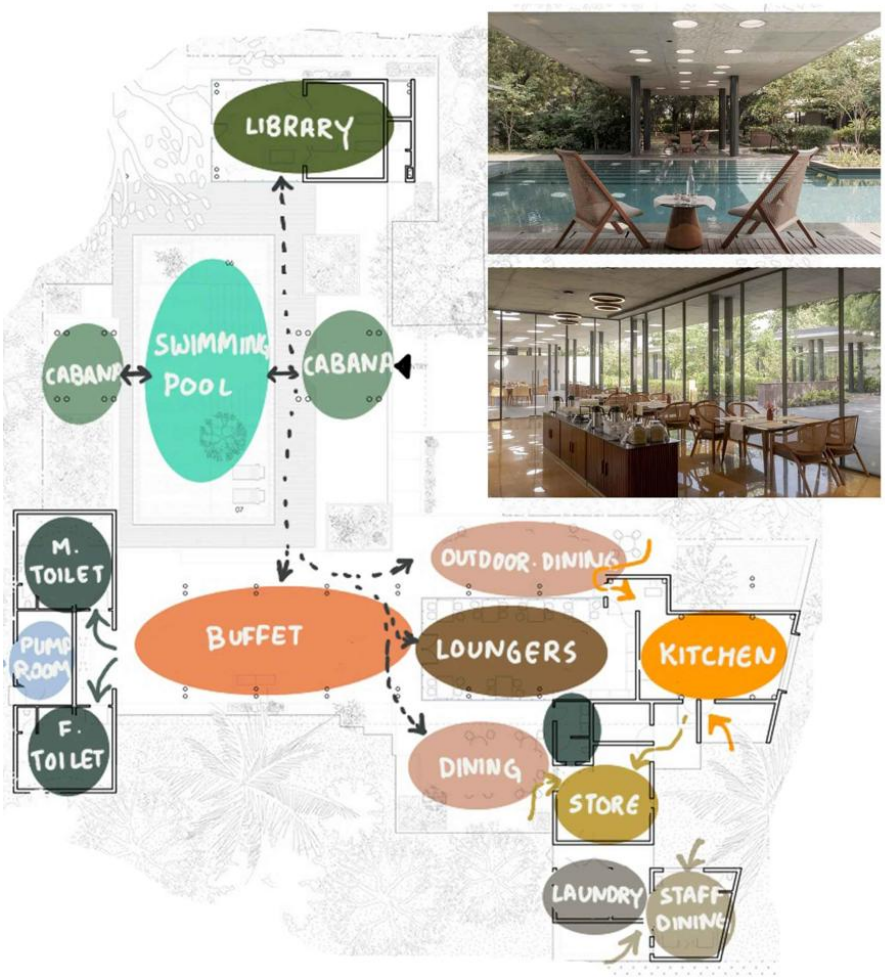


Chamfered and cut roof slabs of the yoga center were planned around existing mango trees (*Mangifera Indica)* offering space for reflection.

Treatment Block

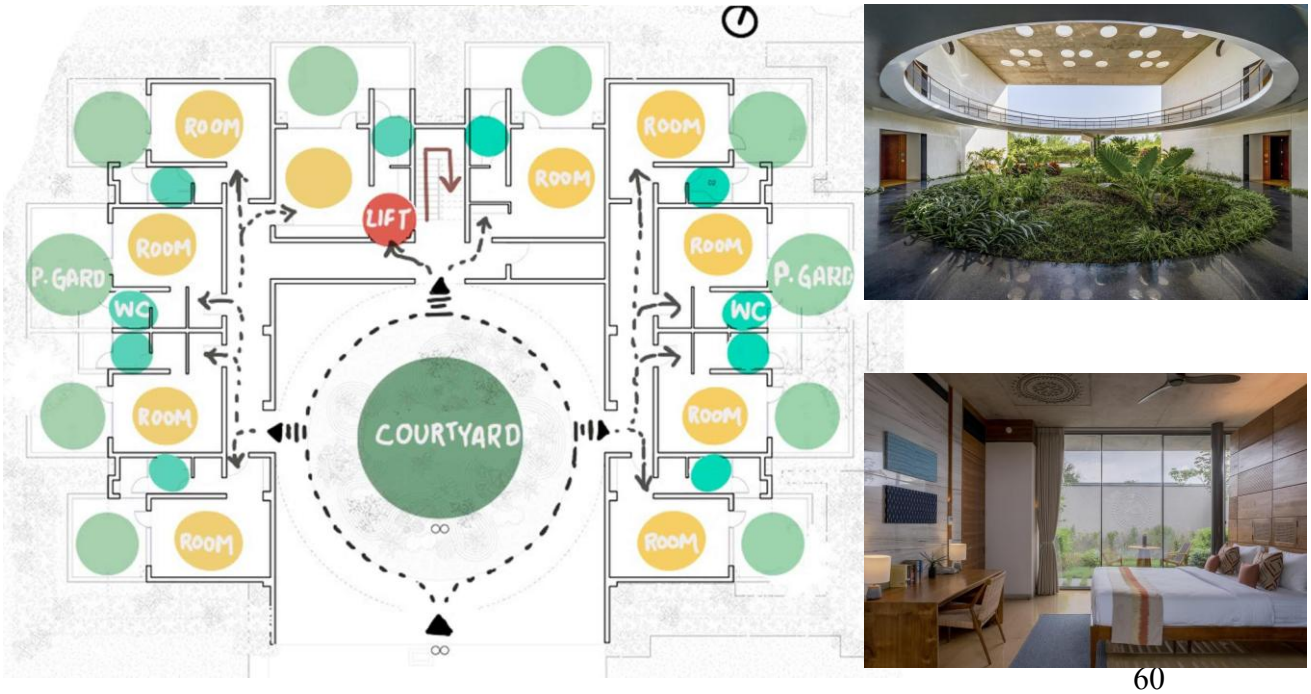


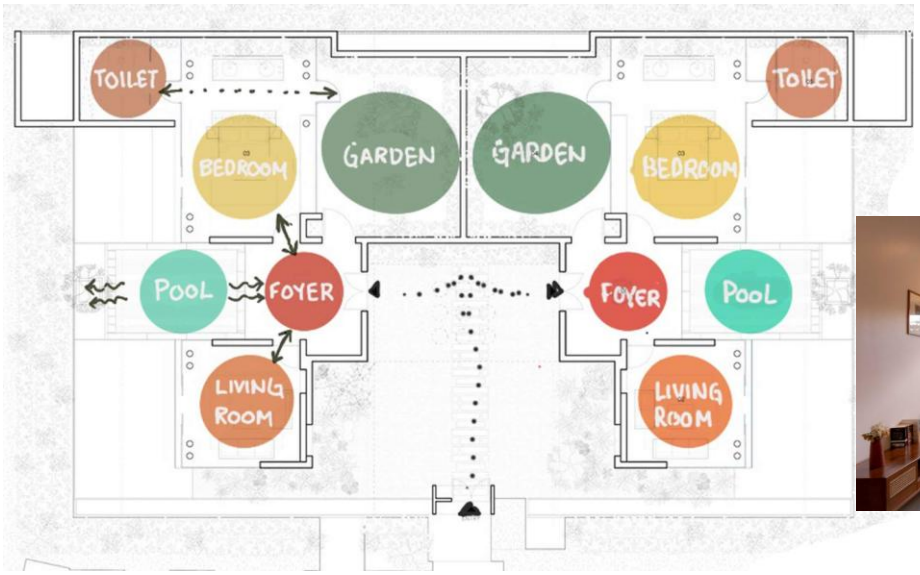
Amenities Block

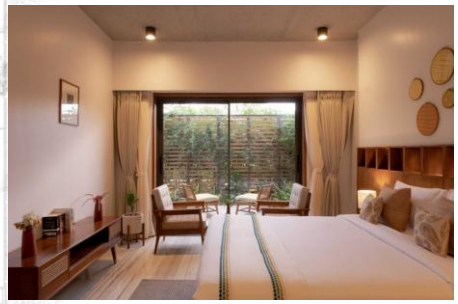


Inspiration from the stepped wells of Gujarat and the requirement of sufficient shaded areas, aided in evolving the swimming pool area that has symmetrically punctured ceilings and granite steps.

Typical Block

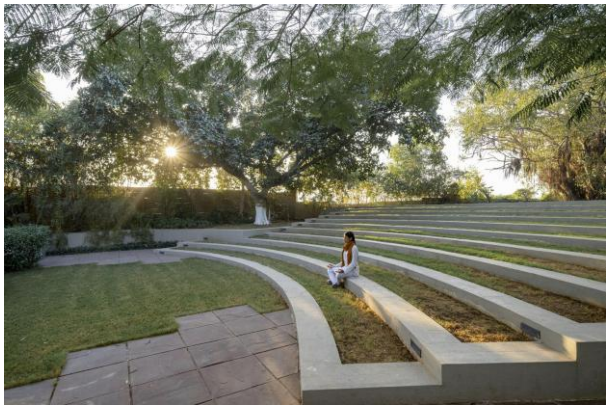






The luxurious 20-key Raga residences were built around a community garden and circumambulatory bridge, that frames a vista of the western sun behind Moringa cultivation. Cottages have their own private garden with a pool and are tucked in behind the zen gardens. All restrooms are naturally ventilated with large private gardens.

Landscape



Inference

Biophilic Design – Integrates existing trees and landscapes to enhance nature connection.
Sustainable Approach – Uses natural materials and passive cooling techniques.
Spatial Serenity – Open courtyards and water elements create a tranquil atmosphere.
Therapeutic Environment – Architecture supports wellness through mindful spatial planning.

3.4 Case Study IV : Avata Wellness Center

Location: Gairidhara Baluwatar, Kathmandu
Architect: Metalwood Design
Size: 15200 sq ft
Year: 2000

The wellness center was renovated with the idea of creating a peaceful, nature bound and minimal organic space that showcased harmony between the built spaces and the landscape surrounding it. The rock garden, the organic plants in the landscape aim at providing a zen space among the concrete structures, creating visual harmony. Incorporation of contours and dry stream landscaping contribute to naturalistic spaces.

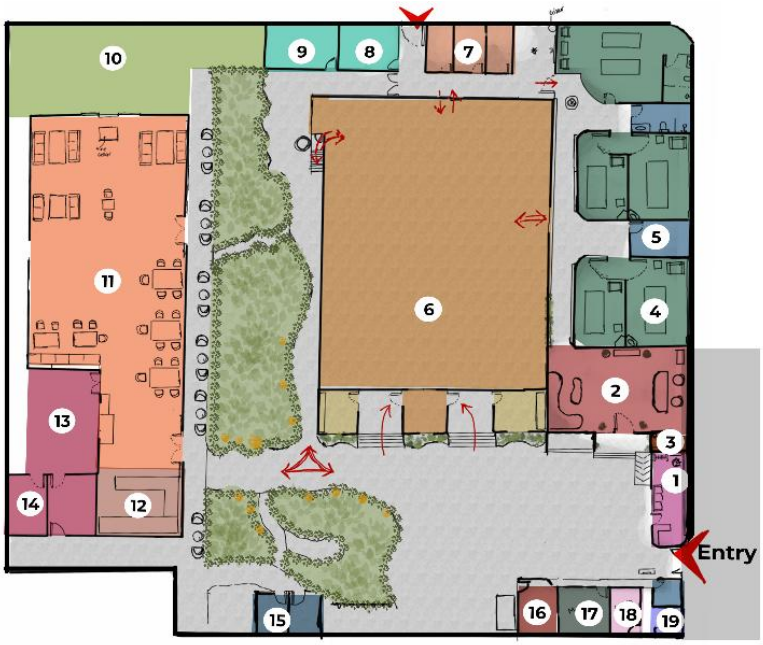


Figure 43: Masterplan od Avata Wellness Center

Figure 42: Yoga Hall

The landscape amalgamates the existing components in the vicinity, letting green spaces breathe in between the three main blocks: the yoga hall, a spa, a shop and an in-house restaurant.

Yoga Hall
Visible from the entry, the yoga hall invites visitors with the use of wooden elements and white brick wall. The design aims to provide a tranquil communal space. The high ceiling, open planning and northeast punctured wall give grandeur to it while the gray accents help keep it minimal.

Spa
The hallway is illuminated by the natural light venturing in from the soft overhead skylights giving emphasis to the wooden floors lined by lush green plants leading you

into the rooms. The spa provides accommodations for both single and couples massage, with the rooms being private, comfortable and cozy.

Figure 45: Massage Room

Figure 44: Reception Area

Restaurant

The open planning of the restaurant gives way to the picturesque view. Interior and balcony seating provide a cozy dining experience. With the addition of a vegetable garden, the products are ingrown and the food is fresh. Natural wood textures, delicate light fixtures and earthy toned fabrics had brought warmth to the space.

Figure 46: Restaurant Area

Workshops From Past

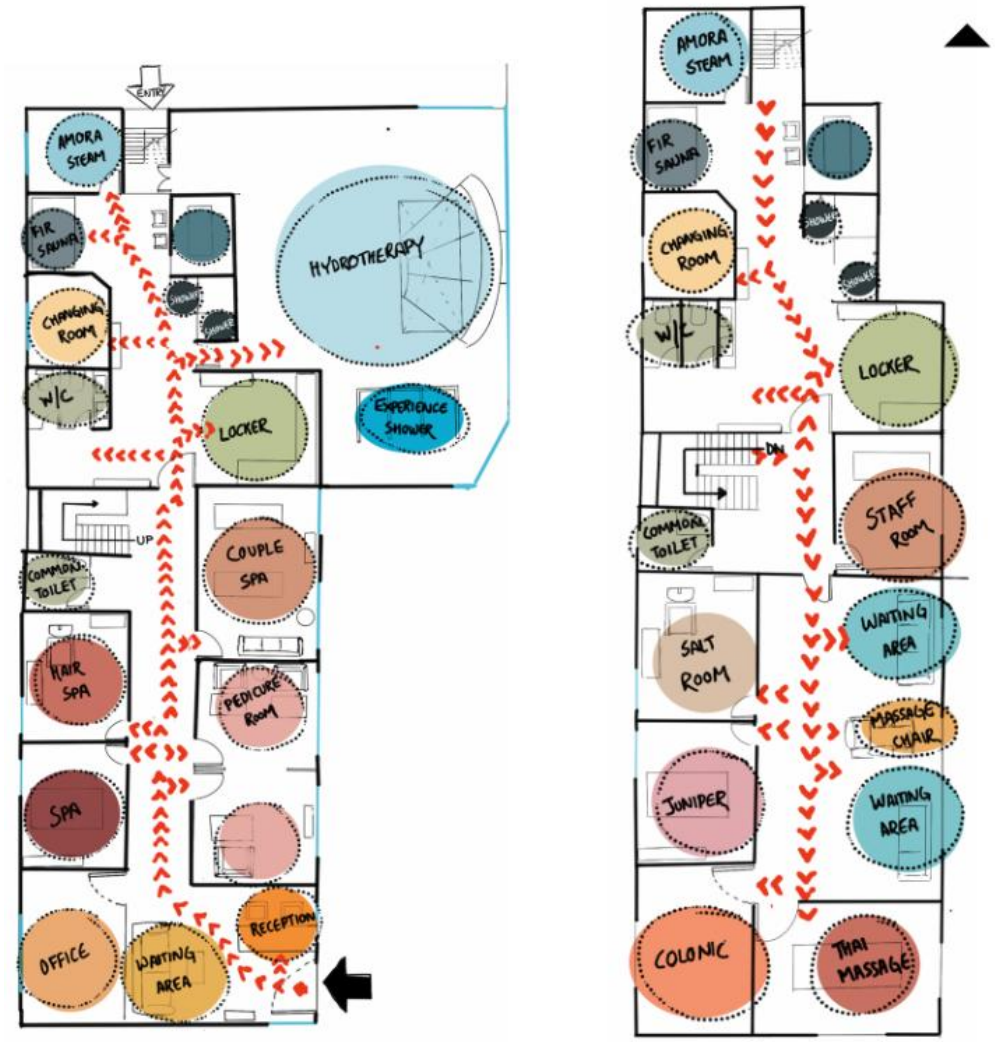
Prenatal and Postnatal Retreat

The session aimed in Preparing new moms for childbirth and parenthood is one of life's most transformative journeys, and at Avata, this process initiated through the Nepal Childbirth Initiative (Prenatal and Postnatal Retreat).

This retreat emphasized the crucial role of childbirth education, couples' connection, and fostering strong partnerships to empower moms- and dads-to-be. From understanding hormones and labour stages to breastfeeding essentials and nurturing mental well-being, the retreat offered transformative insights and deeper connections for couples.

3.5 Case Study V: Meraki Wellness Retreat

Location: Budhanilkantha , Kathmandu
Architect: Metal wood Design
Size: 15200 sq. ft
Year: 2000



GROUND FLOOR FIRST FLOOR

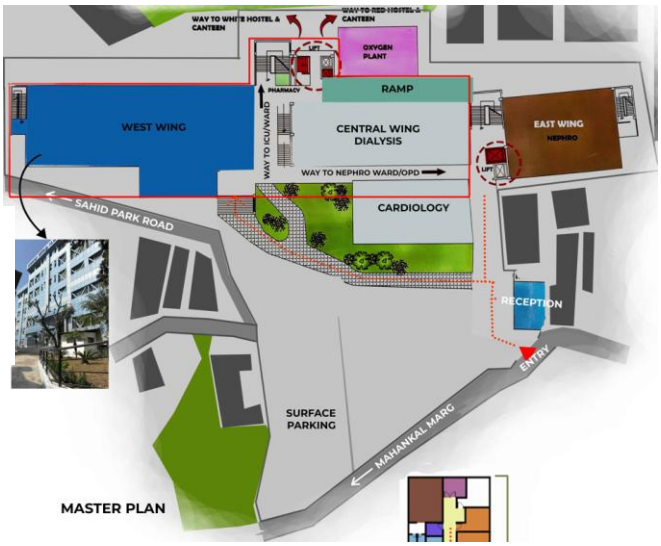
Meraki, Nepal's premier destination spa and wellness resort provides unparalleled accommodations and state-of-the-art wellness therapies to pamper and rejuvenate the body, mind, and soul, ensuring total relaxation and rejuvenation.

Salt therapy, yoga, massage therapy, spa treatments, and sound healing offer significant benefits for both prenatal (during pregnancy) and postnatal (after childbirth) care. These holistic therapies support physical well-being, mental relaxation, and emotional healing, making them valuable additions to maternal wellness practices.

3.6 Case Study V: Nepal Medical College

Location: Jorpati, Gokarneshwor
Size: 1797 SQ M
Year: 1997

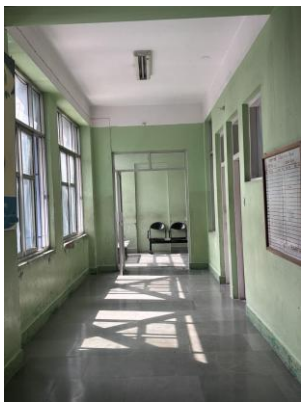
ANTENATAL CARE : 30 BEDS
LABOUR ROOM : 7 BEDS
POST DELIVERY ROOM : 30 BEDS
NICU: 12 BEDS



Nepal Medical College Teaching Hospital (NMCTH) is a major healthcare institution with 700 bedded institutions in Kathmandu, Nepal established in 1997 by the late Sachey Kumar Pahari. NMC provides medical care and provides medical education in Nepal. Nepal Medical College is located in Jorpati, Kathmandu.
Design Feature & Functional Layout

- Site Planning and Spatial Organization
  The site planning incorporates a large surface parking area, ensuring convenient accessibility. The hospital buildings are strategically positioned at the rear north, optimizing space and minimizing disruptions. Maternity care services are exclusively provided in the west wing, creating a dedicated zone for specialized care. The longitudinal layout enhances the flow of natural light and ventilation, fostering a well-lit and airy environment that promotes patient comfort and well-being.

- Entrance & Circulation



The building has 2 service lifts and 2 staircases for vertical circulation. Ramps are provided for universal users Reception and information desks are positioned on the frontal gate.

- Maternity and Paediatric Departments
  Of the 700 hospital beds, 80 are allocated for maternity care, located on the second floor. And Third Floor. However, the paediatric department is on a separate floor, making service coordination between the two departments difficult. The maternity department is accessible via stairs, lifts, and a ramp, ensuring ease of movement for patients.

- Maternity Department Layout

Zoning:
The department is placed on the western portion of the building, with services distributed across the northern and southern sections, separated by a central waiting area.

EHS
The Western Portion Consist of EHS Department having 22 Private Wards and 2 General Ward. Nursing stations can be seen right at the entrance connecting with nursing changing and office room.
Labor Room
The labour and delivery section are isolated with restricted access. Visitors and staff must change slippers before entering.

The section includes:
▪ First-stage labour room (7 beds)
▪ A single major and minor operation theatre
▪ One delivery room with three beds

Antenatal Care
In the Northern part two General Ward is provided with 8 Beds on each for Antenatal Care. Nursing Station is positioned centrally through the entrance.

Postnatal Ward
The postnatal ward consists of three general wards, each containing eight beds. The changing room is accessible from the entrance, while the doctor's room is located on the opposite side, with the nurse station centrally positioned.

NICU
The 8-bed NICU layout was designed to prioritize efficient workflow, infection control, and family involvement. The beds were arranged in a semi-open pod layout, ensuring each one had ample space, with around 6-8 ft. between them to maintain hygiene and minimize contamination. The nurse station was centrally located, offering clear visibility of all beds and quick access to medication storage and emergency equipment.

Observations and Inferences
Strengths:

- The hospital integrates medical education with service delivery, supporting a well-rounded healthcare environment.
- The Longitudinal corridor planning provides openness and natural light.
- The use of lifts and ramps ensures accessibility for patients with mobility issues.
- The maternity ward is functionally zoned with restricted access to labour and delivery rooms for hygiene control.
- Noise was buffered through trees.

Architectural Lessons
Lessons Learned:

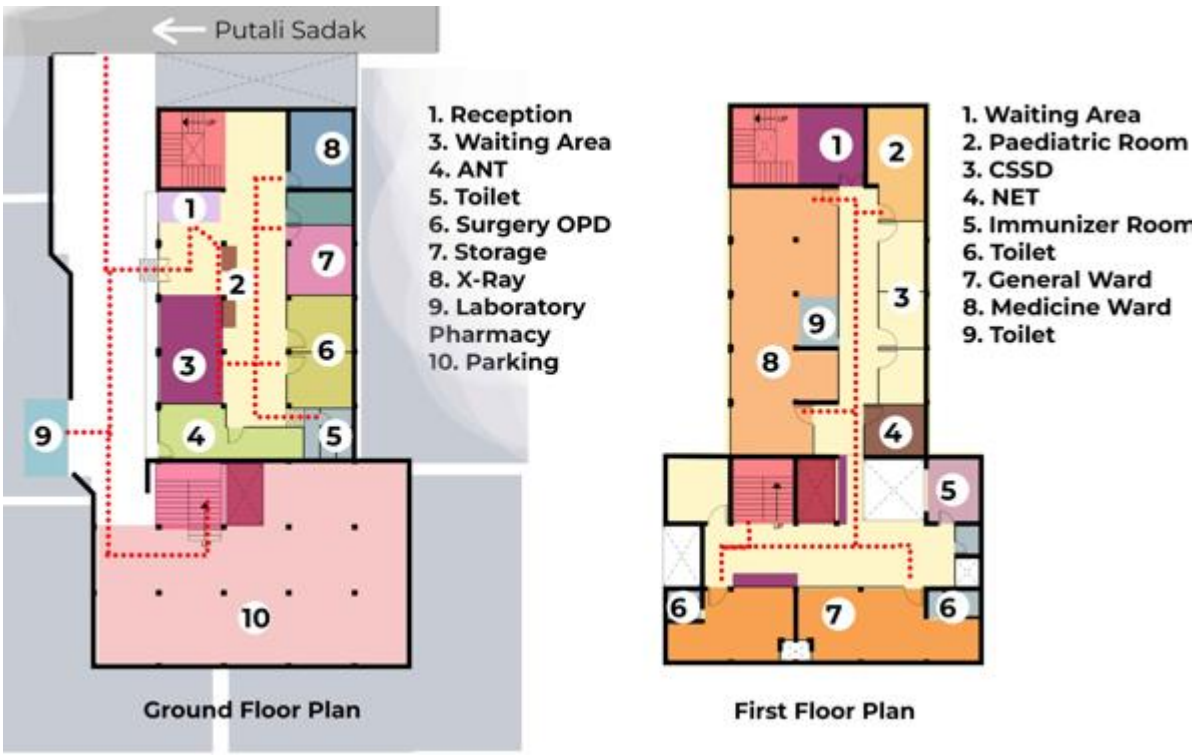
- Zoning plays a crucial role in healthcare planning, and separation of interdependent departments can reduce efficiency.
- Poorly maintained outdoor spaces and unhygienic interiors negatively impact the patient experience.
- Adequate lighting, both natural and artificial, is essential for patient comfort and well-being.
- Green spaces in healthcare is a must for healing.

3.7 Case Study VI: Valley Maternity Hospital

KEY PLAN

Location: Putalisadak, Kathmandu
Size: 420 SQ M

Valley Hospital is a general hospital that offers maternity services, with 37 beds dedicated to maternity care. It is located in the center of Putalisadak and has direct access to the building via a 4-meter pathway from the main highway.



Site Layout and Zoning
The hospital is accessed through two entrances: a northern entrance for patients and services and a southern exit. Parking is located in the southeast corner of the site; only limited parking space is provided. The main hospital building is I shaped. All the three facades of the hospital building are blocked by neighbouring buildings. Although the building has 4 shafts, only 1 of them provides a small amount of light.

Ground Floor: Public & Diagnostic Zone
The ground floor primarily serves as the public and outpatient zone, ensuring easy access for visitors and patients. The reception, waiting area, and consultation spaces (ANT, Surgery OPD) are positioned at the front, allowing smooth patient flow. The diagnostic and treatment zone includes an X-ray room and laboratory, which are strategically placed for quick access from consultation and OPD areas. Support

functions like toilets, storage, and pharmacy are integrated within the layout. The parking area occupies a large portion, ensuring convenience for patients and staff.

First Floor: Treatment & Inpatient Care Zone

The first-floor transitions into a semi-public zone, where treatment and inpatient care are prioritized. The paediatric room and immunizer room indicate a focus on child healthcare services, while general and medicine wards accommodate admitted patients. The presence of CSSD (Central Sterile Services Department) ensures sterilization for medical procedures. The layout also includes necessary service areas like toilets for accessibility and hygiene.

Second Floor: Surgical & Intensive Care Zone

The second floor is a highly restricted zone, mainly dedicated to surgical procedures and intensive care. The presence of major and minor OTs, a labour room, and postoperative wards confirms this function. The doctor's room and observation ward provide necessary medical supervision for post-surgical recovery. The linen and changing rooms are strategically placed to maintain hygiene and operational efficiency.

Third Floor: Administrative & Special Treatment Zone

This floor has a mix of administrative and medical functions, making it a semi-restricted zone. The matron's office, meeting rooms, and chairman's office highlight the administrative sector. The ward, CSSD, and bone density rooms indicate ongoing medical functions, but this floor has fewer patient treatment areas compared to lower levels, showing a shift towards operational management.

Fourth Floor: Staff & Support Services Zone

The fourth floor primarily accommodates staff support and general hospital operations, functioning as a semi-private zone. The financial department, duty doctor's room, and kitchen indicate spaces dedicated to hospital personnel and daily operations. The ward

and waiting area show that patient care continues but at a lower intensity. The canteen serves both staff and visitors, ensuring comfort and convenience.

Observations

Figure 47: Light and ventilation only available through Duct

- Although shafts are provided light and ventilation has to be the major problem in the hospital.
- Nurse Station is far from the eyesight and is very difficult for the patient to reach out

Figure 48: Darker Corridors with no natural lights

- Human-Centric Design: Lack of designated seating areas results in companions and visitors sitting on floors, railings, and pathways. Properly designed waiting areas and green spaces for walking and relaxation are essential for patient and visitor well-being.

- The absence of an initial master plan has led to scattered and unorganized functional blocks, creating inefficiencies in navigation and service delivery. Emergency and OPD entrances are not clearly segregated, leading to congestion.
- Safety Concerns: Lift is very old and stops most of the time.
- Parking Issues: Limited parking space forces vehicles to occupy circulation zones, disrupting pedestrian movement and emergency access.

Architectural Lessons and Recommendations

Lessons Learned:

- Effective circulation planning is critical in healthcare facilities to manage different patient flows and maintain privacy.
- Accessibility features, such as ramps and lifts, must meet universal design standards to ensure inclusivity.
- Outdoor and symbolic spaces require regular maintenance to contribute meaningfully to the healing environment.

Recommendation:

- Entrance and Circulation: Introduce separate entrances for emergency, outpatient, and inpatient services to reduce congestion and improve privacy.
- Outdoor Spaces: Revitalize the garden and fountain, incorporating seating and landscaping to create a therapeutic environment for patients and visitors.
- Visitor Amenities: Increase the capacity and distribution of waiting areas, providing designated resting spaces for mothers and families.
- Space Utilization: Reevaluate underutilized spaces, such as the neglected ramp area, for adaptive reuse.

4. Program Formulation

All the physical requirements of the design were analysed according to information and data collected from literature review, case study and site analysis. The project is a 50-Bedded Maternity Hospital and wellness center. Number of Bed is calculated by considering the high-end facility space and location of the hospital. Since it is in Budhanilkantha, it not only serves that particular area but also serves the patient from Nakkhu, Maharajgunj, Balaju,etc.

Bed Arrangement
Emergency: 10%
Maternity Ward: 50%
Neonatal Intensive Care: 25%
High Dependency Unit: 5%
Kangaroo Room: 5%

S. N	Components	Number if more than one	Total area (m^2)
Outpatient Department (OPD)			
S. N	Components	Total area (m^2)	
1	Entrance Lobby		30
2	Waiting Area		30
3	Registration & Token Counter		6
4	Triage Area		3
5	Doctors Area		
	a. Doctor Room		10
	b. Washroom		4
6	(Gynae/Obst)		
	a. Consultation & Examination Room	4	40
	b. Counseling Room		10
7	Pediatric clinic		
	a. Consultation & Examination Room	2	12

	b. Dressing, treatment and dispensing		12
	c. Immunization Room		20
8	Lactation Counseling Room		12
9	Nutrition Counseling Room		12
10	Family Planning	2	12
11	Minor OT		20
12	Post Abortion Care		20
13	Sterile Store Room		4
14	Lactation Room		12
15	Children Play Area		20
16	Washroom - Public	2	6
17	Washroom - Accessible		6
18	Linen Room		12
Emergency Department			
1	Reception & Waiting Area		36
2	Triage Area		3
3	Treatment Area	3	20.7
4	Operation Theater		18
5	Nurse Station		6
6	Sterile Store Room		4.5
7	Examination		18
8	Clean Utility Room		4
9	Dirty Utility Room		4

10	Doctor’s On-Call Room		10
11	Washroom	2	10
12	Sluice Room & Janitor		4

Blood Bank			
1	Reception & waiting		15
2	Blood Sample Collection		10
3	Donor's Recovery Area		8
4	Serology		6
5	Blood Bank		6
6	Hematology		8
7	Biochemistry		8
8	Report and Sample Collection		6
9	Staff Room with w/c		12
10	Chiefs Lab		6
Laboratory Services			
1	Reception & Sample Collection Area		20
2	Record & Reporting		12
3	Consultation Room		20
4	Hematology		10
5	Biochemistry		10
6	Microbiology		10
7	Histopathology		10
8	Sterilization & Wash Area		6
9	Waste Disposal Room		6
10	Washroom		4
Imaging Services			
1	Reception & Waiting Area		20
2	Changing Room (Patients)		5

3	Dark Room		5
4	X-Ray		20
5	Ultrasound Room (USG)	3	40
6	Anomaly Scan		18
7	Control Room		3
8	Film Developing Room		9
9	Consultation		14
10	Staff Room / Washroom		4
Surgical-cum-Obstetric Suite			
1	Reception and Relatives Waiting		14
2	Examination & Preparation	2	28
3	Staff Changing Room		9.2
4	Doctor’s On-Call Room		6
5	Pre-operative		21
6	Recovery Area		24
7	Labour Room	4	72
8	Eclampsia Room		17
9	Delivery	2	60
11	Sterile Store Room		3
12	LDRP Room	3	35
13	Scrub Room		
14	Dirty Utility		5
15	Washroom	2	16
Obstetrics and In patient Department			
1	Waiting area		36

2	Reception		6
Neonatal Intensive Care Unit (NICU)			
	a. Reception & Waiting Area		7.2
	b. Staff Changing Room		6.9
	c. Neonatal Intensive Care Unit (NICU)		45
	d. Special Care Baby Unit		24
	e. Nursing Station		3
	f. Milk Preparation & Feeding Room		8
	g. Baby Bath & Dressing Room		8
	h. Doctor’s Room		6
	i. Sterile Supply Room		3
	j. Washroom	2	8
	k. Linen Room		2.5
	l. Scrub		12
Post Delivery Unit			
	a. Nursing Station		3
	b. Staff changing room		4.6
	c. Doctor’s Room		6
	d. General Ward		
	- 1 Bed Ward	8	144
	- 2 Bed Ward	4	100
	e. Isolation Ward	2	28
	f. Private Recovery Suite (Villa)	14	455

	g. Janitor		6
	h. Washroom	2	8

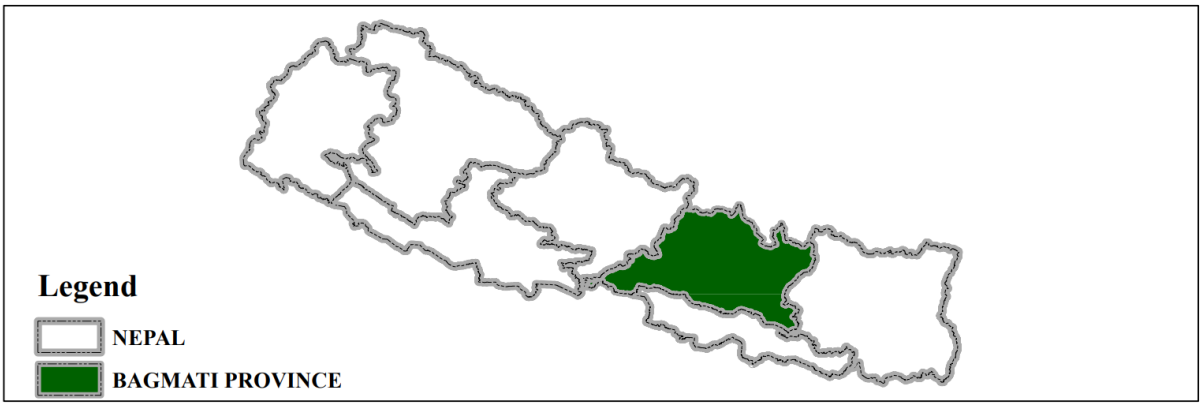
	i. Bathroom		6
Wellness			
1	Reception		
2	Staff Lounge		30
3	Healing & Wellness Amenities		30
	a. Hydrotherapy & Spa		80
	b. Yoga & Meditation Hall		60
	c. Sound Healing & Aromatherapy		25
	d. Outdoor Healing Gardens		200
4	Community & Educational Spaces		
	a. Mothers' Lounge		50
	b. Parenting & Infant Care Class		60
	c. Toddler Play & Daycare		50
5	Laundry & Housekeeping		50
6	Organic Healing Café		100
7	Kitchen		50
Administration			
1	Reception		14
2	Waiting Area		24
4	Help Desk		5
5	Account Room		6
6	Medical Records Room		40
7	Administrative Officer Room		12
8	Staff Cubicles (Admin Staff)		45
9	Director / Superintendent Room		25
10	Meeting / Conference Room		40

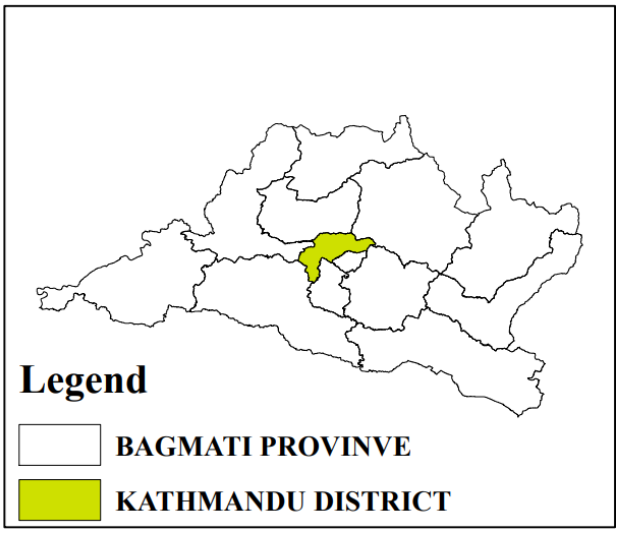
11	Matrons Office		25
12	Staff Room		12
13	Staff Restroom	2	12
14	Public Restroom	2	16
Pharmacy			
1	Waiting Area		24
2	Inpatient Pharmacy		30
3	Dispensing Counter (OPD Pharmacy)		40
4	Records Room		6
5	Staff Changing / Washroom		4

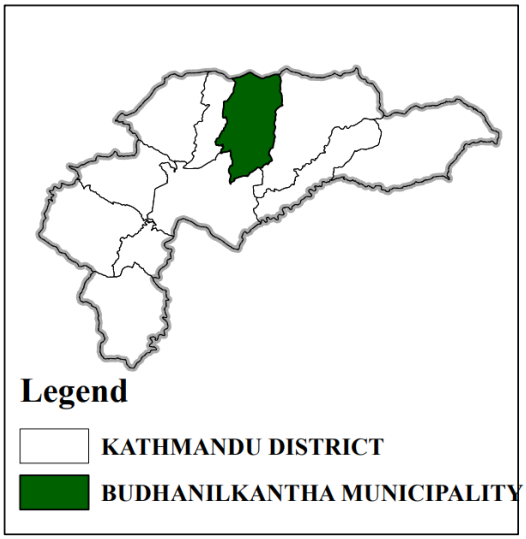
Oxygen Plant/ Central Supply			
1	Oxygen Supply		25
2	Compressed Air		25
3	Nitro Oxide		25
4	Cylinder		12
5	Office		15
CSSD			
Dirty Zone			
	a. Receiving Area		10
	b. Decontamination		10
	c. Assembly & Packing Room		12
	d. Sterilization Room		10
Clean Zone			
	a. Sterile Store Room		6

	b. Dispatch Counter		6
	c. Record Room		8
	d. Staff Changing & Handwashing Area		4
Laundry			
1	Receipt and sorting		5
2	Sluice and washing		8
3	Hydro Extraction		7
4	Drying		15
5	Press		10
6	Clean storage and issue		15
Other Spaces			
	Mortuary		150
	Kitchen		40
	Cafeteria for Staff		40
	Electric Room		25
	Mechanical Room		25
Sub Total Area			3701.6
Circulation Area (25 % of total area)			925.4
Total			4627
Open Space			2313.5
Total Area			6940.5

5. Design Concept







Budhanilkantha is a city and municipality in Kathmandu district of Bagmati province of Nepal. It is the 3rd largest city in the Kathmandu Valley after Kathmandu and Lalitpur.

5.1 Site Potential

The selected site for the proposed Hospital and Wellness Center is located in the serene neighborhood of Budhanilkantha, Kathmandu, approximately 1 km from the Ring Road, ensuring convenient accessibility while maintaining a peaceful environment. The site lies adjacent to a dense forest on its western edge, offering a natural buffer and a strong potential for integrating biophilic design. Surrounded by residential dwellings, educational institutions, and green spaces, the location provides an ideal balance of tranquility, community connectivity, and therapeutic ambience—essential for both medical care and holistic wellness.

According to the basic thumb rule for hospital site selection, the location must fulfill key criteria such as proximity to a main road for emergency access, low noise and pollution levels, availability of open space for future expansion, and a healthy surrounding environment that supports patient wellness. This site aligns well with these standards — it is close to urban infrastructure yet free from the congestion of the city core, lies adjacent to a dense forest offering natural tranquility, and is surrounded by low-density residential zones with minimal noise disturbance. The general feature of selected site are as follows:

1. Natural Edge and Adjacent Hillock

One of the site's most valuable features is the hillock on its western boundary, which offers immense biophilic design potential. Studies show that integrating natural environments into healthcare facilities can significantly reduce stress, improve recovery times, and enhance overall well-being. The forest allows for the creation of healing gardens, therapy walkways, meditation spaces, yoga decks, and outdoor relaxation

areas. Additionally, the tree cover serves as a natural noise and pollution buffer, shielding the site from external urban disturbances while promoting better ventilation and scenic views.

2. Proximity to Urban Infrastructure

The site is located just 1 km from the Ring Road, ensuring excellent connectivity for patients, hospital staff, emergency vehicles, and medical supply deliveries. Quick access to major roads is crucial for healthcare facilities to function efficiently and to accommodate visitors without transportation difficulties. The proximity to urban centers also allows for faster emergency response times and ease of access to supporting medical services.

3. Quiet Residential Setting

Budhanilkantha is predominantly a residential and peaceful area, making it an ideal environment for patient recovery, postnatal care, and holistic wellness programs. Unlike urban hospital settings, which are often plagued by noise and congestion, this location provides a low-stress healing environment. The absence of industrial or commercial disturbances enhances comfort, ensuring a serene atmosphere that is essential for wellness-focused facilities.

4. Buildability and Approach

The site has multiple access roads, ensuring smooth traffic flow for different users, including ambulances, general visitors, and hospital staff. The relatively open landform, with fewer built structures compared to surrounding housing clusters, makes it highly feasible for construction without requiring major demolition. These factors significantly reduce site preparation costs and allow for a more flexible master planning approach, ensuring optimal spatial organization for hospital, wellness, and community-oriented zones.

5. Availability of utilities

The site is facilitated with utilities like water, sewerage, electricity, fuel and telephone.

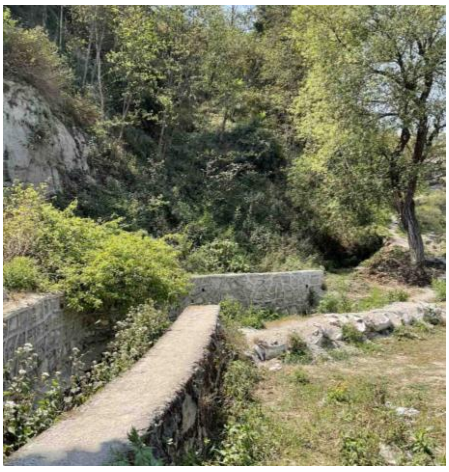


Figure 49: Rajkulo of width 1-2 m runs in the western border of the site

1. Accessibility

The site is located approximately 400 meters inside the main highway, Golfutar Sadak. Accessibility to the site is facilitated by a network of roads branching from the primary highway. The site is about 3 to 4 minutes drive from Narayan Gopal Chowk. The major access route is a well-defined arterial road that connects directly to the site, ensuring convenient entry. Additionally, the presence of secondary and tertiary roads in the vicinity provides multiple alternative routes, improving connectivity for pedestrians and vehicles.

Figure 50: Service Road on the west side connecting the main road

Figure 51: The site is accessed via a 4-meter-wide stream road originating from the Secondary highway.

Figure 52: Stream Road originated from the main highway

2. Surrounding Context

The site is agricultural land gradually inclining towards the residential zone. The site surrounding is being used for Nursery, Sculpture Warehouse. The area across the road is a residential area and schools and small Factories like paper and aqua factories are also located nearby the site.

The site is surrounded by a hillock on its western side. A 4m wide road can be a potential element on the as the secondary access can be given through the path.

Figure 53: Site is fully a farming land

3. Site Character

- Land Topography
- The site is level with the road at its entrance and gradually rises toward the west.
- The site has contours varying 1 feet.
- Soil Condition

The soil is sandy. Its bearable capacity is medium.

- Vegetation

The proposed site is agricultural land.

5.2 Climatic Study

1. Temperature

Budhanilkantha experiences a moderate temperate climate, with noticeable seasonal variations. The average annual temperature ranges from 10°C to 25°C, creating a comfortable living environment.

- Winter (December–February): Temperatures can drop as low as 3°C to 5°C at night, making it necessary to incorporate thermal insulation and passive solar heating strategies in buildings. The days remain cool and pleasant, with temperatures hovering around 15°C to 20°C.
- Summer (May–July): The region experiences warm but tolerable temperatures, reaching up to 27°C to 30°C. The presence of surrounding vegetation and the Shivapuri hills helps regulate excessive heat, ensuring a cooler microclimate compared to urban areas in central Kathmandu.
- Spring and Autumn (March–April & September–November): These seasons offer the most pleasant climatic conditions, with temperatures ranging between 15°C to 25°C, making it ideal for outdoor activities and natural ventilation strategies.

2. Rainfall

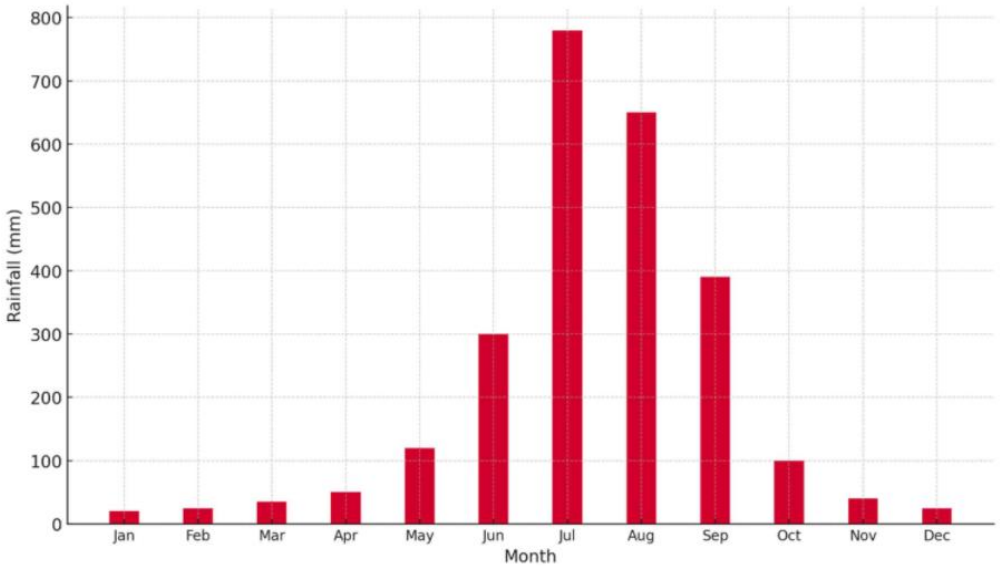
Budhanilkantha experiences heavy monsoonal rainfall, primarily between June and September. The annual average precipitation ranges from 1,400 mm to 1,800 mm, making proper water management essential for any architectural development.

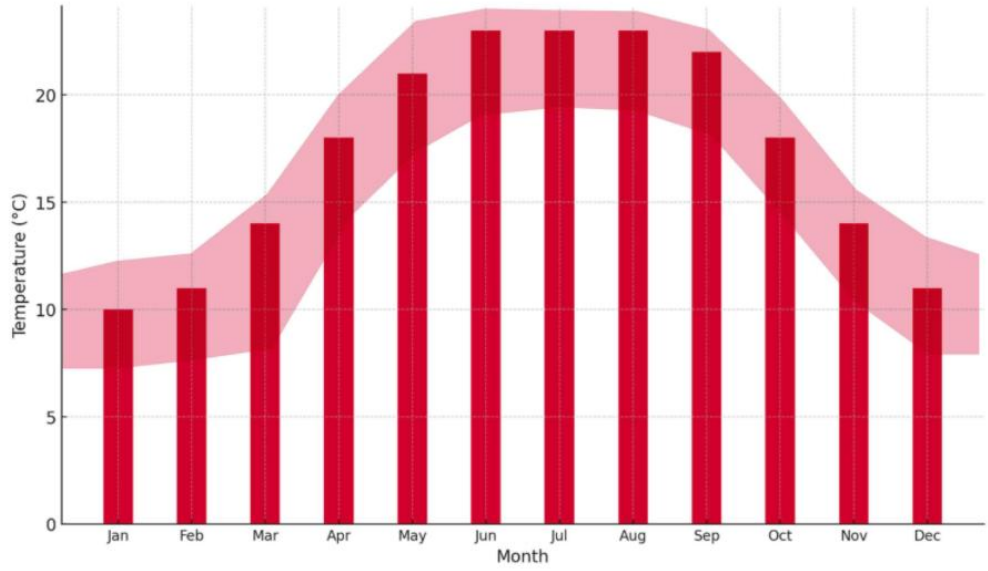
- The monsoon season (June–September) accounts for over 80% of annual rainfall, often resulting in waterlogging and increased humidity. Proper site drainage planning, elevated plinths, and rainwater harvesting techniques can help mitigate potential flooding issues.
- The post-monsoon period (October–November) brings reduced rainfall, with occasional showers, making it a transition phase toward drier conditions.
- The winter months (December–February) receive minimal rainfall, often below 50 mm per month, leading to drier conditions. This allows for maximum utilization of passive solar heating and water conservation strategies.

3. Humidity

Humidity levels in Budhanilkantha vary significantly depending on the season, ranging between 50% to 85%.

- Monsoon Season: High humidity levels (above 80%) lead to a damp environment, which may result in mold growth and discomfort if ventilation is inadequate. Designing buildings with cross-ventilation, breathable materials, and dehumidification techniques can help mitigate these effects.
- Winter Season: The humidity drops to 50%–60%, creating a dry atmosphere that can cause discomfort, particularly indoors. Passive design strategies such as thermal mass walls and interior greenery can help maintain indoor moisture balance.
- Summer and Transitional Seasons: The humidity remains moderate (60%–70%), ensuring a comfortable environment with adequate airflow. Natural ventilation and shaded outdoor spaces can further enhance indoor comfort.





5.3 By Laws

Group D: Hospitals and Clinics
Sub Group D2: Medical Institutions with more than 25 beds

Legal Framework for Small Hospital (50 Bed)
The legal framework for hospital registration in Nepal is primarily based on the following legislation:
Public Health Service Act, 2075 (2018)
Public Health Service Regulation, 2077 (2020)
Health Institution Establishment, Operation and Upgrade Standard, 2077 (2020)

Building Requirements

1. Minimum Floor Area: The hospital should have a minimum floor area of 100 square feet per bed.
2. Emergency Department: A dedicated emergency room with at least 150 square feet of space.
3. Outpatient Department (OPD): Adequate space for OPD services, including consultation rooms and waiting areas.
4. Inpatient Wards: Properly ventilated wards with sufficient space between beds (minimum 4 feet).
5. Operation Theatre: For hospitals providing surgical services, a fully equipped operation theatre is mandatory.
6. Laboratory: A well-equipped laboratory for essential diagnostic tests.
7. Pharmacy: A separate area for medication storage and dispensing.
8. Waste Management Area: Designated space for proper medical waste segregation and storage.

Utility Requirements

1. Water Supply: Continuous supply of clean water, with a minimum storage capacity of 100 liters per bed.
2. Electricity: Reliable power supply with backup generators for uninterrupted service.
3. Sanitation: Adequate number of toilets and bathrooms for patients and staff.
4. HVAC System: Proper ventilation and air conditioning, especially in critical areas like operation theatres

Minimum Staff Requirements

1. Medical Officers: At least one medical officer per 10 beds, available 24/7.
2. Nursing Staff: A minimum ratio of 1 nurse per 3 beds for general wards.

3. Paramedical Staff: Adequate number of lab technicians, pharmacists, and other paramedical staff based on services offered.
4. Specialist Doctors: For hospitals offering specialized services, relevant specialist doctors must be available.

Setback

- For hospitals, minimum setbacks are generally 3–6 meters depending on road frontage and the total built-up area.
- The rear setback should be at least 20% of the plot depth in urban areas.
- The side setbacks depend on the plot size and height but should be a minimum of 1.5 to 3 meters for multi-story hospital buildings

Right of Way (ROW)

- The ROW depends on the classification of the road:
- Primary roads (highways & major streets): 20-30 meters
- Secondary roads: 12-20 meters
- Local roads: 6-12 meters

Floor Area Ratio (FAR)

For hospitals in Kathmandu:

- On smaller roads (6-10m ROW): FAR = 1.5 to 2.5
- On medium roads (10-20m ROW): FAR = 3.0 to 4.0
- On major roads (above 20m ROW): FAR can go up to 5.0 or higher depending on municipal approval

Occupant Load

The requirement of the exit system is based on no of occupants in the building or at each floor level or at each occupancy zone within the building. The designer should calculate occupant load as if all of the area is occupied to determine the maximum possible number of occupants to be accommodated by the exit system.

Table 1 - Maximum Floor Area Allowances per Occupant

	Building Type	Max. area per occupant [Sq.m] - A	Minimum Occupants per 100sq.m [example]
D.	Hospitals& Clinics	14	8

General Exit requirement

The maximum travel distance to exits or stairways from any point within the single floor level shall not be more than 30m for all types of building except when an external corridor of 15m or more is part of the route, in which this distance may be increased to 40m. However it may be noted that external corridor are not allowed

Table 2 - Exit Width Calculation Table

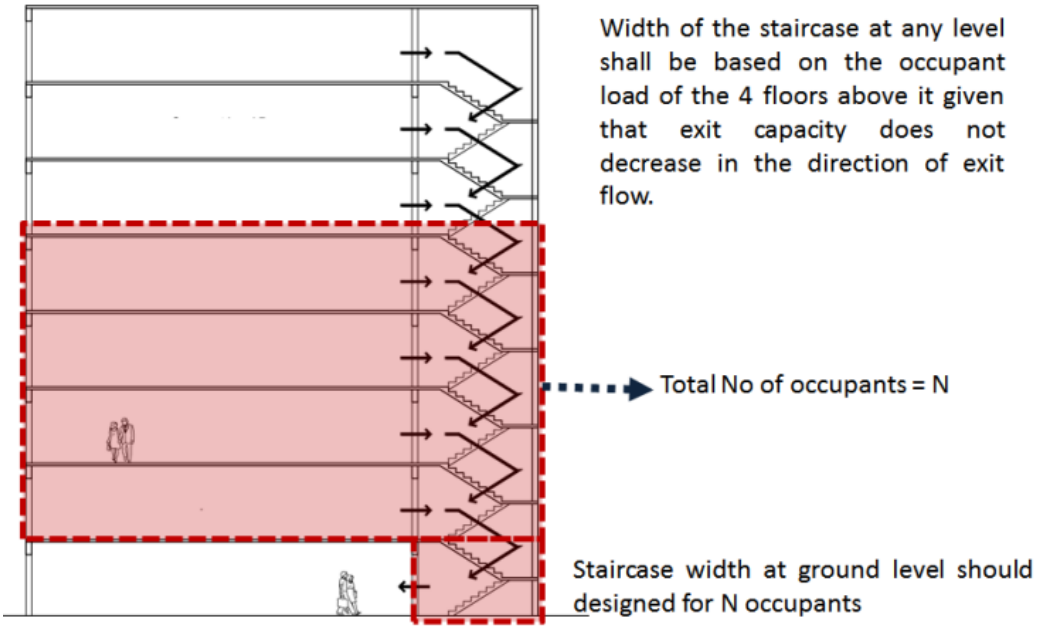
	A	B	C
	Minimum Width (m)	Occupant per unit 500mm width - A	No of occupants when exit medium width exceeds the min. limit - B

Staircase & Ramps

	A	**B**	**C**
Occupancy Type	**Minimum Width (m)**	**Occupant per 500mm width [For ramps add 10 occupants]**	**No of occupants when stairway width exceeds the min. limit**
Hospitals& Clinics	1.8	25	75
Stretcher & equipment accessible	2.2		

For reduced use staircases which are not part of the normal exit system such as accesses to lofts, attics and terraces, the minimum width shall be 600mm.

Fig. 1 Width of the exit route or the staircase at any point is calculated based on the occupant load of the upper four floor



General Staircase Requirements

- For all buildings above 500sq.m in plinth area there shall be at least two staircases. Additional exit route shall be provided for every 500sq.m of plinth area there on.
- Specific Stairways requirements for medium rise and high-rise buildings are provided under respective headings
- Any High rise building above 50m shall have one pressurized staircase as dictated by the 'Fire safety code'.
- All secondary or fire escape staircase shall have at least one side facing towards exterior All staircases except those that are meant for reduced use and not the part of exit system staircases such as accesses to lofts, attics and terraces shall conform to following requirements

Table 4 Staircase Details	
Minimum Tread – A	
Residences	250mm [10"]
Other Buildings	279mm [11"]
Maximum Riser– B	
Residences	190mm [7.4"]
Other Buildings	175mm [6.9"]
Maximum no of risers per flight	15
Minimum Head room under the staircase - C	2m [6'-6"]
Height of the Handrail from center of the tread - D	900mm [3']

Green Space

At least 5% of the total site area must be dedicated to green belt/green space, as per the official norms under hospital infrastructure standards in Nepal.

Lifts

Lifts indicate appliances designed to transport persons or material in a vertical direction.

A. Lift Provision requirement

- Provision of Lift(s) shall be made for all the buildings above 5 stories or 16m in height.
- Provision of at least two lifts shall be made for high rise building [above 8 stories or 25m in height]. At least one of the lifts shall be a fire lift that can be used by firefighters for rescue and access in case of emergency.
- If lifts are provided, at least one of the lifts within the buildings under category 2 and 3 of 'Disabled Accessibility' shall be accessible to the people on the wheel chairs. It may be noted however that provision of lifts for buildings under category 2 is not mandatory while in case of category 3, ramps may substitute for lifts.

B. Lift Size and Capacity requirement

- Minimum width of the Category 3 disabled accessible lift car shall be 1200mm X 1400mm while it shall have minimum clear opening of 800mm
- Minimum width of Hospital lift car shall be 1200mm X 2400mm while having a minimum clear opening of 900mm
- A fireman's lift shall have loaded capacity of not less than 500kg [8 persons]. The lift car of the fire lift shall have floor area not less than 1.44sq.m.

C. Disabled Accessibility Requirements

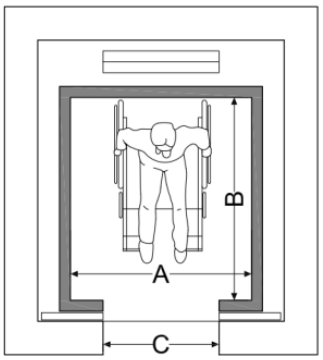
- All lifts shall be accessible without disturbance from the parking and main approach of the building to the wheelchair bound people
- All disabled accessible lifts within the buildings shall emit audible sound to ease the travel of visually impaired people.
- Height of the controls from the lift floor level shall be at most 1200mm for all disabled accessible lifts.

D. Fire Safety Requirements

- Shafts for all lifts shall be enclosed by walls having fire resistance of two hours.

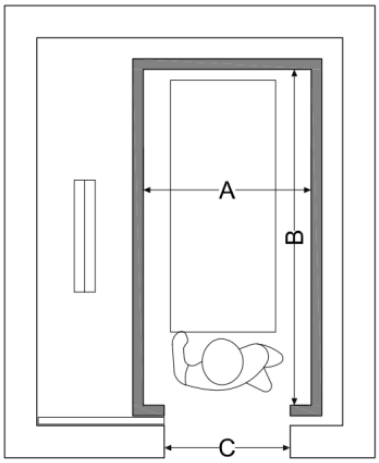
E. Electrical Installation Requirement

- The electric supply for the fire lifts and Hospital lifts shall be on a separate supply line from the supply mains. In case of failure of normal electric supply, it shall automatically trip over to an alternate power source
- All lifts in case of power failure shall stall with the door open at the nearest floor to enable the passenger to exit



Min. dimensions of disabled accessible Lift

A	1250 mm
B	1400mm
C	800mm



Min. dimension of Hospital lifts

A	1200 mm
B	2400mm
C	900mm

Figure 54: Lift car sizes

Basements

Basements are the lower story or storey of a building that are either completely below the average ground level or extending up to 1.2m above the average ground level. Any floor above 1.2m level shall be considered as Semi-basement floor.

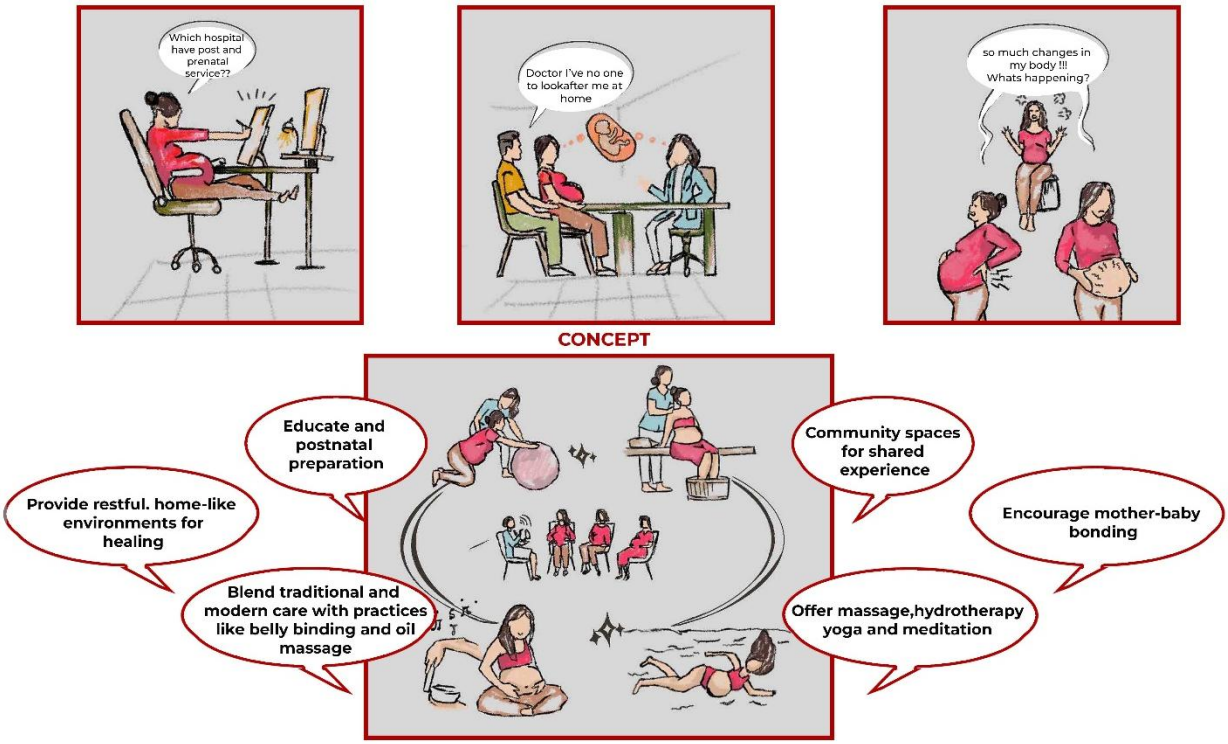
A. Basic Requirements

- Basement floor shall not be used for residential purpose
- The minimum height of the basement floor shall be 2.4m
- Adequate arrangement shall be made such that surface drainage doesn't enter the basement. The walls and floors of the basement shall be water tight

B. Ventilation Requirements

- Each basement shall be separately ventilated. Vents with cross sectional areas not less 2.5% of the floor area spread preferably around the perimeter of the basement shall be provided through stall boards, pavement light or through shafts [in case of double basements]
- Each basement above 200sq.m shall have a minimum of one each system of air inlets and smoke outlet served through a mechanical system. Additional vent system shall be provided for every 200sq.m of plinth area there on.

Conceptual Development



The Maternity Oasis is conceptualized as a haven for maternal recovery and community health, addressing the various challenges mothers encounter during the postpartum phase, such as physical discomfort, emotional sensitivity, and insufficient support. This framework is derived from numerous conversations and observations, illustrated in a storyboard featuring scenarios like a working mother facing overwhelming responsibilities, a pregnant woman adjusting to bodily changes, and a patient voicing concerns about the lack of home support.

These relatable instances guide the development of an environment that transcends typical hospital settings. The aim of the project is to transform postpartum care architecture by creating a nurturing and restorative space that integrates cultural significance with contemporary wellness practices. The design merges traditional postpartum methods, including belly binding and oil massage, with modern therapeutic approaches such as hydrotherapy, yoga, and meditation, facilitating the physical and emotional healing journey of mothers.

Key elements of the design vision include:

- Education and preparation for life after childbirth, calming,
- Home-like healing spaces to soften the clinical atmosphere, community areas that promote peer connections and shared experiences, and fostering mother-baby bonding to enhance emotional and physiological ties during recovery.

The concept recognizes the essential role of built environments in promoting wellness, featuring a series of interconnected yet strategically zoned areas that transition from public engagement to private healing.

As Bernard Tschumi noted, “Architecture is not just about space and form, but also about event, action, and what happens in the space.”

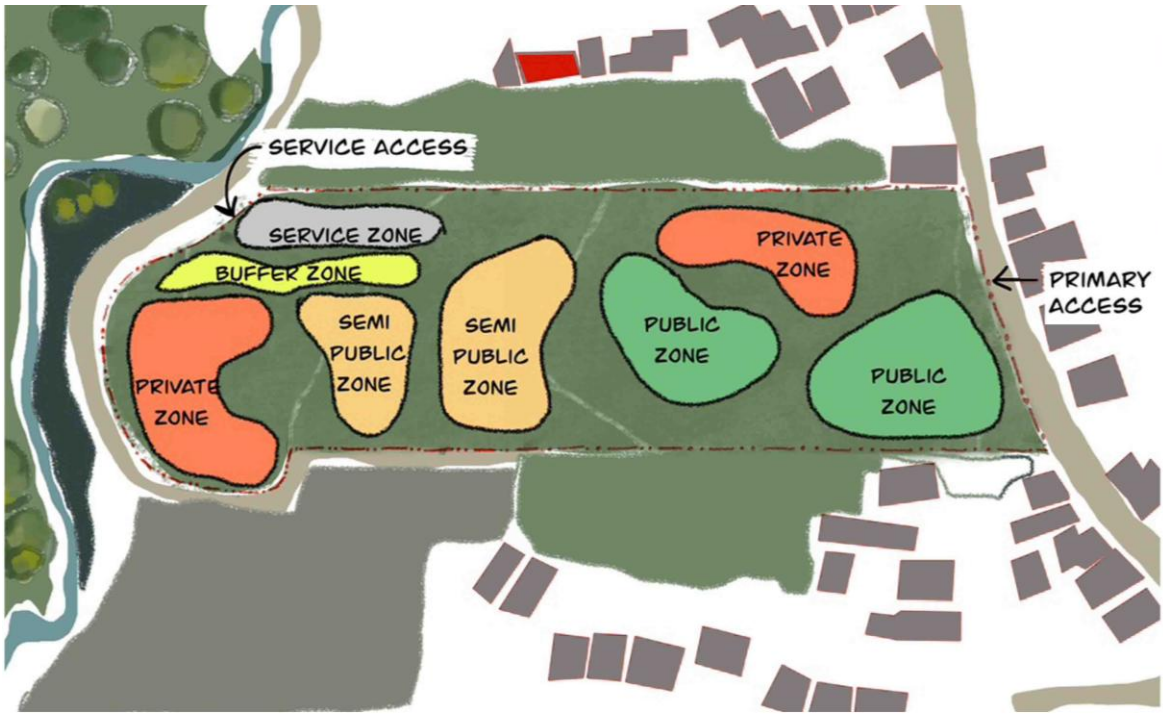


Figure 55: Site Responsive Zoning

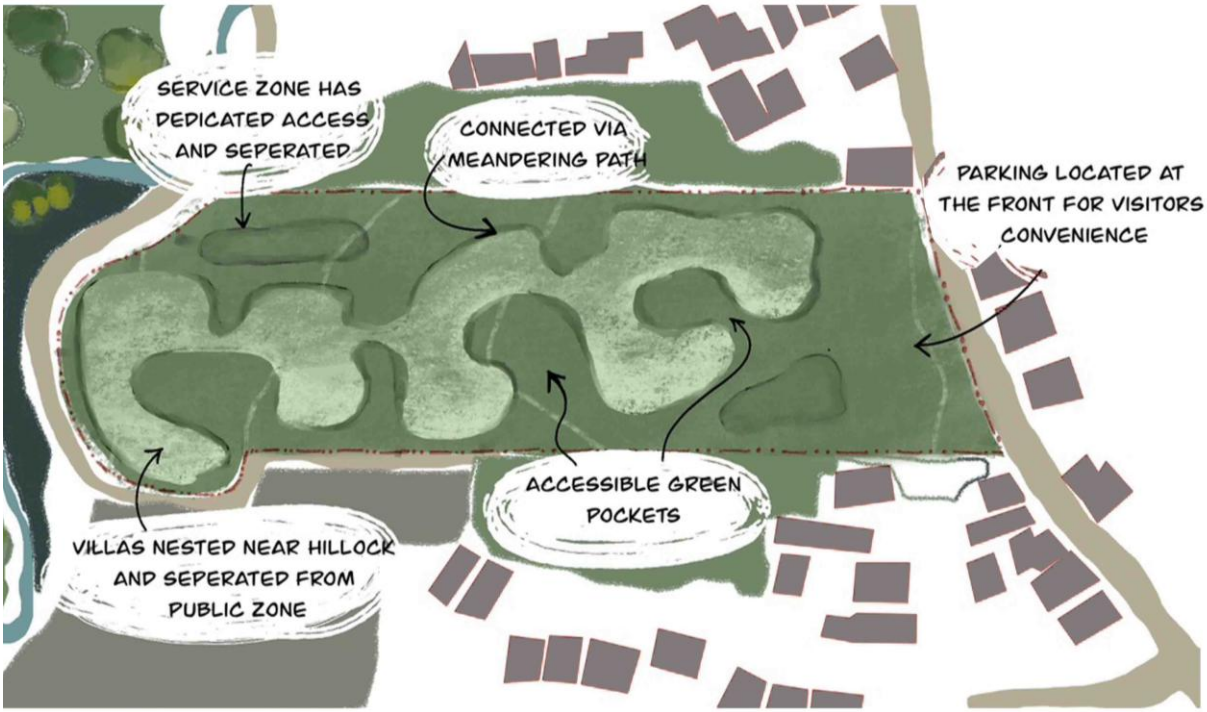


Figure 56: Zoning and their Justification

The zoning of the site is thoughtfully designed to address mothers' emotional needs while ensuring the clarity of healthcare functions. This zoning approach comprises four primary spatial types:

1. Private Zone: Positioned against the site's natural hillocks, the postpartum villas are intentionally distanced from public and semi-public areas, providing the tranquillity vital for maternal recovery.

2. Semi-Public and Public Zones: These areas are located progressively closer to the site's entrance and include facilities for therapy, education, and community interactions, allowing controlled access for external visitors.

3. Service Zone: Designed with separate service access, this zone maintains essential functionality without disrupting the peaceful atmosphere of patient-focused spaces.

4. Meandering Pathways and Green Pockets: Emphasizing biophilic design, the layout incorporates pedestrian pathways through accessible green areas, promoting movement, mindfulness, and a connection with nature—key components in emotional healing.

The zoning reflects not only privacy and access hierarchies but also cultural sensibilities, acknowledging the strong link between healing, environment, and ritual.

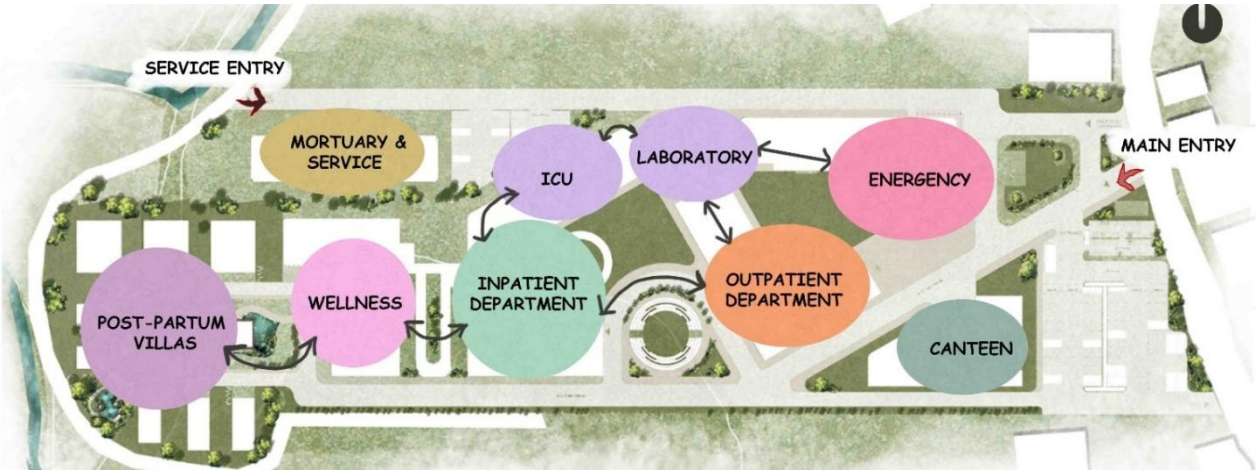


Figure 57: Bubble Diagram

The bubble diagram organizes the architectural program according to the zoning strategy, ensuring a cohesive spatial experience: -

- Postpartum Villas: Situated in the southwestern corner for optimal privacy, bordered by green spaces, and removed from main circulation paths.

- Wellness Block: Adjacent to the villas, this block features yoga, meditation, and hydrotherapy areas, creating a seamless transition between healing and medical care.

- Inpatient Department: Centrally located to connect the ICU and Outpatient Department through short, efficient corridors, enhancing response times and operational effectiveness.

- ICU & Emergency Units: Located centrally and directly linked to lab facilities and inpatient services for smooth clinical interventions.

- Outpatient Department and Canteen: Positioned near the main entrance to facilitate access while keeping public interaction concentrated at the site's periphery.

- Mortuary and Service Area: Carefully located at the far end of the service zone to separate emotional aspects from logistical functions. This zoning ensures that each group—mothers, healthcare professionals, staff, and visitors—experiences the space according to their specific needs for purpose and privacy.

In conclusion, the Maternity Oasis addresses the neglected needs of postpartum mothers through mindful design, human-centred zoning, and environments sensitive to healing rituals. Rooted in community wellness and architectural compassion, this concept invites a fresh perspective on maternal healthcare spaces in Nepal.

As Hippocrates stated, "Healing is a matter of time, but it is sometimes also a matter of opportunity."

CONCLUSION

The Maternity Oasis project presents a thoughtful architectural solution to the often-neglected requirements of working mothers during both the prenatal and postpartum periods in Nepal. By synthesizing thorough research, contextual insights, and a user-focused design approach, this initiative seeks to redefine maternal care environments beyond mere clinical settings. It aims to create nurturing, therapeutic spaces that are deeply connected to cultural values. Acknowledging the numerous challenges faced by today's working mothers—such as physical fatigue, emotional sensitivity, and insufficient community support—the design emphasizes aspects of healing, wellness, privacy, and interpersonal connections.

By merging traditional caregiving methods with modern therapeutic facilities, the project promotes a comprehensive approach to recovery that addresses both physical and mental well-being. The layout strategy, spatial organization, and programmatic design focus on ensuring privacy and tranquility, while also allowing for community engagement, education, and support. The design is attuned to the unique characteristics of the Budhanilkantha landscape, enhancing the healing experience through biophilic elements and carefully designed open areas. In essence, Maternity Oasis exemplifies how architecture can drive social transformation, providing a secure, empowering, and rejuvenating environment for mothers to heal, connect, and flourish within a supportive community.

REFERENCE

Abdelaal, M. S., & Soebarto, V. (2018). The death of modern hospitals: Towards a comprehensive approach for restorative healthcare environmental design. *Architectural Science Review*, *61*(3), 201–210.

Ali, S., Thind, A., Stranges, S., Campbell, M. K., & Sharma, I. (2023). Investigating health inequality using trend, decomposition and spatial analyses: A study of maternal health service use in Nepal. *International Journal of Public Health, 68*, 1605457.

ArchDaily. (2023). SEEDoc: Nyanza Maternity Hospital / MASS Design Group. https://www.archdaily.com/987005/seedoc-nyanza-maternity-hospital-mass-design-group

Atif, R., Sikander, S., Lazarus, A., Nisar, A., & Ahmad, I. (2008). Cognitive behavior therapy-based intervention by community health workers for mothers with depression and their infants in rural Pakistan: A cluster-randomized controlled trial. *The Lancet*, *382*(9886), 902–909.

Avata Wellness. (n.d.). Prenatal and Postnatal Retreat with Leila Ng Caceres. https://www.avatawellness.com/content/prenatal-and-postnatal-retreat-with-leila-ng-caceres

Burger, M., Hoosain, M., Einspieler, C., Unger, M., & Niehaus, D. (2020). Maternal perinatal mental health and infant and toddler neurodevelopment—Evidence from low- and middle-income countries. *International Journal of Environmental Research and Public Health*, *17*(1), 158–172.

Ceccarelli, C., et al. (2024). Infection prevention and control measures in maternity hospitals. *Journal of Healthcare Architecture and Safety*, *12*(2), 145–169.

Cuijpers, P., Karyotaki, E., Weitz, E., Andersson, G., Hollon, S. D., van Straten, A. (2008). The effects of psychotherapies for major depression in adults on remission, recovery and improvement: A meta-analysis. *Journal of Affective Disorders*, *109*(1–2), 1–9.

Dennis, C. L., & Hodnett, E. D. (2007). Psychosocial and psychological interventions for treating postpartum depression. *Cochrane Database of Systematic Reviews*, (4).

Guilherme, C. (2013). Hospital architecture and design for infection control. *Brazilian Journal of Infectious Diseases*, *17*(3), 313–321.

International Health Facility Guidelines. (2023). Wayfinding and signage. https://healthfacilityguidelines.com

Kelemu, A. G. (2017). Postpartum infection and surgical site infection in low-resource settings. *Ethiopian Journal of Health Sciences*, *27*(4), 357–363.

Krokowska, A. (2021). The role of healing architecture in the design of healthcare facilities. *Healthcare Design Journal*, *15*(3), 112–124.

Louise M. Howard, Piot, P., & Stein, A. (2014). No health without perinatal mental health. *The Lancet*, *384*(9956), 1723–1724.

Moxon, S., Ruysen, H., Kerber, K. J., Amouzou, A., Fournier, S., Grove, J., Moran, A. C., Vaz, L. M. E., Blencowe, H., & Gülmezoglu, A. M. (2015). Count every

newborn; a measurement improvement roadmap for newborn health and survival. *The Lancet*, *385*(9966), 466–476.

Raga Svara. (n.d.). Ayurvedic healing and retreat centre. https://ragasvara.com

Simour Design. (n.d.). Design considerations for medspa massage rooms. https://simourdesign.com/design-considerations-medspa-massage-room/

Trends and correlates of caesarean section rates over two decades in Nepal. *BMC Pregnancy and Childbirth, 20*(1), Article 763.

Ulrich, R. S. (1984). View through a window may influence recovery from surgery. *Science*, 224(4647), 420–421.

Watts, D. H. (1992). Postpartum infections. *Obstetrics and Gynecology Clinics of North America*, *19*(3), 573–589.

World Health Organization. (2019). Guidelines on hand hygiene in health care. https://www.who.int/publications/i/item/9789241597906

ANNEX