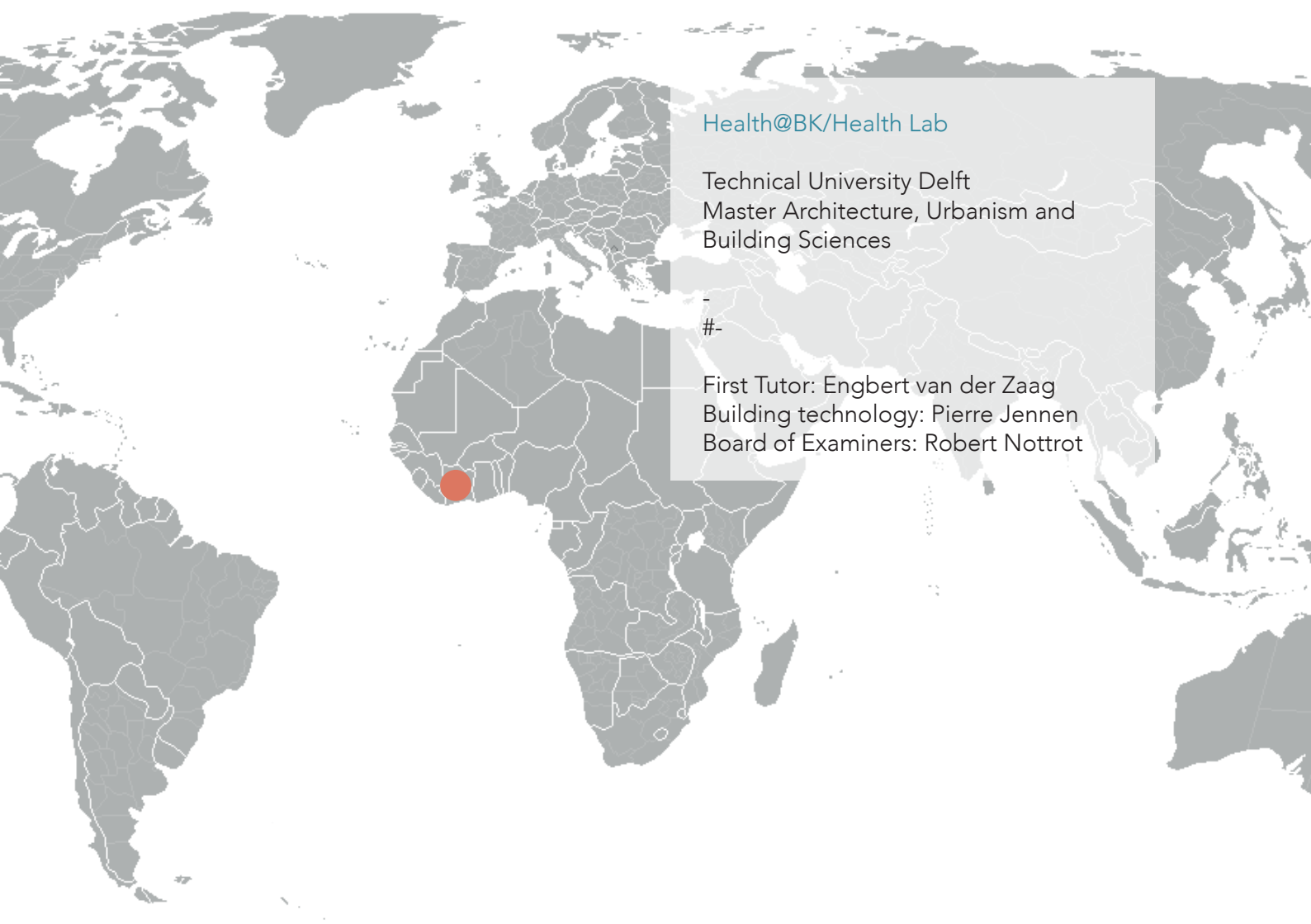
Graduation Project:

Maternity Care in the Republic of Côte d'Ivoire



Health@BK/Health Lab

Technical University Delft
Master Architecture, Urbanism and Building Sciences

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First Tutor: Engbert van der Zaag
Building technology: Pierre Jennen
Board of Examiners: Robert Nottrot

Argumentation of choice of the studio

First of all I chose the Health Lab for my graduation because the way they presented themselves: as an open-minded studio that reaches further than a pretty picture, creating realistic projects where the function as well as the user are important factors. Before this studio I finished an Interiors and Heritage semester, both two studios with a clear direction and vision. I learned a lot but I also missed the practical, realistic side. Secondly I have been interested in the world of healthcare for a while now. I have worked on a couple of healthcare related projects before and I have experienced the intense patient/visitor side of a healthcare facility. I picked this studio to expand my knowledge and develop my way of thinking and looking at health related design projects.

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Supplements:

Booklet 1: Dutch Maternity Care
Booklet 2: The Republic of Côte d'Ivoire
Bookelt 3: Precedent Studies

National Health Development Plan 2016-2020
development plan: 80% supervised deliveries

Component 1

realisation of functioning maternity clinics

investment in building and the rehabilitation of reproductive health care

establish and maintain a quality assurance system and continuous training

investment in equipment

establish and maintain a maintenance system

+

Component 2

raise the awareness of the sexual and reproductive healthcare

education and communication

family planning

providing information and medicine about HIV

providing contraceptives

The Project

For my graduation project I have the opportunity to work with *company name* on the realisation and rehabilitation of several Maternity Clinics in the Republic of Côte d'Ivoire (Ivory Coast). The project is a part of the 'National Health Development Plan 2016-2020'; the development plan states the vision that in the year 2020 80% of all deliveries should be supervised, right now that is only 59%[1]. The goal is to reduce the current high rate of infant and mother mortality.

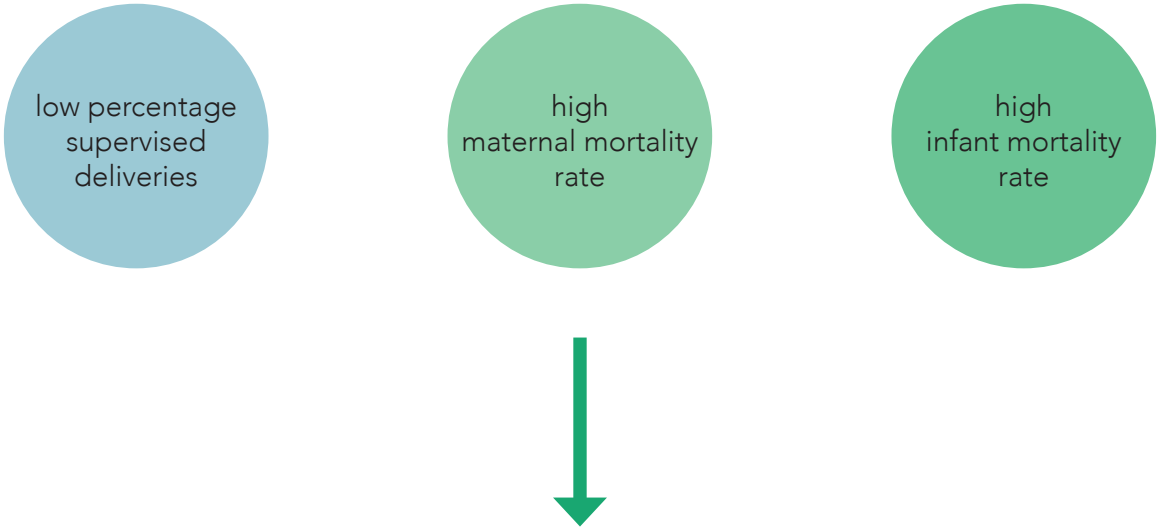
The development plan unfolds in two components:
1: The realisation of functioning maternity clinics
- The realisation and rehabilitation (design and building) of Maternity Clinics
- Integration and installation of equipment
- Establish and maintain a quality assurance system and continuous training,
- Establish and maintain a maintenance system

2: Raise the awareness of the sexual and reproductive healthcare
- Education
- Communication
- Providing contraceptives
- Information about Planned Parenthood
- Information about HIV-prevention and providing medicine

This project will focus on the first component, the realisation of functioning maternity clinics. My graduation project will focus on the first part the component: designing a Maternity Clinic that can provide quality care and offers the possibility to raise awareness of the sexual and reproductive healthcare.

The project is a collaboration between *company name* (NL), *company name* (DE) and *company name* (CI). Additionally they offer guidance to a local research- and design team that will operate in the Republic of Côte d'Ivoire.

Source 1: *"Births attended by skilled health staff (% of total).", World Bank, 2012, https://data.worldbank.org/indicator/SH.STA.BRTC.ZS*

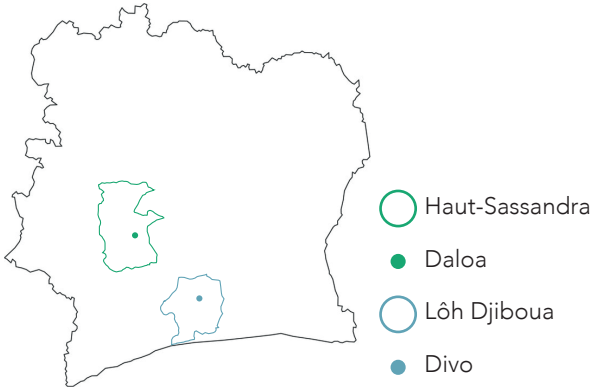

low percentage supervised deliveries
high maternal mortality rate
high infant mortality rate
improvement and expansion of the reproductive health care

Posted problem

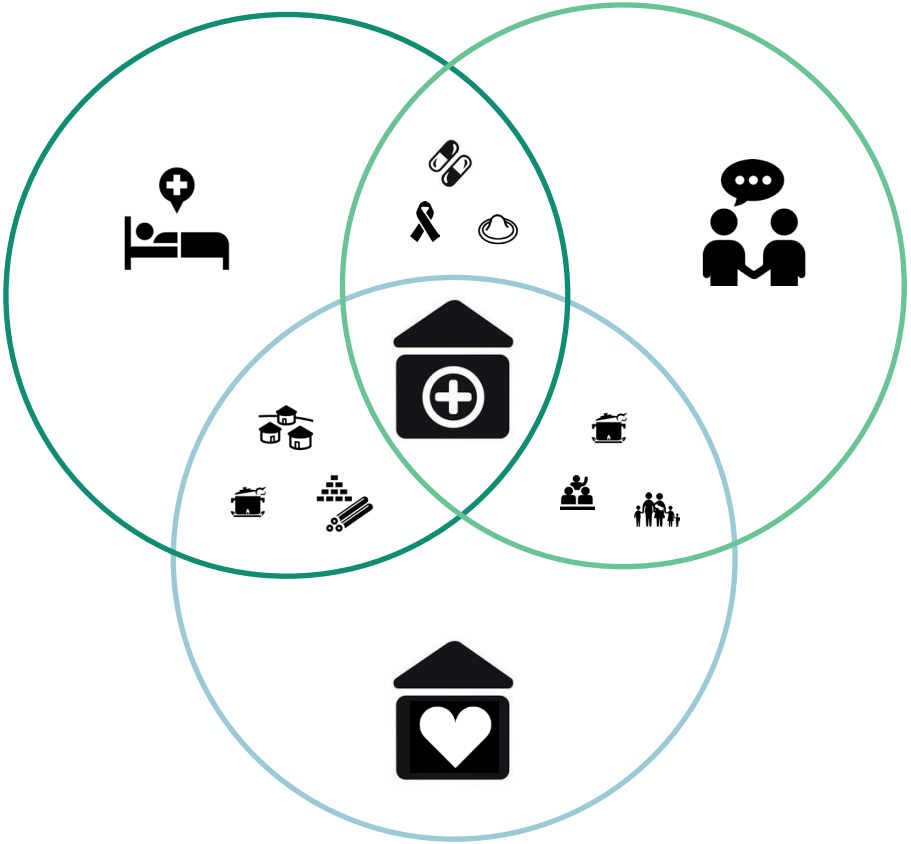
A development in Maternity Care is needed; right now the Republic of Côte d'Ivoire has a really high infant and mother mortality and a very low percentage of supervised deliveries. This is due to the lack of trained medical staff and functioning healthcare facilities. That is why improvement and expansion of the reproductive healthcare is necessary. But dropping a 'Western' facility and wish them good luck will not improve the situation. To achieve a functioning Maternity Clinic that is able to facilitate all the points that are part of the development plan you need to search for possibilities to intergrade the building in its physical and social environment.

Location

My graduation project will be located in the regions Haut-Sassandra and Loh Djiboia in the Republic of Côte d'Ivoire.



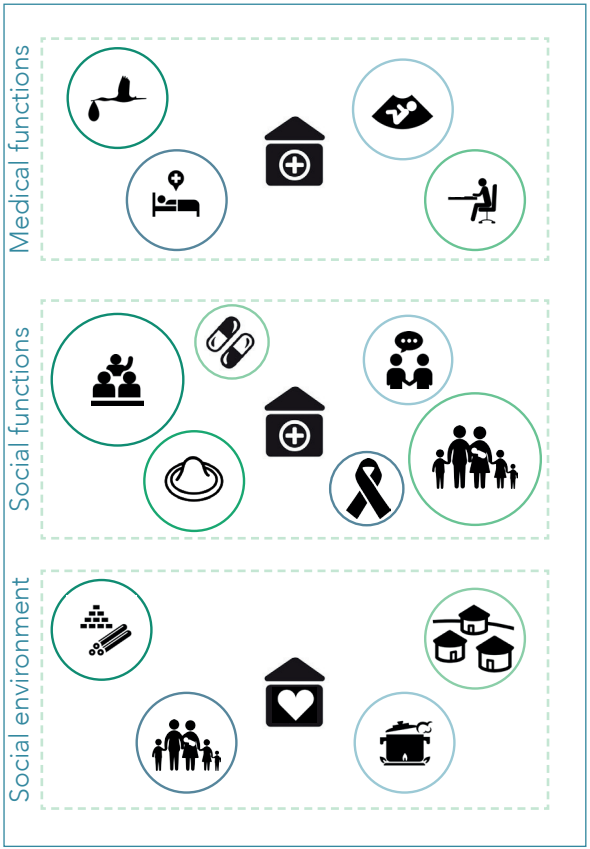
Short introduction *company name*:
Text: information about the company.



Design assignment

My design assignment within this project is to create a so-called 'Blueprint' for a Maternity Clinic (+/- 350 m2). This Blueprint will be used (by a local design team) as a base-design to develop several new clinics and rehabilitate existing clinics. The design must be able to adapt to different locations and the potential integration of existing buildings and/or functions must be taken in consideration. The challenge is to create a functional and simple design that is feasible in the Republic of Côte d'Ivoire, implementing the knowledge and techniques 'we' have in Western countries, while taking local possibilities and customs consideration. This includes scale, materials and buildings techniques (possibilities) as well as the aim to make the user feel like home (customs) by creating a safe place where users don't feel estranged or overwhelmed by the physical appearance of the building.

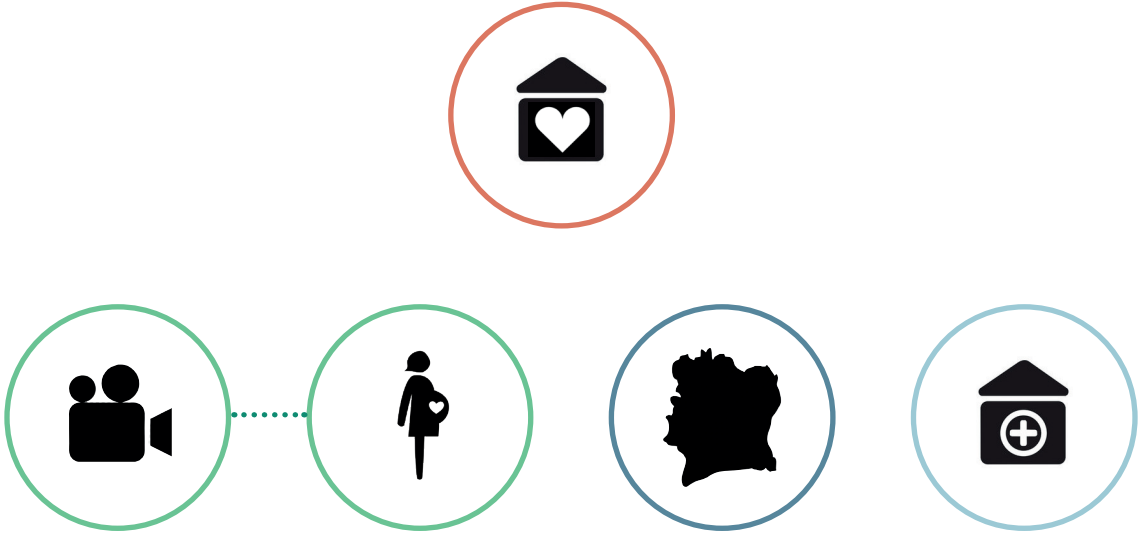
Design assignment: pictograms



Research question:
How can I design a functioning Maternity Clinic in the Republic of Côte d'Ivoire, with the 'Western' knowledge and techniques, while taking local possibilities and customs in consideration?

To make a design answering this question I need to study three subjects:
1: Dutch Maternity Care
> How does the Dutch care system works?
> What is the influence of 'thuisgevoel'?
> How does this influence the design?
2: The Republic of Côte d'Ivoire
> Present an overview of the country
> What are local building materials/ techniques?
> How does a local maternity clinic look like?
3: Central/West African precedent Studies
> How are innovative Central/West African projects designed?
> What can I learn from them? (Functions, routing, connections, spaces, interactions, scale, etc.)

Refelction
I will study the three subjects in three seperate booklets. At the end of every booklet I wil reflect on the matter and adress the points I will take with me as a toolbox for my design of a Maternity Clinic.


documentary
'feeling at home'
Dutch maternity system
'feeling at home'
The Republic of
Côtes d'Ivoire
precedent studies

Human scale and a familiar environment

Feeling comfortable, or at home, at a healthcare facility is important. This means that the building should not be overwhelming or have a distinctly clinical atmosphere. People should feel welcome and safe in order to feel comfortable.

Natural daylight and green environment

Research shows that natural daylight and a green environment are important factors of a 'healing environment' for all its users. It is beneficial for a faster recovery with less medicine and stimulates the productivity of the staff.

Privacy and control

Autonomy during the childbirth is important. In this way the stress levels can be reduced to a minimum, stimulating the natural birth process. By offering a mother a private/ one-bed room she has full control over the physical space.

Reduce movement

The study shows that (unnecessary) movement of the mother increases the stress levels, resulting in delay, stagnation or unnecessary medical interventions. It is important to reduce movement and offer one-bed rooms that facilitate every need.

Climate

The weather in both regions, Haut-Sassandra and Loh Djiboia, is really steady. The temperature is the whole year round basically the same: between 30°-35° during the day and 20°-25° during the night.

Outdoor is indoor

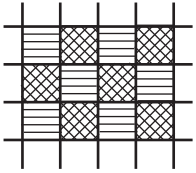
It is common that everyday activities are facilitated outdoors. The houses are mainly used for storage or as shelter during the night.

Local products

In the rural areas it is common to use local products. There are a lot of economic, transportation and environmental benefits to use these products. Possible local products are timber and earth.

Building method: rural area

The beauty and the simplicity of the building method in the rural area: a timber frame supporting an artificial roof to shelter from the rain and the sun; filled with earth or a bamboo cladding to provide protection.



Patterns

Geometrical patterns are imbedded in the Ivorian culture, mostly in artefacts. It is an opportunity and a challenge to translate traditional patterns into an architectural language.

Building type: maternity

The current maternity clinics in the Republic of Côte d'Ivoire have open core, this shows a clear division between the inpatient and outpatient area without breaking the connection. It also identifies the entrance.

Security

The Maternity Clinics in the Republic of Côte d'Ivoire are really introvert to guarantee the safety and security of the mothers and infants. The abduction of infants is a serious threat. This should be taken in consideration during in the design.

Movement

The current workflow of a maternity clinic in West Central Africa includes a lot of movement. It is a challenge to reduce the movement but keep the 'usual' workflow in mind.

enclosed main function

building + roof

outdoor routing

overarching roof

public to private

mound

public ⟷ private

outpatient consulting

- reception
- consultation room
- echography room
- sample room
- pharmacy

inpatient rooms

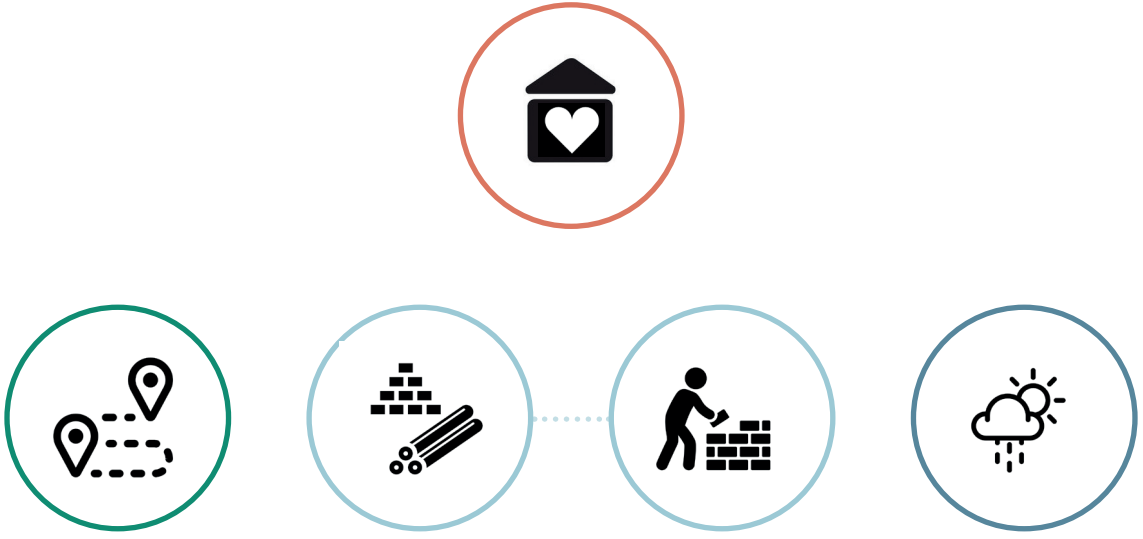
- bedrooms
- bathrooms

delivery rooms

- observation room
- labour room
- delivery room
- neonatal resuscitation

administration

- office
- archive
- nursery station
- staff pantry
- storage


clear routing
local materials
local craftsman
passive building

Introduction

Within the Health Lab we had the freedom to develop our own graduation project related to the main subject: healthcare. The challenge for me was to create my own restrictions by setting goals and guidelines to convert this freedom into a clear project. The studio offered different workshops, discussions and lectures to develop a broader understanding of the healthcare sector and to feed our search for a challenging graduation project. We had to kick off our search by picking a healthcare sector; I decided I wanted to go for a project concerning maternity care. This choice is based on personal preferences, the fact that I was not ready to dive into a more emotional subject and the interesting evolving market of maternity care.

Feeling at home

As a group we developed the overarching theme 'feeling at home' (thuisgevoel) to be our first guideline through our graduation process. Together we made a (Dutch) documentary discussing the importance of 'feeling at home' in a healthcare facility elaborating on different sectors within the Dutch healthcare system. Through very personal interviews with patients and caregivers combined with research data we show that the wellbeing of the end-users should be taken in serious consideration during the design process of a healthcare facility. The documentary shows that if a patient feels comfortable, or 'at home', at a healthcare facility the stress levels drops and the patient will need less medicine and will recover faster. In medical terms they also call this a 'healing environment'. This environment is also beneficial for the productivity of the staff. With this knowledge I set my first goal: my project will take the user and the importance of 'feeling at home' in consideration.

Research directions

In my search for more goals and guidelines to shape my graduation project I got the great opportunity to integrate a real project: the development of a blueprint for a dozen maternity clinics in the Republic of Côtes d'Ivoire. This (small) internship provided me more guidelines to develop my graduation project. Namely: a region (abstract location), a more defined purpose, a project scale and lots of knowledge. With all this new information I had to take a step back and look at the bigger picture: I could just create a design that ticks all the boxes that the company offered me but I wanted to do more for my graduation project and most importantly stay true to my first goal to create a project that will take its user and their comfort in consideration. Encouraged by my mentors I challenged myself to create a design that is feasible in practise but also proposes to go further than the given directives. That is why I not only studied the demographic data but also the culture, the architecture and the building techniques and materials of the Republic of Côtes d'Ivoire. Furthermore I elaborated my personal fascination for innovative and radically simple Central African architecture with precedent studies.

Design challenges

The next step was to merge my three research subjects, (1) Dutch maternity care and 'feeling at home', (2) The Republic of Côtes d'Ivoire and (3) precedent studies of innovative Central African architecture, into one set of design principles. I generated four main principles based on my goals that operate as guidelines trough my graduation project, and I really needed this guidance. First of all the principles were my tower of strength during the rocky period after my main mentor suddenly disappeared. Secondly, after I regained a mentor, the principles challenged me because my mentor would repeatedly encourage me to evaluate and test my design on my own principles in order to detect if I could take my design even a step further. In that way my

goals and guidelines influenced and formed my design on different levels and scales. For example: by keeping the 'feeling at home' theme in mind, and therefore the increasing intention to create a personal connection to a building, I set the goal that the building should be constructed by local people with local materials. Taking this further to challenge myself in making a reversible and most of all circular building by making this a design principle. This goal is visible through the whole design process, from the first space mapping: pushing towards a modular system, to the construction and the details: pre-fab repetitive structure of smaller timber units.

Broad and general application

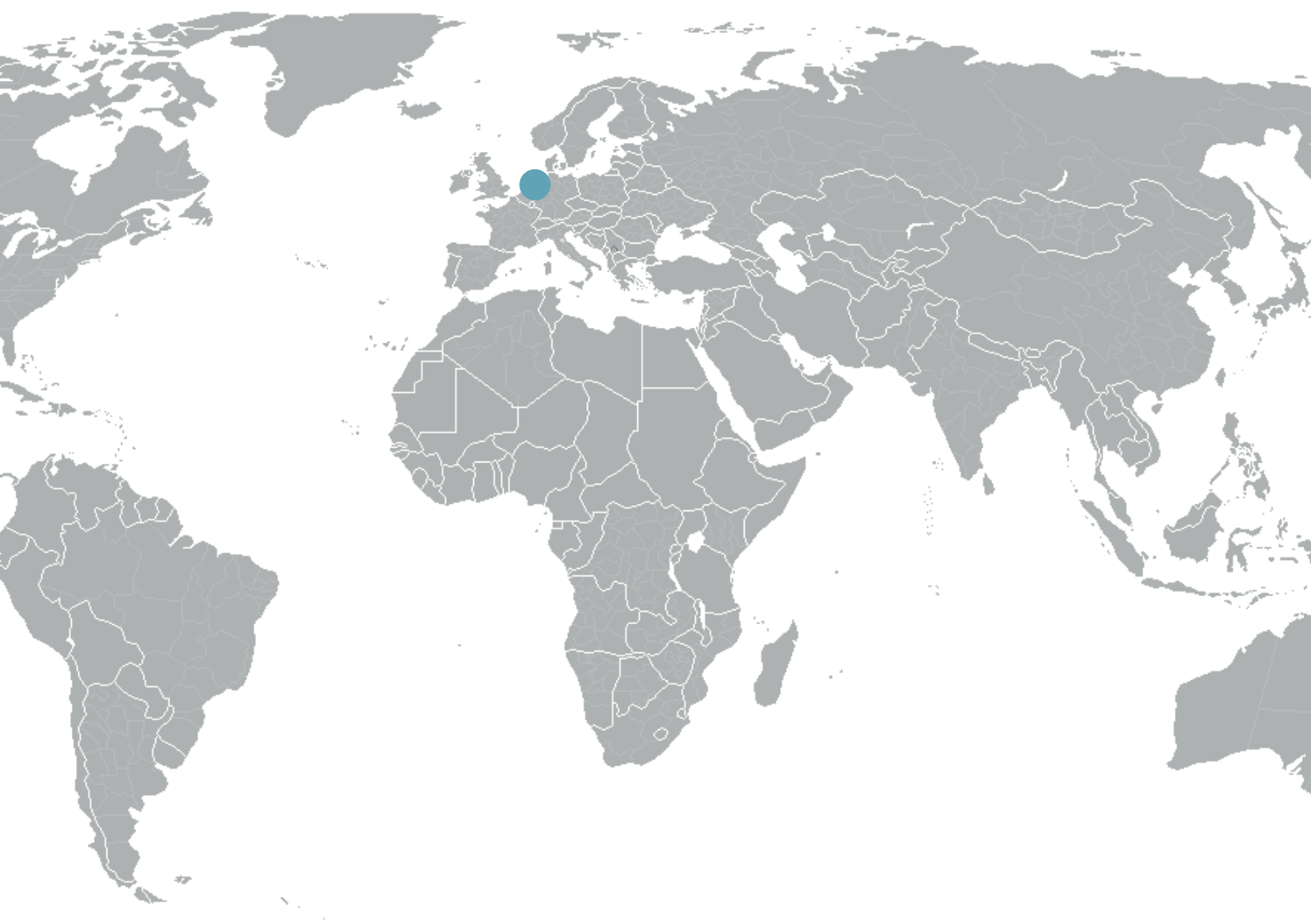
By searching for the simplest form, a wooden structure with a rammed earth fill, it is possible to construct the design on different locations with local timber and local earth. Furthermore the base of the building, which is formed like a pier, makes it possible to build the clinic on every type of land.
In this way it is suiting the directives of my internship, the maternity clinic can be build on a dozen locations, but it also offers the transferability to other locations. In addition its flexibility is possible to re-size or re-shape the building by adding or removing modules making it easier to adapt to different functions and needs.

Conclusion

The studio initiated and encouraged an extended research period; sometimes this was really frustrating because I spent so much time on the documentary and all the different research subjects that it felt like I would never start designing, to keep myself motivated was challenging sometimes. But when I started with my design I understood why it was so beneficial to develop these clear restrictions based on my research. Because there was so much freedom in the design assignment I would have been lost without my goals and guidelines. With keeping them in mind I was able to make well-considered design choices based on my own set of goals and guidelines resulting in a consistent design.

Booklet 1:

Dutch Maternity Care



About this booklet

In this booklet I will study the standards of the Dutch maternal healthcare system and the importance of 'feeling at home' (thuisgevoel) in a healthcare facility, specifically in a maternal healthcare facility.

Background 'Feeling at Home' theme

Within the Health Lab we have the overarching theme of 'feeling at home' in a healthcare facility. Together we made a (Dutch) documentary discussing the importance of 'feeling at home' for different sectors in the Dutch healthcare system. Being: dementia care, maternity care, oncology, elderly care and homeless care.

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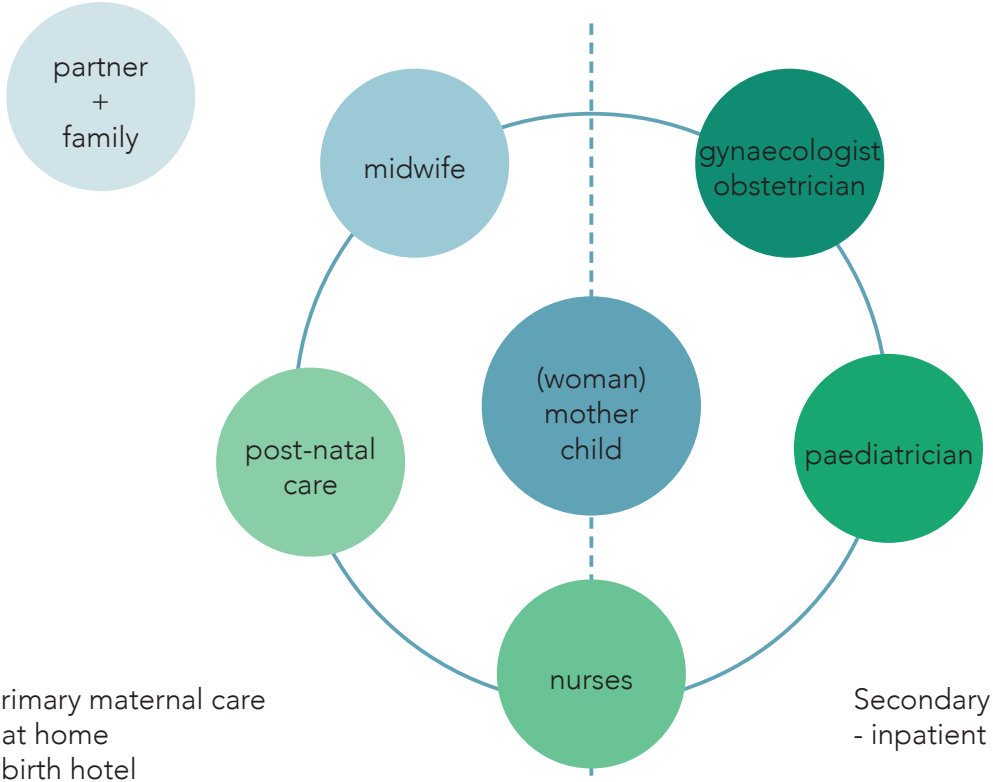


Primary maternal care
- at home
- birth hotel
- outpatient unit (hospital)

Secondary maternal care
- inpatient unit (hospital)

Tertiary maternal care
- academic hospital

The system

The Dutch maternal healthcare system is based on a physiological approach, this means that we stimulate spontaneous and natural deliveries. To achieve this the maternal healthcare system is divided in three so-called 'zorglijnen'.

1: Primary care (eerstezorgslijn)
2: Secondary care (tweedezorgslijn)
3: Tertiary care (derdezorgslijn)

Every pregnant woman has her own independent midwife. The midwife monitors the pregnancy and preforms regular check-ups. She (or he) choses, together with the mother, a birth plan and a fitting 'zorglijn' based on the estimated complications.

1: Primary care (eerstelijnszorg)

With a low risk of complications a mother can give birth at home, a birth hotel or at the outpatient unit of a hospital. This delivery will be supervised by the midwife.

2: Secondary care (tweedelijnszorg)

With a higher risk of complications medical care is needed. In this case a delivery will take place at the inpatient unit of a hospital. Within this level of care is it also possible to induce labour or preform a caesarean section (C-section). The delivery will be supervised by an obstetrician and if needed a gynaecologist, a surgeon and/or a paediatrician.

3: Tertiary care (derdelijnszorg)

With a high risk of complicated complications that can endanger the life of the mother and/or the unborn during or after the delivery will take place in a academic hospital. A specialist team will supervise the delivery.

Feeling at Home

The sense of 'home' (thuisgevoel) is connected with your emotions and it will be different for every person. Although environmental psychologists state that feeling at home depends on 4 conditions:

1: You have the option to withdraw
2: You feel connected
3: It shows your identety
4: It gives you the feeling of control

For example, Duyventak (2009) states that if we want to feel at home somewhere, we need to feel familiar. Duyventak distinguishes to situations within the sense of home: 'harbour' and 'heaven'. In the first situation, the so-called 'harbour' he refers to a safe, comfortable and predictable place that can set people at ease. In other words, the 'harbour' is about a physical place that can be linked to the first four conditions: withdrawal, connectedness, identity and control. In the second situation, the so-called 'heaven', Duyventak describes as a situation where you can be 'yourself', a place (non-physical) where you feel connected to like-minded people. This (mental) connection can make you feel like home anywhere.

Feeling at home is very important. For example, Gifford (2007) states that home is the most important place in our lives; it promotes our physical and mental health. With the lack of feeling at home you run a greater risk of stress, and stress is on its turn a danger to your physical and mental health.

Healing environment

Research shows that if a patient feels comfortable, or 'at home', at a healthcare facility he/she needs less medicine and will recover faster. They call this a 'healing environment'. This environment is also beneficial for the productivity of the staff. That is why more and more healthcare facilities take the well being of the users very seriously. The downside is if (lonely) patients feel too much at home they won't go home.

Source: *https://www.jwduyvendak.nl/wp-content/uploads/2015/07/thuisvoelen-een-korte-introductie-op-drie-artikelen.pdf*
https://www.omgevingspsycholoog.nl/wat-is-je-thuis-voelen/

Stress during labour and delivery

'Feeling at home', in the sense that you feel comfortable and in control, during childbirth is important. Paarlberg (1995) states that labour and delivery among the most intense events a woman faces in life. Maternal distress or maternal anxiety in reaction to stressors can trigger the onset of labour (at term or preterm), and can pre-dispose to an abnormal course of labour. These stressors may be related directly to pregnancy (e.g. fetal or maternal complication, or bad experiences), or may arise from other circumstances (e.g. family, work or social life). Later Paarlberg (2006) adds that anxiety and stress due to the loss of control and feelings of powerlessness has been found to be positively related to 'abnormal' delivery. Leading to (unnecessary) medical procedures.

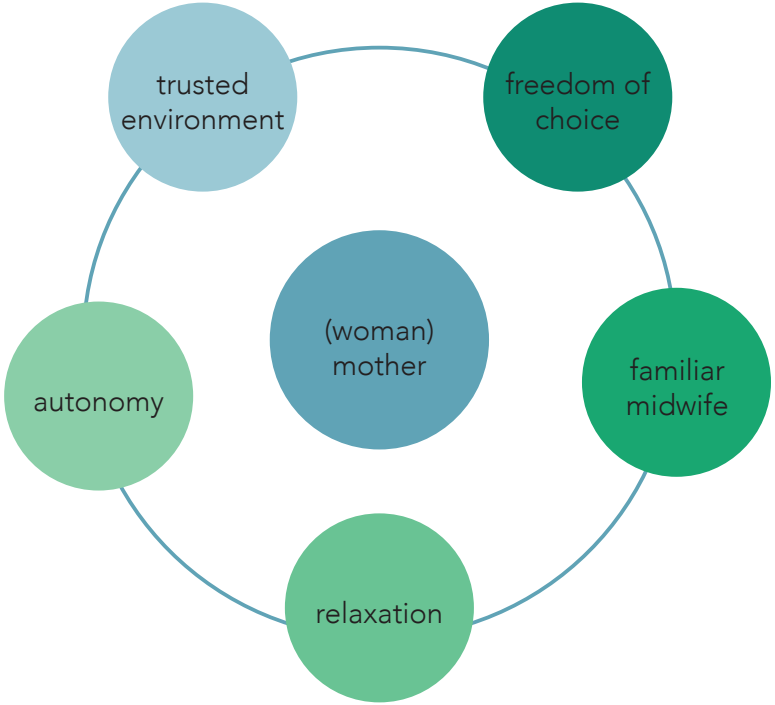
The loss of control and feelings of powerlessness are emotional factors that can be influenced by the physical environment as described as a sense of home.

Effect of stress explained by hormones

Oxytocin is a hormone that is released during labour, oxytocin stimulates regular coordinated contractions that are necessary for a smooth delivery. Besides oxytocin the body also produces endorphin, a natural painkiller that positively influences the delivery. It is possible to stimulate the release of endorphin by making sure the mother feels comfortable in her surroundings.

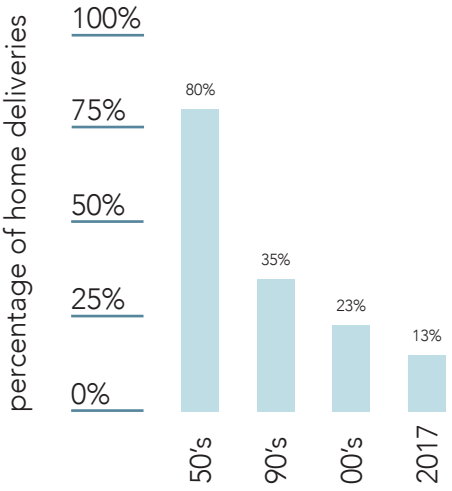
Negative factors during labour can stimulate the production of the stress hormone adrenaline. Negative factors can be fear, bright light, loud/unfamiliar sounds, unfamiliar people, uncomfortable surroundings or movement during labour. Adrenaline not only negatively affects the production of oxytocin, causing failure to progress. It also reduces the release of endorphin, increasing the pain level, which increases the fear of more pain; which increases the release of adrenaline … creating a negative spiral of stress and pain.

Source: *https://www.researchgate.net/publication/263257658_Psychosocial_factors_and_pregnancy_outcome_a_review_with_emphasis_on_methodological_issues*
https://www.researchgate.net/publication/242025008_Maternal_Stress_and_Labor
https://www.verloskundigenpraktijkmeander.nl/de-bevalling/hoe-ga-je-om-met-weeen/


trusted environment
freedom of choice
(woman) mother
autonomy
familiar midwife
relaxation

Home deliveries

For a long time a home delivery was the most common way to give birth in the Netherlands. Giving birth at home has the advantage that it has positive effect on the mental health of the mother. At home she has full autonomy, reducing stress and increasing a smooth labour. Bit the percentage of home birth has been declining for years. More and more women decide to move their delivery to a hospital or birth hotel. Asking new mothers why they prefer a hospital delivery they explain that the (outpatient area of) the hospital gives them a sense of security, if something went wrong, medical help is nearby.



Source: *https://statline.cbs.nl*

Change

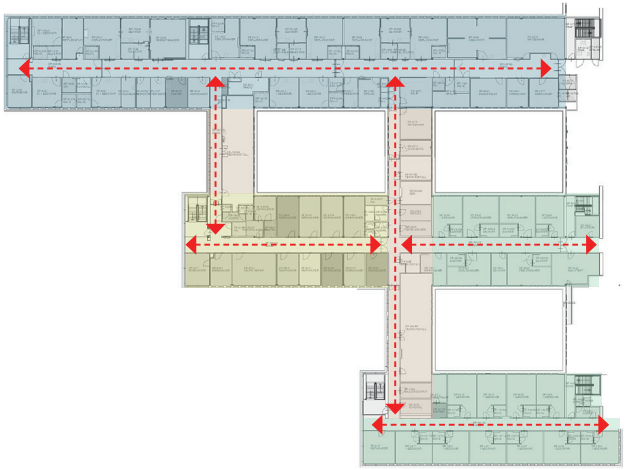
This change challenges the hospitals on different levels. It all starts with the logistic problems: hospitals simply do not have enough space or enough staff to cover the growing demand of out- and inpatient deliveries. This growing under capacity forces hospitals to re-think the use of space, bed occupancy and staff routine. Together with the growing understanding of the 'healing environment' and the importance of 'well-bing' for the end-users (patients, visitors and staff) hospitals start questioning the way a ward and/or a room is designed. For example: some hospitals offer so-called maternity suites that are suitable for lower risk as well as higher risk deliveries.

Delivery Suites

In the Netherlands (and other western countries) the private delivery suite inside a hospital or birth hotel is the new standard. The delivery suite offers the new mother her own space, a room she can control, a place where she has autonomy. A delivery suite is equipped with a private bathroom, a small kitchenette and room to invite visitors. Some suites even offer the possibility for the partner to stay over. Giving the family a chance to bond with the new-born from the first hour. To improve the sense of home medical equipment is locked behind doors and will only be apparent if it is necessary.

Erasmus MC

The new Erasmus MC only has one-bed rooms because research shows that patients will experience less stress, need less medicine and recover faster (evidence-based design). This is new maternity wing, offering delivery suites that limits (unnecessary) movement and stress of the new mothers.

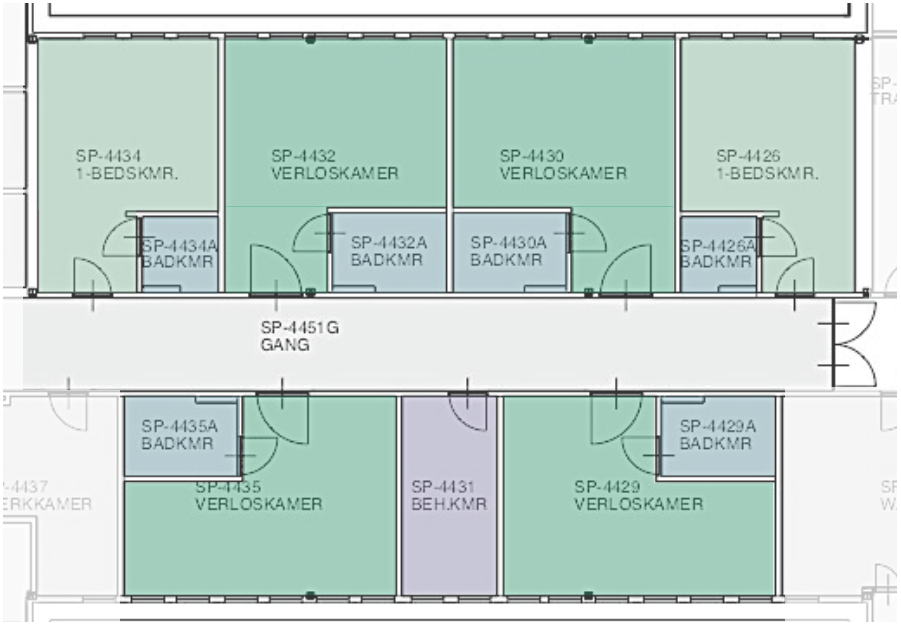


clinical area

poli-clinical area

staff area

technical area

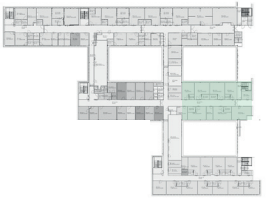


delivery room

1 bed room

bathroom

treatment room



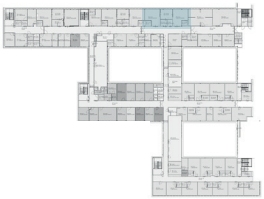
delivery room

bathroom

treatment room

staff: lock

janitors closet



Delivery Suite, Spaarne Gasthuis, Haarlem (NL)

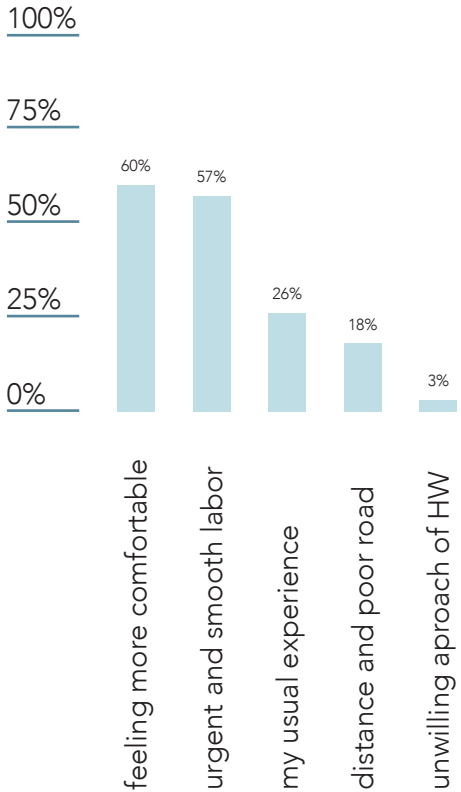
Delivery Suite, St. Antonius, Utrecht (NL)

Delivery Suite, Birth Hotel Izzi, Zutphen (NL)

Delivery Suite, Catharina Hospital, Eindhoven (NL)

Not so different

Although the healthcare system in Central Africa is different, and in a way less developed than in Western countries, feeling 'at home' in a healthcare facility is still very important. Research shows that 60% of the mothers in North East Ethiopia choses a home delivery because she feels more comfortable at home. Only 18% of the mothers consider the distance to a facility and the poor roads as a reason to give birth at home. This shows that, no matter the location, mothers feel the urge to reduce their stress levels during labour. The problem is that in Central Africa the (non-supervised) home deliveries are the reason behind the high infant and mother mortality rates. That is why it is important to keep the mental health in mind when designing for the physical health. Because a women must feel 'at home', comfortable and in control during labour and delivery all over the world.



Source: *reasons for home delivery among study subjects in Alamanta District, North East Ethiopia, 2013*
HW = Health Workers

Human scale and a familiar environment

Feeling comfortable, or at home, at a healthcare facility is important. This means that the building should not be overwhelming or have a distinctly clinical atmosphere. People should feel welcome and safe in order to feel comfortable.

Natural daylight and green environment

Research shows that natural daylight and a green environment are important factors of a 'healing environment' for all its users. It is beneficial for a faster recovery with less medicine and stimulates the productivity of the staff.

Privacy and control

Autonomy during the childbirth is important. In this way the stress levels can be reduced to a minimum, stimulating the natural birth process. By offering a mother a private/ one-bed room she has full control over the physical space.

Reduce movement

The study shows that (unnecessary) movement of the mother increases the stress levels, resulting in delay, stagnation or unnecessary medical interventions. It is important to reduce movement and offer one-bed rooms that facilitate every need.

Booklet 2:

The Republic of Côtes d'Ivoire

About the booklet

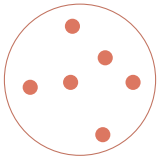
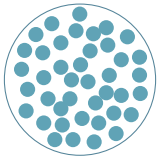
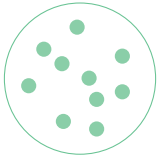
In this booklet I will provide an overview of the Republic of Côte d'Ivoire. Starting with the demographic data, eleborating on the healthcare situation. For a better girp on the data I will compare the information to the demograpic data of The Netherlands and France. Furthermore I will give brief report about climate, agriculture, forrest growth, the possibilities of local timber, domestic culture, religion, art and architecture.

Index:

Demograpic data:
- Population 4
- Economics 5
- Healthcare 6

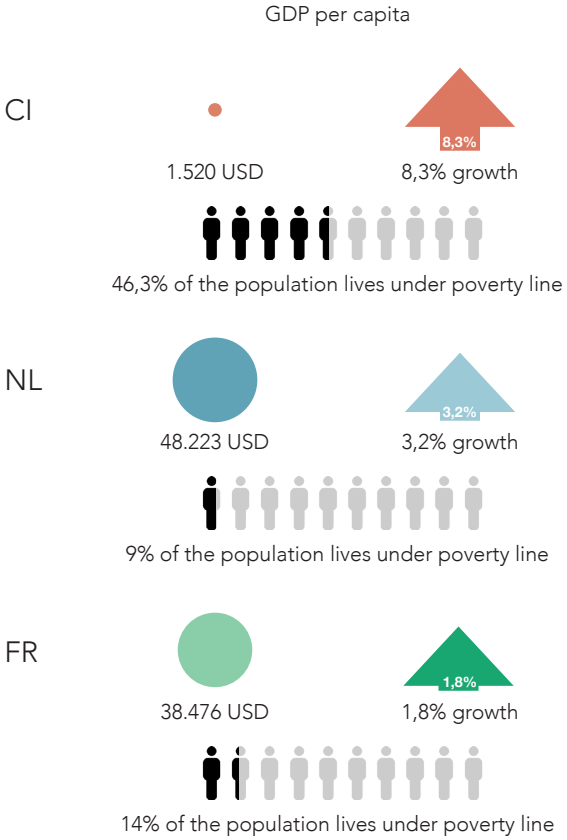
Climate 12
Agriculture 14
Forests 15
Timber production 16
Domestic culture 18
Religion 19
Culture: Art and Patterns 20
Architecture: Rural Areas 22
Architecture: Urban Areas 23
Building techniques and materials 24
Current Maternity Clinics 26
Reflection 32

- The Republic of Côte d'Ivoire (CI)
- The Netherlands (NL)
- France (FR)

	area	population	population density	population growth
The Republic of Côte d'Ivoire (CI)	 322.463 km²	 23,7 milion people	 63 people per km²	 2,5% growth
The Netherlands (NL)	 41.543 km²	 17,08 milion people	 416 people per km²	 0,6% growth
France (FR)	 643.810 km²	 67,2 milion people	 105 people per km²	 0,3% growth

Introduction

The Republic of Côte d'Ivoire is located in West Africa. The Republic is a former French colony and independent since 1960. The country once flourished but now, after a series of (armed) conflicts, the economic status is strongly reduced. For example: in 1985 only 10% of the population lived under the poverty line but after the conflicts in 2010 more than 50% of the population lived in poverty. In 2011 the public safety and stability was secured and the Republic of Côte d'Ivoire could start to rebuild itself. Since that moment the country has known great economic growth of almost 5% a year and considered as a lower-middle income country. The political situation is relatively stable; the last incident was in 2016 when the new constitution was presented and the army was unsatisfied.



	life expectancy	fertility rate
The Republic of Côte d'Ivoire (CI)	 53 years	 5 births per woman
The Netherlands (NL)	 82 years	 1,66 births per woman
France (FR)	 82 years	 2 births per woman

Healthcare

The Healthcare system in the Republic of Côte d'Ivoire is problematic, first of all there is not enough quality or quantity to deliver proper healthcare to its population. The years of Civil War left their mark on all facets of the healthcare system. First of all a lot of facilities were plundered and destroyed; others fell into disrepair due to a lack of maintenance or the shortage of supply. Secondly most of the (medical) staff fleeted to the cities or abroad because of safety concerns. Besides the shortcoming of the facilities and staff the constant population growth, the fertility rate of 5 babies per woman , is challenging the healthcare system. For example: there are only 4 hospital beds and 5 nurses (including midwifes) per 10.000 people , in comparison the Netherlands has 47 hospital beds and 105 nurses per 10.000 people. Furthermore the healthcare that is available is unevenly divided, 45% of the medical staff works in the capital region while only 20% of the population lives there.

Maternity Care

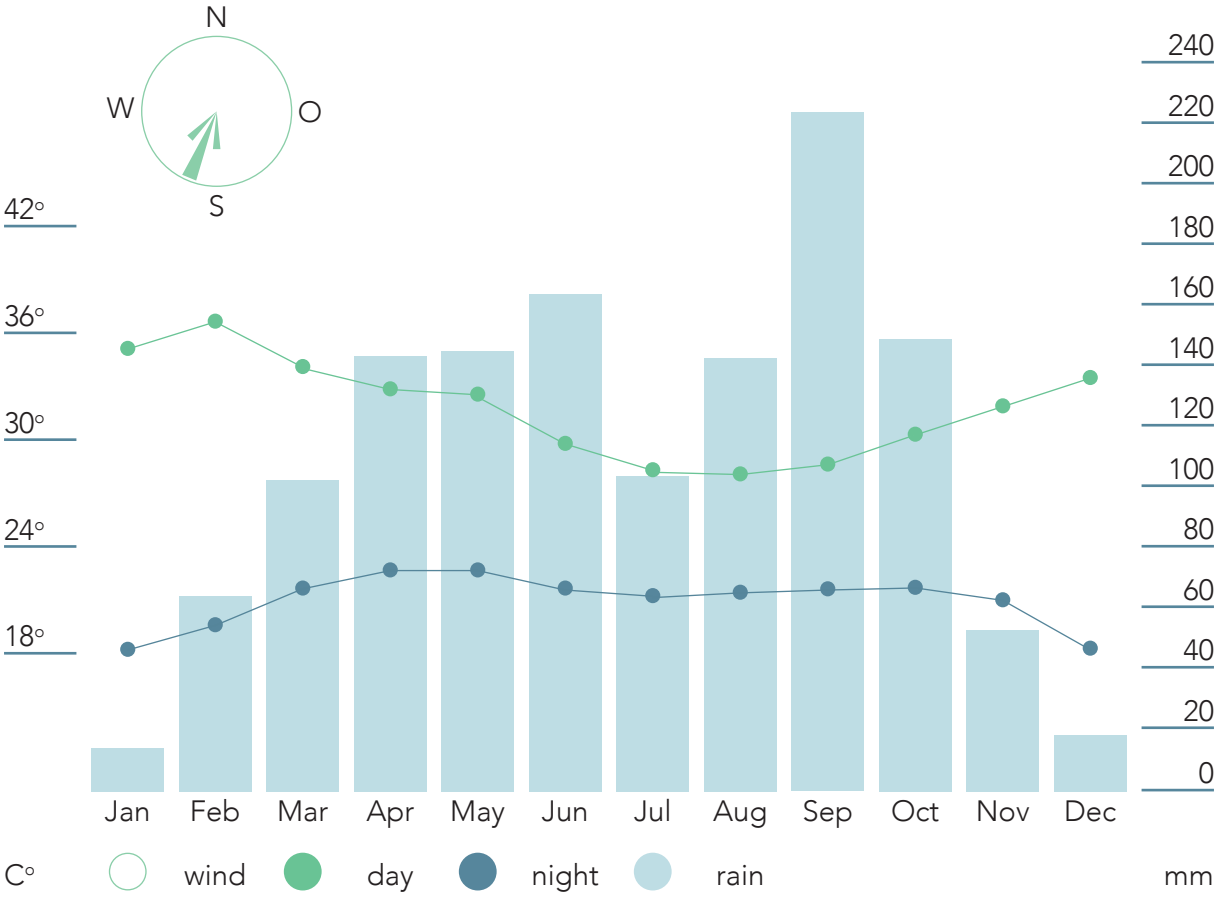
The problematic healthcare situation also leaves a significant mark on the maternity care. In fact, complications during the pregnancy and delivery are the number one cause of death for women. To put this in numbers, there are 645 deaths of mothers per 100.000 live births . This number is significantly larger than the West-African average of 500 deaths of mothers per 100.000 live births. Besides the high maternity mortality rate the infant mortality is also alarming with 64 deaths of infants per 1.000 live births . In compare, in the Netherlands we count 7 deaths of mothers per 100.000 living births6 and 3 deaths of infants per 1.000 live births7.

	density hospital beds	density doctors
The Republic of Côte d'Ivoire		
	0,4 hospital beds per 1.000 people	0,14 doctors per 1.000 people
The Netherlands		
	4,7 hospital beds per 1.000 people	3,35 doctors per 1.000 people
France		
	6,4 hospital beds per 1.000 people	3,23 doctors per 1.000 people

	density nurses and midwifes	supervised deliveries
The Republic of Côte d'Ivoire		
	0,48 nurses and midwifes per 1.000 people	59% of the deliveries
The Netherlands		
	10,5 nurses and midwifes per 1.000 people	99,9% of the deliveries
France		
	10,6 nurses and midwifes per 1.000 people	99,9% of the deliveries

	birthcontrol	teenage mothers
The Republic of Côte d'Ivoire		
	20% of the women	136 mothers per 1.000 teenage girls
The Netherlands		
	73% of the women	7 mothers per 1.000 teenage girls
France		
	78% of the women	9 mothers per 1.000 teenage girls

	maternal mortality	infant mortality
The Republic of Côte d'Ivoire	 x 10	
	645 deaths of mothers per 100.000 live births	64 deaths of children per 1.000 live births
The Netherlands	 x 10	
	7 deaths of mothers per 100.000 live births	3,6 deaths of children per 1.000 live births
France	 x 10	
	8 deaths of mothers per 100.000 live births	3,2 deaths of children per 1.000 live births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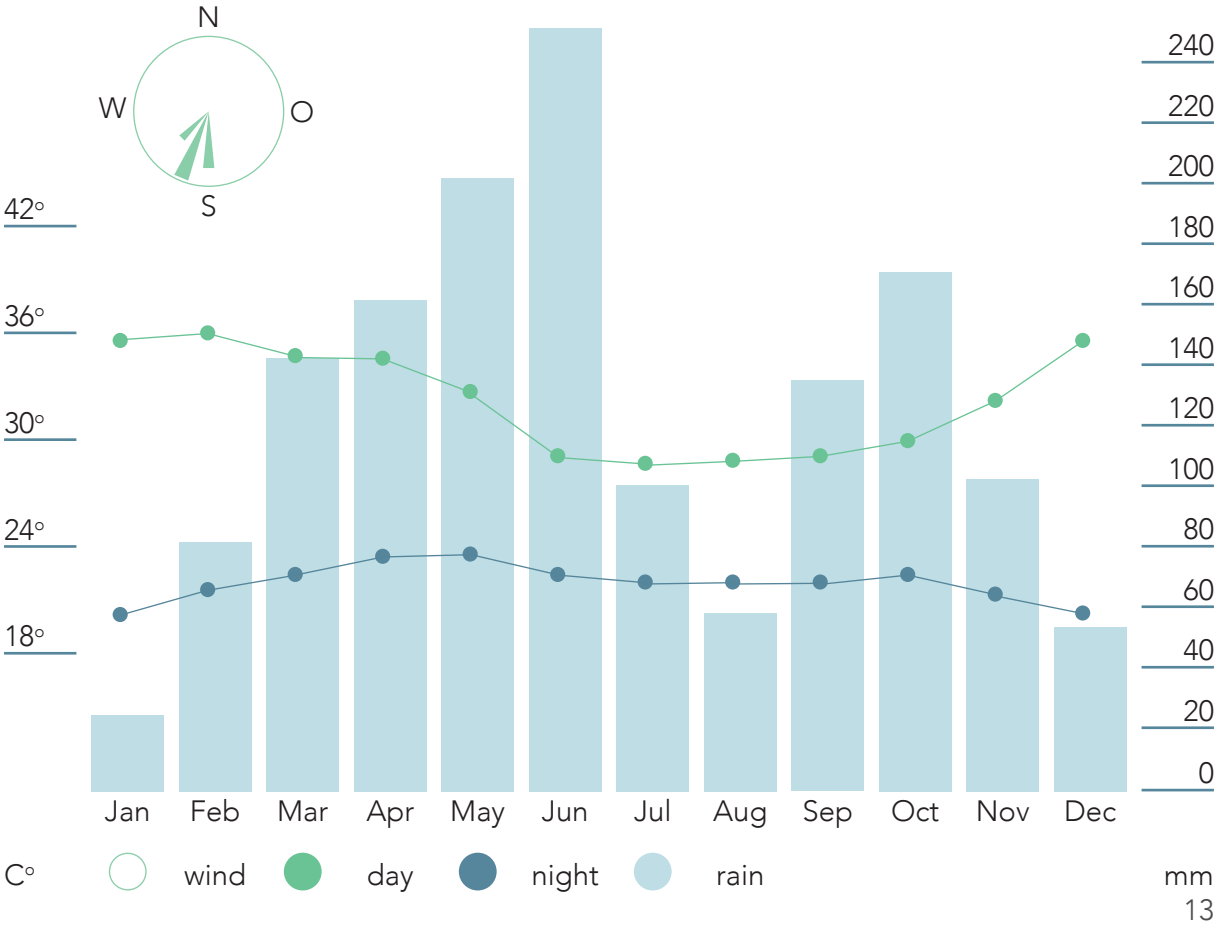
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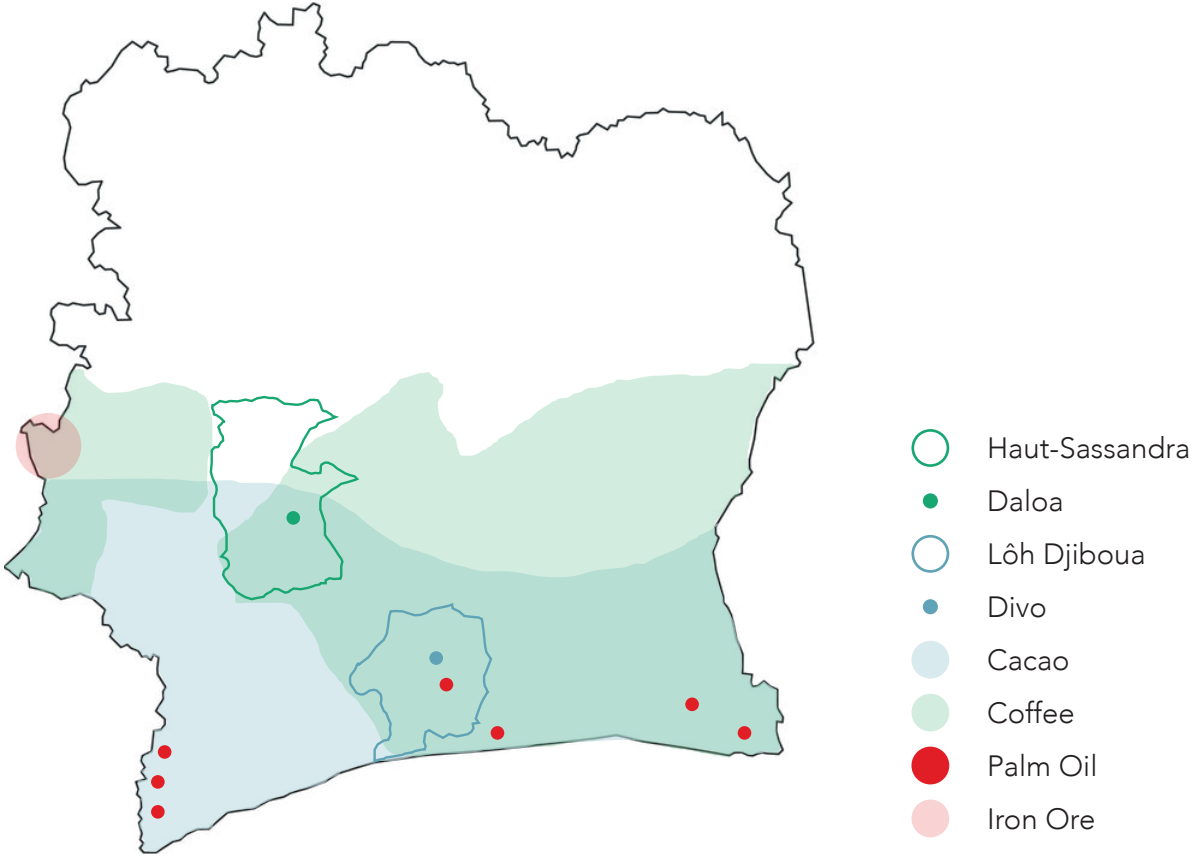
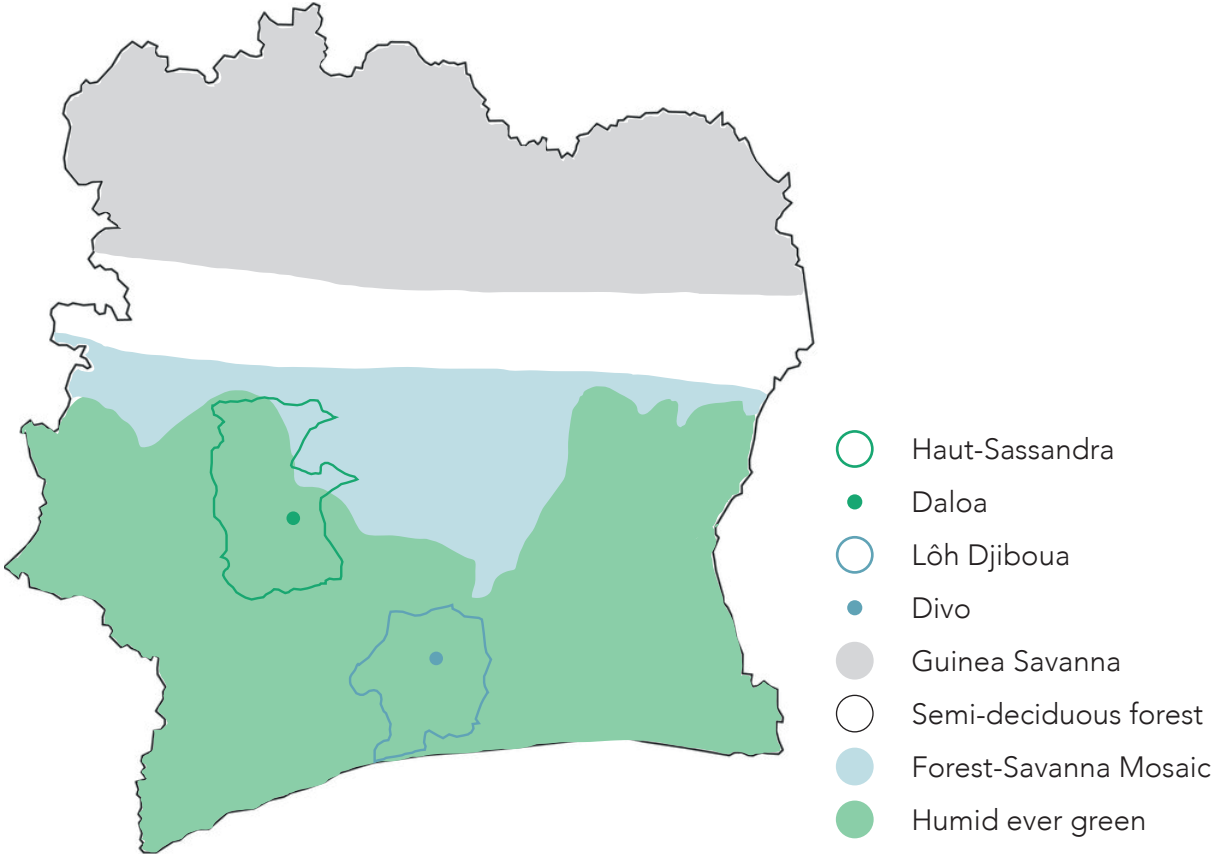

Haut-Sassandra
Daloa
Lôh Djiboua
Divo
Cacao
Coffee
Palm Oil
Iron Ore


Haut-Sassandra
Daloa
Lôh Djiboua
Divo
Guinea Savanna
Semi-deciduous forest
Forest-Savanna Mosaic
Humid ever green

Timber and forests:

The Republic of Côte d'Ivoire has around 10.4 million hectares of forested land, this is 32.7% of the total land area. In compare, the forest land in the Netherlands only constitutes 13% of the area.

The type of forest can be divided in three different ecological zones:

1, the North: a extensive savannah
2, the centre: a transition zone with mainly semi-deciduous forest
3, the South: a humid ever green forest

Some of the forests are protected, others are used for (food) production. A fair amount of forest is used for timber production. I listed 20 of the most common (and valuable) timber species with their use, durability and processing options.

Timber species:

African Mahogany, Khaya
Azobé
Bossé
Cedar
Danta, Kotibé
Dibetou
Fraké
Framiré
Fromager
Ilomba
Iroko
Kosipo
Koto
Lingué, Afzelia
Makoré
Mansonia, Beté
Niangon
Samba, Ayous
Teak
Tiama

Source: *Houtdatabase.nl & Houtinfo.nl*
Termites&Insects: *D: Durable, M: Moderately Durable G: Sapwood Susceptible to Damage*
Durability: *1: Very Durable (>25 years), 2: Durable (15-25 years), 3: Moderately Durable (10-15 years), 4: Non-Durable (5-10 years), 5: Perishable (<5 years)*

Botanical name:	Logs	Sawn w.	Veneer	Plywood	Constr.	Windows	Cladding	Decor.	Durability	Termites	5 most common species
Khaya Ivorensis, Anthotheca		x					x		3	G	
Lophira Alata	x	x			x				1	D	x
Guarea Spp.		x	x			x	x		2	G	
Cedrela Odorata		x	x			x	x		2	M	
Nesogordonia Spp.		x	x		x	x			3	M	
Lovoa Trichilioides		x	x					x	3	G	
Terminalia Superba		x	x				-	x	4	G	x
Terminalia Ivorensis		x		x		x			2	G	
Ceiba Pentandra		x	x	x				x	5	G	x
Pycnanthus kombo		x	x					x	5	G	
Milicia Excelsa, Milicia Regia		x	x			x	x		1	D	
Entandrophragma Candollei		x	x					x	2	M	
Pterygota Macrocarpa		x	x					x	5	G	
Afzelia Africana	x	x			x	x	x		1	D	
Tieghemella Heckelii		x	x				x	x	1	D	
Mansonia Altissima		x	x					x	1	D	
Heritiera spp.		x		x		x		x	3	M	
Triplochiton Scleroxylon		x	x					x	5	G	x
Tectona Grandis		x	x	x		x		x	1	M	x
Entandrophragma Angolense		x	x					x	3	G	

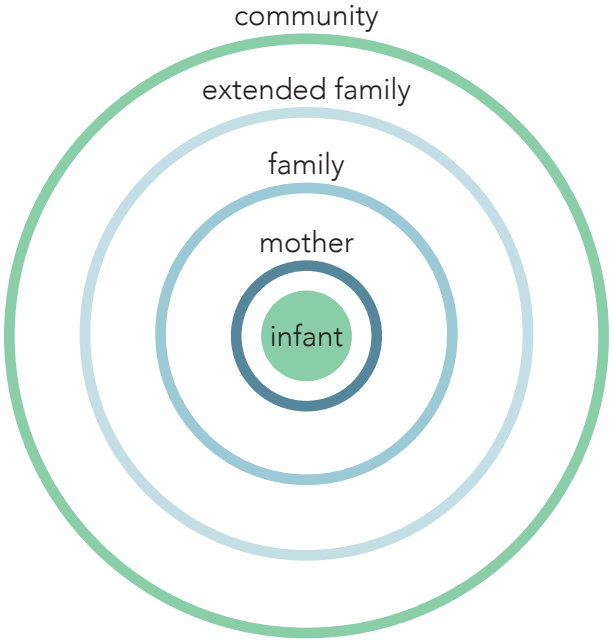
Marriage:

Marriage in the Republic of Côte d'Ivoire is about combining two families and creating a new household.

Infants and children:

A child in the Republic of Côte d'Ivoire will be seen and treated as an infant until the age of three. Afterwards a child becomes a full member of the family and the community. The girls will learn from the women how to provide care and boys will learn how to work from their father.

The mother is the primary care giver to an infant, closely followed by the family and extended family. But after all children are the responsibility of the whole community.



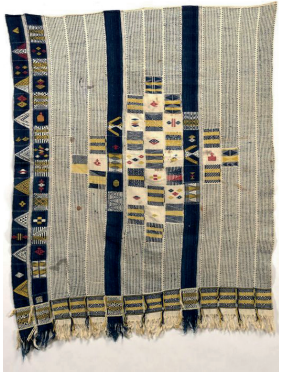
Religions:

Traditional Tribal religions	63%
Islamic	25%
Christian	12%

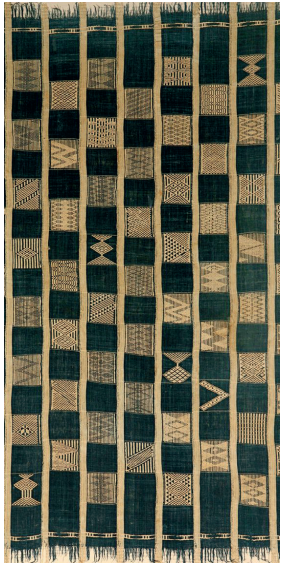
La Grande Mosquée de Yamoussoukro

La Grande Mosquée de Kong

By:The SMA African Art Museum



By: P. Pailler



By: Sotheby's

By: Hot Moon Collection

Art and patterns:

Every Tribe has their own specific cultural artefacts. But there are a couple of categories that are present in most traditions. For example the (wooden) masks and sculptures, jewellery and body art. These artefacts are mainly used during rituals and ceremonies. But there are also more every-day use items like cloths and wrappers that are unique artefacts from the tribes in the Republic of Côte d'Ivoire.

Patterns:

The striking resemblance between all artefacts from different tribes is that almost every item is based on geometric patterns. Sometimes those patterns are based on nature; sometimes the patterns are more abstract. But all patterns show a lot of detail and represent the tradition of Ivorian culture.

Modern Day:

Today geometric patterns are still part of the everyday culture in more modern ways like home decoration or fashion.

Wooden Masks/Sculptures

Jewellery

Body Art

Cloths

House in West Côte d'Ivoire By: Habitat for Humanity

House in West Côte d'Ivoire By: Habitat for Humanity

Village near Gonate, By: T. Neuhaus

Village in North-West Côte d'Ivoire, By: B. van Son

Skyline Abidjan, By: RyansWorld

Ambassy of Switzerland, Abidjan, By: P. Stevens

St. Paul's Cathedral, Abidjan, By: RyansWorld

Basilique Notre-Dame de la Paix, Yamoussoukro By. A. Jones

Cocoa farm, by: Be Fair

Electricity house, By: Econoler

Kodimasso, By: N. Loomis

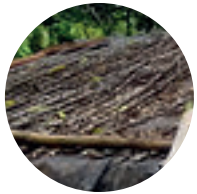
House, by: Habitat for Humanity

Contrast

There is a big contrast between the rural and urban areas. While the urban areas are developing fast and integrating western building techniques and materials in their design, the rural areas are still quite primitive due to the lack of financial and material resources. This result in man made structures with local resources combined with cheap imported materials.

Techniques and materials

The majority of the houses in the rural area have a timber main structure that supports an improvised waterproof roof, made with plastic tarps or steel plates. The timber structure is filled with earth or covered with a bamboo cladding. The homes, build for shelter and/or storage, barley have any openings. Most of the time the only opening in the whole structure is a door, with or without an actual door, to enter the building.



Plastic tarp roof

Earth filled walls

Bamboo cladding

Opening to enter

Centre de sante régional de DIVO, Loh-Djiboua

Centre de sante rural de TIEGBA, Loh-Djiboua

Hôpital général de Guitri, Loh-Djiboua

Centre de sante regional BAHOULIFLA, Haut-Sassandra

Centre de sante urbaine de IBOGUHE, Haut-Sassandra

Hopital gegeral de TABOU, Haut-Sassandra

Centre de sante DIGBAPIA, Haut-Sassandra

Centre de sante ZEGBAN, Bas-Sassandra

Centre de sante de MENEKE , Bas-Sassandra

Centre de sante de BEMADI, Haut-Sassandra

Building type:
One story building, rectangular or L-shaped.

Roof:
Sheet metal roof, slented or pitched

Walls:
Reinforced concrete, cast-in-sito.

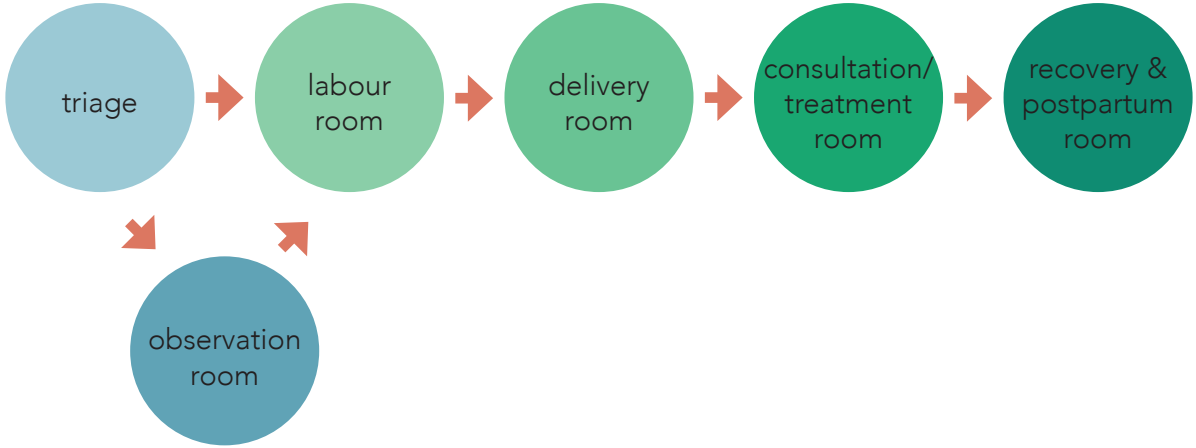
Floor:
Tiles, square.

Colour use:
Typical combination of white and light blue, minor exception with earth tones.

Open center:
indicates the entrance and connecting two building parts.

Windows:
Minimal windows towards the outside, small and locked with bars. To prevent infant abduction.

Louvres:
Windows and doors covered with louvres.


triage
labour room
delivery room
consultation/ treatment room
recovery & postpartum room
observation room

Workflow

The current workflow of a maternity clinic in West Central Africa is based on the movement of the mother. Every room in a clinic has its own function, moving the mother from one room to another. When a pregnant woman arrives at the maternity clinic she will enter the triage, this is the first check-up, if she is having regular contractions she will be moved to the labour room; if she is not, she will be moved to the observation room until she is in labour. The mother will stay in the labour room until she is fully dilated, than she will be moved to the delivery room where the baby will be born. After the delivery the mother is moved to the treatment room where she will get a check-up, after the examination she is moved to the recovery & postpartum room. These are mostly shared rooms, depending on how much you are willing to pay.

Contradicting

The workflow is really contradicting to the current workflows in Western countries where the mother stays in a (private) room and the workflow is moving around her. This western workflow is based on the knowledge that stress reflects negative on the delivery, as explained in the first booklet. This concludes that moving the mother (among others), can increase stress levels, resulting in delay, stagnation or unnecessary medical interventions.

Climate

The weather in both regions, Haut-Sassandra and Loh Djiboia, is really steady. The temperature is the whole year round basically the same: between 30°-35° during the day and 20°-25° during the night.

Outdoor is indoor

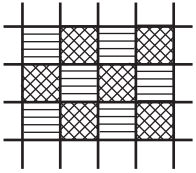
It is common that everyday activities are facilitated outdoors. The houses are mainly used for storage or as shelter during the night.

Local products

In the rural areas it is common to use local products. There are a lot of economic, transportation and environmental benefits to use these products. Possible local products are timber and earth.

Building method: rural area

The beauty and the simplicity of the building method in the rural area: a timber frame supporting an artificial roof to shelter from the rain and the sun; filled with earth or a bamboo cladding to provide protection.



Patterns

Geometrical patterns are imbedded in the Ivorian culture, mostly in artefacts. It is an opportunity and a challenge to translate traditional patterns into an architectural language.

Building type: maternity

The current maternity clinics in the Republic of Côte d'Ivoire have open core, this shows a clear division between the inpatient and outpatient area without breaking the connection. It also identifies the entrance.

Security

The Maternity Clinics in the Republic of Côte d'Ivoire are really introvert to guarantee the safety and security of the mothers and infants. The abduction of infants is a serious threat. This should be taken in consideration during in the design.

Movement

The current workflow of a maternity clinic in West Central Africa includes a lot of movement. It is a challenge to reduce the movement but keep the 'usual' workflow in mind.

Booklet 3:

Precedent Studies

About the booklet

In this booklet I will do a couple of precedent studies. I made a selection of projects that can offer insight in the configuration of a Maternity Clinic, the customs of Central/West Africa, (inventive) local building techniques and/or materials. I also selected a couple of architects that have done multiple projects and developed their own design and buidling method.

Functions

I will analyse the floor plans to find the connection between functions in different scale levels. In this way I will try to get a grip on the functions of a Maternity Clinic.

Reflection

At the end of every precedent I will recap on what I like about the project and what I will take with me during my design. This varies from material use, configuration, construction etc.

Republic of Côte d'Ivoire

Woldyia Maternity Centre 4

Panzi Hospital 18

LEVS in Mali 28

Kéré in Burkina Faso 38

Woldyia Maternity Centre

Project information

Function:	Maternity Centre
Location:	Woldiya, Ethiopia
Architect:	Vilalta Arquitecta (ES)
Project Year:	2017
Area:	800 m2

The project is based on two elements: the functional maternity unit and the mothers waiting area.

Functional Maternity Unit

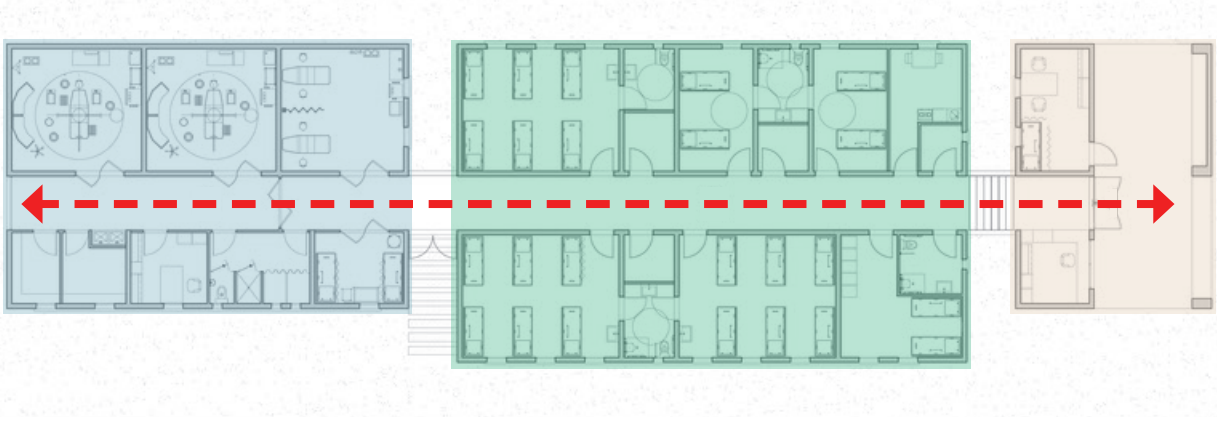
This part is formed by three connecting blocks, the reception, the maternity ward and the surgical ward.

Mothers Waiting Area/Home

This part of the project offers comfort and shelter to mothers from rural areas that are in the last stage (last weeks) of their pregnancy.

Source: https://www.archdaily.com/877633/woldyia-maternity-center-vilalta-arquitectura

Functional Maternity Unit

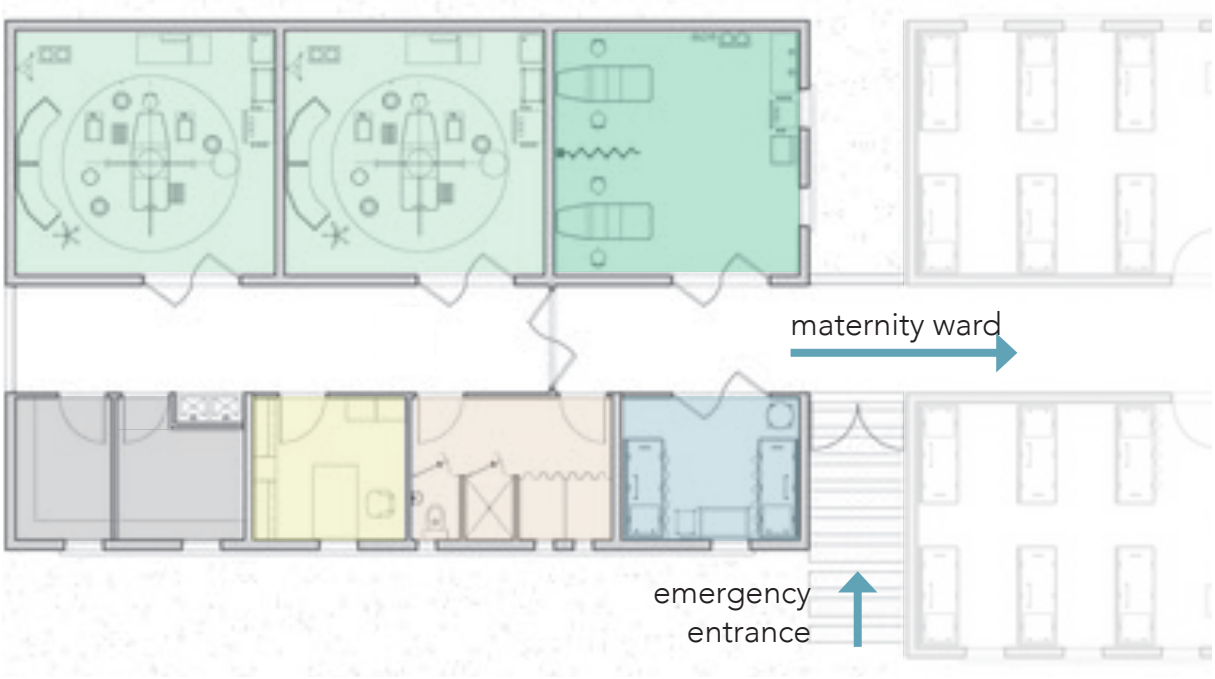


entrance area

maternity ward

surgical ward

Hallway



operating theater

preperation room

recovery room

staff: changing room (lock)

office

equipment storage

Delivery Room

6-bed room

2-bed room

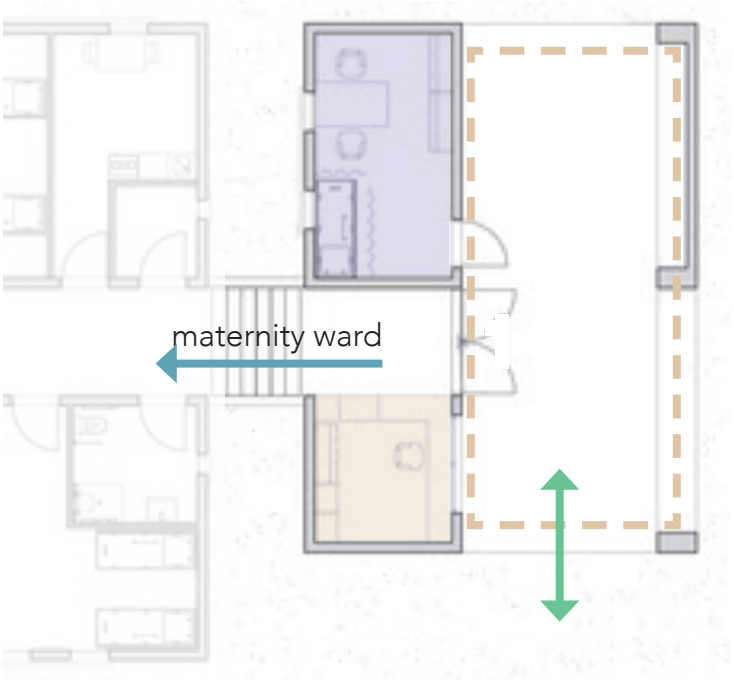
bathroom

storage/janitors closet

staff: pantry

staff: nursery station

Entrance Area

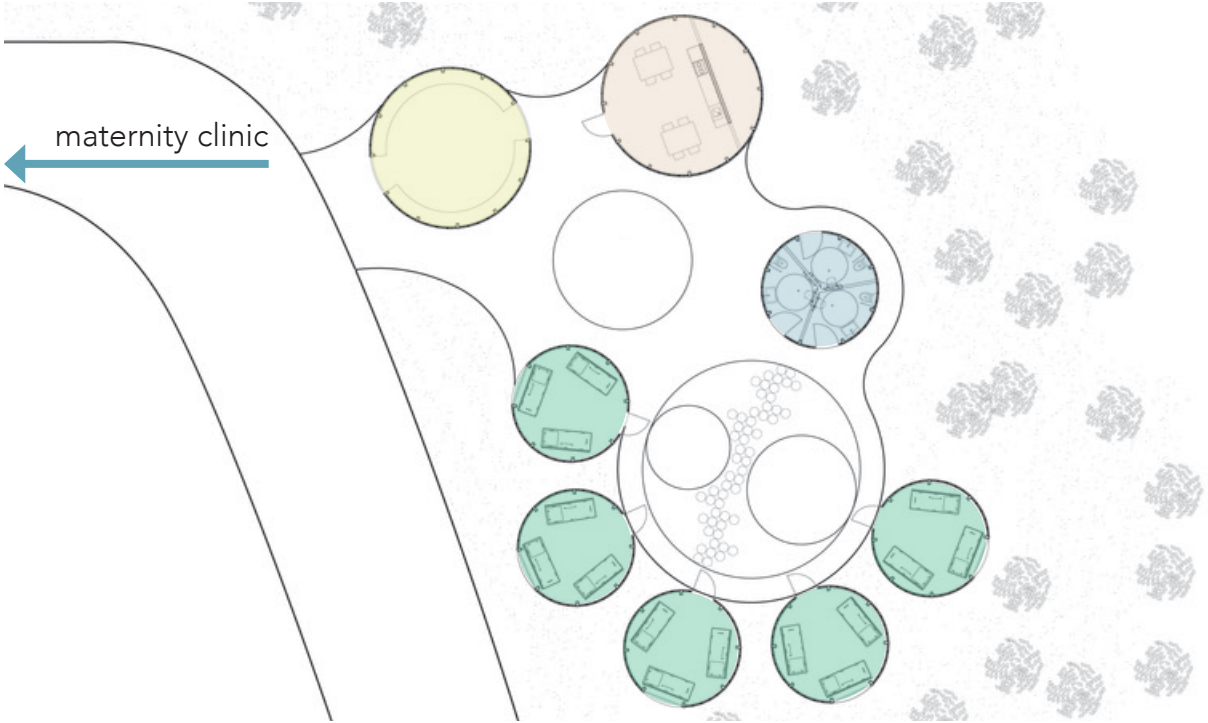


consulting room

reception

waiting area (outside)

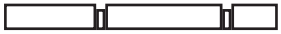
Mothers Waiting Area



sleeping units
shared space
bathroom
shared kitchen

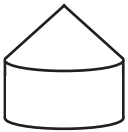
Two Worlds

I feel like that this project is divided in two worlds. On one side you have the white plastered set of blocks with a flat roof. The architecture does not fit in with the culture nor is it practical when you look at the weather influences (a lot of sun and rain). On the other side you have the Mothers Home, a set up and architectural style that is influenced by Ethiopia: Bamboo cladding and a pitched roof. Only the steel structure does not fit in with the traditional concept.



Main Building

The building is a one story volume with a flat roof



Mothers Home

The form is based on a traditional Ethiopian *Tukuls* hut

Structure

Light weight prefab concrete

Facade

White plasterwork

Windows

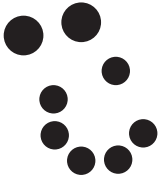
Pine wood, window grills with a traditional Ethiopian patern

Mothers Home

Steel structure with bamboo cladding

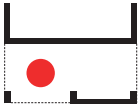
Simple layout

The simplicity of the design makes it easy to understand its routing and functions. It also shows the level of privacy, public > semi-public > private. This layout is possible because the Maternity Clinic is small and the distances are short.



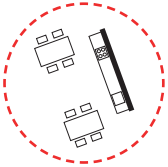
Mothers Waiting Area (Home)

The Mothers Waiting Home that offers mothers a place to stay before they go in labour (up to 2 weeks). In this way they are close if something happens and offers the opportunity to educate the women about motherhood.



Outside Waiting Area

Because of the climate it is not necessary to have a enclosed (inside) waiting area. You only need a roof to provide shelter in case of rain. But most of all it intergrates the community with the building



Kitchen

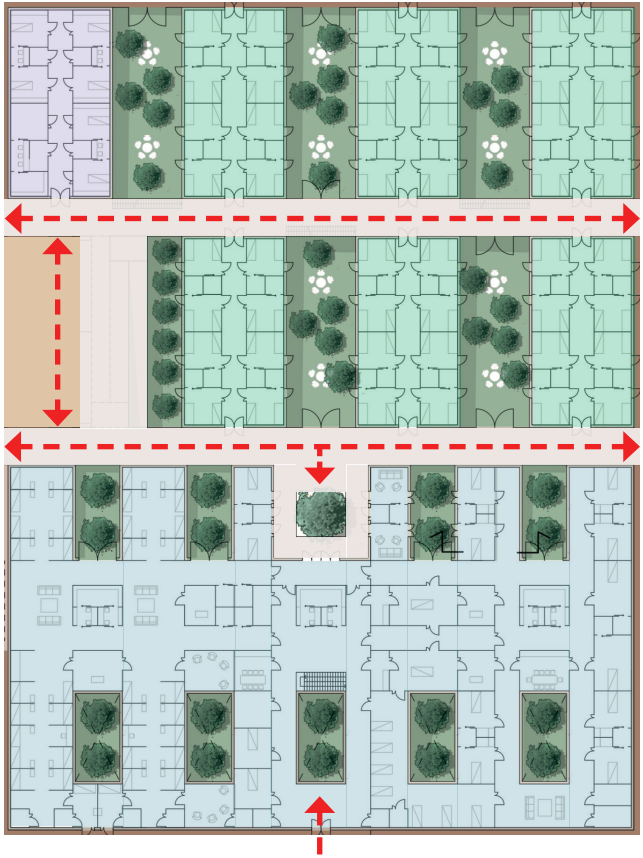
The open air kitchen provides the possibility for the mothers and family to cook if they stay at the Mothers Waiting Home or if the mother is inpatient.

Panzi Hospital

Project information

Function:	Maternity Hospital Unit
Location:	Bukavu, Congo
Architect:	White Arkitekter (DK)
Project Year:	(2017-.. not build yet)
Area:	5.500+ m^2

This project is an addition to a larger hospital. The Maternity Unit is formed by an outpatient consultation, an inpatient maternity ward and a medical care unit. The medical care unit consists out of a neonatal unit, an emergency unit, a delivery unit and a surgical unit.



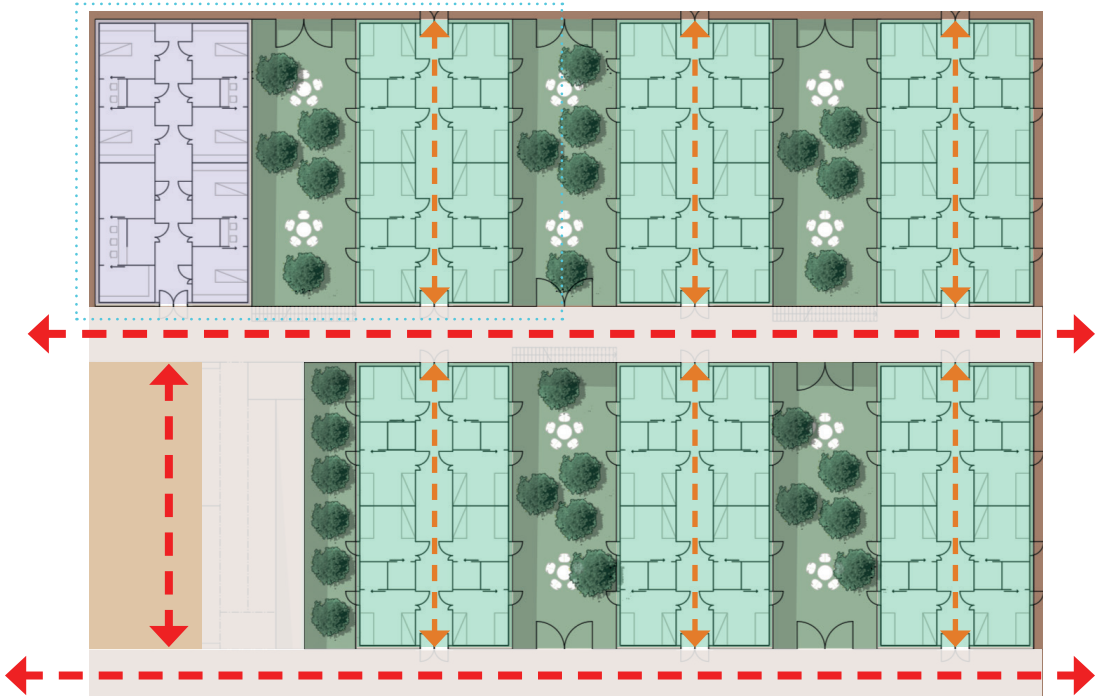
entrance/reception

outpatient consultation

inpatient maternity ward

medical care unit

Source: https://whitearkitekter.com
https://www.archdaily.com/909323/white-arkitekter-designs-mother-and-baby-hospital-unit-in-the-democratic-republic-of-congo



entrance/reception

inpatient maternity ward

outpatient consulting

outpatient consultation

consultation room

echography room

sample room

bathroom

reception

office

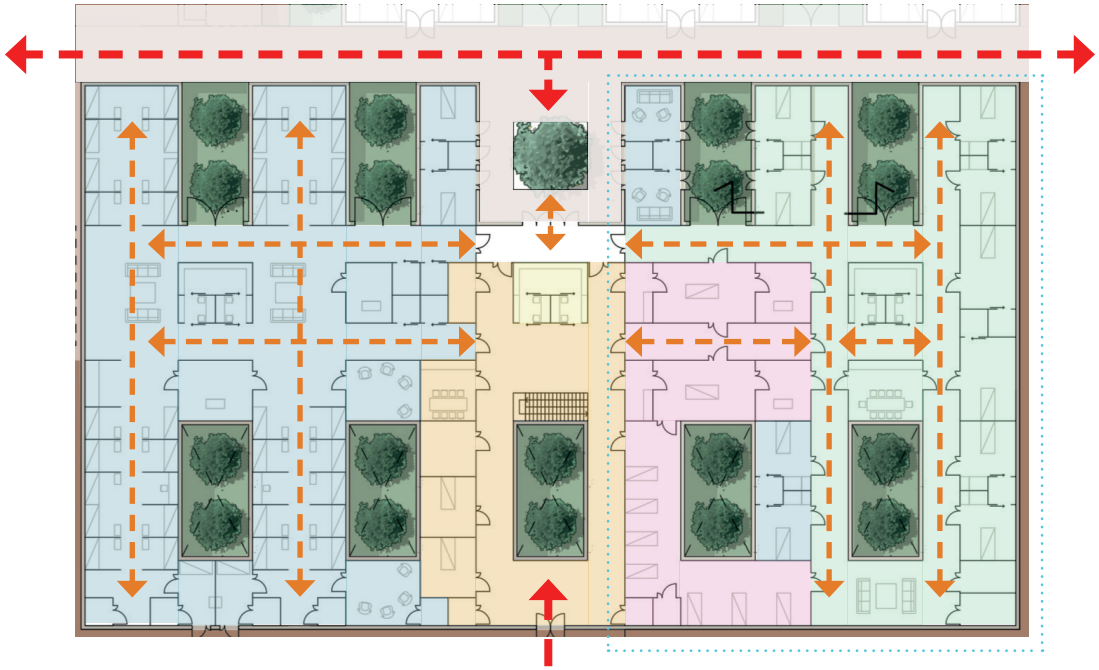
archive

storage

inpatient maternity ward

postpartum room 1/2 bed

bathroom



neonatal unit

delivery unit

surgical unit

emergency entrance

entrance neo/delivery

- delivery room
- bathroom
- reception
- back office
- staff: pantry/meeting room
- storage
- **surgical unit**
- operating theater
- preperation room (lock)
- recovery room
- staff: changing room (lock
- toilet

Structure
Coconut sheets for lighting and acoustic diffusion.

Structure
Concrete columns and beams, filled with brickwork.

Indoor Walls
White painted bricks for hygiene and light reflection.

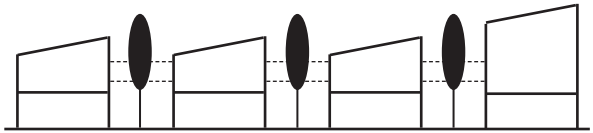
Indoor Floor
Polished concrete, easy to clean and thermal mass.

Delivery Room

Local Materials That Create The Form

The use of form as well as materials is well considered in the design. Most materials are local and used in a way (form) that it contributes to a healthy, natural and confortable indoor experience.

Medical Area (1)



Inpatient Area (2)

Building Form

The building is shaped by a series of small scale units, one (1) or two (2) stories, with slanted roofs.

Roof Structure

The wooden roof structure is above all pathways.

Facade

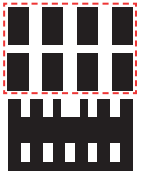
Brickwork

Facade

Open brickwork filled with mosquito nets for ventilation.

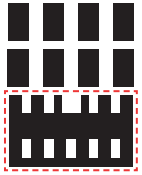
Facade

Wooden Panels



Pavilion Architecture

Even though the inpatient area is very large they managed to keep a small scale by creating a pavilion like setting. Every block hosts 8 mothers creating a small community within the hospital.

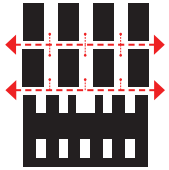


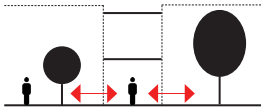
Patio Architecture

The medical side of the Maternity Centre has a higher density of functions and requires shorter walking distances. To accomplish this and maintain a small recognizable scale the functions are positioned around patios.

Gardens

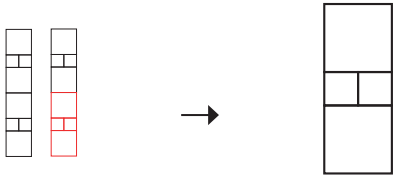
First of all the gardens create the small-scale pavilion structure on one side and a patio structure on the other side. Secondly the patios provide natural light and natural ventilation. Thirdly it offers every inpatient direct access to the outside.





Patio vs. Hallway

The hallways are actually covered pathways in the open air. Only a wooden structure offers shelter from the rain and sun. This means that the pathways are in open connection with the gardens.

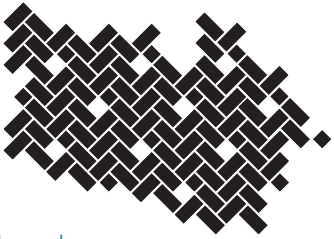


Repeating Form

The configuration of two square rooms with two small squares in the middle is a repeating element though the whole design. This offers the possibility to adapt to another function.

Simple Construction

The combination of reinforced concrete columns with a brick infill for lateral stiffness forms the base of the construction. The slanted roof is based on a wood construction.



Open Brickwork

Parts of the brick walls have outtakes to provide natural ventilation and daylight. In this way a wall can offer enclosure and shelter but it still breathes.

Showing Material

Besides the use of local materials like wood, bricks and coconut sheets the design also shows these materials, creating a warm and comfortable atmosphere.

LEVS in Mali

Primary School Tanouan Ibi (2013)

About the Architect:

LEVS Architecten is a Dutch Architecture firm that works together with Partners Pays-Dogon (PPD). PPD is a Dutch foundation that supports the Dogon people who live in the Mid-West of Mali. The foundation works together with the locals to support a sustainable development of the area.

LEVS Architecten has the honour to design all PPD construction projects since 2011. During the design process LEVS challenges themselves to search for innovation within the existing context. This means that the design must always recognise and acknowledge the existing situation and at the same time deliver a positive contribution to the development of the community, education and the economy. Therefor the construction projects are set up and preformed in collaboration with locals.

Through the years LEVS developed their own building method that is able to adapt to different projects.

Source: https://www.levs.nl
https://www.oskam-vf.com

LEVS, Primary School Balaguina (2012), Mali

LEVS, Primary School Gangouroubouro (2013), Mali

LEVS, Primary School Sono Ma (2014), Mali

1: the use of local earth

2: on-site production

3: pile of bricks

3: build by local people

Compressed Earth Blocks

Most of LEVS recent Mali projects are build with Compressed Earth Blocks (CEB). CEB is an innovative building material developed by the Dutch company Oskam v/f.

The production

The production process of CEB is simple:

1: collecting on-site earth
1b: manual or mechanically pulverize the earth if the grain is too big.
2: mixing the earth with 10% cement
3: compressing the mixture to a manageable block with a (mobile) mechanical press.

The Advantages: production

One of the biggest advantages of the CEB is that on-site dirt/earth can be used to produce the block. In this way transportation and material costs are reduced; increasing efficiency and sustainability of the building. Another environmental benefit is that the blocks are not fired. This reduces carbon emissions and saves trees.

The advantages: the material

Building with earth has the benefit that the material naturally regulates the indoor climate like moister and temperature. Further more the addition of cement will make it possible to create load-bearing walls.

Local people

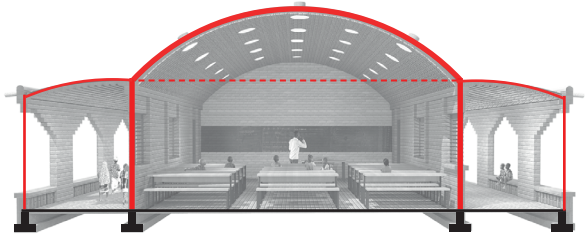
Oscam v/f states that the whole production process can be executed by local people but on-site training in soil selection, production, maintenance and masonry is essential.

Block size

The blocks have a rectangular shape that are easy to handle by an (professional) bricklayer.

Barrel vault

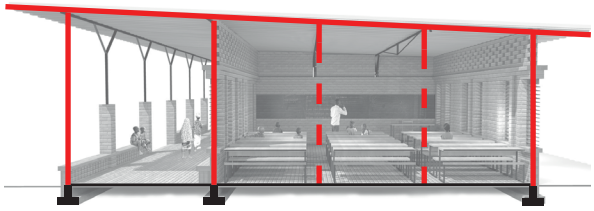
In the first projects LEVS created their whole building with one main material: The CEB; including the roof by creating a barrel vault with a tension bar.



Section Primary School Tanouan Ibi (2013)

Columns + roof + walls

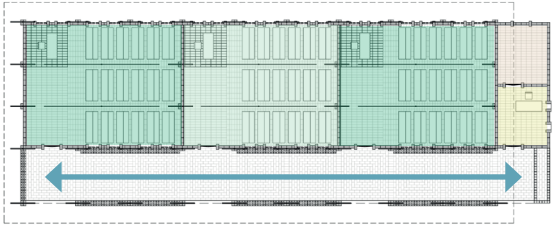
The latest LEVS projects use a more conventional building method: steel columns and beams to support the steel sheet metal roof filled in with CEB to create walls.



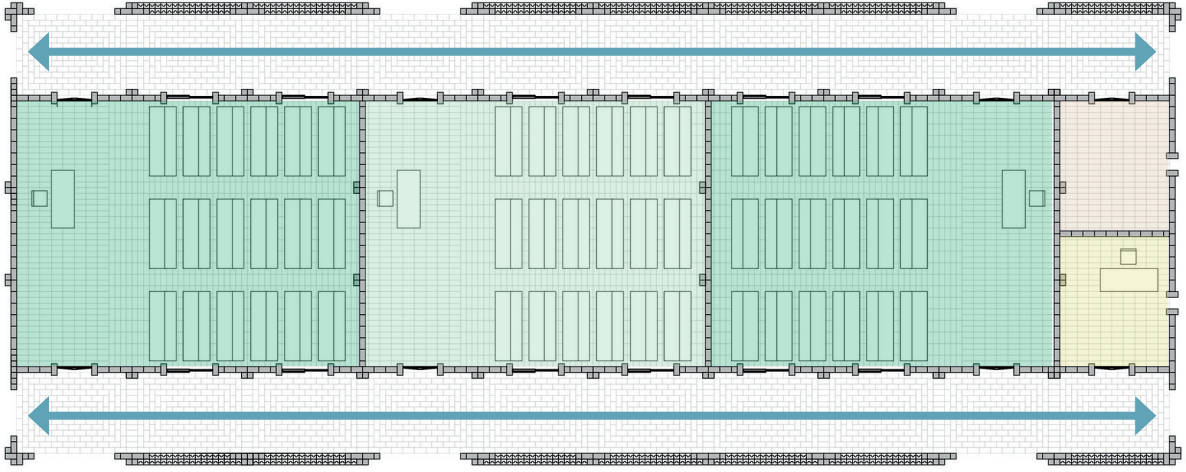
Section Primary School Gangouroubouro (2013)

Layout

The layout of the building is always simple: the functions are accommodated in a series of enclosed rectangular spaces. The there are no internal circulation spaces, creating an optimal floor plan that only covers the necessary. This type of layout also stimulates the natural ventilation flow; each enclosed space has at least two (opposite) walls connected to the outside.



LEVS, Primary School Gangouroubouro, Mali



LEVS, primary school Tanouan Ibi, Mali

Primary School Tanouan Ibi (2013)

Climate plan

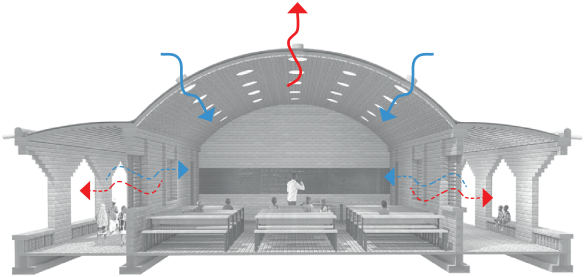
The climate plan in all LEVS projects is based on natural ventilation. This is executed in different ways in different projects.

Climate plan A

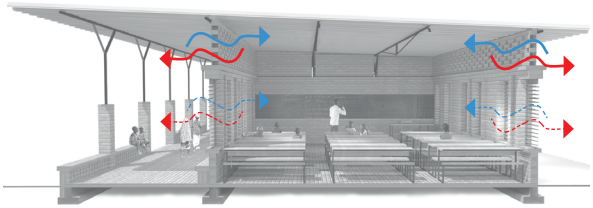
The buildings with a barrel vault have holes in the roof that allows the air to enter and exit. Plus the windows are not glazed; they are only covered with louvers adding extra ventilation options.

Climate plan B

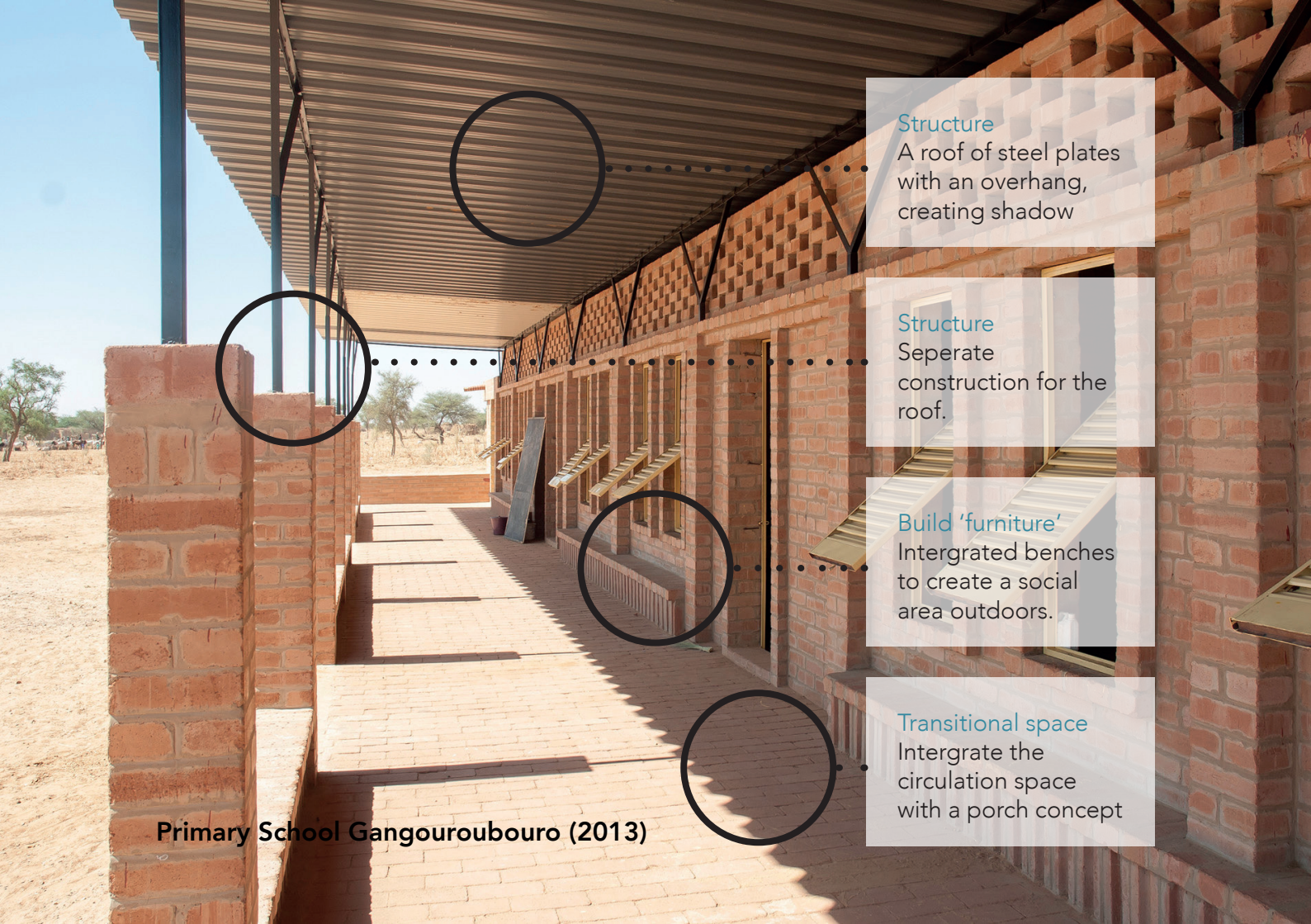
In the more traditional build projects the airflow can enter and exit through an strip of open brickwork directly under the roof. This open strip creates a version of a double roof: the constant airflow directly under the roof will take along the heat that passes trough the roof; enabling it to heat the space. These projects also have louvers that add an extra ventilation option.



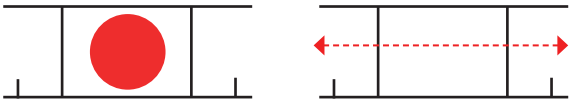
Section Primary School Tanouan Ibi (2013)



Section Primary School Gangouroubouro (2013)

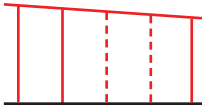


Primary School Gangouroubouro (2013)



Enclosed main function

By only enclosing the main function with solid walls you create an optimal functional floor plan. And offers an optimal framework for natural ventilation and daylight.



'Traditional' construction

By building a column and beam structure to support the roof you are free to fill in the walls with different materials. Furthermore it is easier for inexperienced builders.

Routing

By placing the routing external of the main functions it is clear how to access all functions. It also operates as a transitional space between the inside and the outside and duals as a social area.

Compressed Earth Brick

The compressed earth brick allows to be made on site, with a local material (earth) by local people. This makes the product an interesting, sustainable building material.

Kéré in Burkina Faso

Léo Surgical Clinic & Health Center (2014)

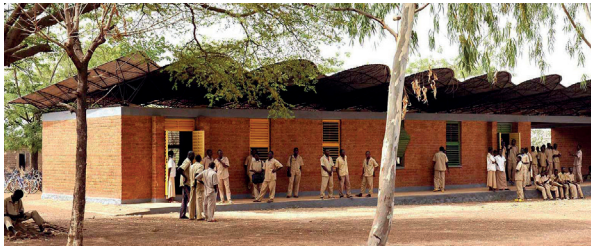
About the architect

Diébédo Francis Kéré is the founder of Kéré Architects. Kéré is a German based and educated Architect who was born an raised in Burkina Faso. As a teenager he had the chance to 'escape' his hometown to pursue an education. Now he reinvests his knowlegde in his homeland by creating architecture.

Kéré's principels in architecture are: simple materials, bioclimatic strategies and social participation. He challenges himself to reduce a design to the most original and primeval condition by the use of sustainable techniques and limited recourses.

Every project of Kéré is different, it is an interpretation of the local social needs, but trough every project you can see the same design principles that communicate the architectural language of Kéré.

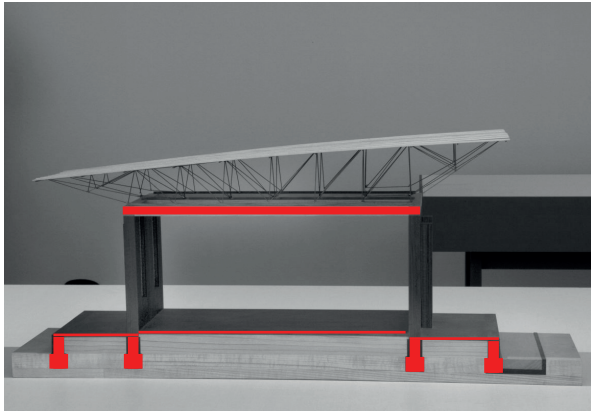
Kéré, Primary School Gando (2001), Burkina Faso



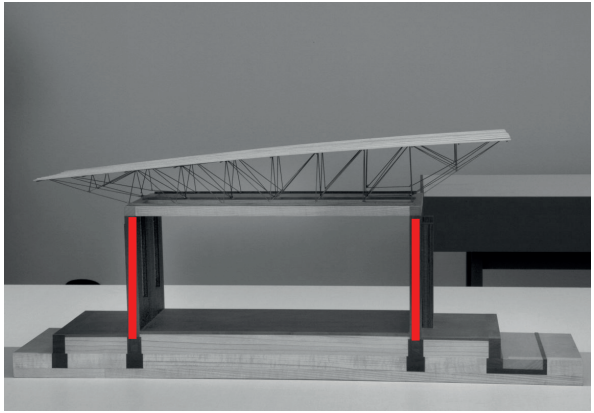
Kéré, Dano Secondary School (2007), Burkina Faso

Kéré, Centre for Earth Architecture (2010), Mali

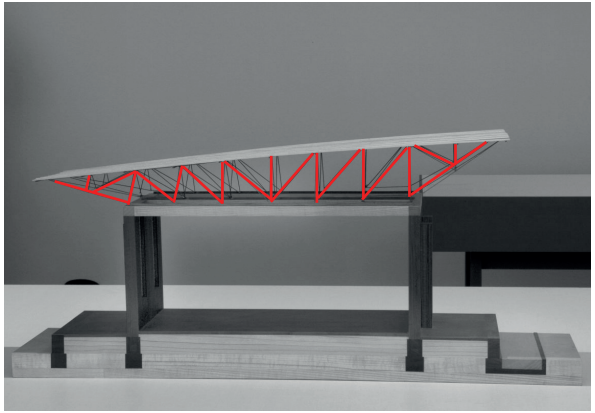
Source: AV Monographs 201, Francis Kéré: Practical Aesthetics, Edited by Luis Fernández-Galiano, 2018, Arquitectura Viva
Francis Kéré: Radically Simple, Hrsg. Andres Lepik, Ayça Beygo, 2016, Hatje Cantz
http://www.kere-architecture.com



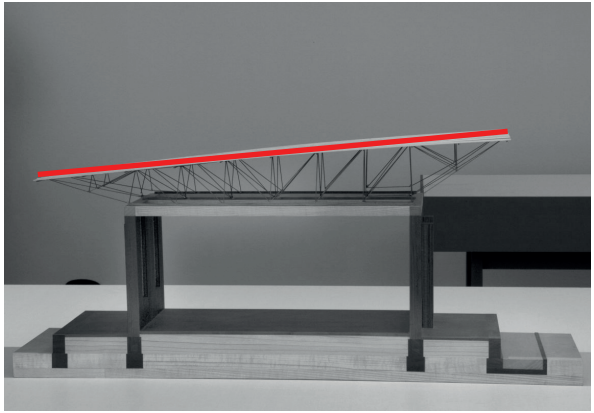
Concrete foundation, slab and ring beam



Earth walls: rammed or sundried



Space frame of steel bars (Ø 10mm)

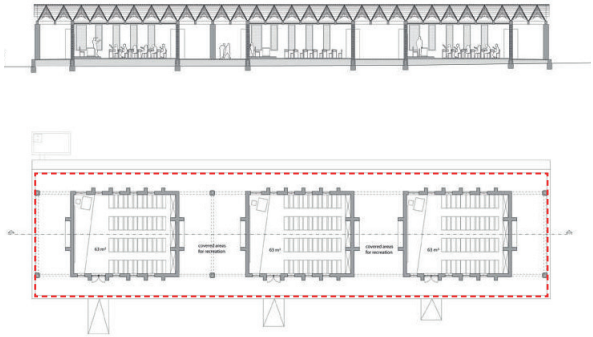


Sheet metal roof

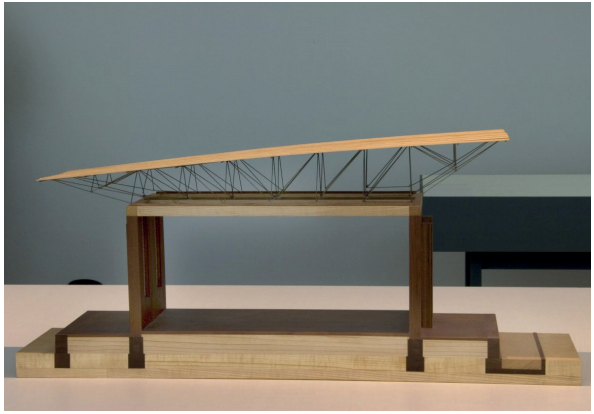
Architectual Language

Kéré has a clear regonisable architectural language, most of his designs for Burkina Faso are realy regonisable: a solid block with a big hovering roof. The construction and materials for these buildings are similar:

- a concrete foundation and base
- a local earth wall (sundried or rammed)
- a concrete ring beam
- a light space frame carring a big hovering sheet metal roof



Primary School Gando (2001)



Model of Primary School Gando (2000-2001)


Roof
Hearth (or tree)
Enclosure
Mound

Kéré and Semper

Luis Fernández-Galiano, a Spanish architect and professor, has written an interesting essay about the resemblance between the 'Four Elements of Architecture' of Gottfried Semper (1851) and the work of Diébédo Francis Kéré. He states that Semper describes that the origin of architecture is the hearth, but that in arid or tropical regions this hearth would have been a tree. Semper describes the hearth as the origin and the most important element of architecture: a fireplace offers reviving, warmth and a food preparing flame, the hearth is where people gather. Fernández-Galiano states that the tree is, in arid or tropical regions, in fact the origin. He explains that this is the place that offers reviving, shade and protection. Under the tree is the centre where groups are formed. And therefore, if Semper had had knowledge of warmer climates, he would have included shade as the important element of architecture. Fernández-Galiano continues to identify the other three elements of Samper to the architecture of Kéré. Fernández-Galiano adresses the mound, the platform that Semper considered indispensable in protecting the fire, elevating it over ground level, as the platform Kéré builds in Burkina Faso to protect the building from rain and floods Fernández-Galiano identifies the earth walls of Kéré's projects as the by Semper described enclosure with its origins in textile and weaving. Fernández-Galiano explains that the earth walls are commonly used in the area, traditionally painted with patterns that are derived from textile weaving. He concludes with the roof, the element that Samper describes as carpentry. An tectonic element that Kéré formed with his, almost flying, space frame of steel bars.

In conlusion Fernández-Galiano states that the work of Kéré is the perfect combination of stereotomic and tectonic architecture creating practical aesthetics.

Source: AV Monographs 201, Francis Kéré: Practical Aesthetics, Edited by Luis Fernández-Galiano, 2018, Arquitectura Viva

Building + Roof

The flying roof does not only give the architectural work of Kéré the typical appearance it also protects the whole building and its close surroundings from sunshine and rain. Furthermore the flying roof stimulates natural ventilation.

Overarching roof

In some projects Kéré covers multiple closed building blocks with one roof. In this way he creates communal space in the open areas under the roof offering a possibility for the community to gather.

Mound

The base of the building offers protection to heavy rain and small animals. At the same time the mound puts the building on a pedestal that functions as a transitional area (border) between the outside and the inside. It also functions as a social space.

Social participation

Designing and building for and with the local community is important to Kéré, all his designs involve social participation from the people who are going to use the building.