

# CARE OF KOLANDOTO

THE ROLE OF CULTURAL AND LOCAL ADAPTATION IN  
HOSPITAL DESIGN



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*ARCHITECTURE IS A GAME OF INNOVATION AND CREATIVITY AND ARCHITECTS CAN IMPROVE PATIENT OUTCOMES BY REDUCING STRESS THROUGH INNOVATIVE DESIGN OF HOSPITAL INTERIORS USING LIMITED RESOURCES. LESS CAN SOMETIMES BE MORE AND THE ARCHITECT CAN USE MINIMUM RESOURCES TO CREATE A REQUIRED LEVEL OF COMFORT IN HOSPITAL SETTINGS. THIS THESIS AIMS TO SHOW HOW ELEGANT SOLUTIONS CAN BE IMPLEMENTED THROUGH VERNACULAR ARCHITECTURAL PRINCIPLES WHEN THE DESIGNERS UNDERSTANDS THE CONTEXT.*

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# ABSTRACT

Regardless of our gender, socio-economic or ethnic background, our health is considered to be our most basic asset. The right to health is a fundamental part of our human rights and one key aspect of the right to health includes access to quality healthcare. According to United Nations’ ‘Millennium development goals’, the poor standard of the built environment at health facilities in developing countries, is a major factor that could be improved to decrease the risk of infections and number of deaths significantly.

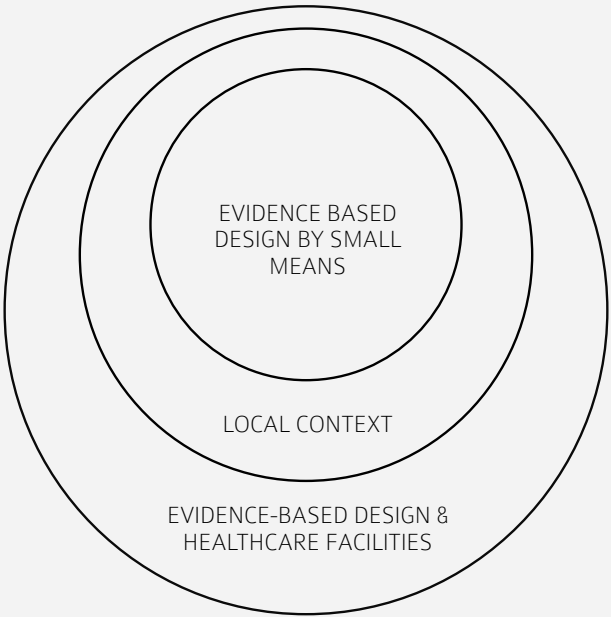
Scarce resources in terms of personnel, money and adequate spaces, is the case at Kolandoto Hospital in Tanzania. The hospital is a private hospital with governmental support that provides services consisting of both inpatient and outpatient care. The hospital has great challenges ahead with large infrastructural improvements, since an increase in number of patients is expected.

The purpose of this master thesis is to investigate the role of culture and local adaptation in evidence-based design, in order to create healing hospital environments in an international development context - a subject, where nearly all studies are made within the western context.

High-quality solutions built with small means, are shown in two phases of a building process - a refurbishment of a maternity ward together with a new building for a private ward.

The research has been carried out through literature and analysis of evidence-based design and the local socio-cultural context. Workshops and interviews were arranged, together with field trips and participation in an on-site construction of the hospital’s new emergency department.

This thesis shows various strategies to improve the accessibility to quality healthcare in many levels and results in a design showing that quality healthcare environments can be created with low-technical solutions when the designer understands the context and an effort is put into the architecture.



THESIS OVERVIEW

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# 1. INTRODUCTION

THE BACKGROUND, REASON & GOAL

# 1.1 PROJECT BACKGROUND & COLLABORATIONS

This master thesis is part of the development project ‘Healthy Hospital’. The project is a collaboration between Kolandoto Hospital and the three Swedish NGOs; Involve Aid (IA), Architects without borders (ASF) and Engineers without borders (EWB). The interdisciplinary project aims to support a sustainable development of building infrastructure, water and electricity at Kolandoto Hospital. With improved facilities, the hospital aims to fully become a Council Designated Hospital (CDH).

The project has been carried out in several phases. This master thesis is the third phase of the project. The first phase of ‘Healthy Hospital’ took place 2015 and included a full survey of the infrastructure and context of Kolandoto Hospital together with a masterplan for future development. The masterplan included a gradual development with order and timing of the interventions needed to meet the current and future needs of the hospital. The most urgent interventions were made on site, which was an extension of the maternity operating theatre together with short term engineering solutions concerning water and electrical systems.

The second phase took place 2016 and consisted of the implementation the recommended design solutions from the first phase. Further improvements of the hospital’s water system and power supply system were also made, in combination with a design proposal for a new emergency department.

The third phase is similar to phase two and a continuation of the masterplan for the development of the hospital. The phase include a design proposal for a refurbishment of the maternity ward and a new building for the private ward as well as the construction of the new emergency department.

Two master theses are conducted during the third phase. This architectural thesis alongside with an engineering master thesis on the topic of revision in aid projects, centered on a case study at Kolandoto Hospital.

## THE NGO;S:

### INVOLVE AID (PREVIOUS NAME I AID AFRICA):

IA is an NGO working with mostly health issues in Tanzania. It has an established collaboration with Kolandoto Hospital since 2008.

### ARCHITECTS WITHOUT BORDERS SWEDEN:

ASF is an NGO that works for socially, environmentally and economically sustainable development of the built environment across the world.

### ENGINEERS WITHOUT BORDERS SWEDEN:

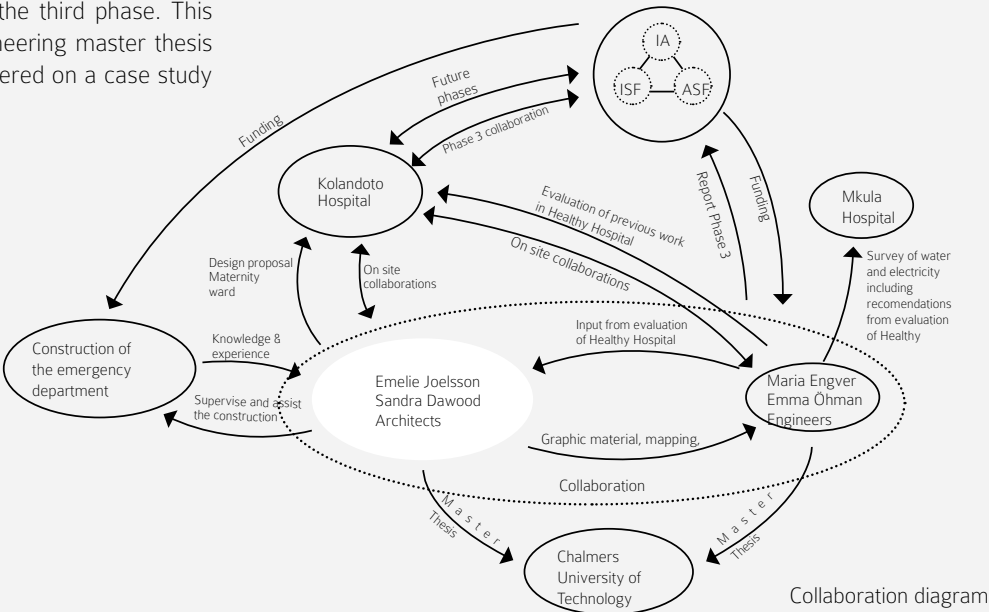
EWB is an NGO that intendeds to contribute to a better world by engineering, science, entrepreneurship and project management. The work is carried out through volunteer projects in primarily Africa and through seminars in Sweden, to broaden the minds of professional engineers.

### AFRICAN INLAND CHURCH TANZANIA:

The AICT is a faith based organization (FBO) whose goal is to support individuals, families and communities, both physically and spiritually. The organization is working to try to achieve quality healthcare for all individuals, regardless of economic status. AICT has several medical facilities and also conducts field activities. The organization’s headquarter are based in Mwanza, Tanzania. AICT runs Kolandoto Hospital and has cooperated with I Aid Africa since 2008.

### MINOR FIELD STUDIES:

The thesis will be carried within the framework of the Minor Field Studies Scholarship Program, (MFS), which is funded by the Swedish International Development Cooperation Agency, SIDA.



### Kolandoto Hospital:

The hospital was founded by an American missionary doctor 1913 and is run by the African Inland Church Tanzania (AICT). It is a private educational hospital located in a village close to Shinyanga town, a regional capital in the northwestern part of Tanzania. The facility provides healthcare services consisting of both inpatient and outpatient care including extensive care such as surgery, a special leprosarium center and an eye department. The total catchment population is of about 15 000 people.

The hospital consists of many buildings connected with outdoor pathways and has around 180 beds. Currently the private ward and the maternity ward are in the same building, where the maternity ward has 23 beds and 2 delivery beds in the delivery room. The catchment area currently has about 600 pregnant women and all women have the right to receive free maternal health care.

The private ward has 17 beds divided in different levels of standards. The ward provides a good opportunity for income to the hospital, since patients who are able to get admitted here, pay a higher fee than other patients. The private ward can charge this higher fee, as it offers a slightly higher standard than the other wards at the hospital (Danielsson, 2015).

In 2010, the Ministry of Health and Social Welfare signed an agreement with Kolandoto hospital about their role of becoming a hospital at district level - a council designated hospital. This means that the government should support the hospital with staff salaries, drugs and materials. It also means that the hospital needs to do infrastructural improvements, since it results in an increase of number of patients together with lower patient fees.

Today, 7 years after the agreement, the hospital has not yet fully become a council designated hospital. The government supports the hospital with around 80 percent of the hospital's expenditure and around 64 staff members out of 130, get their salary from the government.



# 1.2 UN SUSTAINABLE DEVELOPMENT GOALS

## THE 17 GOALS TO STRIVE FOR

In September 2015, UN formulated 17 Sustainable Development Goals (SDG) for the upcoming 15 years, which replaced the previous 8 Millennium Development Goals (MDG). Similar to the millennium goals, the mission of the new goals, are to combat poverty, disease, environmental degradation and ensure prosperity. The new goals are built on the achievements of the MDGs but are broader, deeper and far more ambitious in scope by focusing both on west and developing parts of the world. According to UN, all development and planning of cities and buildings as well as other interventions that affect humans, the 17 goals should always be taken into consideration. For that reason, they are constantly present in the architectural profession.

## GOAL 3

Number 3 of the 17 goals, concerns health with the target to ensure healthy lives and promote well-being for all the ages and for all people. One main ambition is to end the epidemics of AIDS, tuberculosis, malaria and other communicable diseases by 2030, by providing access to safe and affordable medicines and vaccines for all people in all parts of the world. With the first 8 Millennium Development Goals, major progress have been made in reducing child mortality, improving maternal health and fighting diseases such as HIV/AIDS, tuberculosis and malaria, but according to UN, still more than 6 million children die before their fifth birthday every year from preventable diseases, hundreds of women die during pregnancy or from child-birth and millions of people suffer from the lack of access to quality healthcare. Many more efforts are thus needed to address the different persistent and emerging health issues.

### THE 17 SUSTAINABLE DEVELOPMENT GOALS:

#### 1. Poverty

*End poverty in all its forms everywhere.*

#### 2. Hunger and food security

*End hunger, achieve food security and improved nutrition and promote sustainable agriculture.*

#### 3. Health

***Ensure healthy lives and promote well-being for all the ages.***

#### 4. Education

*Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.*

#### 5. Gender Equality and Women's Empowerment

*Achieve gender equality and empower all women and girls.*

#### 6. Water and Sanitation

*Ensure availability and sustainable management of water and sanitation for all.*

#### 7. Energy

*Ensure access to affordable, reliable, sustainable and clean energy for all.*

#### 8. Economic growth

*Promote sustained inclusive and sustainable economic growth, full and productive employment and decent work for all.*

#### 9. Infrastructure, Industrialisation

*Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation.*

#### 10. Inequality

*Reduce inequality within and among countries.*

#### 11. Cities

*Make cities and human settlements inclusive, safe, resilient and sustainable.*

#### 12. Sustainable Consumption and Production

*Ensure sustainable consumption and production patterns.*

#### 13. Climate Change

*Take urgent action to combat climate change and its impacts.*

#### 14. Oceans

*Conserve and sustainably use oceans, seas and marine resources for sustainable development.*

#### 15. Biodiversity, Forests, Deforestation

*Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.*

#### 16. Peace and Justice

*Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.*

#### 17. Partnerships

*Strengthen the means of implementation and revitalise the global partnership for sustainable development.*  
(UN, 2016)

# 1.3 PROBLEM STATEMENT

## INEQUALITIES IN ACCESS TO HEALTHCARE

“As human beings, our health and the health of those we care about is a matter of daily concern. Regardless of our age, gender, socio-economic or ethnic background, we consider our health to be our most basic and essential asset” (WHO and OHCR, 2008). The right to health is a fundamental part of our human rights and a requirement for a dignified life. The key aspects of the right to health includes a wide range of factors, such as access to quality water and sanitation, adequate nutrition, adequate housing and healthy environmental conditions as well as access to adequate healthcare facilities. This should be fundamental and therefore it is a major problem that it cannot be fulfilled in an adequate way for most people in developing countries due to a lack of resources.

The lack of access to good healthcare, is a major driver of the large difference in maternal-and infant mortality rates between different countries. In Sweden, only about 4 women per 100 000 live born children, died during pregnancy, childbirth or complications associated with the birth in 2013. While in Tanzania, during the same year, that number was about 410 women per 100 000 live born children (Globalis, 2013). According to the World Health Organization, in 2015 over 300 000 women died worldwide during pregnancy and childbirth, with the majority of the deaths occurring in low-resource settings. Even though the number still is unacceptably high, large improvements have been made in the last 25 years. Between 1990 and 2015 maternal mortality worldwide dropped 44 % and the UN target is to reduce the global ratio to less than 70 per 100 000 live births by 2030.

## THE SCARCE RESOURCES

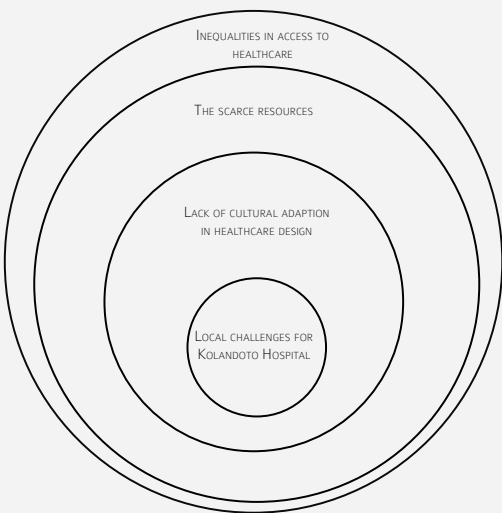
It is essential that future building development must respects the world’s scarce resources, not to jeopardize the environment, especially not the ones focusing on health.

An environmentally sustainable building is energy efficient, both including the building construction and in terms of usage of the building. In order to achieve low energy consumption, it is essential to adapt the building design to the local climate and context - meaning using local resources in terms of materials and building techniques, natural ventilation, natural water collection and natural light. (Un-habitat, 2014)

## LACK OF CULTURAL ADAPTION IN HEALTHCARE DESIGN

Western healthcare practises have dominated the development in the design of new hospitals all over the world. There are few studies on cultural differences of environmental preferences across nations, races and ethnicities and the outcomes of studies done in one country might not be culturally appropriate for another. The research that has been made is mainly concentrated to North America, Europe and Australia and there is insufficient on environments in developing countries. A context where financial resources are scarce and emerging diseases demand new concepts of space design. (Shepley and Song, 2014)

According to the Tanzanian healthcare architect Moses Mkony, the building methods applied to healing design concepts have used western technology and design layouts are almost exclusively tailored to a developed-country context. Hospitals in different cultural contexts, have strong similarities in their physical setting, since architects almost only used modern design concepts in their design, with little consideration of patient’s cultural identity. This is also stressed by Shepley and Song, claiming that healthcare environments that do not reflect the cultural needs of patients and staff, and instead uses foreign building elements, results in increased stress and anxiety among the users and the healing diminish.



## LOCAL CHALLENGES FOR KOLANDOTO HOSPITAL

Kolandoto Hospital is in the process of fully becoming a Council Designated Hospital (CDH), which will make the hospital more financially stable and also enable the hospital to exempt many patient groups from fees (Bergstrand, 2016). In addition, the number of patients are increasing, which make it even more important to further develop the facilities to meet the growing demand.

The current maternity ward does not have enough capacity, due to a lack of beds and space, as it shares the building with the private ward. The congestion of inpatients in a space which is too small, in the same building, poses a high risk due to the increased likelihood of transmission of diseases and infections between patients.

Now with free maternal healthcare, more women come to give birth at the hospital instead of giving birth at home, which results in an urgent need of extending the maternity ward and increasing the number of inpatient- and delivery beds together with improving the flows and sanitary facilities (Danielsson, 2015).

Due to a growing demand for private care, the ward also needs to be improved with higher standard in terms of sanitary facilities, equipment, patients rooms and services the hospital wish to provide.

Based on previous analysis done by Annika Danielsson 2015 in the first phase of 'Healthy hospitals', this master thesis results in a new building for the private ward in the open area south of the current building and the current building will be redesigned and used for a larger maternity ward. The design proposals include better standards in terms of sanitary facilities, indoor climate and flows.

In addition, the new private ward can provide the hospital with a higher level of income, which can be used to finance investments in the hospital's future development. The logic behind this, is that a new building which offers higher standards for the private ward, would attract more companies to use Kolandoto Hospital as their preferred hospital for employees in need of hospital care. The hospital should also be able to charge a higher fee per bed with improved standard.



The Maternity and private ward building



## 1.4 PURPOSE AND GOAL

The goal with this master thesis is to improve the access to quality healthcare and to create healing hospital environments that promote human well-being, in an international development context. Primary focus is to improve the accessibility and affordability to emergency care, maternal healthcare and high quality inpatient care for inhabitants in Kolandoto and Shinyanga urban district in Tanzania.

The aim is to investigate the role of culture and local adaptation in evidence-based design and in particular the cultural aspects of healing environments in Tanzania.

### RESEARCH QUESTIONS

#### MAIN QUESTION

- How is evidence-based design adapted to a developing context, in order to create sustainable healthcare facilities built with small means?

#### SUB-QUESTIONS

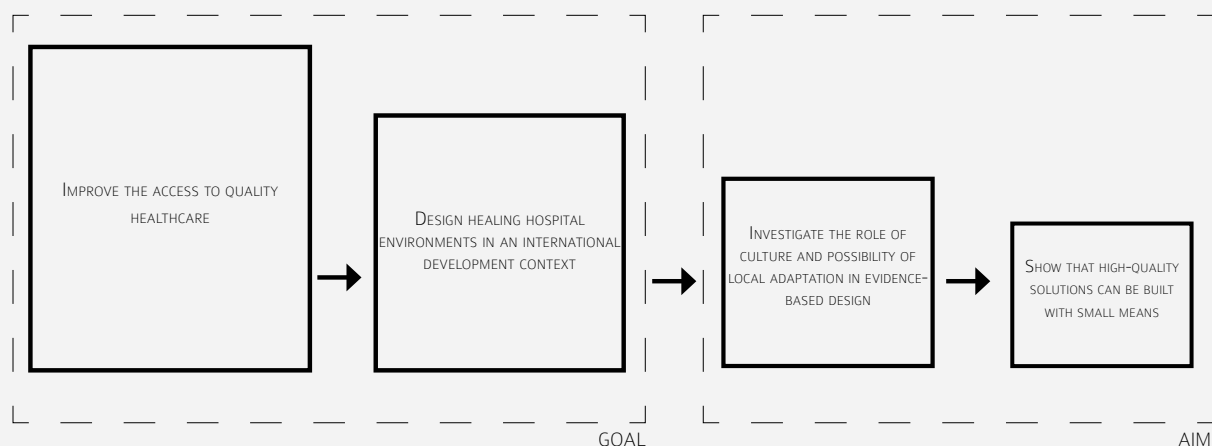
- What factors of evidence-based design are relevant for meeting the socio-cultural needs in healthcare buildings in Tanzania?
- What strengths and qualities in vernacular architecture in Tanzania, are relevant in order to build sustainable with small means?

### DELIMITATIONS

This master thesis mainly focus on the relation between the built environment and people's well-being, in regards to the aspects of sanitation, light, ventilation, adequate space, recreation and empowerment in the design of the maternity ward and the private ward.

In the field of hospital design, there are several theories that support a healing healthcare environment, but this master thesis mainly focus on evidence based design (Ulrich, 2012).

Since the context in which the hospital is located is very different from Swedish hospital conditions, it affect the building design significantly. Therefore, the project's focus is on the environmental and cultural adaptation concerning sustainable building techniques, which include social, cultural and economic aspects. The design proposal enhance the local handicraft, vernacular architecture and use local materials to show the strengths of the context the project take place within.



## 2. METHODOLOGY

## 2.1 METHOD

The approach of this master thesis is explorative and research based design by using Kolandoto hospital as a case study for the creation of good hospital design within the international development context. The research include several methods:

**Literature** - Mainly within evidence-based design, healing hospital design and the socio-cultural context.

**Workshops (participatory design)** - The feedback from workshops and meetings with reference groups, resulted in an iterative design process with several rounds of information collection, analysis and strategies formulation, and finally the creation of design proposals.

**Interviews** - To fully understand the situation, flows and functions needed, we discussed and anchored our design with both the staff at Kolandoto and experienced architects and caregivers in Sweden that are used to work with projects in similar contexts.

**Study trips** - To get a broader perspective of the local architecture and the Tanzanian context, study trips were made to a similar hospital and to larger cities within the country.

**Participation of an on-site construction** - One major part of the methodology was the participation and start-up of the construction of the hospital's new emergency department. The experience of an on-site participation of a construction gave us a foundation of knowledge and understanding of building techniques in a hot climate, local handicraft traditions as well as the building process in Tanzania.

**Collaboration with engineers** - Another information source was the other master thesis written by the two engineers over the same time period. Their goal was to investigate and evaluate the previous work done at Kolandoto Hospital and see what could have been done better and what was successful, both in terms of physical implementations and in how the processes was communicated. Their analysis gave us guidelines and tips, which was used in our process and in our design proposal, not to repeat previous mistakes and increase process efficiency.

### PROCESS

The conceptual methodology is that the collected information are analyzed to formulate design strategies that are applied in a design proposal for the maternity ward and the private ward at Kolandoto hospital.

In reality, the process was not that linear. The research, the feedback from workshops and interviews, the knowledge from the on-site construction and the general impression and observations from the time on the site, accumulated a constant, growing base of knowledge. The projected became an iterative design process with several rounds of information collection, analysis and formulation of strategies and creation of design proposals.

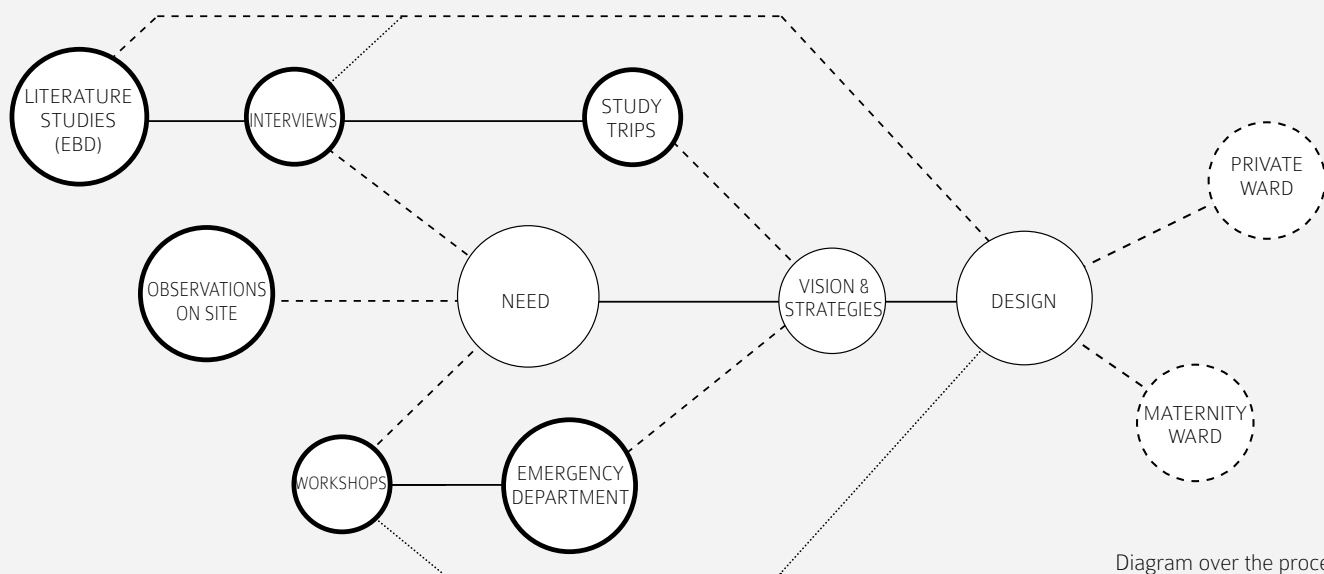


Diagram over the process and structure

## 2.2 COLLECTION OF DATA

### TWO MONTHS OBSERVATION ON SITE

To fully understand the situation and complications of the local context, the major part of this master thesis was done at the site of Kolandoto Hospital. For two months, daily visits to the hospital and interaction with the staff and patients were made. During the stay, lots of information and knowledge were accumulated by drawing, sketching, photographing and mapping the site.

### WORKSHOPS: PARTICIPATORY DESIGN

With the aim of designing spaces for certain users, it was essential that the end-users should be involved in the project from start to finish, contributing with their knowledge about what is needed and desired. Their active participation also helped to create a sense of ownership and responsibility, both during and after the building process.

To give all participants, including us, a base of understanding we started the project with an introduction meeting where we introduced ourselves, the upcoming project and upcoming process, and similarly - the reference group members presented themselves individually. In the following two months, about 5 workshops were arranged with different themes and tasks for the participants - for example the 3+3 workshop, bubble diagrams and mind-mapping workshops, scenario thinking and full scale workshop. There were different reference groups for the maternity ward and the private ward. However, it was possible to combine some workshops at the same time and have a good dialogue, since many staff members had insight in both wards. Between the workshops, conversations and dialogues with the hospital staff took place constantly.

The structure and type of workshops conducted were chosen and partly based on the evaluation of previous workshops held at Kolandoto Hospital by Lisa Bergstrand during the design process of the emergency department. All the workshops are described more thoroughly in the appendix.

### INTERVIEWS

**Previous students** - Before leaving for Tanzania, meetings with the two previous architect-master thesis students at Kolandoto Hospital were held - Lisa Bergstrand, the head architect of the emergency department and Annika Danielsson that together with the hospital planned the future masterplan of the hospital. They shared their experiences and went through the plans for the emergency department.

**Experienced architects** - Before departure, also an interview was arranged with Christiana Caira - an architect with large experience in working with healthcare project in developing contexts, together with her colleague Magnus Carlstrand, a previous nurse that today is working at WHITE Architects, with their hospital projects all over the world. They gave a large amount of input on what to consider when designing in an unfamiliar context.

**Midwife** - Christiana and Magnus gave the contact information to Maria Hogenäs - an experienced midwife they have been collaborating with in their healthcare projects abroad. Several skype meetings and interviews with her, were held during the stay at Kolandoto, where discussions about the flows of the maternity ward and the focus within maternal healthcare were the topic.

**Local architect** - In Dar-es Salaam a meeting with the local Tanzanian healthcare architect Moses Mkony was arranged. He is well-experienced and besides he has done a PHD at Chalmers University, which gives him a very good understanding of both western and the Tanzanian context. The meeting was very interesting and rewarding.

**Staff at Kolandoto Hospital** - During the stay in Kolandoto several interviews were arranged, with both hospital management and patients, who gave us a good foundation of understanding of what their struggles are and what functioning well. These interviews together with the workshops became the major input for the final design.





**"Make the women feel as  
safe as possible as quickly  
as possible"**  
- Maria Hogenäs

## STUDY TRIPS

With the aim to get a broader perspective of the Tanzanian culture in terms of traditions, local architecture, building techniques, use of space and material, several study trips were arranged.

The first study trip went to Mkula hospital close to Lake Victoria. At the guided tour, the hospital management showed us their departments and their needs of improvement as well as what functioned well at the hospital.

To get a better view of a denser atmosphere than the small village Kolandoto and to see the diversity within the country, study trips to the capitals of four different regions in Tanzania were made during our two months stay within the country.

**Shinyanga Town** - is the regional capital of Shinyanga District, where Kolandoto is situated.

**Arusha** - After 11 hours on the local bus through the country, we reached Arusha situated on the border to Kenya. This way of travel are the best way to see the change of landscape as well as the mentality through Tanzania.

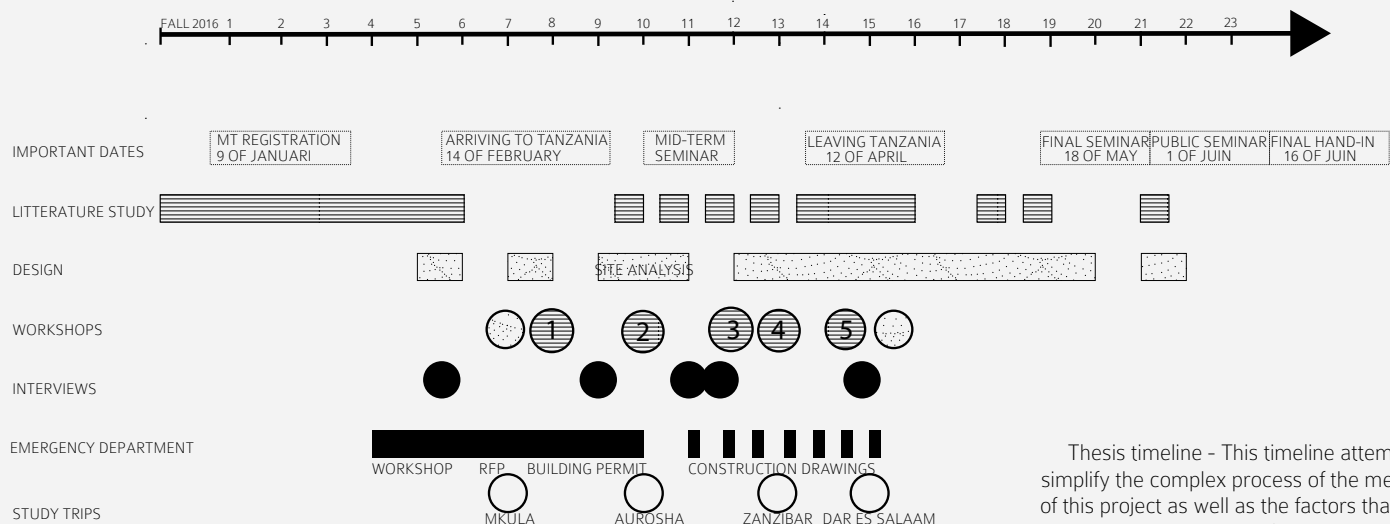
**Zanzibar/ Stone Town** - A study trip to Zanzibar was incredibly exciting and rewarding. This city is amazing and has an incredibly rich architecture that inspired us a lot. It also gave a better understanding of the religious mix that exists in the country.

**Dar es Salaam** - It is the largest city in Tanzania which is markedly visible. There is a big change of architecture, pulse, mentality and atmosphere.

## CONSTRUCTION OF EMERGENCY DEPARTMENT

To participate in the start-up of the construction of the Emergency department, gave a good base of knowledge when designing the next phase for the hospital. Meetings with three contract firms were arranged, where we discussed their building techniques, construction process and choice of materials with the purpose to redraw detailed and technical solutions adapted to the local context. The contractors different bill of quantity was audited and compared by us, which clearly showed what is expensive, what materials are normally used and can be found locally in Shinyanga Region and what materials that need to be transported.

In the end together with the hospital we chose the most suitable contractor and adjusted the drawings to their way of constructing. We met with the local city architect when we applied for building permit to the government, where we got valuable input on local building techniques from him. After a month in Kolandoto they started constructing the emergency department in an impressive pace.







First spade taken on the construction of the Emergency Department



Cement blocks are made on site.

# 3. THEORETICAL BACKGROUND

## HEALTH AND HEALING ENVIRONMENTS

## 3.1 HEALTH

### UN HEALTH GOAL

**“Ensuring healthy lives and promoting well-being for all ages is essential to sustainable development.” (UN, 2016)**

The maternal mortality in the world has been reduced by almost 50 percent since 1990. North Africa, East- and South-Asia has been even more successful with a two-third reduction. However, still mothers that do not survive childbirth in developing regions are 14 times higher compared to developed regions. In many rural areas, only 56 percent of births are attended by skilled staff.

In developing regions only half of the women receive the recommended amount of healthcare they need. Fewer teens are having children in most developing regions, but progress has

slowed. The large increase in contraceptive use in the 1990s was not matched in the 2000s. More and more women get family planning but the need is increasing at a rapid pace.

New HIV/AIDS infections fell by 30 percent between 2000 and 2013, and over 6.2 million lives were saved from malaria. However, more than 6 million children still die before their fifth birthday every year and 16,000 children die every day from preventable diseases such as measles and tuberculosis, diseases that are very common in east Africa. (UN, 2016)

#### GOAL 3 TARGETS FOR 2030:

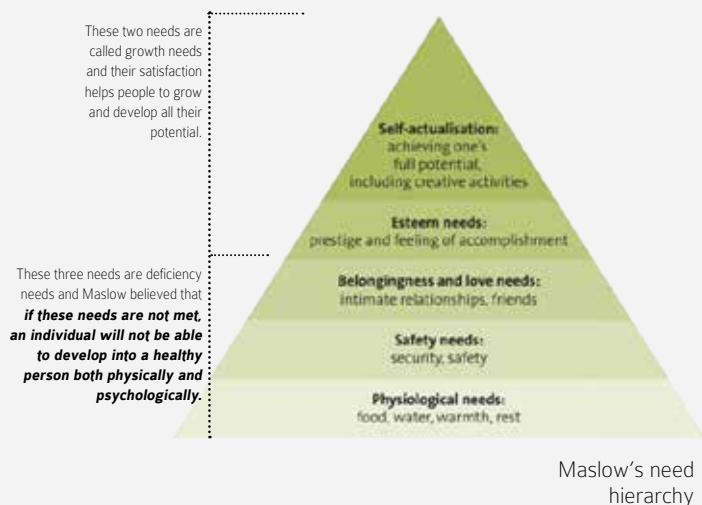
- Reduce the global maternal mortality ratio to less than 70 per 100,000 live births.
- End preventable deaths of new-borns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births.
- End the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases.
- Reduce by one third premature mortality from non communicable diseases through prevention and treatment and promote mental health and well-being.
- Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol.
- Halve the number of global deaths and injuries from road traffic accidents.
- Ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes.
- Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all.
- Substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.
- Strengthen the implementation of the World Health Organization Framework Convention on tobacco control in all countries, as appropriate.
- Support the research and development of vaccines and medicines for the communicable and non communicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines, in accordance with the Doha Declaration on the TRIPS Agreement and Public Health, which affirms the right of developing countries to use to the full the provisions in the Agreement on Trade Related Aspects of Intellectual Property Rights regarding flexibilities to protect public health, and, in particular, provide access to medicines for all.
- Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small-island developing states.
- Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks.



## BASIC NEEDS TO BE HEALTHY

To be able to feel well and be healthy, the first and most important part is to have the basic needs satisfied. The basic needs are universal for all human beings, not only the physiological needs but also need for security, love, acceptance and integrity. Although the needs are universal, the underlying aspects how to fulfil them can vary a lot. The different needs theories assume that the behaviour of the individual can be explained by the needs the person has in a given situation.

One of the most well-known theories is Maslow's need hierarchy. Maslow supposed that all individuals have five types of needs that are activated in a specific order. The basic needs must be satisfied before higher order needs are activated. The five needs are physiological needs, safety needs, social needs and esteem needs and self-actualization needs. (Shou, 1991)



## THE SALUTOGENIC CONCEPT

Salutogenic concept means looking at the whole human being and focusing more on the resources of the individual, the healthy part and what create and sustain health as opposed to the pathogenic concept focusing on risks and diseases.

The concept of salutogenesis was created by Aaron Antonovsky, professor in medicinal sociology at Ben Gurion University of Negev, Israel. He was interested in why some people, regardless of major stressful situations and severe hardships, stay healthy and others do not.

He found that the way people relate to their life has an impact on their health and introduced the salutogenic concept, which includes the following dimensions:

**Comprehensible** - refers to our need to understand and our endeavor to create structures at chaos and to put ourselves in a context.

**Manageable** – refers to the extent one perceives that we have the ability to use our resources to cope with stress and meet life demands.

**Meaningful** - refers to the extent to which one feels that life makes sense emotionally, when things become meaningful and significant, we find it worth investing energy, willingness and commitment to solve the difficulties that cause stress.

Traditionally in the field of healthcare, the focus has been on the sickness and the problems of the individual instead of seeing the healthy part and the individual's resources. This approach tends to define communities and individuals in negative terms, disregarding what is positive and works well in particular populations. In contrast 'assets' models tend to accentuate positive capabilities to identify problems and activate solutions. They focus on promoting salutogenic resources that promote the self-esteem and coping abilities of individuals and communities, eventually leading to less dependency on professional services. (Antonovsky, 1987)

## 3.2 HOSPITAL DESIGN

### HEALING ENVIRONMENTS

One result of basing design decisions within healthcare facilities on EBD, is a safe and healing hospital environment that is humane, personalized and provide both physical, emotional and psychological comfort. The word healing and healing design is often used with a sense of common knowledge regarding its meaning and consequently it's a risk that the meaning sometimes is taken for granted and remains vague in many instances. As Moses Mkony states, a healing environment should include a supportive environment that is sensitive to the needs of the individual, as well as giving access to information, choice and physical involvement of family and friends. Designing healing puts the patient first and empower patients and their own inner healing process. Promoting harmony of mind, body and spirit.

Also sustainability should be seen as an important parameter of a healing design, where a design cannot be sustainable if it does not provide the healing environment. Another result of improving the quality of care through a healing design, is an increases of profitability and savings. (Mkony, 2009)

People's perception and acceptance of physical comfort and a healing environment are influenced by the culture and current level of social-economic status. Therefore, when designing healing, a cultural perspective should be in mind and local vernacular architecture should serve as the core of healing environments.



#### DEFINITION OF HEALING

**"The word healing comes from the anglo-saxon word 'haelen' which means to make whole. One way to look at it is as harmony of mind, body and spirit. Healing is not the same as curing, which is more about fixing problems, eradicating diseases and decreasing symptoms. People can be healed even if they are not cured. For example, those with a chronic disease can learn to live in peace with their condition. It is both a psychological and physiological process of getting well."**  
(Mkony, 2009)

## EVIDENCE-BASED DESIGN

EBD is the process of basing decisions about the built environment on credible research to inform design and achieve the best possible outcome. The notion of EBD was introduced in North America and Europe in the 1980s. Similar to evidence-based medicine, the purpose of EBD is to use research to inform professional practice. (Shepley & Song, 2014). This is particularly important in the creation of healthcare facilities. The most important principle learned from this research field, is that well-designed physical settings can influence patient satisfaction, employee performance, make hospitals safer, more healing and positive clinical outcomes can increase. A stressful environment can be a consequence of poorly designed and built environment.

According to Roger Ulrich in his article "A Conceptual Framework for the Domain of Evidence-Based Design" the research has found 9 crucial design variable categories that have relevant impact for healthcare outcomes. These are:

### 1. Privacy

A healthcare environment that supports the integrity and privacy of the patient can improve patient experience significantly and facilitate conversation and an honest communication between patient and staff.

### 2. Family support spaces

For the patient to more easily cope with stress from illness or pain, it is of great importance that the patients can receive support from their close ones. The healthcare facility should be planned and designed for spaces that supports this comfort.

### 3. Visual environment

To improve the visual environment, aspects of positive distractions are of great importance, such as views towards nature, art and attractive visual elements of the design. The positive distractions can divert the patient's attention of patients from stressors, reduce pain and due to this improve the patients' psychological and emotional well-being. (Ulrich, 2012).

### 4. Audio environment

The experience of healthcare can be improved by reducing noise and be replaced with a more pleasant sound, such as music. Music or bird songs etc. also works as positive distractions. Disturbing noises increase risk of medical errors and create stress among patients and staff. It can impair patient sleep and increase the sense of pain. (Ulrich 2010). According to the New-born Individualized Developmental Care and Assessment Program (NIDCAP), a good audio environment is particularly important in intensive care and neonatal care.

### 5. Wayfinding system

A clear and efficient wayfinding system with architectural landmarks can improve the feeling of security of the patient and remove an unnecessary stress factors. The wayfinding will be one of the factors people first notice and a poor wayfinding makes the new visitor feel disoriented and out of place.

### 6. Safety enhancement

A well-designed physical environment of a healthcare facilities can support the safety of both patient and staff by reducing medical errors and infections. Elements such as air-ventilation, alcohol-based, hand-rub dispensers, hand-washing sinks, easy to clean surfaces, good lighting and single patients rooms helps to control and decrease infections. (Ulrich, 2010)

### 7. Patient room

Single patient room is the major factor that has shown to have best possible healthcare outcome, including lower infection rates, improved sleep quality and reduced stress level for instances. In fact, it is a tool used to achieve many of the other categories such as privacy, family support and audio environment. It is also showed that communication between patients and staff and the patient satisfaction in general are improved.

### 8. Staff support spaces

A good work environment has both an effect on the work performance with a reduction of medical errors and the health and satisfaction of the caregivers.

### 9. Sustainability

The design variables that affect healthcare sustainability include building mass, shape, and orientation. The designer should adapt these variables to suit the local context and support a future development of the building.



### 3.3 CULTURAL ASPECTS OF HOSPITAL DESIGN

Today western medicine is embraced as the only appropriate medicine in most part of the world and hospitals that are in different cultural context, have strong similarities in their physical setting (Mkony 2009). They address important aspects as functional efficiency, costs and providing effective platforms for medical treatment and technology. But one important aspect that often being neglected, is the psychological and cultural needs of the patients. Little effort is being put on creating exterior and interior surroundings that calm patients and avoid exposing them from stress factors. People prefer environments that are familiar and in particular when they are stressed. Familiar physical health environments is therefore crucial to a patient's comfort and satisfaction. (Shepley & Song, 2014)

Preferences in healthcare settings are not universal, they varies from one culture to another, since culture has a great influence on health. It affects our perceptions of health, illness and death and our beliefs about what causes disease. It affects how we experience and express pain and illness and what kind of help and treatment we prefer. Cultural awareness can promote trust, better healthcare, lead to higher rates of acceptance of diagnosis and improve treatment compliance. It is thus important that the built hospital environment support cultural, spiritual and religious beliefs where patients find hope and inspiration. (Shepley & Song, 2014)

#### DEFINITION OF CULTURE

Culture is defined as the set of values, norms, basic assumptions, customs and behaviours that are shared and applied within a social group or society. These patterns identify members as part of a group and distinguish members from other groups. The concept of culture can be applied to different kind of groups, nations, ethnic groups and families. Important factors are that there is interdependence in the group and that group members live together over time and share and understand the reality in the same way. Culture is learned and norms, customs and established beliefs are passed on through generations. (Aronsson, Hellgren, Isaksson, Johansson, 2012)

On the individual level, cultural membership plays an important psychological function. It is interwoven in a person's identity and influence what they believe in, their lives, their values, what they believe to be good and bad, acceptable and unacceptable and the set of rules and beliefs about how to behave. (Altman & Chemers, 1980)



Culture described as an iceberg

*The elements in culture can be described as an iceberg, with many powerful elements hidden under the surface. The factors above the surface are often obvious and easy to recognize but several factors under the surface are more influential but difficult to detect and many of them are also unconscious.*



"It is people who make the hospital" - Moses Mkony

## 4. CASE BACKGROUND

THE CONTEXT OF THE PROJECT

## 4.1 GEOGRAPHICAL CONTEXT



### TANZANIA

Tanzania is situated on the east African coastline, south of the equator. The population is over 50 million people and the largest city Dar es Salaam is located by the coast to the Indian Ocean. The second largest city is Mwanza, is situated along the shoreline of Lake Victoria in the northwest. In 1996 the capital of Tanzania was changed from Dar es Salaam to Dodoma, which is located in the middle of the country.

Tanzania is a union between the Christian dominated mainland and Muslim Zanzibar. The Union Parliament in Dodoma establishes laws for the whole Union and especially for the mainland. According to the 1977 Constitution, Tanzania is a one-party state, but by 1992, multi-party systems were introduced. However, the ruling Revolutionary Party Chama Cha Mapinduzi (CCM) has dominated the policy even after 1992. CCM was initially a socialist party but it is now an increasingly market-oriented policy. The trend towards greater political diversity has been slow.

After Tanzania's independence 1961 when British rule came to an end, the country has received substantial aid and loans. However Tanzania still remains one of the poorest countries in Africa. The combination of weak economic growth and a rapidly growing population puts great pressure on the healthcare system and the infrastructure in the country. The mining industry, tourism and financial markets have grown sharply in recent years, but with the high population growth, rural residents have remained poor. By far, the biggest obstacle to economic development is also the corruption that permeates society, combined with extensive bureaucracy and bad communications. (Landguiden, 2014)





### SHINYANGA REGION

Shinyanga is one of 26 administrative regions in Tanzania. The region is located in the north-east and has a population around 1,5 million people. It takes about 2 hours by car from the second largest city Mwanza to Shinyanga town.

### KOLANDOTO VILLAGE

Kolandoto Village is situated 15 km from Shinyanga town, and around 150 km from Mwanza. The village has a population of about 10 000 people and belongs to Shinyanga Urban District. In the middle of the village, Kolandoto Hospital and Kolandoto College of Health Sciences is located. Christianity is the dominated belief in the area.



Shinyanga Region



Kolandoto Village and hospital

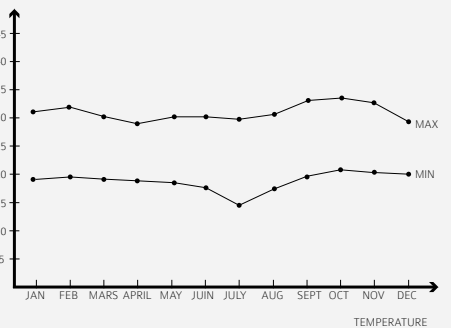
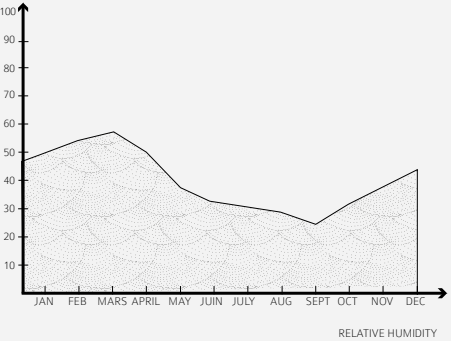
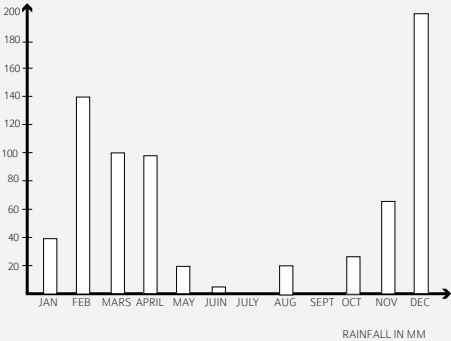
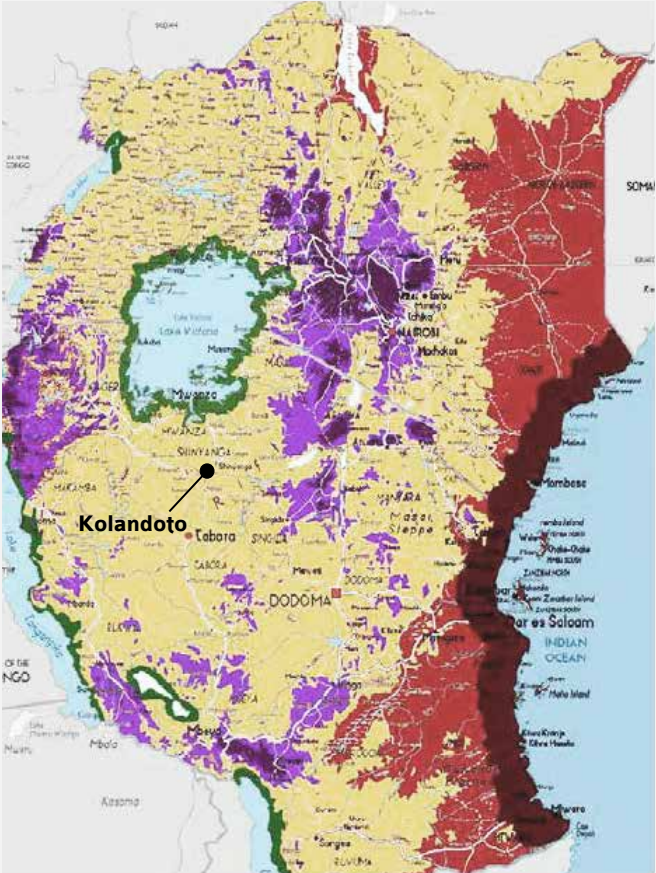
CLIMATE

According to the UN-habitats report , 2014 for sustainable building design for tropical climates, buildings need to be climate adapted to be sustainable and energy efficient.

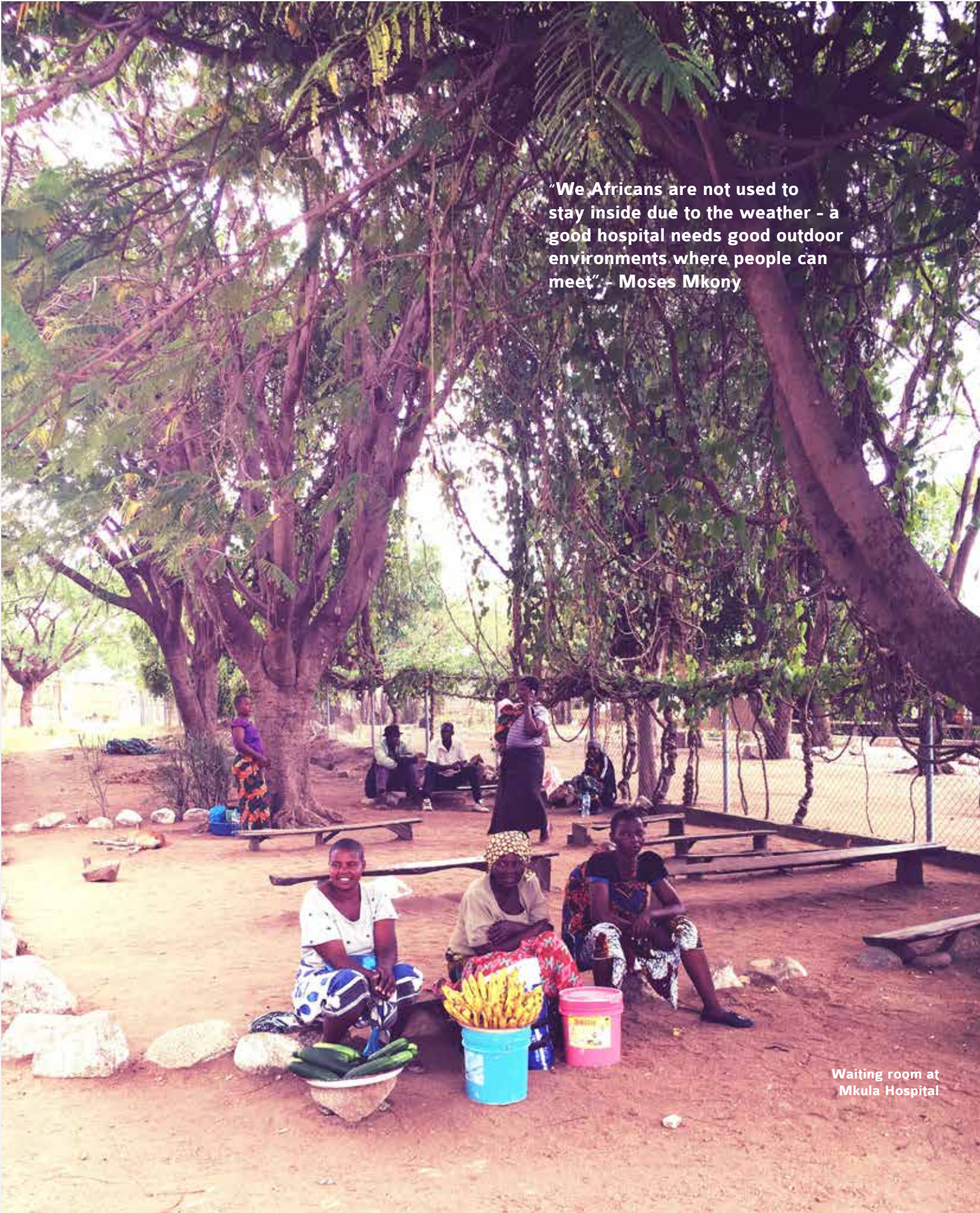
There are six different climatic zones within the tropical climate in East Africa. Shinyanga Region and Kolandoto Village is located in the hot semi-arid/savannah climate zone.

The temperature is during most of the year around 20-22°C but peaks in the summer with up to over 30 °C. The humidity varies during the year with an average around 65%. During the dry periods of the summer it can drop down to 40%. At the same location the monthly rainfall during the winter and spring can reach up to 200 mm.

	MIN TEMP IN C°	MAX TEMP IN C°	AVG. RELATIVE HUMIDITY AT NOON	RAINFALL IN MM
JAN	19.1	30.7	47	37.8
FEB	19.5	31.4	54	138.3
MARS	19.3	30.0	56	98.1
APRIL	19.1	29.0	50	96.0
MAY	18.7	29.9	37	18.9
JUIN	17.7	29.9	32	5.7
JULY	14.9	29.7	31	0.0
AUG	17.9	31.1	29	20.9
SEPT	19.9	32.6	26	0.0
OCT	21.3	33.2	32	27.3
NOV	20.3	32.1	44	66.9
DEC	19.7	29.3	44	191.0







**"We Africans are not used to stay inside due to the weather - a good hospital needs good outdoor environments where people can meet" - Moses Mkony**

**Waiting room at  
Mkula Hospital**



## 4.2 SOCIO-CULTURAL CONTEXT

### UNDERSTANDING THE PEOPLE

#### IDENTITY, ETHNICITY & RELIGION

The ethnic diversity is big in Tanzania with around 120 different tribes. On the mainland, Bantu people dominates, of which Sukuma is the largest ethnic group with around 8,9 million people. They live in northwestern part of Tanzania is the tribe most people in Kolandoto and Shinyanga belongs to. (Landguiden, 2014)

On the islands Zanzibar and Pemba many residents are of Arab origin. No ethnic group has dominated the others, which helped Tanzania to largely avoid ethnic conflicts that have been so devastating to many neighboring countries. The national identity is clearly stronger than the belonging of certain ethnic or religious group, where probably the national language Swahili, has been a contributing factor. (Globalis, 2013)

Religion in Tanzania is always a present part of life. About 40 to 50 percent of the Tanzanians are Christians and 35 to 40 percent are Muslims, where most Muslims live along the coastline and on Zanzibar. In essence, they live peacefully together and marriages over religious boundaries are common. Also traditional African beliefs still remain big in Tanzania. Particularly widespread is the belief in spirits of life - often the ancestors' spirits, where they can bring help and support or illness and accident. Even belief in magic and witchcraft are exercised, even if it has been forbidden since the colonial era.

#### PRIVACY, FAMILY & SOCIALIZATION

Socialization and privacy clearly reflect cultural and social norms where the personal space varies a lot from one culture to another. In Tanzania, relatives, family and the social community are extremely important. Families are big with an average of 4,9 children per woman. (Globalis, 2013) There is a strong social responsibility for the own group where the family and village community is the most important social security network and relationship generally governs the rights and opportunities of the individual. For instance people are often employed due to family ties or other loyalty and you build personal relationships before doing business. (Landguiden, 2014 )

Privacy and family social support are clearly reflected in the local architecture with houses designed to encourage family support and prioritize social spaces (Mkony, 2009). The social spaces are also a fundamental element in the design of healing hospital environments. By our interviews done with patients at Kolandoto Hospital together with Mkony's field studies, this is further strengthen. Many patients emphasized that the big positive aspect of open wards, is the social interaction with other patients where they helped and supported each other and shared their experiences. However, they still pointed out the need of privacy, where they can decide whether and when to interact with others. This is a universal need among all people.

#### WORKING & LIVING

Most Tanzanians live in rural villages and have no formal employment. Instead they rely on small-scale farming or working in the growing informal sector of the economy, such as street sales.

Unemployment is high, especially in the big cities, and about two-thirds of Tanzania's population is expected to live below the poverty line, but there is usually no starvation. (Landguiden, 2014)

### UNDERSTANDING THE HEALTHSEEKING BEHAVIOUR

#### ILLNESS

Traditionally in the African culture, illness is seen as a family issue involving both relatives and friends. Also the family undergoes the healing process together with the sick by caring, supporting and helping throughout the sickness. Thus, the sick person receives lots of support and company in the fight against the disease, which is very important in a healing process. (Mkony, 2009)

Today, in modern hospitals in Tanzania and particularly at Kolandoto Hospital, patients are even more dependent on their relatives and family, since they are the ones that provide food and coming with clothes during their hospital stay.

#### TRADITIONAL MEDICINE

If people are unable to get to a hospital or dispensary, it is not unusual to visit a traditional healer. In fact many patients go there first before visiting a hospital, in hope to recover easily. Traditional healers affect the psychological healing process without using medicines, by using a variety of objects that are believed to have spiritual powers. The patient can thus get opportunity to feel whole and experience peace between mind, spirit and body.

Looking at traditional clinics, they highlight spiritual beliefs, social traditions and a strong concept of healing environment within the African cultural context. The thermal comfort is usually good and the love of nature is enhanced with strong connection to nature. (Mkony, 2009)

According to Verderber, traditional care might play a more important role in the healthcare future, where there will be an increasing need of therapeutic aspects, patient empowerment and home- and community-based care.



**"People want to sit together, cook together, eat together and laugh together, that how we are"  
- Dr Bwire**

## 4.3 HEALTH IN TANZANIA

### CHALLENGES PEOPLE FACE IN TANZANIA

#### AIDS AND MALARIA

The expected life expectancy for Tanzanians is 61.5 years and HIV/ AIDS infections is one common cause of death. The region around Lake Victoria and Lake Tanganyika has long been one of the AIDS epidemics centres in Africa, but the proportion of HIV-infected in Tanzania has decreased slightly to 5.3 percent in the age category 15-49 years. In Zanzibar, the figure is only 0.6 percent. Tanzania has fought the AIDS epidemic in collaboration with the United Nations and offers inhibiting drugs to HIV-infected pregnant women. (Landguiden, 2014)

Over ten million Tanzanians get malaria every year, and about 70,000 die, mainly pregnant women and children under five years. Malaria accounts for 37 % of all outpatient attendance at the health facilities. Shinyanga district is currently ranked among the highest in terms of malaria cases and type of malaria. However, medication of infants has reduced the number of malaria cases significantly in the 21st century. Tuberculosis (TBC), Ambobadysentery and diphtheria are also common diseases. However, infant mortality, halved between 2004 and 2014 and is now lower than in most other countries at Tanzania's developmental level. (Landguiden, 2014)

#### WATER AND SANITATION

Almost one-third of deaths in children under five are related to lack of hygiene. Among the most common diseases are diarrhea and respiratory illness among new-borns. Awareness of the importance of hand hygiene is low. Sanitation is the second most important factor to reduce diarrhea. Access to safe drinking water and clean toilets are key to decrease the mortality among children under five.

### CURRENT HEALTHCARE


Healthcare in Tanzania is available but depending on one's income. Outside major cities like Dar es Salaam, the medical services is uneven. In many remote areas, there are no hospitals or medical centres. There is also a lack of skilled staff like doctors and nurses as well as medical supplies and equipment in the centres. (landguiden) Cultural system considerations in hospital designs has not been high on the agenda and according to Mkony, the vernacular architecture has consistently been neglected throughout the construction of modern hospitals in Tanzania. The lack of cultural adaptation and vernacular architecture in the modern hospital settings, create an artificial environment for patients that can contribute to stress and discomfort. The result is a situation where the majority of the population, especially those in the rural areas, seek help from traditional healers, instead of normal hospitals and dispensaries. (Mkony 2009)

Healing design concept is rather new in Tanzania and has not been established yet. To reach the government goals of healthcare, it's important to use healing design and to develop the organisations to be responsive to patient's cultural, physical and emotional needs, is very important.





**"We have to provide  
spaces for the soul"  
- Moses Mkony**



## 4.4 BUILDING IN THIS CONTEXT

### VERNACULAR ARCHITECTURE

Modern architecture and technical and economic development should not diminish the importance of traditional vernacular architecture. Vernacular architecture has been influenced and well adapted to the local climate and socio-cultural life during the history. It is often cost effective solutions where communities have used locally available materials and techniques to construct buildings that are based on the climatic conditions. Using elements and qualities from vernacular architecture in healthcare setting, is an effective way to promote a healing environment where patients do not experience any stress and get a cultural shock when visiting the hospital.

Tanzania has many traditional vernacular styles of architecture. All of them are well adapted to local conditions and climate, even though most vernacular buildings in Tanzania were short-lived since they mostly relied on adobe materials or wood in some regions, which are not very sustainable to the weather conditions (Mkony, 2009).

The most long-lived and predominant vernacular architecture, is the Swahili architecture which is usually constructed of coral limestone and plaster. It is found in stone towns along the east-African coast, built during the time when ports and trading flourished in this area and people from Arabic, Persian and Indian cultures settled down here. The stone towns are characterized by organic streetscapes and narrow streets. The houses have an inward orientation with inner courtyards and are usually grouped and attached to each other, which enables the high density of buildings. Even though Swahili buildings seem Arabic in style and expression, it has gone through many local African adaptations to bring its unique appearance.

The Swahili architecture is a successful example of architecture with a strong cultural mix with solutions providing both adaptability, flexibility and sustainability. It uses passive cooling techniques for thermal comfort with thick external walls, high ceilings and small windows to ensure that the interiors are cool, private and quiet. At the same time a strong socialization culture is provided with unique external and internal building elements and features.



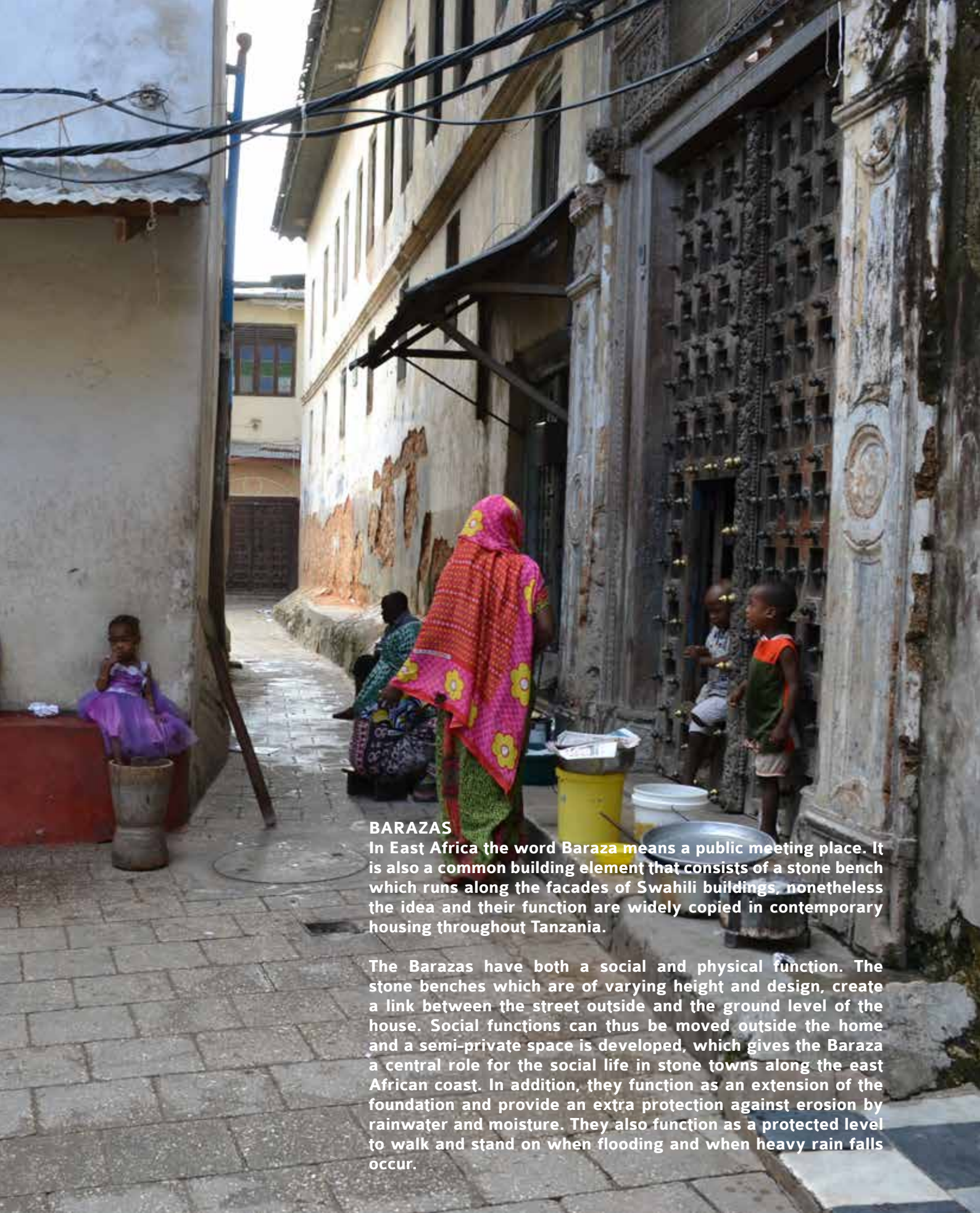


### COURTYARDS (KIWANDA)

Courtyards and interior courtyards named Kiwanda, are very common in the African context. Private activities move outdoors and the boundary between indoor and outdoor space becomes diffuse. The courtyards offers a private or semi-private environment with good thermal comfort and becomes a natural social gathering place.

Courtyards in healthcare environments get similar functions as in people's homes where they offer both privacy and socialization. Instead of sitting indoors on beds in the wards, patients and relatives can sit outdoors in green courtyards and eat, cook and socialize, which in turn can encourage more friends and family visits.





### **BARAZAS**

In East Africa the word Baraza means a public meeting place. It is also a common building element that consists of a stone bench which runs along the facades of Swahili buildings, nonetheless the idea and their function are widely copied in contemporary housing throughout Tanzania.

The Barazas have both a social and physical function. The stone benches which are of varying height and design, create a link between the street outside and the ground level of the house. Social functions can thus be moved outside the home and a semi-private space is developed, which gives the Baraza a central role for the social life in stone towns along the east African coast. In addition, they function as an extension of the foundation and provide an extra protection against erosion by rainwater and moisture. They also function as a protected level to walk and stand on when flooding and when heavy rain falls occur.



## ARCHES

Arches have a widespread use and size whether they are semi-circular, horseshoe, pointed or multi-foil arch, they have universal adaptability. This is well illustrated within the Swahili architecture where arches, for instance are used in door openings, arcades and whole walls of zakida niches for storage. Also in other vernacular building styles across Tanzania, arches is commonly used.

Arches are one of the building elements that clearly give a certain identity to buildings with strong connection to form and symbolism. They are both decorative and have in the history provided solutions to many practical and structural problems.





## ORNAMENTS

African vernacular architecture and particularly Swahili architecture, are characterized by ornaments and different types of decorations. With the purpose to make building elements more decorative, they add a sense of perspective, beauty and depth to both interiors and exteriors that might otherwise look simple and dull. Still today, ornaments works as an indication of wealth, social status and belonging, and they fulfil spiritual and religious purposes, although this is expressed in different ways in different societies.

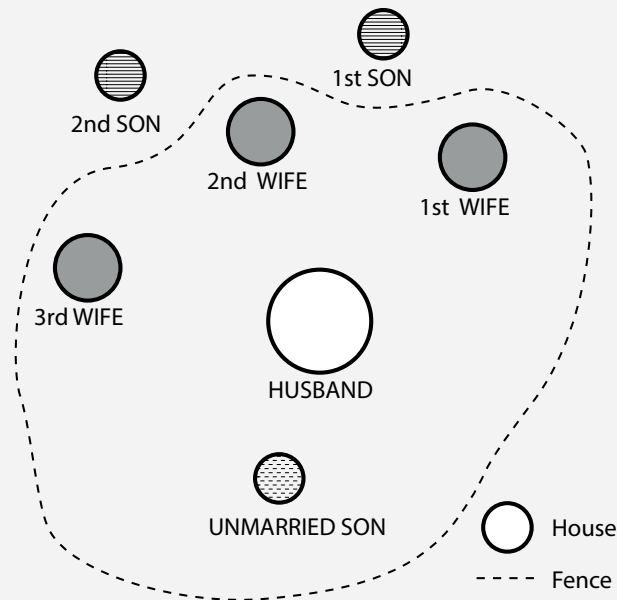
Ornaments cover a series of building elements, where the most apparent and natural application in hot climates, is the pattern of perforated window openings. Whether they are carefully designed or simply made by leaving out some of the facade bricks, decorative patterns occur that gives an extra value to the buildings.



## ARRANGING BUILDINGS

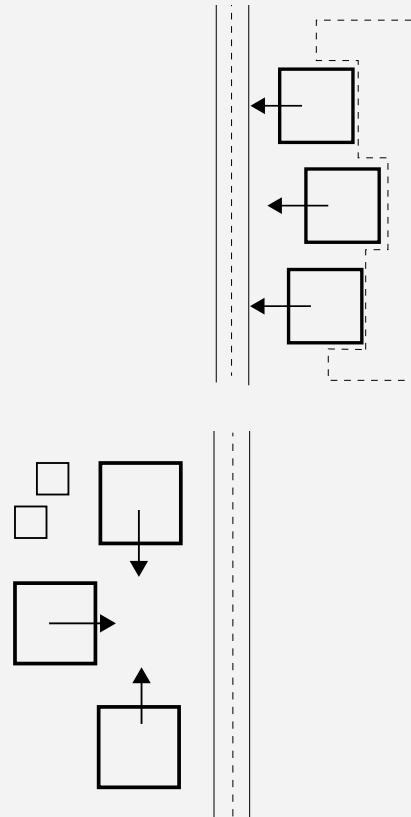
### Traditionally

The heritage of the polygamist family tradition is still vibrant in the structure of the Tanzanian villages. The main building and core of the village is the home of the husband. Close to the husband, the first and the second wife live in separate houses and the third and fourth wife next to them, which together forms a ring structure. Every new wife would be given a house according to the same system. When the family grows and the sons are forming their own families they establish their house and own compound next to where they grew up and the structure grows organically. (Cultures in Context Series, 2013).



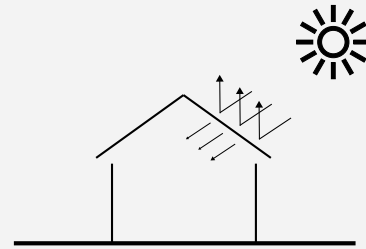
### Modern structure

The modern way of arranging buildings today is either to place them in a row facing the road with a private backyard, or place them further from the road in half-circle facing each other, which create a semi-private courtyard.

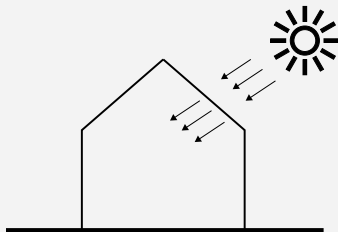


## LOW-TECH SOLUTIONS

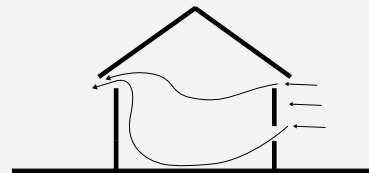
A sustainable and comfortable proposal for a healthcare building situated in an East African context must take the sun, heat and humidity into consideration not to create a high energy consuming building or discomfort for the users. The indoor climate and comfort can change significantly depending on the choice of building material, placement of openings and sun shading. Choosing a local material is an essential aspect when the goal is to design sustainably. Besides the familiarity and knowledge about the material and building techniques the advantages are often a lower cost and a lower environmental impact when long transportations are not needed. (UN-Habitat 2014)



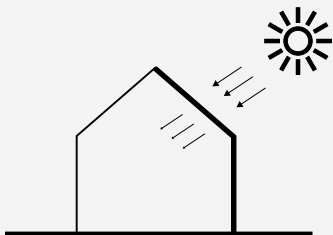
The most effective type of roof in a hot climate is a ventilated double skin structure where the interior is protected and shaded by the outer skin. To minimize the heat absorption a highly reflective material can be used for the structure of the roof.



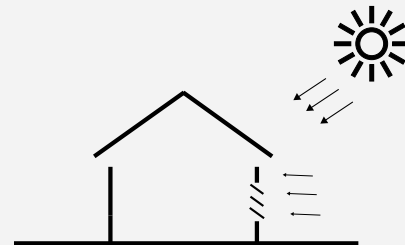
A light structure with a low thermal mass is quickly heated by the sun, resulting in a healthcare building with a bad thermal performance and an uncomfortable high interior temperature.



To increase the interior comfort the building should be designed to provide a natural ventilation. The openings are most effective if facing the prevailing breeze. Natural ventilation will be more effective if the building has openings both at the floor and ceiling. When the temperature is lower outside than inside, the hot air will flow out through the opening connected to the ceiling which creates an intake of new cooler air at the bottom opening.



By using a material with a heavier mass and thicker walls such as stone or soil bricks the result is a building that is heated slower. The consequence of building with a heavier structure is that when the building has been heated it will however take longer to cool. In situations when variation in temperature between day and night is small, like in Kolandoto, it is most advantageous to use a semi-high thermal mass structure.



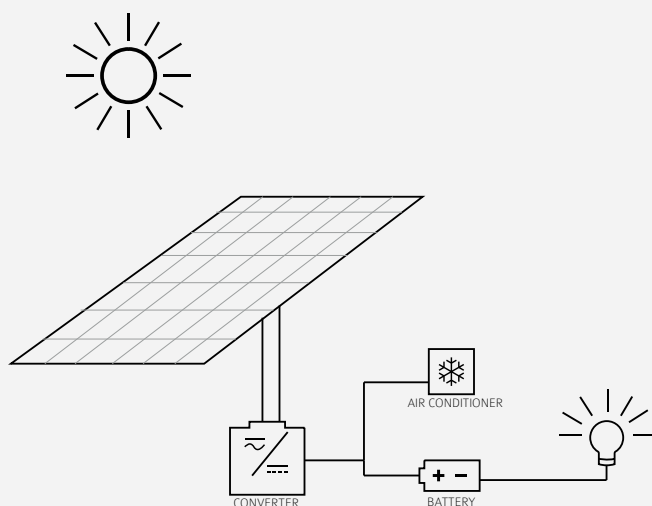
Another aspect that will affect the indoor climate is the size and placement of window openings. Natural ventilation is increased by larger openings but this requires a proper solar shading. Good shading will also limit the direct or reflected glaring of the sun.



## ENERGY

The national grid owner in Tanzania is the parastatal organization TANESCO which controls the distribution of electricity. The grid is regularly deficient, which results in regular power outages at Kolandoto Hospital. This complicates the work and security of the hospital. To avoid prolonged power outages at the hospital a diesel generator is turned on when any power outage occurs. Since the generator is not automated it takes approximately 15 minutes from when the power is cut off until the generator is in full operation. Some activities at the hospital are strongly affected by any power outage, therefore there is an Uninterruptible Power Supply (UPS), that serves as a backup source and is powered by solar panels. An UPS can further also to serve as a suppressing filter from fluctuating frequencies and voltage spikes that may occur in the main grid. (Rohlén & Skilbred, 2016)

To have a more reliable source of power than the national grid, the ones who can afford it have solar panels on the roof connected to the house. The panels produce direct current (DC) that is converted to alternating current (AC) and generated in a battery that needs to be kept in a cool space to function well. From the battery, the power is distributed when needed.



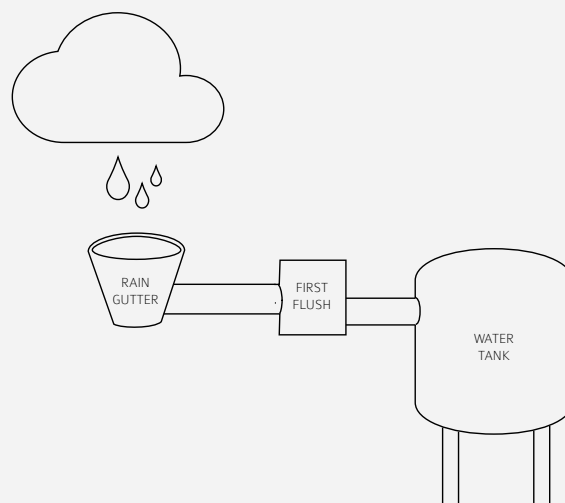
## WATER

In the Shinyanga region the rain season is between November and April, with a peaks in December and February. During a month in the winter it can rain up to 190 mm. The dry season is between May to October where rainfall is very rare. Since water is a deficit in Tanzania, it is common to harvest rainwater for personal use in addition to the groundwater that is collected from local wells in the villages.

At Kolandoto hospital's outpatient ward there is a sophisticated solution for using the rainwater. The water is collected from the roof and led to an underground water tank through pillars that also are loadbearing elements for the roof. The water is then roughly filtered and pumped up to another tank above the toilets, before being used for flushing and washing hands.

When using and harvesting rainwater from roofs the dirt gathered on the building will risk both clogging the drains and giving the water poor standards if not weeded out. One way to separate the dirt gathered on the roof from the rest of the harvested water is to use a first flush system with a tank that collects the first batch of rainwater.

To avoid infection spreading and illness the water management needs to be handled properly. Wastewater needs to be filtered and sewage should be collected in a sewage tank to be sanitized before reaching the ground again. Stagnant, open waste and stormwater could otherwise become good breeding conditions for mosquitoes with increasing risk of malaria.



# LOCAL MATERIALS

In Tanzania it is most common to use materials found locally when constructing a building since the transportation is one of the major costs in the building process. It is also a big part of the building tradition to use the earth's resources when constructing, such as grass, stone, wood and soil. In Shinyanga region the quality of the wood is poor and due to this most houses are made of local soil. Earth buildings with medium mass are well suited for the semi-arid savannah climate zone and gives a good interior thermal comfort.

To provide a construction with a good natural ventilation the local buildings technique in Tanzania is to include ventilation holes in the walls to let the breeze enter. Another way to get a good indoor thermal comfort, is to lift up the roof and separate it from the load bearing pillars and beams. This also makes the building more flexible for future changes since the interior walls is not attached to the roof structure.

## ROOFING

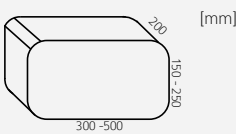
The most commonly used materials for roofing are thatched or corrugated metal sheets. The most ideal being aluminium sheets with the disadvantage that the material is hard to find locally. Another solution is to use corrugated steel or iron sheets that can be found in Shinyanga district. The steel and iron will rust if not protected, but with treatment the material can last for decades.

## BRICKS

Traditionally, the vertical elements of the buildings are most commonly made of different types and sizes of bricks in the Shinyanga region.

### SOIL BRICKS

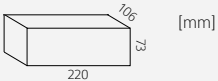
1 SEK / BRICK  
20-30 BRICKS/ M<sup>2</sup>  
20-30 SEK /M<sup>2</sup>



The simple houses in Shinyanga region are usually shaped by sun dried bricks made in moulds with the local soil. It is a low-cost production, usually self-made by the owner. The bricks are porous and can easily lose their shape and structure over time.

### BURNED BRICKS

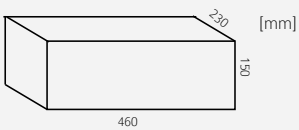
0.5 SEK / BRICK  
130 BRICKS/ M<sup>2</sup>  
65 SEK /M<sup>2</sup>



Burned bricks is an alternative for buildings with a bigger economy and demand of durability. Compared to the sun dried bricks, the fabrication of the burned bricks consume a lot of energy and needs to be transported from the factory to the building site.

### CEMENT BRICKS

6 SEK / BRICK  
15 BRICKS/ M<sup>2</sup>  
90 SEK /M<sup>2</sup>



Concrete and cement bricks are also hardwearing over time and can be constructed at the site but the cement needed for constructing the bricks, needs transportation and is expensive.

Thatch



Corrugated iron sheets



Soil bricks



Burnt bricks



Cement bricks

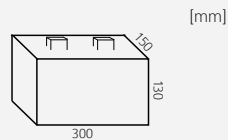


## INTERLOCKING BRICKS

2 SEK / BRICK

20 BRICKS/ M<sup>2</sup>

40 SEK /M<sup>2</sup>



A combinations of soil and cement bricks such as Adobe is a solution that is more sustainable, durable and economical. It is also one of the oldest building techniques in the country due to its availability and good thermal performance with excellent regulations of humidity in interior spaces. To minimize the use of cement, the material used as sealants can be excluded by shaping the bricks so they interlock together.

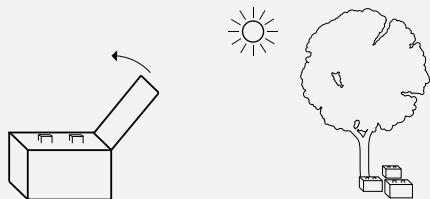
### HOW INTERLOCKING BRICKS ARE MADE

The ratio of soil, water and cement to produce a good mix for stable interlocking bricks that does not consume an unnecessary amount of cement depends on the quality of the soil and how fine the sand in the soil is.



A sample of the soil is taken and poured down into a wine bottle, water and salt is added and the bottle is shaken two times and then left for 24 hours. When the soil has fallen to the bottom, the bottle is layered with the bigger stones in the bottom and the fine sand on the top. The ratio of fine sand and small stones decides how much cement that needs to be added.

The fine soil, cement and water is mixed. The ratio should be approximately 1 part cement to 16 parts soil.



The mix is poured into a mould, pressed and removed. Three craftsmen with one mould can produce about 50 bricks in a hour.

The bricks are then placed to dry and burn protected from direct sunlight to avoid cracks. They should be watered every morning and evening for one week to become enough hard. When the building is constructed the bricks should be polished with a water repellent solution for the bricks to last longer.





### INVESTIGATING THE BRICKS

The technique of using interlocking bricks has not yet been used at the hospital. Therefore the hospital management was included when investigating the material by visiting several houses in Shinyanga Town built with the material. Since the bricks are a locally produced, and additionally one of the hospital staff turned out to be a local craftsman, the use of this material for the hospital's new constructions, can strengthen local entrepreneurship and the community.





## 5. ANALYSIS

THE CURRENT SITUATION & NEED OF DEVELOPMENT AT  
KOLANDOTO HOSPITAL

## 5.1 THE SITE

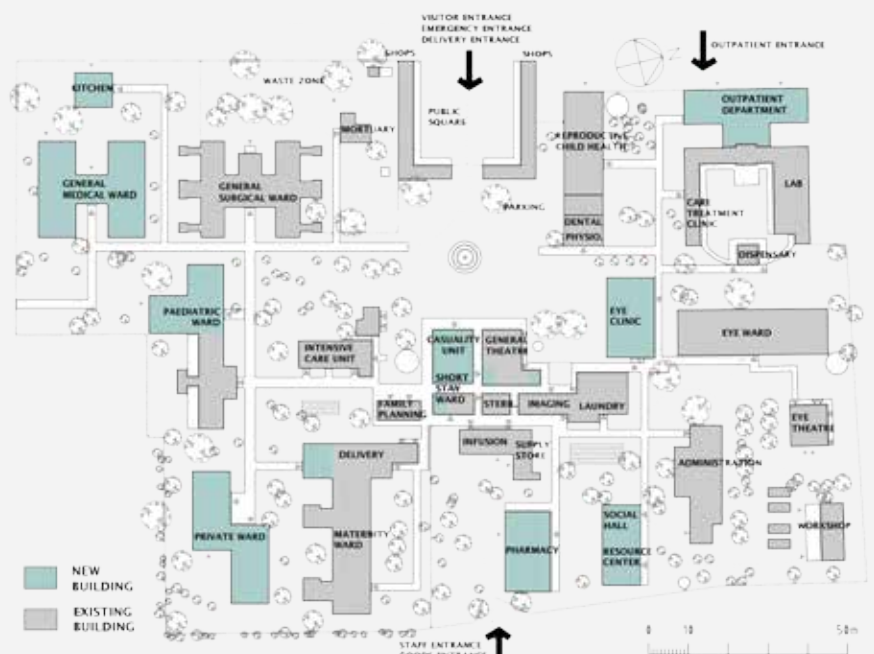


EXISTING SITEPLAN

The hospital is characterized by scattered one-story plastered buildings, mostly in white colours with saddle roofs of corrugated metal. The buildings are anonymous in their expression and rather simple. The conditions of the buildings varies from very old to new well working buildings like the general theatre. Outdoor, roofed pathways connects the buildings and provide shading. The hospital covers approximately 27 000 m<sup>2</sup>.

During phase one of 'Healthy Hospital' project, Annika Danielsson developed a masterplan that identified the long-term need for new or renovation of buildings together with a prioritized plan for the order and timing of the implementation.

Step three in that plan is to build a new building for the private ward south of the existing building and extend and improve the maternity ward.

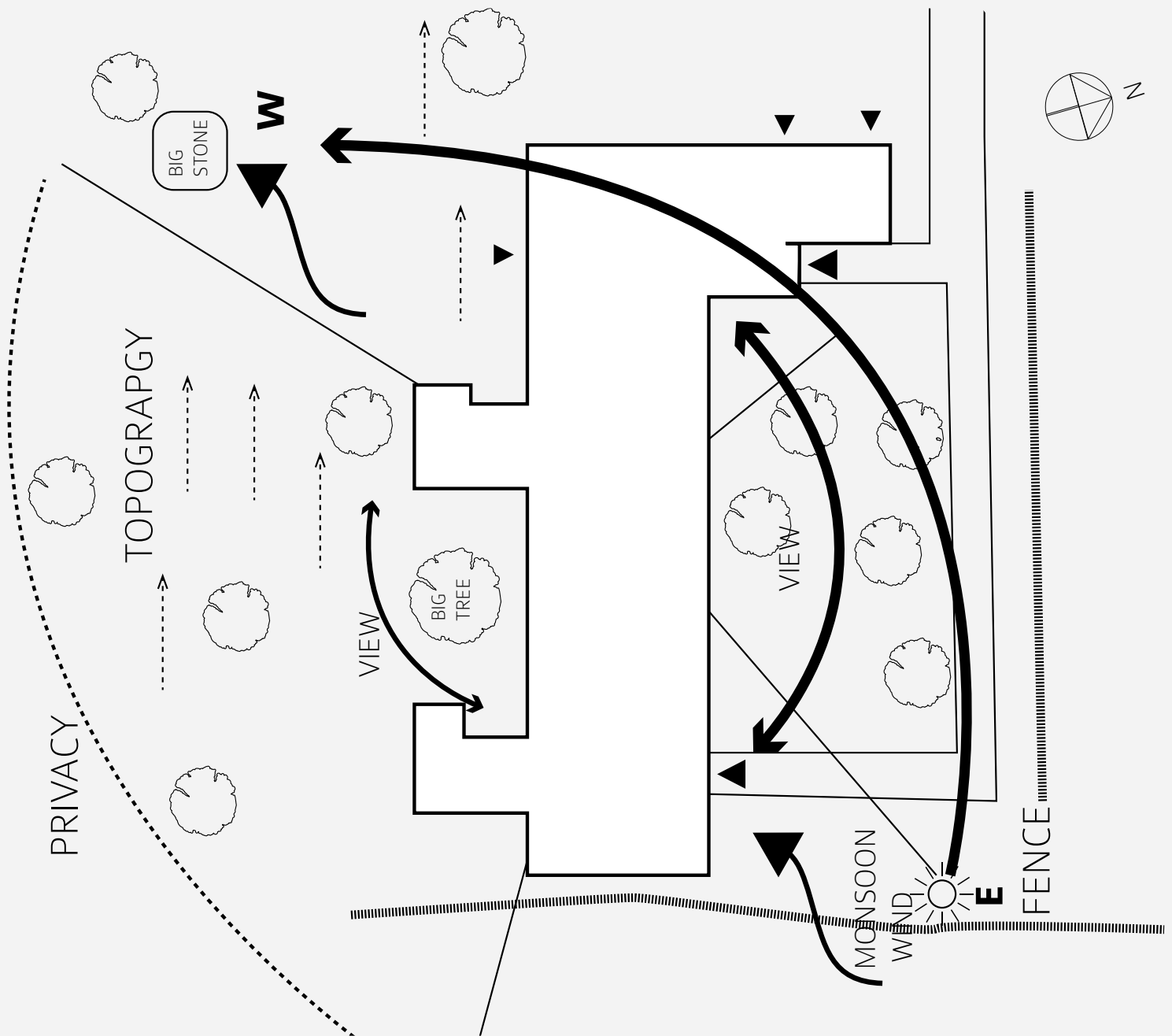


FUTURE MASTERPLAN  
(DANIELSSON, 2015)









## SITE VARIABLES

The site surrounding the building of the maternity and private ward is full of greenery, the north side is a planned and maintained garden and the south is a backyard where the greenery is wilder. The whole plot leans slightly towards the west. The monsoon winds come from the east. Since the site is situated just south of the equator the sun is always high casting small shadows and is angled from the north.





Frontside of existing maternity  
and private ward building.



Backside of existing maternity  
and private ward building



## 5.2 THE TWO UNITS



### THE PRIVATE WARD

At the private ward patients pay a higher fee of 10 000 - 15 000 shilling (TZS) per day (approximately 50 SEK), in order to get a slightly higher standard and be treated in smaller rooms with 1 - 4 beds in each room. At the hospital's general wards, patients are treated in rooms containing 10 - 20 beds for a cost of 3000 Tanzanian shilling per day which corresponds to 12 SEK. In the fees of both wards, no food or snacks are provided, which means relatives must bring food to the patients.

The fee of the private ward is a major income for the hospital, where they have several agreements with local companies that provide employees with insurance and good medical care. The hospital also offers their own staff to be treated at the private ward when they are in need of care.

The private ward has a total of 17 beds, which is sufficient today but the estimation is that the ward will get an increased demand for single and double patient rooms with higher standard. The hospital would like to offer only single or double patient rooms with different standards and with different rates depending on what the patient wants and can afford.

#### **17 beds divided into:**

- 4 single patient rooms
- 1 double patient room
- 1 patient room with 3 beds
- 2 patient rooms with 4 beds



## THE MATERNITY WARD

Today the ward has a total of 23 beds and around 5 birth per day. Full staffing consist of one midwife, two nurses and one doctor doing their daily rounds together with many students from Kolandoto College of Health.

The maternal healthcare is provided for free since a few years back, but the ward has one "private" room where they for a fee, offer a double room with own toilet.

**Antenatal** - The women arrives to the hospital a few days before expected date of delivery and stays there during their labour work. The ward has one open room for antenatal ward with 7 beds.

**Delivery** - Women are moved to the delivery room when they are 9 cm open about one hour before and stays there up to one hour after the baby is born. During the delivery up to 6 staff members are there to assist. The delivery room has two beds with a thin mobile wall in between, but it is not unusual to have three or four births occurring at the same time. The solution then is to use the small examination room as a delivery room.

**Postnatal** - The women stays here with their babies usually up to one week after the delivery. During this time they get both education and the babies are vaccinated. A lot of relatives visit the mothers when they stays here. The postnatal room consist of 8 beds and is situated very close to the antenatal room

**ICU** - ICU stands for Intensive Care Unit and is used by women that are in an unstable condition after the delivery and needs additional supervision. The ward has 4 ICU beds in one room close to the nursing station.

**Premature** - When babies are born too early they stay with their mother in a separate room with two patient beds and one incubator. Here they can stay up to a month depending on the baby's condition. The kangaroo method of keeping the baby constantly on the mothers chest, is essential in this situation and especially in this context where there is a lack of equipment.

### **23 beds divided into:**

Antenatal ward room with 7 beds

Postnatal ward roomwith 8 beds

ICU room with 4 beds

Private room with 2 beds

Premature room with 2 beds



## 5.3 CURRENT SITUATION & COMPLICATIONS

### THE BUILDING

The building of the maternity ward was constructed in 1977. In 2002 there was a reconstruction of the building with a small expansion where parts of the maternity ward and the isolation department was changed to a private ward. In 2015 a caesarean section theatre was added to the maternity ward. The building is a concrete construction with corrugated iron sheet roof.

As the situation is today, there are no benefits of having a physical connection between the maternity ward and private ward, since they do not share staff or equipment.

### THE MATERNITY WARD

The ward is often crowded which contribute to the evident lack of integrity and privacy for both patients and staff. The indoor environments especially in antenatal and postnatal wards are often stressful. There is also a very high risk of transmissions of infections and diseases to the newborn babies since the wards share toilets and are placed very close to each other.

The nursing station is situated close to the main entrance, being the heart of the ward. The only wash room and toilets are used by both patients and staff.

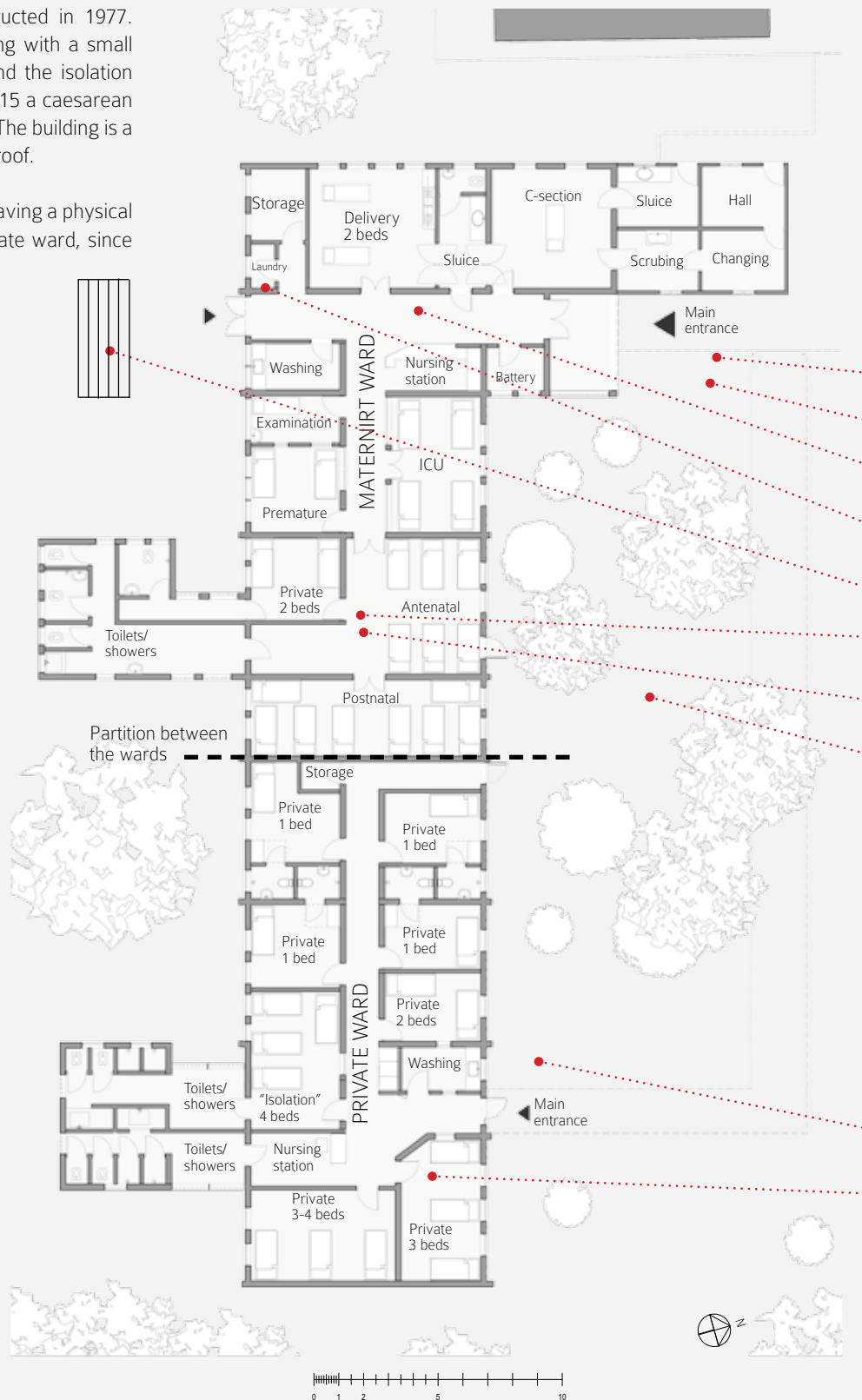
Also no spaces for family support are provided and the relatives have to sit and wait along the corridors outside the main entrance.

### THE PRIVATE WARD

The situation in the private ward is not as overcrowded as in the maternity ward. Here it is primarily higher standards that are the greatest need since it is this kind of service that is focus of the ward.

However, there is also a lack of separate staff spaces where the ward today almost have a non-existing nursing station - only consisted of a table in a dark corridor towards the toilets.

Family support spaces and especially social gathering places are a big need since many patients wants to meet others patients and socialize.



#### DAILY ACTIVITIES

The pictograms illustrate where many of the daily activities take place which are linked to human wellbeing - in addition to the usual care-related activities.



Cooking



Gathering with family



Waiting



Washing clothes



Hanging clothes



Learning/ vaccination



Gathering with other patients



Labour activities



Meditating & praying



Washing clothes



Hanging clothes



Light cooking



Gathering with family



Gathering with other patients



Reception/ Nursing station at the private ward



Corridor in the private ward



Main entrance with reception/ nursing station, waiting area and bed transport to delivery room.



View from antenatal ward towards corridor



Bed in premature room



Examination room before delivery, but can also function as delivery room



One of two beds in delivery room



New c-section theatre.

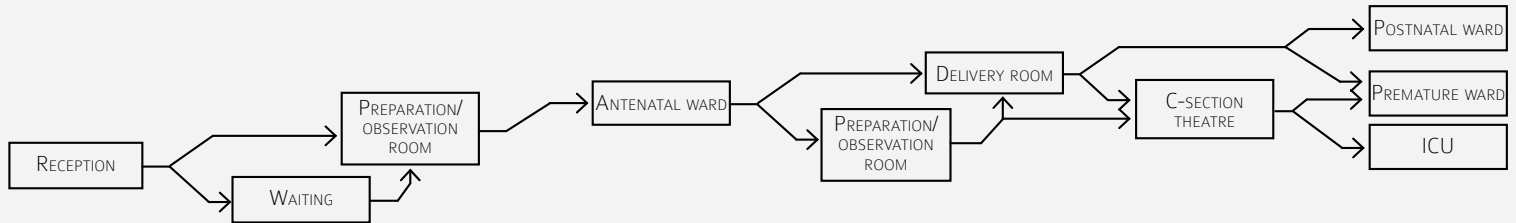




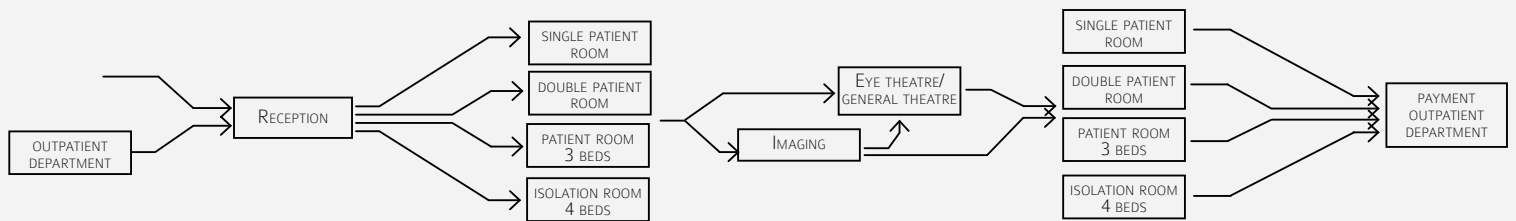
"I miss somewhere to warm my  
tea while I'm waiting for my  
granddaughter to give birth"  
- Mirian, Esthers grandmother

## FLows TODAY

One of the major issues in the existing building is the poor flows, especially in the maternity ward where the flows are more complex. Any separation of flows or zones within the building does not exist.



Movement patten of a pregnant woman coming to give birth at the maternity ward.



Movement patten of a private ward patient

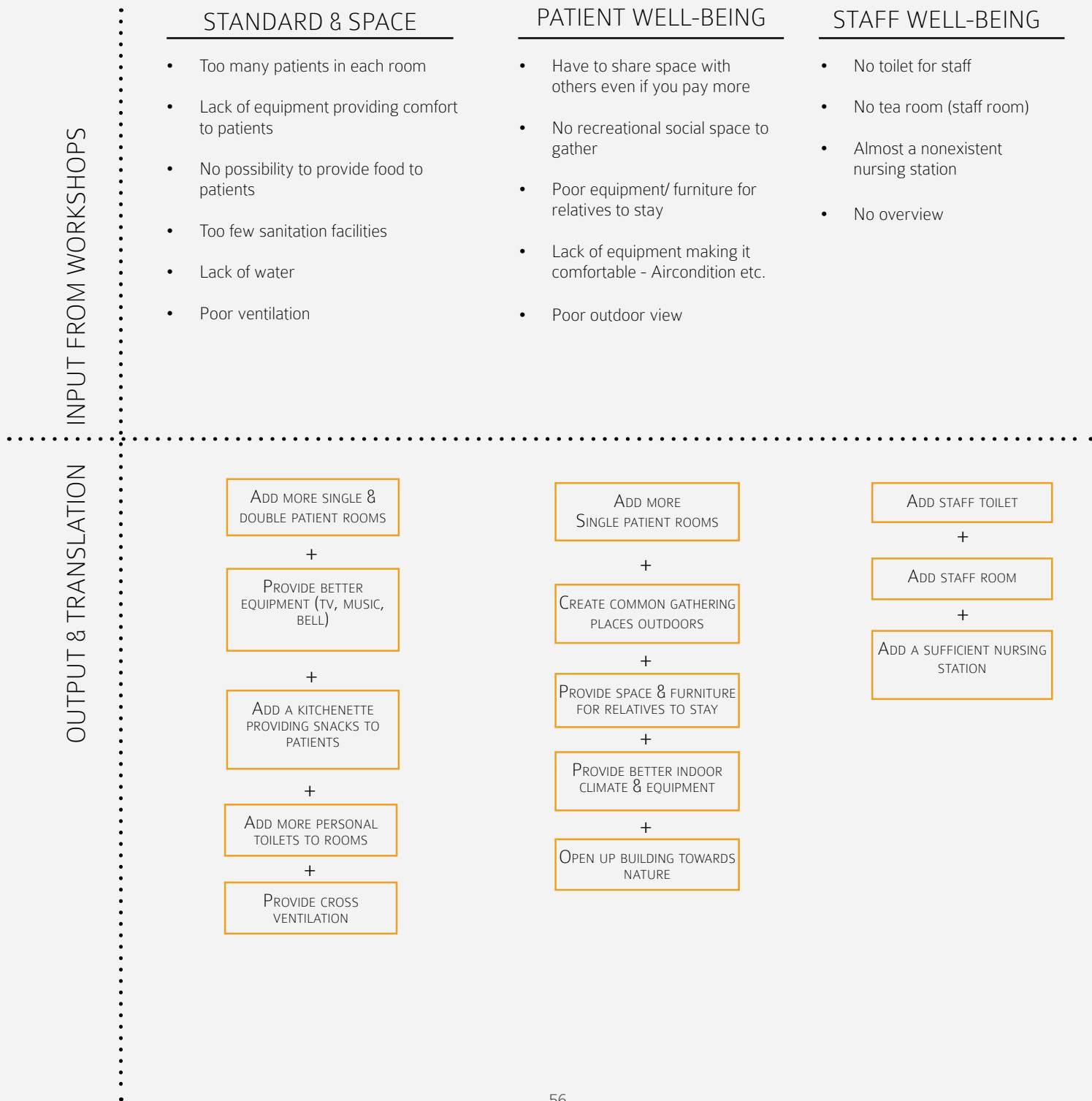


# 5.4 INPUT FROM WORKSHOPS

## THE NEED

The method of participatory design workshops was frequently used to understand the current situation and needs for the future with several rounds back and forth. The first meeting with the staff, resulted in concrete points about their needs, of what they are lacking today and what they wish to have in the future.

## THE PRIVATE WARD





# THE MATERNITY WARD

## STANDARD & SPACE

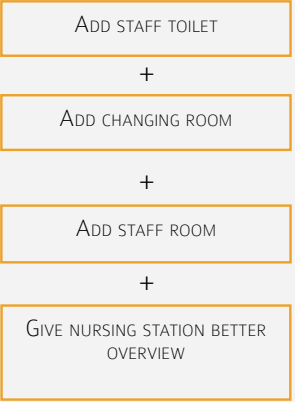
- Too small space for consultation and examination
- No room for observing the labour
- Not enough space for prematures
- Too few delivery beds and room not in standard
- No single or double patient rooms
- No health education space & vaccination
- Transmission of diseases and infections between antenatal and postnatal
- Poor separation of flows
- Not enough sanitation laundry space

## PATIENT WELL-BEING

- No privacy
- Always moved around
- No social gathering space
- No waiting room
- No space for relatives
- Noisy & poor outdoor view

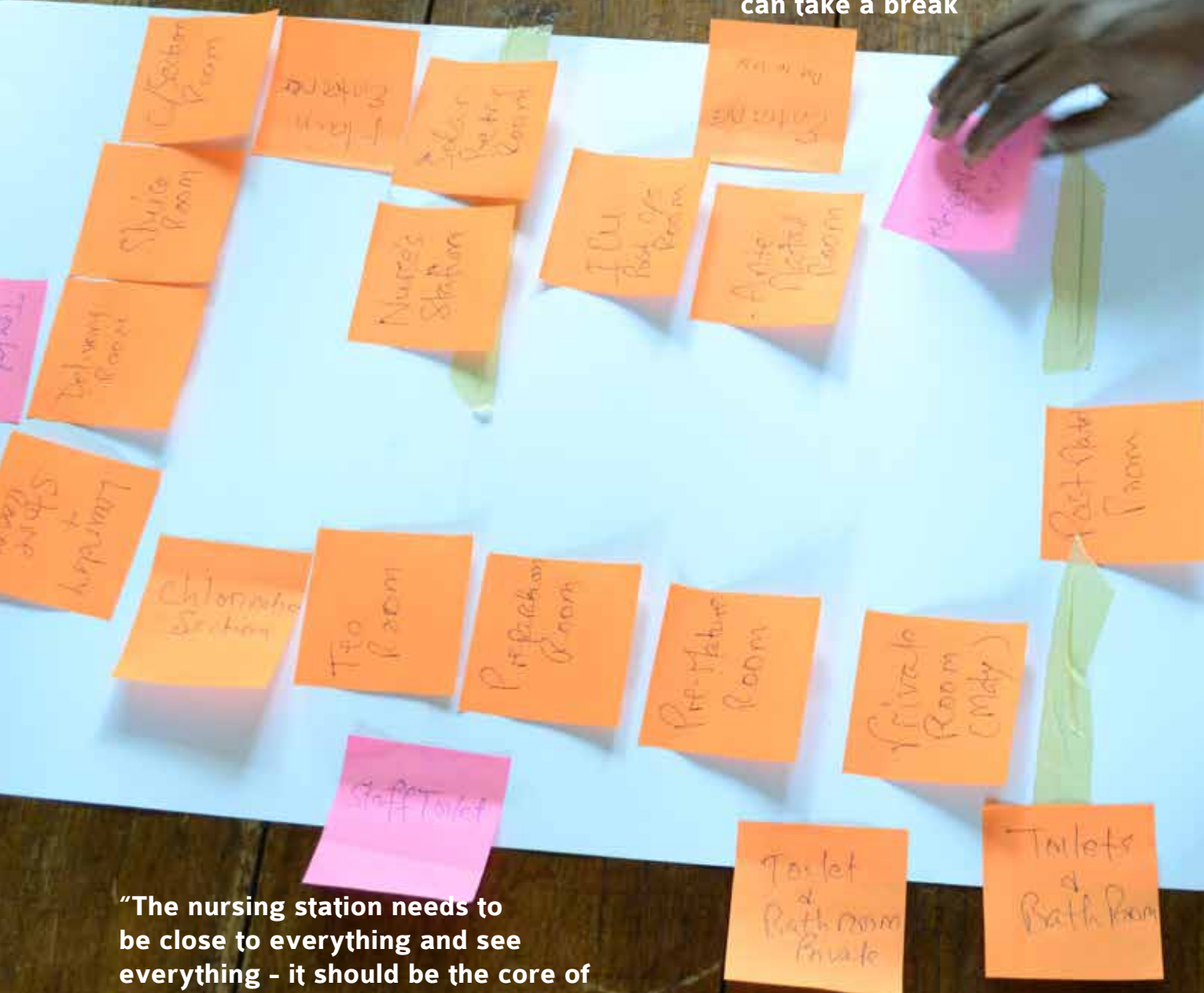
## STAFF WELL-BEING

- No toilet for staff
- No changing room
- No tea room (staff room)
- Overcrowded nursing station



**"When we got the new washing machine for the postnatal women, we saw a reduction in infections - This is something we should keep"**

**"Today we use the same spaces as the patients - we need a place to change and a tea room where we can take a break"**

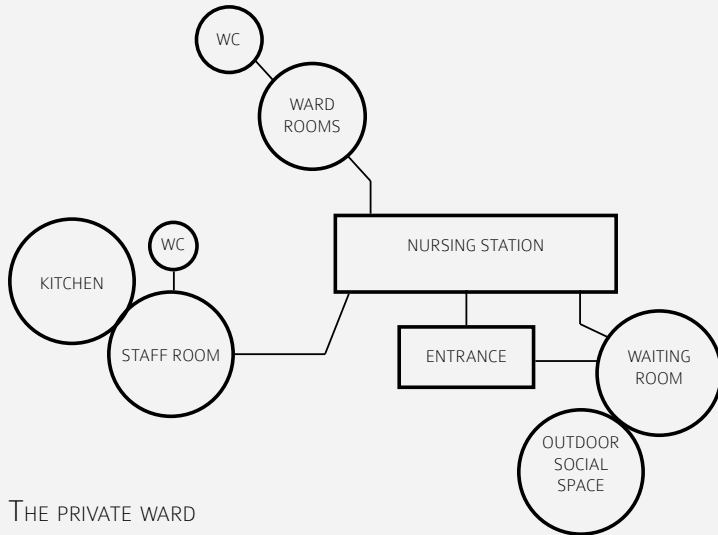


**"The nursing station needs to be close to everything and see everything - it should be the core of the ward"**

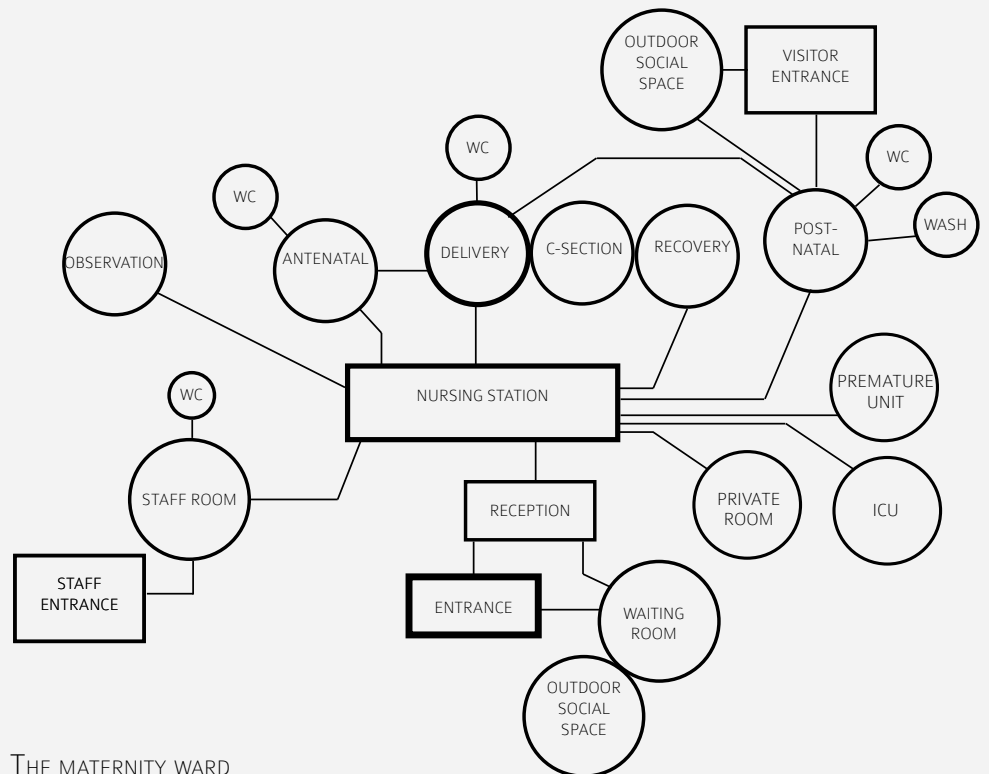
**"We need a proper waiting area - maybe outside"**

## BUILDING PROGRAMME AND CONNECTIVITY

The first workshops resulted in conceptual programs of what rooms are needed and how they should be connected. These diagrams illustrates the optimal layout of functions and have been in mind throughout the design process with several updates.



THE PRIVATE WARD



THE MATERNITY WARD





**EMANUEL** 66 years old  
Emanuel is waiting for an eye consultation together with his grandson. Since Emanuel has retired from working at the Diamond mine he is now exempted from fees when receiving care at the hospital but has chosen, together with his family to pay a smaller amount to the hospital to receive his care at the private ward.



"I would like to have  
the walls in the same  
colour as carrots"

**ANA 32 YEARS**

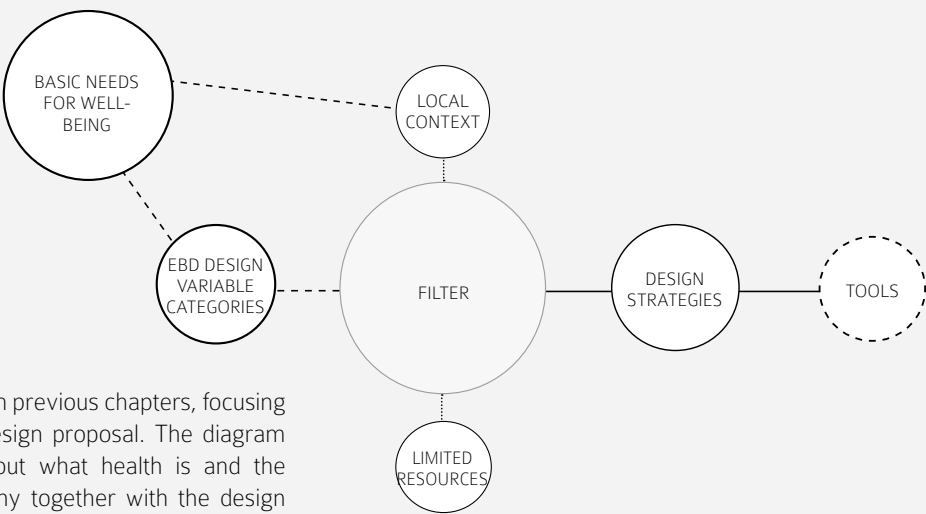
Anna is having her third child at the hospital.  
She delivered her first child at home and  
the second one at the Kolandoto hospital.



## 6. DESIGN STRATEGIES



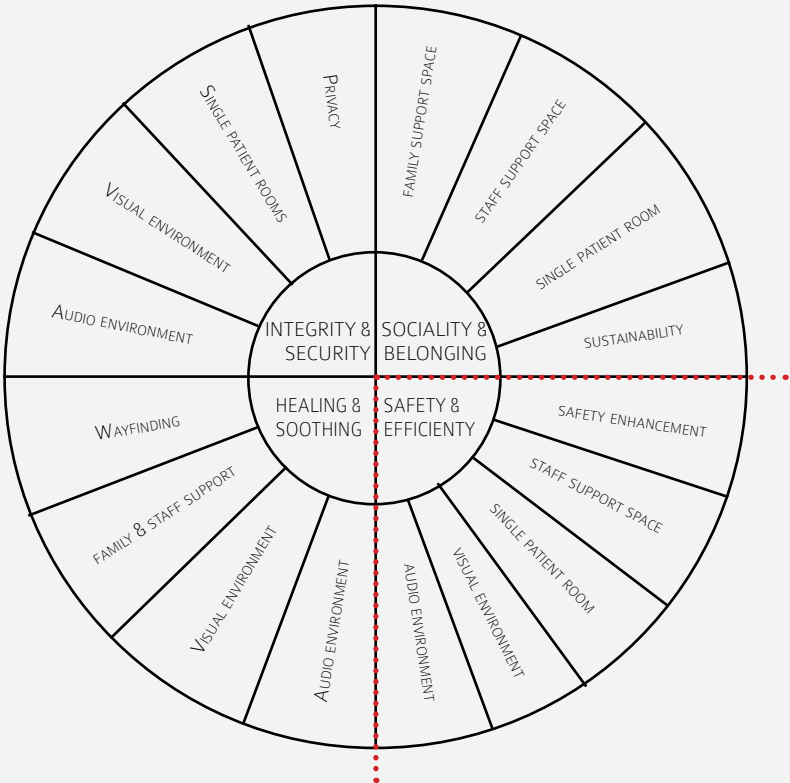
# 6.1 STRATEGIES & APPLICATION

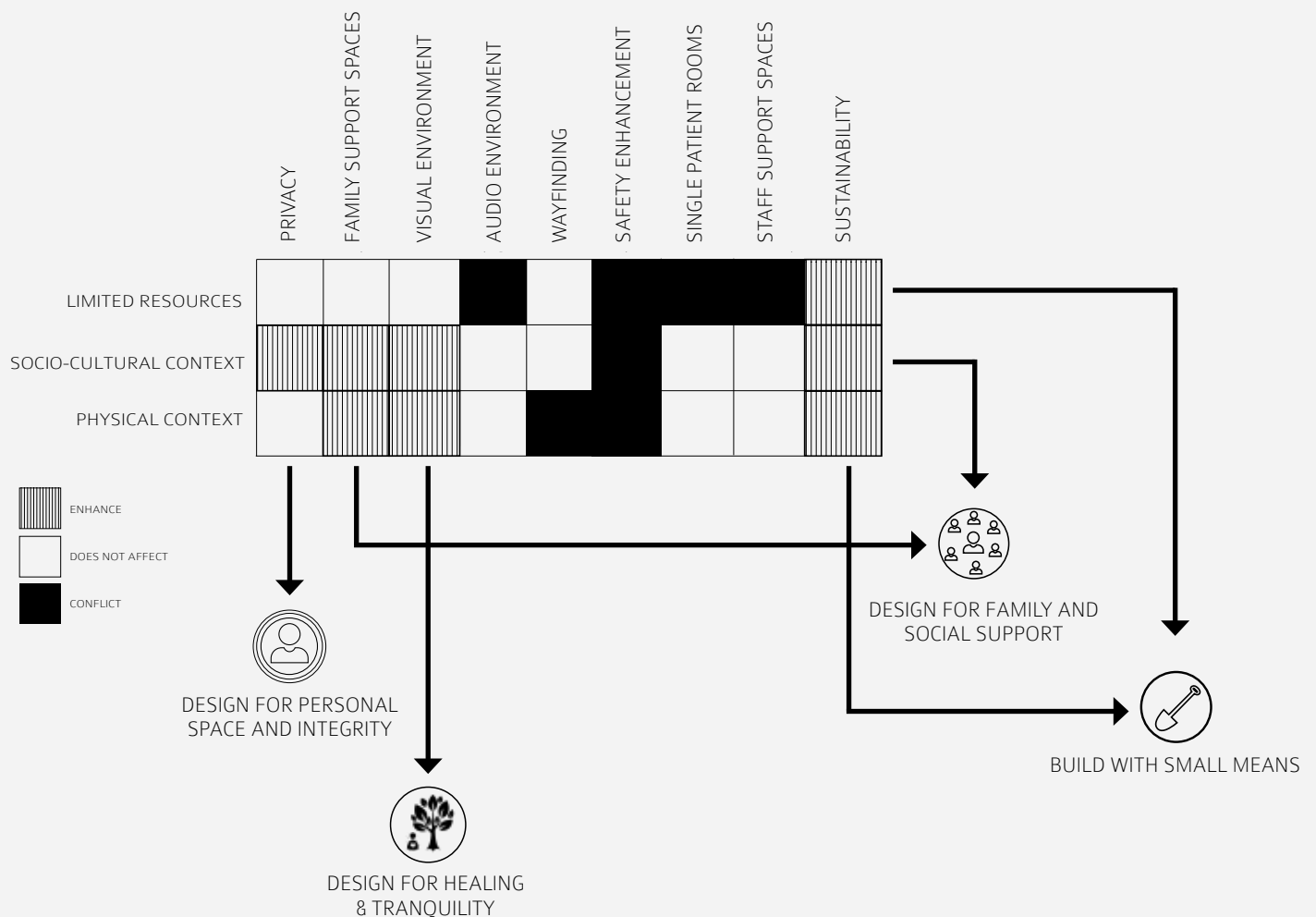


This section summarise the findings in previous chapters, focusing on the elements relevant for the design proposal. The diagram above illustrates how research about what health is and the psychological factors of being healthy together with the design variables from evidence-based design, are translated into design strategies and tools used in our design. A large factor that affect strategies and tools used, is the limited resources in the context of Kolandoto, both in terms of economy but also competence and manpower.

Most of the 9 design variable categories of EBD relates to people’s basic needs. They are universal but the factors that affect them and satisfy them can look different for one person to another.

The part in red illustrates factors that relates more to the physical outcome of healthcare - reducing infections and increase efficiency.





This matrix puts the 9 categories of EBD in relation to the local context of the Kolandoto Hospital. The design strategies and design tools are formulated after analyzing in which intersections of the matrix, the theory conflict with the local context and where theory and context strengthen each other.

The category of safety enhancement including hand washing, overview, sanitation and other physical aspects that decrease transmissions of diseases, are affected by the scarce resources in the local context of Kolandoto. Many of these design aspects become an extra challenge to work with, but they are constantly considered throughout our design process.

## DESIGN STRATEGIES

These are tools used to achieve our strategies. The following tools and activities connected to the strategies are presented further in our design proposal.



### DESIGN FOR PERSONAL SPACE AND INTEGRITY

#### ACTIVITIES CONNECTED TO STRATEGY

- Resting
- Meditating & praying
- Labour activities



### DESIGN FOR FAMILY AND SOCIAL SUPPORT

#### ACTIVITIES CONNECTED TO STRATEGY

- Gathering with other patients
- Eating
- Gathering with family
- Cooking
- Learning
- Washing clothes
- Waiting
- Hanging clothes



### DESIGN FOR HEALING & TRANQUILITY

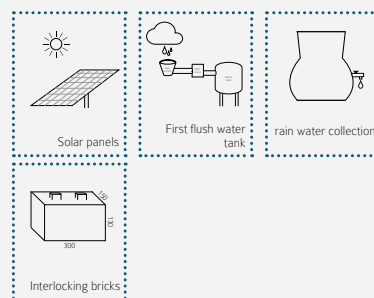
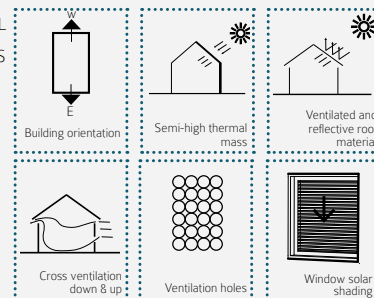
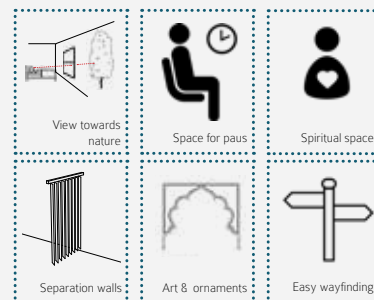
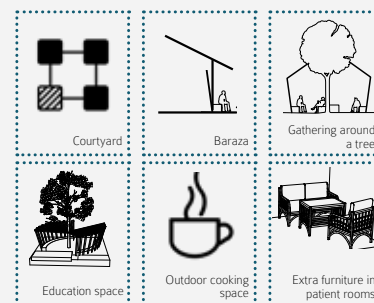
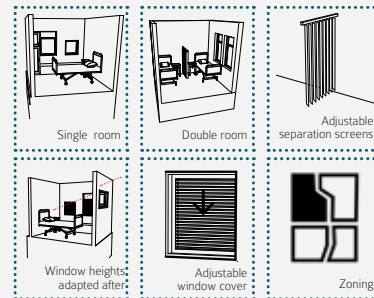


### BUILD WITH SMALL MEANS

### CLIMATE CONTROL MECHANISMS

### LOW-COST SUSTAINABLE TECHNOLOGIES

## CATALOGUE OF TOOLS AND FEATURES







**"We want a private ward that is unique and that stands out" - Dr Kattani**

## 7. DESIGN PROPOSALS

### REFURBISHMENT OF MATERNITY WARD & NEW BUILDING FOR PRIVATE WARD

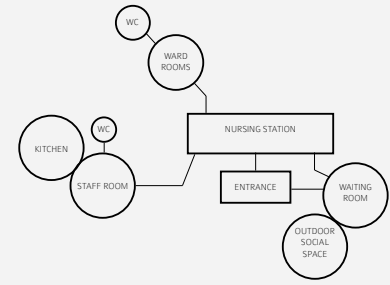
# 7.1 DESIGN DEVELOPMENT

## DESIGNING ALTERNATIVES

The feedback from workshops and dialogues with staff, accumulated a constant iterative design process with several rounds of analysis and creation of different design proposals.

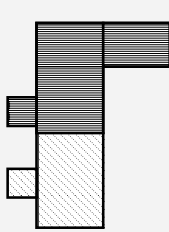
Through a sketching process three different layout alternatives were developed for the private ward. These were presented and discussed at the final meeting with the staff before we left Kolandoto.

## THE PRIVATE WARD



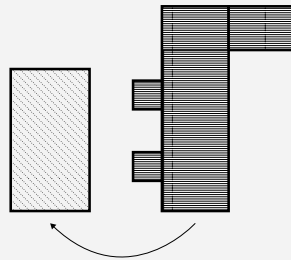
### HAVING IN MIND

Functions and connections kept in mind during the design process.



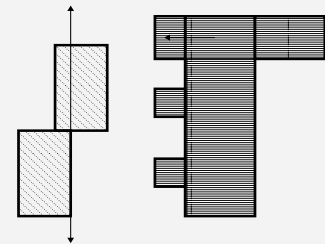
### The situation today

The building today with maternity ward and private ward in the same building



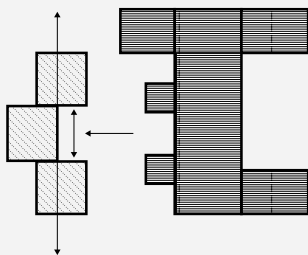
### Addition

The private ward moves out to a new building on the empty plot south of the existing building.



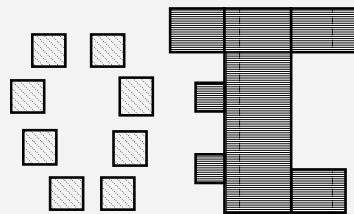
### Alternative 1 - Efficient & clear flows

The design of each building was shaped to support an efficient and clear flow. A rational and efficient suggestion, but anonymous.



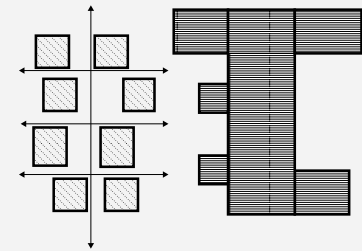
### Alternative 2 - Good public & private outdoor environments

The volume was adjusted to meet the existing building better and create good public, private and semi-private outdoor environments. An extension of the maternity building was made.



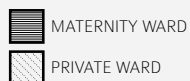
### Alternative 3 - A feeling of familiarity.

With the aim of providing the private ward patients with a feeling of familiarity, the typology of the private ward was inspired of vernacular building arrangements of local villages. This typology results in a more human scale, enclosed, semi-private courtyards where patients can interact with each other and their families.



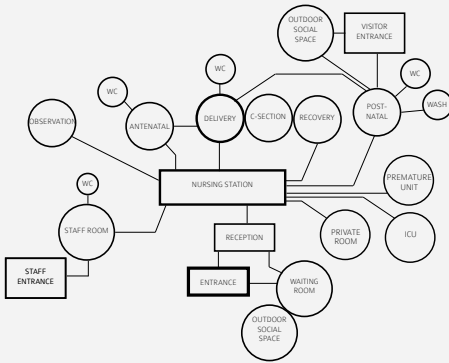
### Alternative 4 - rationalized to provide good flows and overview

The vernacular typology is rationalized to provide the ward with good flows, good overviews and a possibility of a future expansion. This suggestion was very appreciated among the staff at the final presentation. Also at the meeting with Moses Mkony in Dar es Salaam, this suggestion was the one he recommended to develop further.





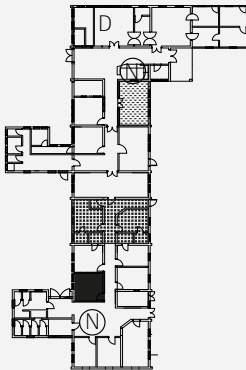
# THE MATERNITY WARD



For the maternity many suggestions were made where there is a big struggle to work with an existing building that is not always so well designed. A constant dialogue were held with the doctors and nurses at the department together with the midwife Maria Hogenäs.

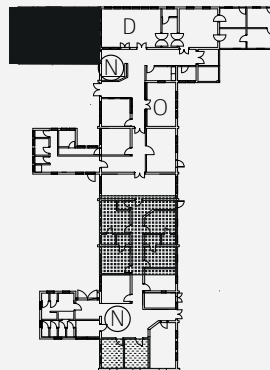
## HAVING IN MIND

Functions and connections kept in mind during the design process.



### The situation today

Crowded nursing station, too few delivery beds and big risk of infections due to the lack of space. For example the ICU has 4 beds in one room and the premature room 3 beds with no private toilet and no space for family support.



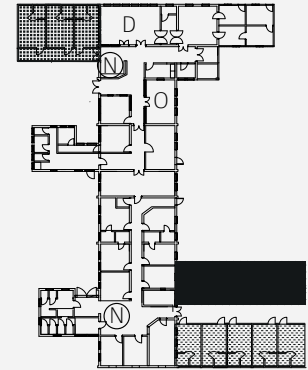
### Extension premature unit

Observation room added.

Premature unit in single patient rooms to keep the new-born with the mother and close to delivery with good overview, but no private toilets.

ICU in single patient room with good overview.

Still too few beds for delivery, antenatal and postnatal.



### Extension premature, private & ICU

Private rooms with the possibility to deliver.

Nursing station is moved with better overview of ICU and premature unit but still not enough overview.

ICU in single patient room with good overview.

Still too few beds for delivery, antenatal and postnatal.

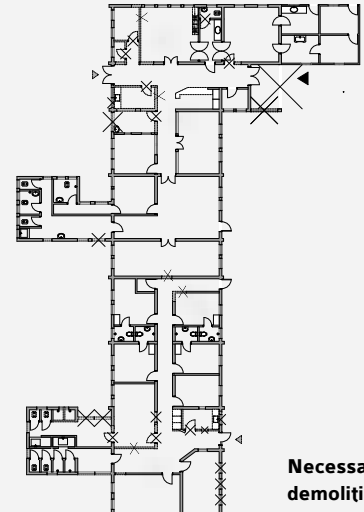
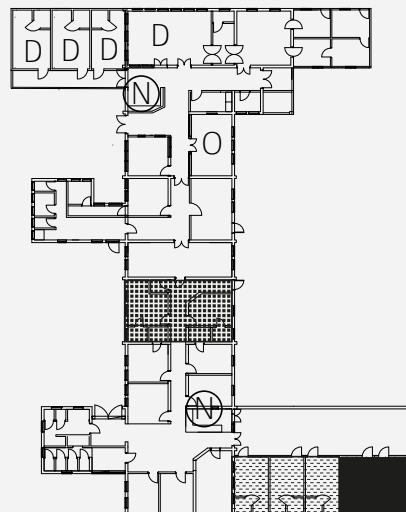
### Final suggestions

4 single patient delivery rooms.

ICU in single patient room with good overview.

Premature unit isolated to reduce risk of infections.

- N NURSING STATION
- D DELIVERY ROOM
- O OBSERVATION
- ICU
- PRIVATE
- PRE-MATURE



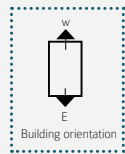
Necessary demolitions

## 7.2 PROPOSAL

### FUTURE SITE PLAN

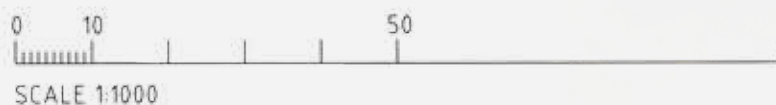
The future flows of the hospital site will be modified to become clearer. With the aim of separating the patient flow from the staff flow, the main entrance of the maternity ward is moved from the north side of the building to the south. This is also where the main entrance of the private ward is situated and where the main flow of the other wards of the hospital are, which enables easier wayfinding. This improves both the wayfinding for the patients and the staff can work more efficient.

The new buildings are orientated on an east- west axis to catch the breeze from the monsoon wind, similar to most of the other hospital buildings.



PATIENT & VISITOR FLOW

STAFF FLOW



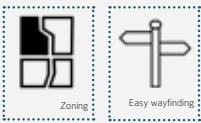
PUBLIC MAIN ENTRANCE  
(Women to delivery enter  
from here)





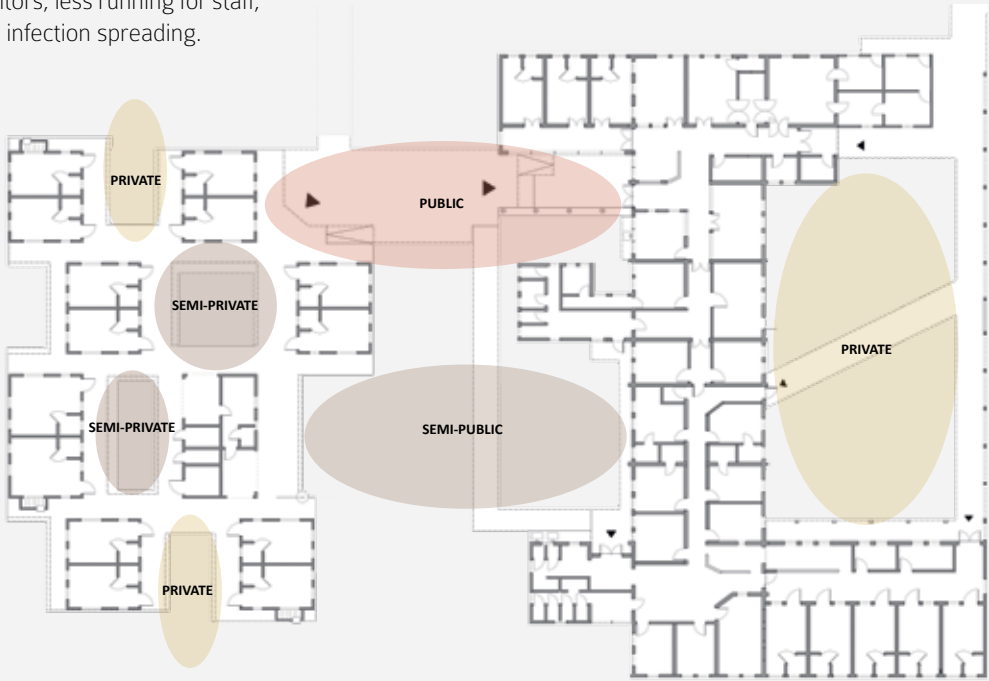
# FUNCTIONAL ZONING

Since one of the major problems with the existing building was the poor flows and lack of separation of functions, much effort has been put on the creation of social public spaces and more private quiet spaces. Also separation of flows has been made through zoning of functions in the buildings. This contributes both to easier orientation for patients and visitors, less running for staff, increased integrity for patients and less infection spreading.



## PRIVATE WARD NUMBER OF BEDS

- Single patient rooms:  
8 beds (2 with higher standard)
- Double patient rooms:  
12 beds in 6 rooms



EXTERIOR ZONING

- Delivery
- Before delivery
- After delivery
- Staff zone
- Single ward rooms
- Double ward rooms



INTERIOR ZONING

## MATERNITY WARD NUMBER OF BEDS

Antenatal: 7 beds in 3 rooms

Postnatal: 11 beds in 5 rooms

Delivery: 4 beds in single patient rooms

Private: 4 beds in single patient rooms

(2 where delivery is possible)

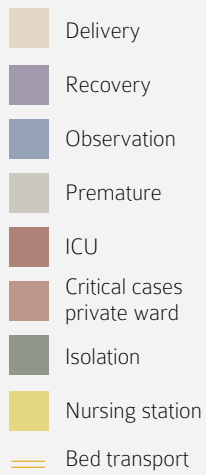
Recovery: 2 beds in 1 room

Observation: 3-4 beds in 1 room

ICU: 2 beds in single patient rooms

Premature: 2 beds in single patient rooms

Isolation: 1 bed in single room



OVERVIEW

The functions above are all functions that need extra care in terms of high technology equipment and particularly extra observation from nurses and doctors. This need has clearly determined our final floor plans, where all functions have good contact and overview from a nursing station.

## OBSERVATION

The observation is a room used for the women that are in an unstable condition and needs extra supervision before the delivery.

## DELIVERY

The delivery room contains a special delivery bed and should be provided with supportive equipment and materials that can keep an appropriate level of sanitation.

## RECOVERY

After a C-section the women will wake up and recover for a few hours in this room with good supervision.

## PREMATURE

Single patient rooms for babies and their mother that were born too early. Here they are able to stay together and the mother help to keep an extra eye on the baby

## ICU

ICU is for women that are in an unstable condition after the delivery. This room needs both additional supervision and in some cases good isolation from the other women since they might have infections or are in great risk of receiving infections from others.

## ISOLATION

This room is used if the patient is in a bigger risk of receiving or contaminating others with an infection.

## PRIVATE ROOMS MATERNITY

For the women that are willing to pay for an improved privacy and a higher standard of care, there are private rooms within the maternity ward, where the women stays both before and after delivery. Also the delivery can take place here if the equipment and staff is enough.

## THE PRIVATE WARD




The new private ward "village" reminding of local village structures and create familiar spaces for the patients. The nursing station works as a core situated along the main corridor. Staff spaces are provided here together with a big storage. The rest of the storage spaces are decentralized and put outside each ward unit, to minimize the running for the staff. Close to the nursing station, two bigger ward rooms are situated with a bit higher standard, since it is one of the points the hospital required. Now they have 3 levels of private ward with the double rooms as the lowest level.

## THE MATERNITY WARD

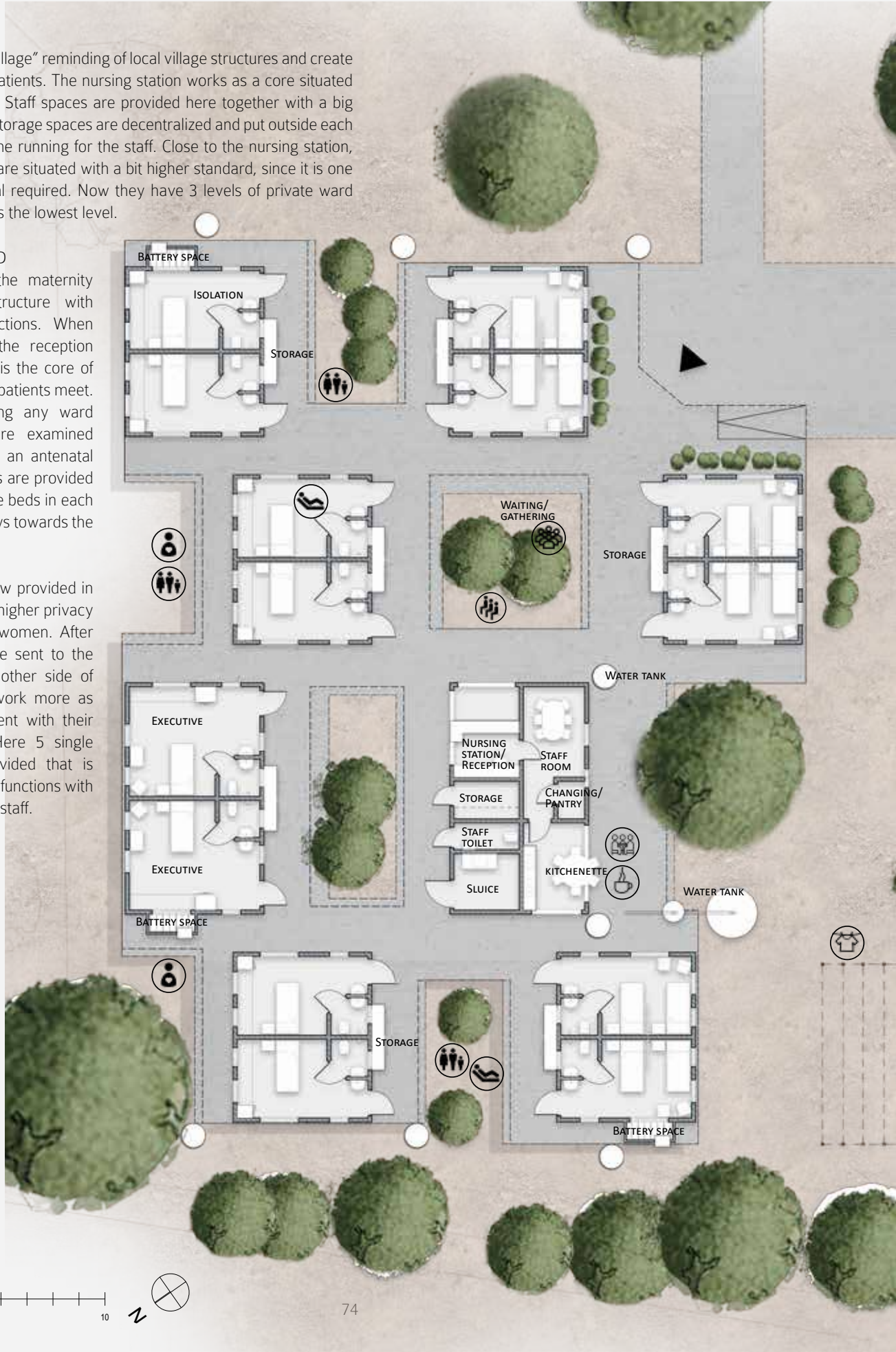
The refurbishment of the maternity ward has a clear structure with different zones of functions. When entering the building, the reception and the nursing station is the core of the building and the first patients meet. Directly without crossing any ward rooms, the patients are examined before they are sent to an antenatal room. The patient rooms are provided with a maximum of three beds in each room. All beds have views towards the green garden outside.

4 delivery rooms are now provided in single patient rooms for higher privacy and less stress for the women. After delivery, the women are sent to the postnatal ward on the other side of the building that now work more as an own small department with their own nursing station. Here 5 single patient rooms are provided that is very flexible for different functions with good overview from the staff.

## DAILY ACTIVITIES

-  Gathering with other patients
-  Cooking
-  Washing
-  Hanging clothes
-  Gathering with family
-  Learning
-  Eating
-  Waiting
-  Resting
-  Labour activities
-  Meditating & praying

 NEW CONSTRUCTION  
 EXISTING WALL





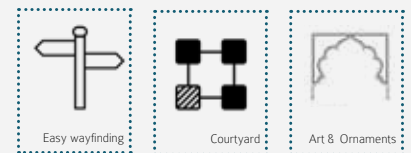






ENTRANCE TO THE PRIVATE WARD

The new private ward “village” has a unique appearance at the hospital today, but the expression is still familiar with a lot local building elements like courtyards, arches and a warm brick facades. From the entrance plaza in front of the village, you see the small courtyard inside and have direct sight-line to the nursing station which is clearly characterized with its arches.





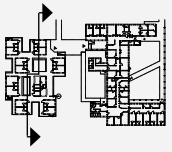
ENTRANCE TO THE MATERNITY WARD

The entrance is clearly visible with a “baraza” for waiting both along the facade and around the surrounding trees. Here also tea and cooking spaces are available for waiting relatives.



WEST ELEVATION





SECTION A-A



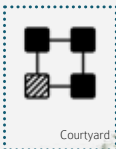
MAIN CORRIDOR AND NURSING STATION IN THE PRIVATE WARD

The small courtyards just outside the ward rooms offers both privacy and socialization. Instead of sitting indoors on beds in the wards, patients and relatives can sit outdoors in green courtyards, which in turn can encourage more friends and family visits.



OUTDOOR KITCHEN IN THE PRIVATE

A small kitchen is provided for preparation of easier snacks and food for the patients and the staff. It also works as gathering place in between the private and maternity ward, opposite to the big education and gathering place outside postnatal entrance.



Courtyard



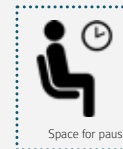
Baraza



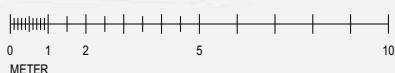
Art & Ornaments



Outdoor cooking space



Space for pause





#### ENTRANCE TO POSTNATAL

The postnatal ward has its own entrance for visitors, since a lot of people coming to watch the new born babies. At the entrance a shaded gathering place under the big tree is provided, where also education and vaccinations of the babies can take place.

Close by, a bigger laundry and washing area is provided where the women can wash their clothes and sheets, which is a highly appreciated feature today that has reduced the spread of infection significantly.





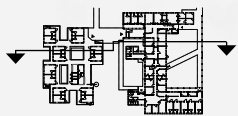
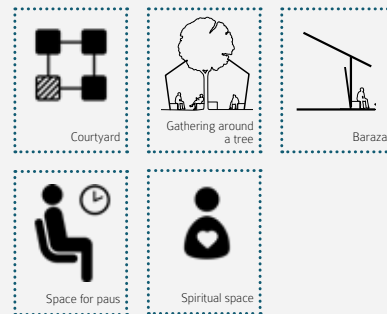


NORTH ELEVATION MATERNITY



PRIVATE YARD AT THE BACKSIDE OF MATERNITY

The courtyard on the north side is calm and enclosed by a fence in corrugated bricks, reminding of the outpatient department. Here the women can walk around or sit and socialize on the barazas around the trees and be undisturbed during their labour.



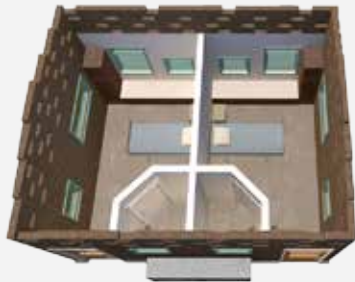




NURSING STATION AT MAIN ENTRANCE MATERNITY



WARD ROOM IN ANTENATAL ROOM



SINGLE PATIENT ROOM IN THE PRIVATE WARD

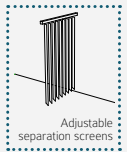
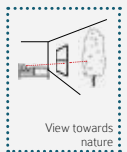


DOUBLE PATIENT ROOM IN THE PRIVATE WARD

The wardrooms are planned to give the patient as much integrity as possible and still provide the staff with good overview. This design proposal suggests mostly double rooms since it provide good social qualities but still decrease infections and stress levels. In the antenatal and postnatal wards, a few rooms with a maximum of 3 beds are also provided. Between the beds, adjustable screens are placed that are fixed in the wall. It gives both privacy and better audio and visual environment. The windows are of various sizes and heights, which allows the patient to see out and the staff to see the face of the patient without entering the room. All beds have views towards the nature outside the windows.

In the antenatal rooms, a space is left in each room for encouraging movement during their labour, either with pilates balls or something to hang in.

The ward rooms should always have seating possibilities for the relatives of the patients. In the maternity ward mostly loose chairs can be provided but in the private ward, seating possibilities are integrated in the design with big bed sofas, where the big families can sit. At the private ward, the walls in front of the beds are left without plaster, which gives a warm and natural feeling to the rooms.

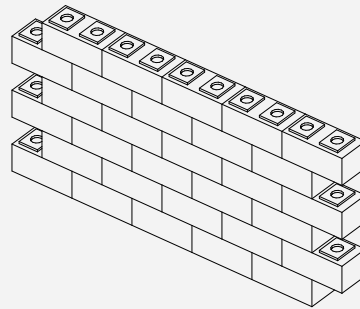


# THE WALLS

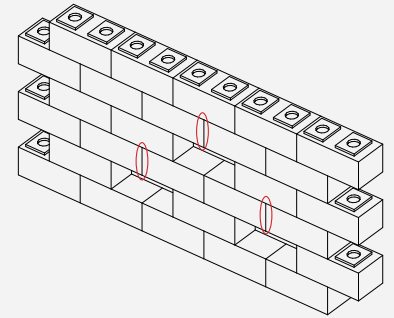
## LOW-COST SUSTAINABLE TECHNOLOGY – INTERLOCKING BRICKS

The exterior walls of the private ward consists of interlocking bricks that don't need any mortar when building since they are attached together like Lego. But to provide natural cross ventilation and also giving the buildings an identity, holes in the upper part of the walls are made by leaving out some of the bricks. This functional decoration is possible if some mortar are used just between the bricks above the holes.

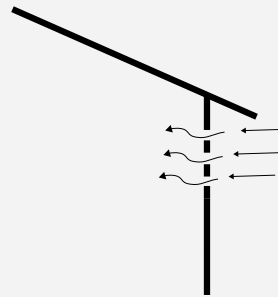
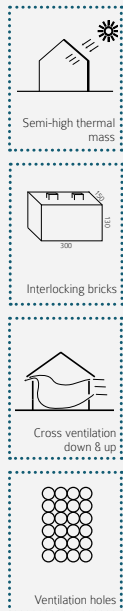
In the holes, insects net is also attached for protection against mosquitos and bats.



WALL WITH INTERLOCKING BRICKS



VENTILATION HOLES WITH INTERLOCKING BRICKS



VENTILATION HOLES PROVIDING CROSS VENTILATION

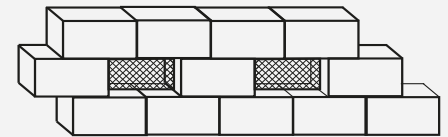


DIAGRAM OF ATTACHMENT OF INSECTS NET BETWEEN THE BRICK IN VENTILATION HOLES



SOUTH ELEVATION PRIVATE WARD

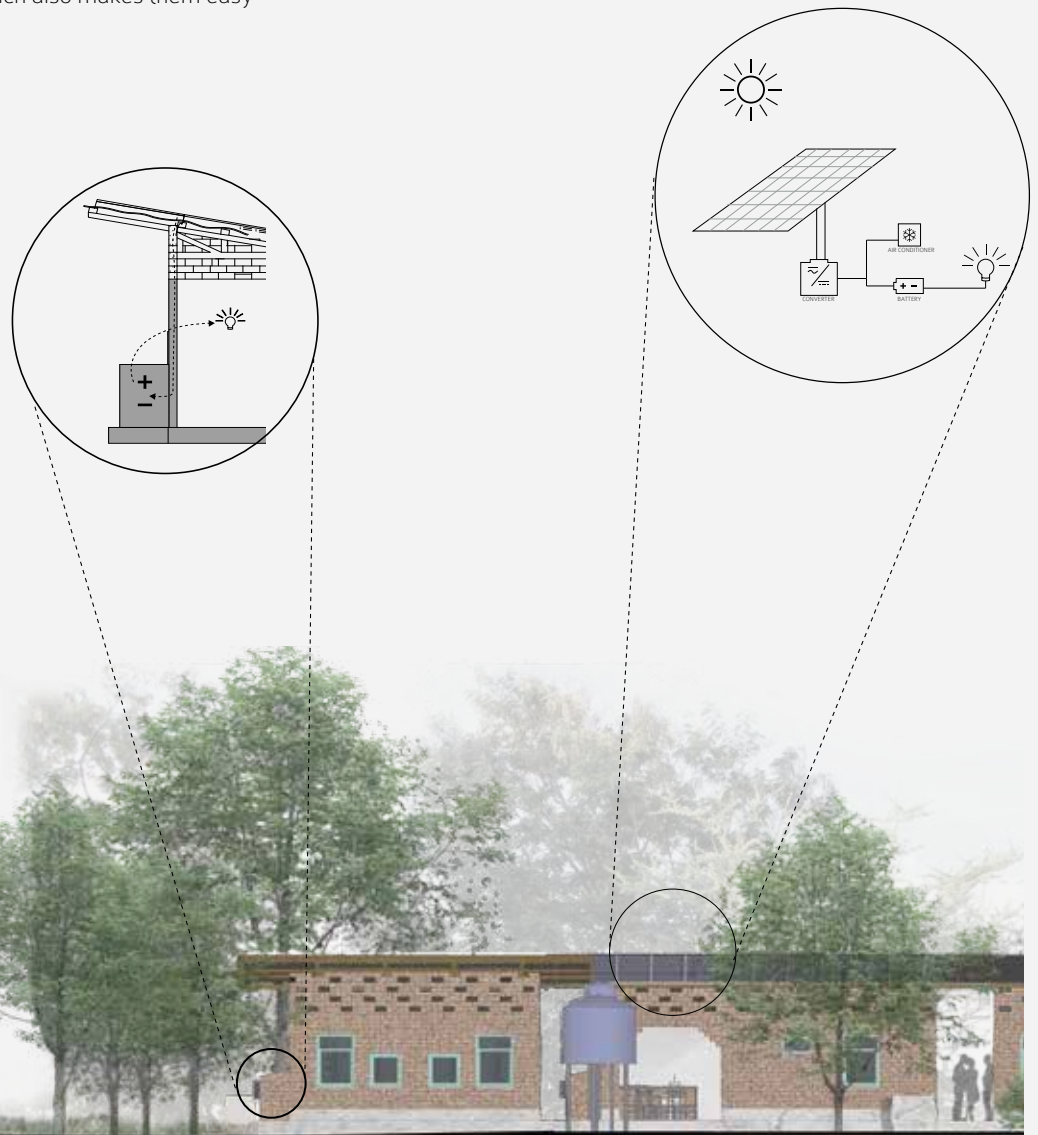
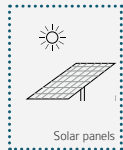
# THE ROOF

## LOW-COST SUSTAINABLE TECHNOLOGY - SOLAR ENERGY

At the private ward iron sheet roofing covers the building and is extended over the corridors and placed on wooden trusses. The roof is provided with solar panels that give enough energy to be self-sufficient for a couple of hours when the regular power outage occurs. The roof is angled 11 degrees, to catch the sunrays in the best position.

The batteries that are connected to the solar panels needs to be kept in a cold place, usually in a room with air-condition in this type of climate.

Instead of taking up a lot of space indoors as the batteries do in the maternity ward, they are placed just outside the ward rooms in separate mini-rooms, which also makes them easy to maintenance.



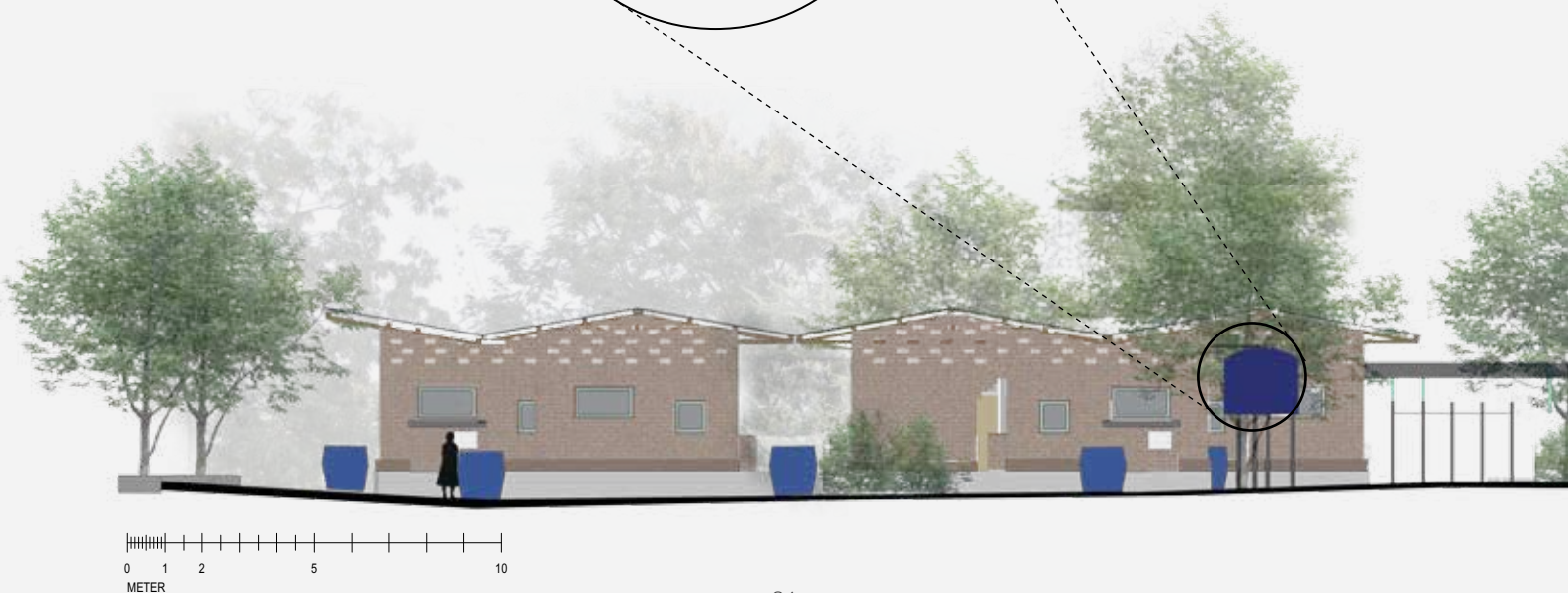
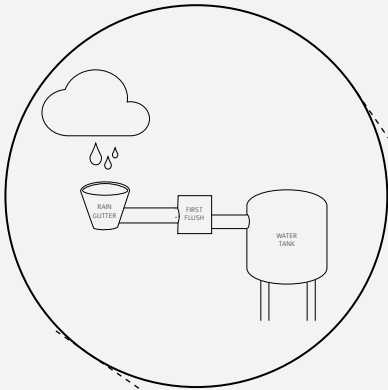
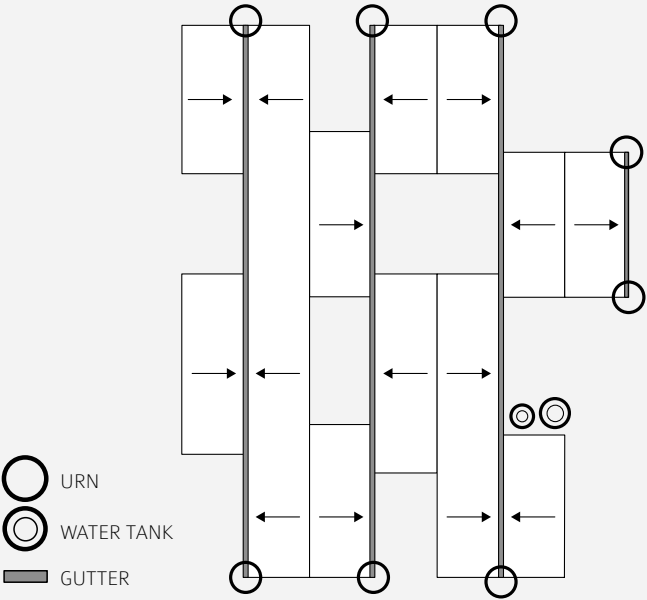
NORTH ELEVATION PRIVATE WARD

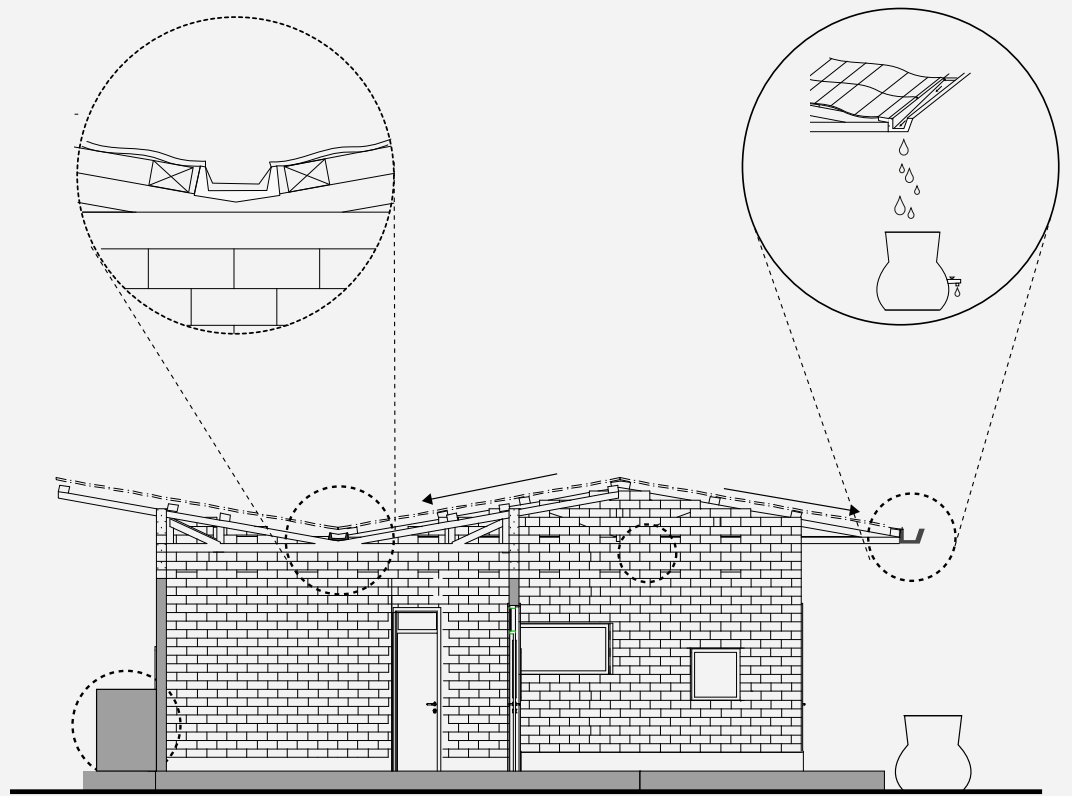


# THE ROOF

## LOW-COST SUSTAINABLE TECHNOLOGY - WATER COLLECTION

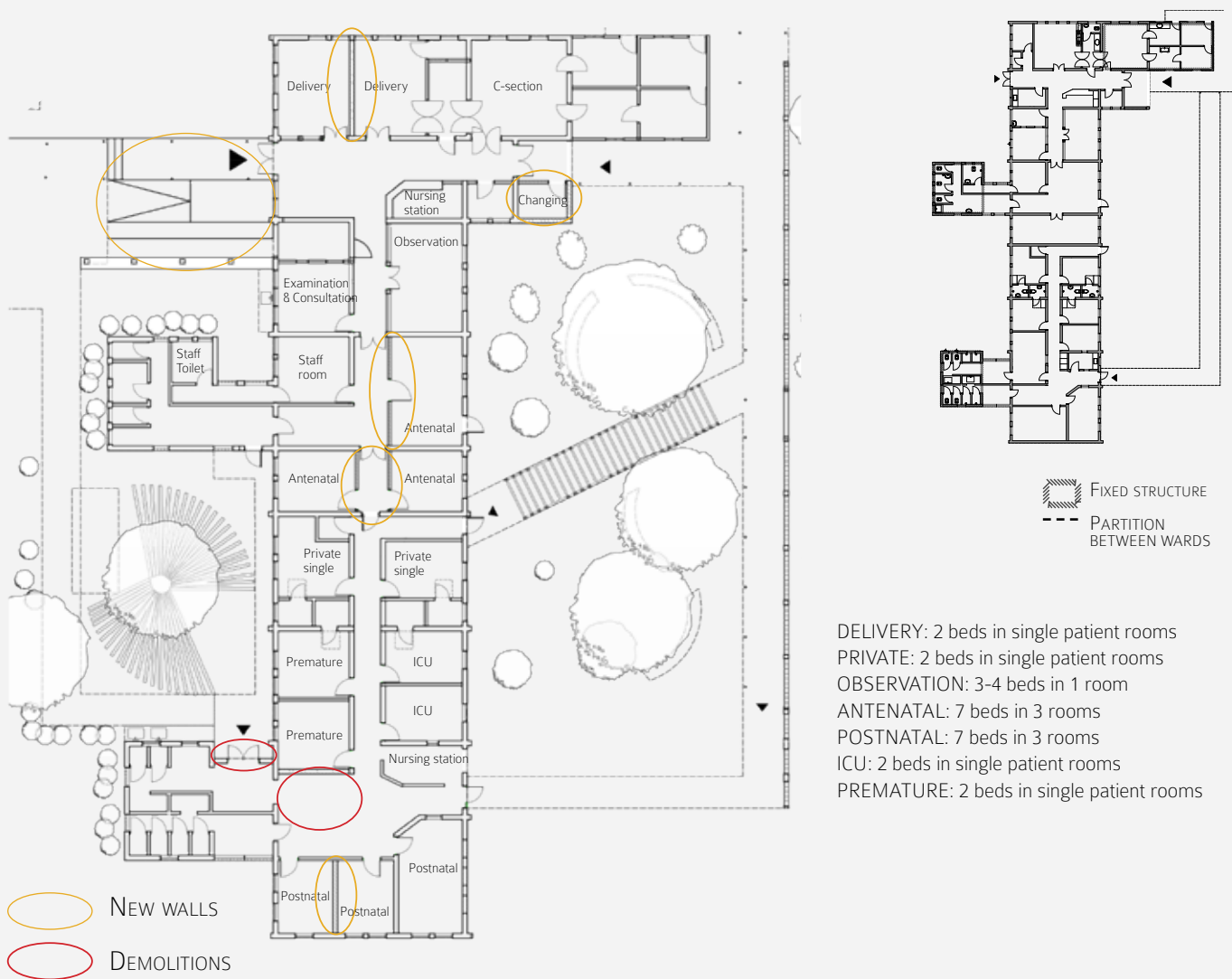
Rainwater is collected from the roof in two ways at the private ward. Through leaning gutters, the water is either led to urns where the water is collected and can be used for cleaning and washing. The other collection is for flushing and washing hands, where the water is collected and filtered in a first flush system.





EAST ELEVATION

## IMPLEMENTATION - ONE STEP AT THE TIME



The aim is to create a feasible design proposal that will make an improvement and that the hospital can afford even if there is a limited financial support. This plan shows how the final design proposal can be achieved in phases whenever the economy supports a development, where this step can be made by the hospital themselves.

The drawing above is a solution of how the ward can be improved without the two extensions. A few parts of the facade has been opened up and a couple of walls have been torn down and added, in order to provide a more well-functioning maternity ward and a healing environment.

By using the whole building, spaces that were lacking before are added, such as staff and family support spaces both inside and outside of the ward. The women do not longer receive their care in open halls but in enclosed rooms with one, two or maximum three other patients. The two delivery beds have been separated into individual rooms, providing more space for integrity and a healthier environment.

With the aim of keeping the costs down through the refurbishment, the new design will avoid making big changes in the water and sewage system of the building as well as to avoid changes in latest interventions done, including the battery room for the solar panels and the new C-section extension.



The primary design proposal should be flexible and adaptable for future development and changes. (Francis ,2007) This diagram shows how the same maternity ward could be used differently if the way of working would change. Instead of moving the women from the antenatal room, to delivery and further to postnatal care, this suggestion shows how the ward could look with only single patient rooms, where the women would arrive, get examined, do the labour work, deliver and recover in the same room. The same proposal could host 17 deliveries at the same time by only adding 2 walls if the amount of staff and experiment was sufficient. It would also allow the premature and ICU unit to grow if needed.

## 8. CONCLUSION

## 8.1 DISCUSSION & REFLECTIONS

As human beings, our health and the health of those we care about is a matter of daily concern. Regardless of our age, gender, socio-economic or ethnic background, we consider our health to be our most basic and essential asset. The right to health is a fundamental part of our human rights and all people, regardless of their economic situation and underlying factors of health, should have access to the same quality of healthcare.

The unjust distribution of the world's resources, resulting in big inequalities in the access to healthcare, is the major drive and reason for this master thesis. Although, this thesis is only a small project, it contributes to a bigger cause. Together, all efforts of this type contribute to reducing the unfair and unequal situation in the world.

The primary focus of this thesis was to improve the current accessibility and affordability to emergency care, maternal healthcare and high quality inpatient care for the inhabitants in Kolandoto and Shinyanga District in Tanzania. During the process the ambition of a more prospective solution grew. The additional vision became to support the hospital with a design that can make the hospital financially independent in the future by making it well known in a larger region, more trustworthy and improve their income. By providing the hospital with a design where time and effort has been put on adapting the solutions to the climate, culture and local challenges, the hospital can be more trustworthy and feel less foreign to the people in the village - making the healthcare easier to approach and more accessible.

Reflecting on this project, the discussion will look back to the primary problem statement and research questions with the objective to analyze the process.



## INEQUALITIES IN ACCESS TO HEALTHCARE & CHALLENGES AT KOLANDOTO HOSPITAL

Looking back to the theoretical part of this thesis and putting it in relation to the local context, this part of the discussion will reflect on the relevance of implementing EBD when designing hospital environments anywhere in the world. Also reflections on how the strengths of local architecture can be enhanced in the design to support a healing environment and the access to healthcare, will be presented

The first impression when arriving to the Kolandoto Hospital and walking through the facilities was the lack of space and the poor standard of the physical environment, where weather and usage of the buildings has taking its toll.

The hospital has an architectural language with a small-scale typology, where each building functions as its own unit. This human scale typology is a quality we wanted to respect and enhance with our design but we still wanted the end result of the additional constructions to be a building that makes a statement and stands out from the surroundings. The choices made in the design is a balance between affordable, local materials and more robust yet more expensive imported materials. The building also aims to be true to the scale of the hospital and use local building techniques and design elements. The vernacular, traditional techniques and new concepts are mixed to create a new, modern building that can be the new face of the hospital and attract more patients - improving both the economy of the hospital and the health of the people in the Shinyanga Region.

We wanted to give the hospital and the village a building they can be proud of and this includes a feeling of ownership. Therefore we arranged multiple interviews and workshops to really understand their needs and co-design together with the end users of the buildings. By taking the time and making the effort to listen to the staff and management, the new design becomes theirs. The new flows support their way of working and the improvements are something they see a need for and is not something imposed by us.

A building, designed with familiar techniques and co-designed with the local community, is more likely to support the users need and the users will in return have the knowledge of how to use, maintain and develop the building in a sustainable way. From a sustainability perspective, we believe that taking the time to fully understand the context and creating a common vision together with the user is the key. A sustainable architectural project should build on the strengths of the local context and achieve the vision of the project by creatively combining new and traditional design solutions.

## THE SCARCE RESOURCES

This part of the discussion relates back to the inequality in the distribution of the world's resources and more specifically, how a hospital situated in Tanzania can be designed in order to build sustainable, with small means and still provide the hospital with a qualitative design, adapted to the local context.

To be able to create a good healthcare environment with a small budget, creativity is a key. When the aim is to construct a building with small means, innovative, low-technology solutions built with local materials and resources is evident to create a successful project.

Time is also a big factor. Most projects have a limited time frame and it is important to continuously evaluate the ambition of the range of the project. When designing with the aim to improve the conditions for others it is easy to grasp after too much when trying to do as much as possible during the limited time frame. We must be careful not to take rash decisions and complicate the future development, instead of improving it and make sure to plan for a flexible future development. The ability to improvise is needed since the process is usually in an unaccustomed speed and quick decisions are constantly needed to be taken. Even though the speed of these decisions is crucial, sometimes, it is important to take a step back and reflect on the future consequences, not to prohibit better solutions in the future. Previous quick-fixes and short term solutions made at the hospital, frequently hampered our design for a future development.

The participation in the planning and construction of the emergency department gave us an insight of the process and situation of the local context. We got the knowledge of the struggles, possibilities and limitations of the local context early in our own design process which resulted in a more feasible design that took the local, yet scarce resources into consideration.

To be a part of this project, just as arriving to a completely new context was challenging but incredibly rewarding. Especially the opportunity to collaborate with real stakeholders and to plan and construct a building that has the possibility to do a big improvement for the local community as well as the hospital.

This part of the discussion relates back to the lack of cultural adaptation in healthcare design and the research question of what factors of evidence-based design that are relevant for meeting the socio-cultural needs in healthcare buildings in Tanzania.

The relationship between healthcare design and culture is an important part in evidence based design (EBD), that has been given a too small role when designing healthcare environments in a foreign part of the world. The cultural background of the users of the hospital is essential when it comes to the feeling of security. To feel secure is an important aspect in EBD, since the lack of physical and emotional security might be the major factor causing stress among patients. Stress is universal, but the underlying factors that contribute to stress varies from an individual to another, often depending on their cultural background.

All people want to feel safe, calm and have control of the situation they are in and all humans have a need of integrity and privacy. When sick, it is universal for a human to seek help and lean on physical and social support to get the feeling of belonging and being taken care of. By making a design that supports a person centered care and is shaped to suit its local users, a better healing healthcare environment is created, with a better outcome.

The hospital design in a place where the financial resources are scarce, should still be informed by EBD even though many design solutions are too expensive. For the project to be successful and feasible, the factors and solutions indicated by EBD needs to be adapted, twisted and modified to suit the specific local needs and possibilities. The designer must understand the deep and complex belief system, diverse cultural traditions and norms, climatic conditions and political and economic context. It is up to the designer to seek solutions different from the ones we are used to implement in the western hospitals and find innovative ways of reaching the goals of EBD with solutions that are adapted to the local context both in the terms of local resources as well as the culture.

By spending time in the context we got to both experience of the culture and started to understand the difference in needs. Through observations and conversations with patients, hospital staff and other Tanzanians during our stay in Kolangoto and around Tanzania, it was evident that the major difference is the sociality and the individual's role in the community. Compared to Sweden where the general person is an individualist, the Tanzanian people are much more depending on their families, their village and their community. This is noticeable and of great importance in their everyday life. Their behaviour shapes their community and the social and warmth of the Tanzanian people creates an open environment where the security network is depending on the community. This strongly affects one factor, significantly relevant to this thesis - how illness traditionally is treated and what support is needed to make the ill person better.

Culture is a powerful and essential factor in all architectural design, likewise architecture is a big part of the cultural identity. It is hard to create architecture without being influenced by the culture and context, including both the context of the architect's background and the surrounding context the architecture take place in. Therefore it is strange that healthcare architecture often is designed with similar physical setting all over the world. There seems to be an intention in all hospital design to imitate the design of western hospitals. The natural reason is the aim for modern bio-medical care and high quality. But a successful healing environments is not equal to financial and bio-medical solutions alone. If the design does not meet the user's healing and environmental needs the environment will not be fully healing.

### ON A FINAL NOTE

Architecture is a game of innovation and creativity and architects can improve patient outcomes by reducing stress through innovative design of hospital interiors using limited resources. Less is more, and architects can use minimum resources to create a required level of comfort in hospital settings using vernacular architectural principles when the designer understands the context.

Since we view the world through our native eyes, shaped by our background and our cultural context we approach problems and more specifically design problems, in a different way than the local community. By communicating and exchanging ideas with the local workers the strengths from both backgrounds can be brought into the same project. In this cultural exchange we are challenged not only to work in a different climate but also to use unfamiliar materials, building methods and customs belonging to a culture that perceives what is correct or beautiful, sometimes very different to our own culture but surprisingly often we share both solutions and taste. It is when this exchange of perspective happens, that something seriously new and exciting is created, both on a personal and a professional level.

To say that working in a developing country is different than it is at home is an understatement. There are different kinds of limitations that do not arise from the same policies or legislation and the problems are less predictable. These constraints might be seen as a hindrance to work, but this project has shown us that it is because of them that the work becomes interesting. These challenges have contributed to our knowledge and developed us as architects.

On a final note, this thesis would never been possible if not for the previous efforts made on site before and the support from the people involved from the beginning of the project until the end. Tutors and fellow students from Chalmers University of Technology, provided both encouragement and academic guidance in carrying out the field study and finishing the project. This enabled us to reach our goal of this thesis of providing Kolangoto Hospital with a future design that can improve the access to quality healthcare and to create a more healing hospital environment.

## 9. REFERENCES



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# APPENDIX

## THE EMERGENCY DEPARTMENT & WORKSHOPS

# EMERGENCY DEPARTMENT

## THE SITUATION

Kolandoto Hospital does not currently and officially provide any emergency healthcare. An emergency department is of great importance, since the entire region currently lacks emergency healthcare. Many patients arrive to the hospital in a state of emergency, often caused by different types of accidents. The emergency flow of patients is undefined, inefficient and cause dangerous delays in providing patients with help. With a new emergency department, the hospital can aid this group of patients by providing an improved level of service. This will make the hospital more well-known in the region and increase its reputation.

The building was designed during a previous phase of 'Healthy Hospital Project' by Lisa Bergstrand in collaboration with the hospital staff.

## THE MISSION & PROCESS

Together with two civil engineering students our mission was to assist the hospital in the process of procuring and building the emergency department. The main task was to ensure that the quality and origin of the plan for the department was maintained. Our role as architects was to ensure that the construction drawings were understood both by the hospital management and contractors. We modified the drawings to fulfill the hospital's need today.

To keep down the cost of the construction we made changes in collaboration with the contractors. The modifications mainly concerned the choice and dimensions of materials but also drainage solutions and handling the difference in height on the plot so the ambulance can unload patients in a good way. Another big change from the original design to keep down the costs was the roofing solution. The angled and raised roof was replaced with a more traditional pitched roof.

In the process of applying for a building permit we once again had to update and complete the material to get it approved by the government.



Birdview over the emergency department before changed roof

### MEETING WITH CONTRACTORS

With the aim to get a fair price for the emergency department and a qualitative construction we met three local contracting companies together with the hospital management. We discussed the drawings, the challenges of the site and modifications needed to be done to adapt the drawings to the vernacular way of constructing in Tanzania with all three companies. After changing the drawings accordingly, the companies gave us their bill of quantity to fully construct the emergency department. With the bill of quantity as a base and input from us and the engineers the hospital management chose the firm that would construct the emergency department.

### ROOM FUNCTION PROGRAM

Together with the staff at the hospital we have developed a room function program where we mapped and specified the need and function for all spaces in the emergency department in terms of furniture, interior materials, medical equipment and instruments, type of electricity needed and sockets. This gave us an understanding of what the norms and standards are in the Tanzanian context in a hospital environment.

### BUILDING PERMIT & CONTRACT

Before the submission of building permit and the construction documents, a lot of drawings needed to be updated and supplemented, mainly concerning details of window solutions, ceiling plan, detailed sections, drainage systems and raising the ground level and door widths.

In Tanzania the submission of the building permit to the government is a formality made some time during the building process, not necessarily before the start of construction. We sent in the material for the permit two weeks before the construction work began and received an approval a month after the start of construction.

### MEETING WITH LOCAL ARCHITECT

When handing in the building permit for the emergency department we met Mambisasam Hoja, a local architect working for the government. We discussed the construction method chosen for the emergency building and got the opportunity to ask additional questions about solutions we had gotten mixed comments about concerning roofing, concrete blocks and handling height differences in the ground.



GOING THROUGH THE DRAWINGS TOGETHER  
WITH THE CONTRACTORS



SITE ANALYSIS WITH THE CONTRACTORS  
AND THE HOSPITAL



## OUTCOME AND CONCLUSION

To meet multiple local contractors and discuss their building techniques, construction process, choice of materials and architecture with the purpose to redraw detailed and technical solutions adapted to the local context, gave us a foundation of understanding of the vernacular building traditions and building process in Tanzania.

The bill of quantity showed us clearly what parts of a construction that are expensive and complicated, giving us the advantage to know what to avoid when building with small means in the next phase. It also made us understand what materials that can be found locally and what needs to be transported to Kolandoto.

For example we learned:

The local wood is limited and in bad condition and needs to be transported from Tabora region south of Shinyanga.

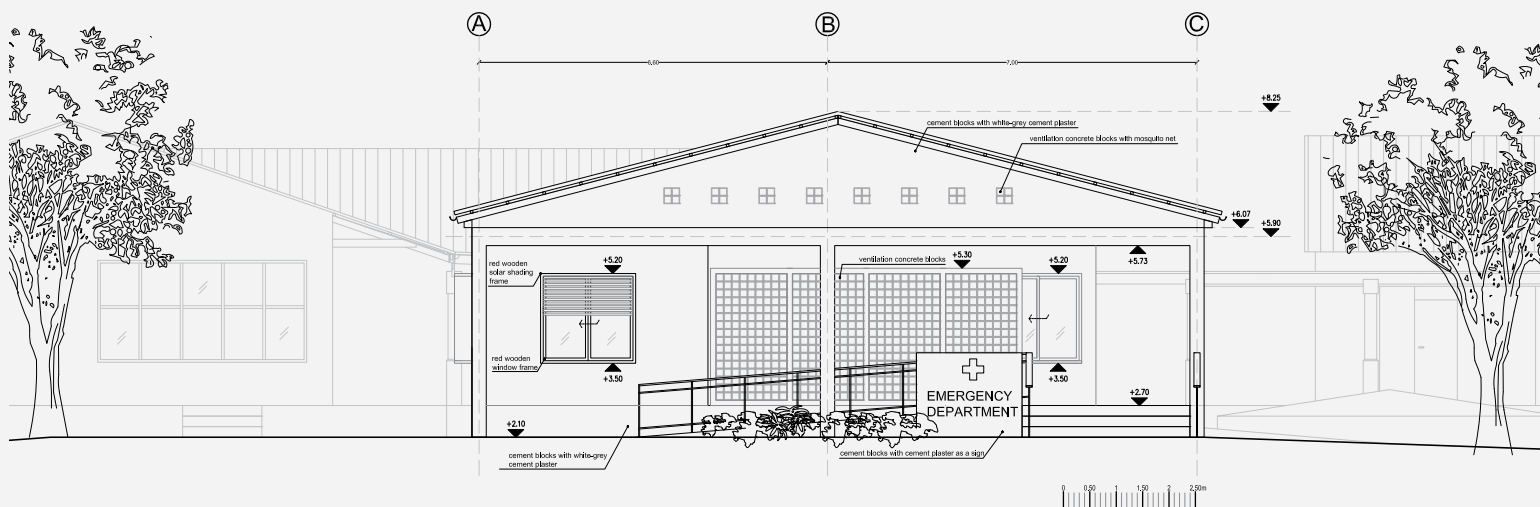
Concrete is often the solution building healthcare facilities since it is robust even though it is one of the most expensive materials to build with. The most commonly used material for roofing is corrugated iron sheets because it can be found locally in the Shinyanga district. The sheets will rust if not protected.

Occasionally there can be heavy rainfalls and very strong eastern winds. This needs to be taken into consideration when designing roofs and implementing natural ventilation in buildings. Another thing that is important to avoid when designing for natural

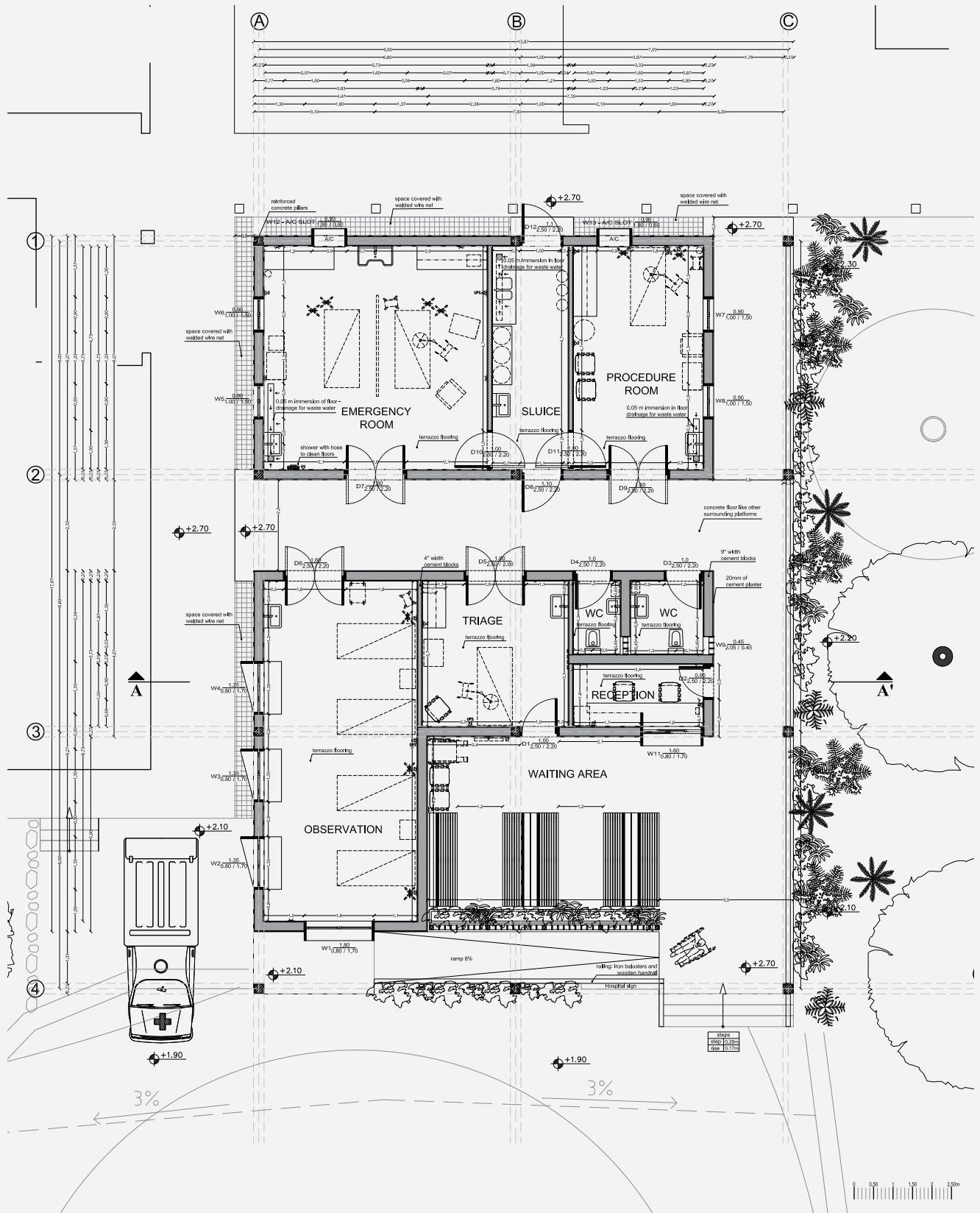
ventilation is to create nests for insects and bats. Therefore it is necessary to cover holes with different types of nets.

The part in the construction work that is least expensive in Tanzania, is the manpower. Transporting material is one of the most expensive parts in the process.

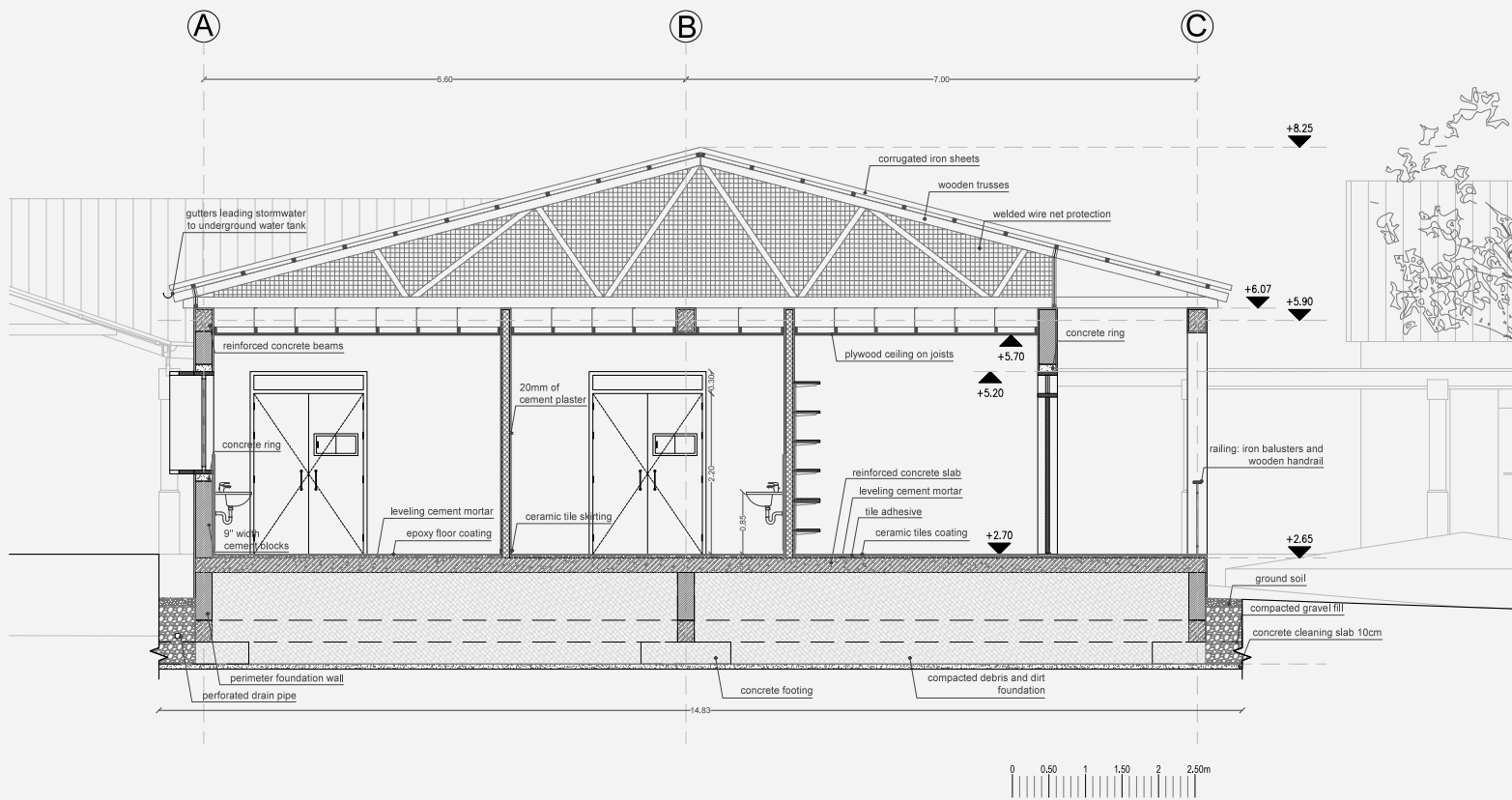
Grasping what the challenges of the process can be and what the qualities of the site are, enhanced our confidence to start designing the next phase of the hospital's development.



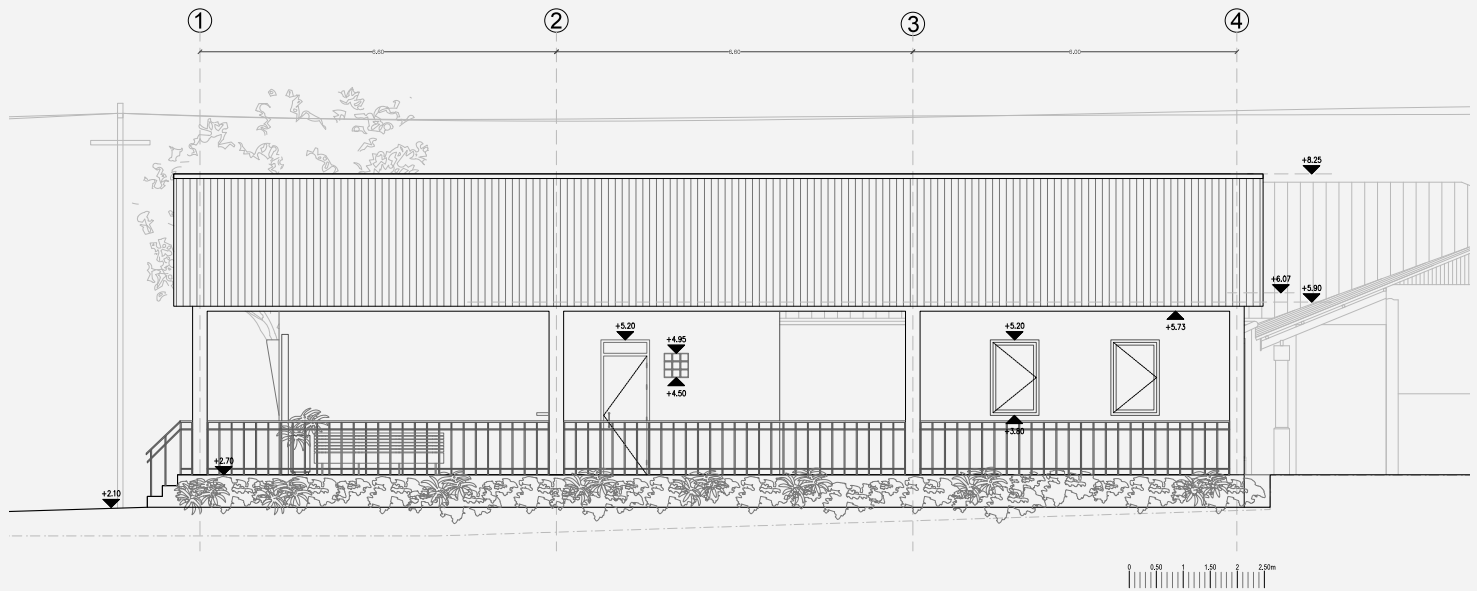
WEST ELEVATION OF EMERGENCY WITH THE  
NEW ROOFING SOLUTION



PLAN OF EMERGENCY DEPARTMENT



SECTION A - A



SOUTH ELEVATION



# OVERVIEW WORKSHOPS

	SET UP	PARTICIPANTS	AIM	OUTCOME	APPROACH
INTRODUCTION MEETING	INTRODUCTION OF THE ORGANISATION AND SITE	HOSPITAL MANAGEMENT & MIKAEL MANGOLD	TO GET A BRIEF OF THE HOSPITAL AND INTRODUCE EACH OTHER AND OUR WORK	A BRIEF UNDERSTANDING OF THE ORGANIZATION AND CONTEXT	BE HUMBLE BE RESPECTIVE BE POLITE BE OPEN BE ADAPTABLE
WORKSHOP 1 "3+3 WORKSHOP"	THE PARTICIPANTS ARE ASKED TO WRITE DOWN ON POST-IT NOTES 3 GOOD THINGS AND 3 BAD THINGS ABOUT THE GIVEN TOPIC	6 PARTICIPANTS WITH DIFFERENT OCCUPATIONS	GET ANSWERS TO FOLLOWING QUESTIONS:  ARE THERE ANY BENEFITS OF HAVING MATERNITY WARD AND PRIVATE WARD IN THE SAME BUILDING? WHICH WARD UNIT BENEFITS THE MOST FROM A NEW BUILDING?  MATERNITY WARD: WHAT WORKS GOOD AND BAD TODAY? FUTURE POSSIBILITIES AND GOALS?  PRIVATE WARD: WHAT WORKS GOOD AND BAD TODAY? FUTURE POSSIBILITIES AND GOALS?	VISIONS FOR THE FUTURE OF PRIVATE WARD AND MATERNITY WARD	TRY TO MIX PEOPLE WHO BELONG TO THE SAME HIERARCHY IN DISCUSSION GROUPS  BE NEUTRAL  GIVE ALTERNATIVES SO THEY UNDERSTAND AND NOT ANSWER WHAT THEY THINK YOU MIGHT WANT TO HEAR
WORKSHOP 2 "The bubble diagram"	MAP FUNCTIONS & DRAW LINES AND ARROWS BETWEEN THEM TO SHOW NECESSARY CONNECTIONS	5 PARTICIPANTS WITH DIFFERENT OCCUPATIONS	DISCUSS AND GET KNOWLEDGE ABOUT:  WORKING METHODS CONNECTION BETWEEN FUNCTIONS AND THE FLOWS WITHIN THE BUILDING.	IDENTIFY AND EVALUATE THE FLOWS & HAVE ABILITY TO DEVELOP DIFFERENT LAYOUTS/ FLOOR PLANS	TRY TO MIX PEOPLE WHO BELONG TO THE SAME HIERARCHY IN DISCUSSION GROUPS LET THEM DISCUSS IN THEIR OWN LANGUAGE  ASK THE QUESTIONS IN ALTERNATIVE WAYS - SHOW THAT YOU ARE NEUTRAL
WORKSHOP 3 "Mind-mapping the functions"	ADAPT THE BUBBLE DIAGRAMS OF FUNCTIONS TO THE SITE.  IDENTIFY THE FUNCTIONS WHAT THEY SHOULD INCLUDE	4 PARTICIPANTS WITH DIFFERENT OCCUPATIONS	DISCUSS AND GET KNOWLEDGE ABOUT:  TO DISCUSS THE ALTERNATIVES OF LAYOUTS IN RELATION TO THE SITE.  SPECIFY AND IDENTIFY THE FUNCTIONS IN DETAIL	SPECIFY THE PROGRAM MORE IN DETAIL	LET THEM DISCUSS IN THEIR OWN LANGUAGE  QUESTION THE ANSWERS - AND WAY OF WORKING  ASK THE QUESTIONS IN ALTERNATIVE WAYS - SHOW THAT YOU ARE NEUTRAL
WORKSHOP 4 "The HEAD GAME"	STEP BY STEP DETERMINATION OF DIFFERNT SCENARIOS AND SITUATIONS WITH GUIDING QUESTIONS	4 PARTICIPANTS WITH DIFFERENT OCCUPATIONS	TO TEST ALTERNATIVE LAYOUTS AND DISCUSS AND SOLVE PROBLEMS AND DIFFICULTIES THAT MAY ARISE.  GIVE ROOM FOR CO-DESIGN WHERE SPECIFIC DETAILS SHOULD BE LOCATED	UNDERSTANDING OF DIFFERENT SITUATIONS.  CHOOSE THE BEST LAYOUT AND DEVELOP IT FURTHER.	TRY TO MIX PEOPLE WHITH DIFFERENT PROFESSIONS - LET THEM UNDERSTAND EACH OTHERS WORK  LET THEM DISCUSS IN THEIR OWN LANGUAGE  ASK THE QUESTIONS IN ALTERNATIVE WAYS - SHOW THAT YOU ARE NEUTRAL
WORKSHOP 5 "FULL SCALE"	THE NEXT STEP OF THE HEAD GAME BY USING THE SAME SCENARIOS AND TEST THEM ONCE MORE — LETTING THE PARTICIPANTS MOVE IN A FULL SCALE LAYOUT.	5 PARTICIPANTS WITH DIFFERENT OCCUPATIONS	TO GIVE THE PARTICIPANTS AND US OPPORTUNITY TO UNDERSTAND THE REAL SIZE , LAYOUT AND IMAGINE THE ACTUAL BUILDING	TEST THE LAYOUT AND GET MORE INPUT FOR THE FINAL DESIGN PROPOSAL.	LET THEM WALK AROUND AND TEST THEY LAYOUT.  ASK THE QUESTIONS IN ALTERNATIVE WAYS - SHOW THAT YOU ARE NEUTRAL

# WORKSHOPS

## WORKSHOP 1 - "3+3"

The purpose is to get information about the participant's experience and knowledge in the field and find out their visions for the future of private ward and maternity ward.

The questions we want answered are the following:

Are there any benefits of having maternity ward and private ward in the same building?

Which ward unit benefits the most from a new building?

What works good and bad today at the maternity and private ward?

The result gave us knowledge to set up a strategy for our proposal and a conceptual program for each building.

The participants were asked to write down on post-it notes three good things and three bad things about each given topic.

When summarizing the first workshop the focus changed from how it is today to the future. The participants were asked to write down the possible positive and negative effects of a new redesigned maternity ward and new building for private ward.

## WORKSHOP 2 - "THE BUBBLE DIAGRAM"

The second workshop was a continuation of "3+3" to get more information about the need and vision. The aim was to receive enough information to set up strategies for the design proposals for both the maternity ward and private ward. After understanding the functions of their spaces today we moved on to the connections and flows between different functions. The participants were asked to write down all the functions of the maternity and private ward today and put them in relation to each other.

The participants received post-it notes representing the functions and a big paper to attach them on. The task was to map the functions and draw lines and arrows to show which functions are connected.

The workshop ended with a discussion and a conclusion of the necessary and unnecessary connections in the building.

The result gave us knowledge about desired future working methods, functions and the flows needed within the building.

### WORKSHOP 3 - MIND-MAPPING THE FUNCTIONS

The intention was to look at the layouts of functions adapted to the site. Discuss alternatives and see the result of mapping the connections from workshop 2 in relation to the site. Another purpose was to specify the program more in detail by identifying the functions through mind maps.

### WORKSHOP 4 – THE SCENARIO THINKING

Game workshops is a social activity and seen as a powerful way of exploring future possibilities. A common part of design games is to construct and use different scenarios. There are many advantages by using scenarios that represent a concrete situation, since possible problems and difficulties that may arise, becomes very clear. The design game create room for discussion, change and problem solving.

When alternatives of layouts and functions are developed, a good continuation is to test them by using game workshops. Another purpose can also be to let the participants be co-designers, by making decisions where further details in the building should be located – for example where the doors should be or where the sinks and beds are best located etc.

One developed design game is the HEAD game, which stands for “Healthcare Environment and Activity Design”. The game consist of a task-flow and a miniature environment, including playing figures and a game board (in this case the developed layout). The purpose is to get a holistic view of a future work environment and work processes.

The workshop started with us giving an explanation of the goals with the session and the current layout of the plan.

We gave the participants different scenarios and challenging situations and asked them to explain what they would normally do using the plan to describe their method of work and flow. To get a better understanding we added guiding questions to help the participants to explain.

The workshop was concluded with a brief review of the result to make sure that we understood correctly.

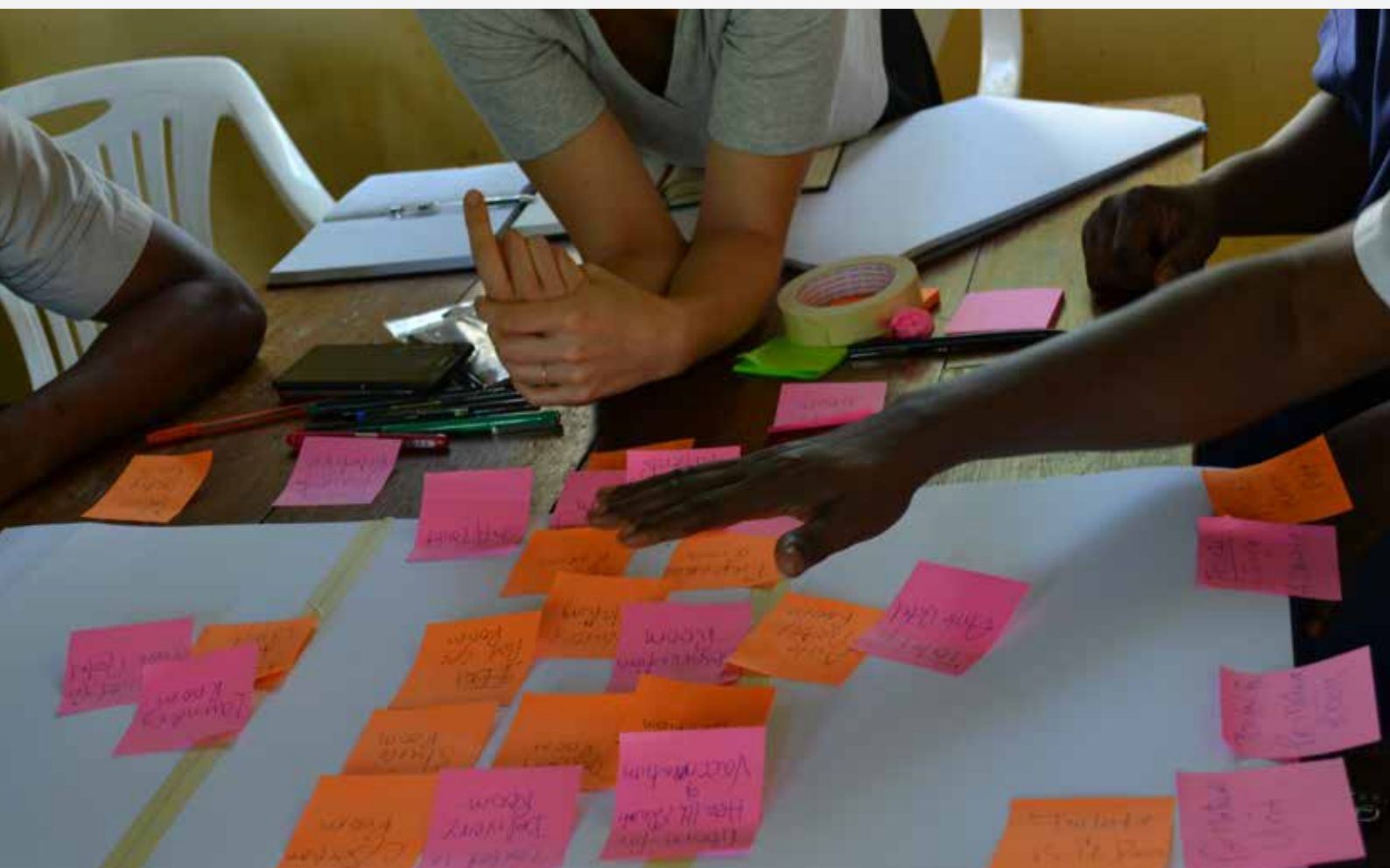
### WORKSHOP 5 – FULL SCALE

The purpose was to give the participants an opportunity to understand the real size and layout of the building. This is especially useful for non-architects, since it is a very clear and easy way to imagine the actual building.

The workshop functioned as a continuation of the scenario thinking by using the same scenarios and test them once more, letting the participants move in a full scale layout in the existing building of the maternity and private ward.

This was a good opportunity to show the layout to the public and involve new people, since the workshop attracted attention.











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