



**Feasibility study for the construction of the future
FADA N'GOURMA's CHR-U, BURKINA FASO**

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ACRONYMS

AP-HP	Greater Paris University Hospitals
AHU	Air handling unit
ALS	Average length of stay
ANAP	National agency for performance support
ARV	Antiretroviral therapy
BOR	Bed occupancy rate
AN	Assistant nurse
CAMM	Computer-aided maintenance management
CD	Communicable diseases
CHR-U	Regional Teaching Hospital
CICU	Cardiology intensive care unit
COPD	Chronic obstructive pulmonary disease
ENT	Ears, nose and throat (otolaryngology)
FCFA	CFA franc
FSS	Fire safety System
FTE	Full-time employment
GDP	Gross domestic product
HBP	High blood pressure
HDI	Human development index
HEP	Hospital project
HEQ	High environmental quality
HGE	Hepatology, gastrology, Enterology
HR	Human resources
HSPC	Health and social promotion center
ICU	Intensive care unit
IMF	International Monetary Fund
CM	Medical Center
CMA	Medical Center with surgical antenna
MDG	Millennium development goals
MS	Medical staff
MW	Midwife
NCD	Non-communicable diseases
PNDES	National economic and social development plan
PND	National health development plan
NMS	Non-medical staff
OR	Operating rooms
PCE-3	Construction and equipment project of three regional hospital
PISR	Post-Interventional surveillance room
PLHIV	Person living with HIV
GPEC	Provisional job and skill planning
PNC4	Prenatal consultation n°4
CHR	Regional Hospital
SDG	Sustainable development goals
UNDP	United Nations development program
VAT	Value added tax
WB	World Bank
WHO	World Health Organization

MOBILIZED TEAM

This study was conducted in April 2019 by the following team of AP-HP international's experts:

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Elaborated in 2016, the Burkina Faso's national economic and social development plan 2016-2020 (PNDES) allows to assess the targeted objectives of the State in terms of improving the living conditions of populations, in particular by strengthening health infrastructures.

As such, the Ministry of health has expressed the wish to construct and equip three new regional hospital (CHR) of approximately 300 beds in Dédougou, Gaoua and Fada N'Gourma in order to increase access to quality care in the regions of the loop of Mouhoun (Dédougou), the East (Fada N'Gourma) and the Southwest (Gaoua), peripheral regions less endowed with health and infrastructure resources than the center of the country which benefits from the attraction of its capital Ouagadougou.

The construction and equipment project of the Dédougou's CHR was the first to be launched. It is currently being built. With a view of pursuing this major project with the Fada N'Gourma's CHR, AP-HP International was consulted in order to develop a feasibility study based on the existing documents and the first analyses carried out by the Ministry of health, through its project management unit "PCE-3 CHR".

The proposed feasibility study is based on an analysis of health needs, relying on demographic and epidemiological data. It also results from the analysis of the health care provision in existing health facilities of the eastern region, and more broadly across the country. An exploratory mission has collected numerous activity data and established a preliminary inventory of available resources and existing strategies to ensure the feasibility of the Fada N'Gourma's CHR construction project. The report's recommendations take into account the orientations and evolutions expressed during these exchanges. The study presented finally results from the experience that AP-HP International has acquired in the development of hospital in many countries.

In view of the analytical work carried out and the data collected from the project's stakeholders, several objectives have emerged regarding the future hospital:

- To increase the availability of hospitalization for the eastern region;
- To diversify medical and surgical specialties to meet current and future health needs by ensuring quality and safety of care;
- To improve the policy of organizing care at regional level in conjunction with other care structures;
- To integrate a teaching dimension to make it a regional university hospital center (CHR-U) with the vocation of training doctors.

The elaboration of the feasibility study has highlighted some health needs, especially for the mother and the child, as well as in terms of medical specialties. The political commitment is strong to ensure the viability of the construction of the future CHR-U in Fada N'Gourma, with a mobilization of financial, technical and human resources envisaged in the Ministry's health policies.

This document presents the justification of the project (part 1) and then elaborates, on the basis of the exchanges and the data collected, a medical project with a bed dimensioning integrating the future activities (part 2). These elements are reflected in a technical and functional program with an estimate of the construction costs (part 3). Part 4 of the report finally introduces an estimate of the human resources required, and a projected budget for the future hospital. The last part summarizes these different aspects in general recommendations to ensure the success of the project.

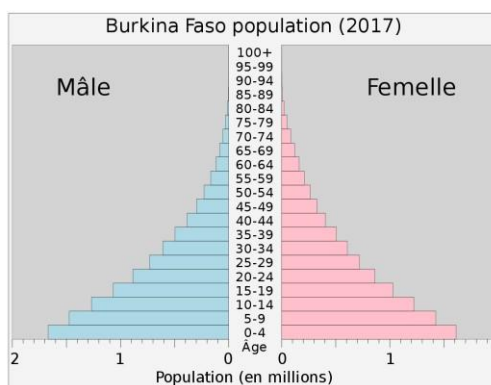
1. RATIONALE FOR THE CONSTRUCTION OF THE NEW CHR-U OF FADA N'GOURMA

1.1 BACKGROUND ELEMENTS

1.1.1 Demographic and epidemiological elements

Burkina Faso has about 19.6 million inhabitants (Annual statistics of Burkina Faso 2017), with more than three quarters of the population living in rural areas. The Burkina Faso population is defined by a high concentration of young people under 15 years of age (46%) with only 3.5% over 65 years. Annual population growth is estimated at 3.1% in 2017.

Figure 1: Age pyramid of Burkina Faso



Source: current population pyramid of Burkina Faso (2017), from UN estimates, *world population prospects*

The age pyramid in Burkina Faso underlines the high concentration of the under-19 population, and shows both a low average life expectancy (60 years) and a still high fertility rate of 5.4 children per woman which might lead to a significant increase in the population in the coming years.

The landlocked situation of Burkina Faso, between Mali and Niger in the North, and Benin, Togo, Ghana and Côte d'Ivoire in the South, offers a delicate position in terms of economic activity, mainly oriented towards agriculture, which employs almost 80% of the labor force (World Bank). Despite a stable annual growth of 6% and rather favorable medium-term forecasts with the support of mining and service activities, 40% of the population remains below the poverty line (150 000 FCFA/year, about 230 €/year) and Burkina Faso is ranked 183rd out of 188 by UNDP (HDI 2015).

Figure 2: Map of Burkina Faso



Source: Canal Monde <http://www.canalmonde.fr/r-Annuaire-Tourisme/Monde/guides/Cartes.php?p=BF>

In terms of health economics, health expenditure reached 6.2% of GDP in 2015. Health expenditure is \$43 per capita and per year, of which 90% comes from direct payments. The Government's share of the health budget increased from 9.1% in 2011 to 12.6% in 2015, reflecting a political will to improve access to care and the State's share of health spending.

The future CHR-U is planned in Fada N'Gourma, a city estimated at 41 000 inhabitants in 2012 (national statistics), and whose total population has probably increased in 7 years. Indeed, if we apply the growth rate of the Eastern region estimated at 3.6% (Annual statistics of Burkina Faso 2017), the population of Fada N'Gourma would now be around 50 000 inhabitants. The interviews with hospital staff also highlighted the attractiveness of the Fada N'Gourma RH to bordering countries (Niger, Benin, Togo), which reinforces the need to revise the health map and adapt the health care provision.

Like all West African countries, Burkina Faso faces a demographic and epidemiological transition:

- The **demographic transition** is reflecting into lengthening life expectancy, a relative ageing of the population, and a gradual decline in the average number of children per woman. The above demographic indicators show, however, that this transition is far from complete: the fertility rate is 5.4 children per woman, and life expectancy does not exceed 60 years.
- The **epidemiological transition** defines a specific situation, between communicable diseases that remain a major public health problem (60% of the causes of death), a high maternal and infant mortality, and a significant emergence of noncommunicable diseases (30% of deaths).

Table 1: Key health indicators

Informer	Result	Comments
Life expectancy	60 years old	Regular improvement
Crude death rate	11.8%	
Synthetic fertility index	5.4	Always high; Inadequate contraceptive prevalence rate; MDG not achieved
Coverage rate CPN4	34%	Insufficient MDG not achieved
% assisted childbirth qualified personnel	84%	In regular improvement
Maternal mortality rate	330	Remains high; MDG not achieved
Infant mortality rate < 1 year	42/1000	Remains high; MDG not achieved
Juvenile infant mortality rate < 5 years	81/1000	
Neonatal mortality rate	23/1000	
HIV prevalence	0.9% (7% in 1997)	Insufficient level of knowledge of the population; inadequate condom use
Number of PLWHA	95 000	
ARV cover	88%	In progress
Tuberculosis incidence	52/100 000	Low notification rate (30%)
Prevalence malaria child	46%	First cause of consultations, hospitalizations, and mortality

Source: WHO, *complete sanitary profile of Burkina Faso - Module 1, 2017*

To be remembered for maternal and child health as key health indicators:

- **Maternal and Child health** : insufficient coverage for prenatal consultations (PNC4) 34%, with a maternal mortality rate which remains high (330/100 000), and has not improved much over the past five years ;
- **Malaria** remains the leading cause of death in children ;
- The acute **malnutrition** rate for children under five is around 10%, the chronic malnutrition rate is about 30% ;
- The **infant mortality** rate for children under the age of five increased from 129/1000 in 2010 to 81 /1000 in 2015, the infant mortality rate of less than one year increased from 65/ 1000 to 42/1000 ;
- The **total fertility rate** decreased from 6.2 to 5.4 in ten years with a target reduction to 4.7 in 2020

Communicable diseases are still major public health priorities. They are responsible for nearly 2/3 deaths, especially in children. The management of the 3 major endemics (malaria, tuberculosis and HIV) are essential objectives to be taken into account.

Non-communicable diseases (NCD) account for about one third of deaths in Burkina Faso.

The epidemiological evolutions of these diseases are specified in Chapter 2.1 for the medical project.

According to WHO, the leading cause of mortality is perinatal, maternal and nutritional communicable diseases (56%) (see box above), then cardiovascular diseases (13%), trauma (11%), and cancer (5%). These estimates, particularly for cancer, may nevertheless be underestimated due to a lack of a national screening strategy, and a difficult access to antimitotics.

High blood pressure (HBP) has a higher prevalence in urban areas (between 20% and 30% according to studies). Diabetes, representing 1% of deaths, has a prevalence of up to 5% among the 25-64 years. The most severe chronic respiratory diseases (2% of NCD deaths) are chronic obstructive pulmonary disease (COPD) and frequent lung cancers, particularly as a result of significant smoking in young boys.

According to the WHO health profile in Burkina Faso, mental illnesses represent an important but poorly measured subject, with a significant incidence of mental disorders but low management in care structures. The diagnosis is similar for sickle cell anemia, which remains an ill-measured and poorly cared-for public health problem, with inadequate staff training. Finally, dental problems are very common, this is the 10th reason for consultation.

Key points:

- 1) **Maternal and child health issues remain real national priorities ;**
- 2) **Communicable diseases, often severe in children, are a major reason for the use of care;**
- 3) **Non-communicable diseases, which are not adequately documented to measure their actual weight, require a change in the supply of health care.**

All these elements must be considered in order to reinforce health care provision for the future reference hospital of Fada N'Gourma. In this demographic context and in view of the country's epidemiological transition, the construction of an efficient CHR-U with a first level technical unit appears necessary and justified.

1.1.2 Presentation of the healthcare offer

At the national level, public care structures are organized in 3 levels.

- The first level provides primary health care with two levels of care. The first level includes medical centers (43 in 2015) and health and social promotion centers (1698), as well as isolated clinics (119) and isolated maternity wards (12). The second level represents the medical centers with surgical antenna (CMA), 47 in 2015. CMAs are the reference centers for this first level of care.
- The second level is represented by all 9 regional hospital centers (CHR) in Burkina Faso. These are the reference centers for CMAs.
- Teaching hospitals (CHRCHU) are the third and final level of the care pyramid. There are currently 4 CHUs in Ouagadougou: Yalgado Ouedraogo, Charles de Gaulle (Pediatric), Bogodogo and Tenedogo (formerly Blaise Compaoré). There is finally the Sourou Sanou hospital in Bobo Dioulassou in the Southwest and the CHU of Ouahigouya in the North-West. It should be emphasized that the landscape of CHUs is currently quite scalable with the future hospitals of Fada N'Gourma and Dédougou being promised to become CHR-U. In this capacity, the desire for decentralization is important to note. The strengthening of CHRs must be done in a regional vision of the health map to improve coverage for the entire population of the region concerned

There are currently 63 health districts throughout Burkina Faso. The eastern region where Fada N'Gourma is located includes 6 health districts (Gayeri, Bogandé, Diapaga, Fada, Manni and Pama). The map below represents the regions and health districts of Burkina Faso. Since 2005, a sixth district (Manni) has been added to the eastern region.

The Eastern health region has, in addition to the Fada N'Gourma's CHR, 4 CMA, 4 CM and 140 primary care health centers supported by 8 infirmaries, or 157 health clinics spread throughout the region, as illustrated in the map below.

The existing Fada N'Gourma hospital is currently a regional hospital of 164 beds. Its activity covers medicine, surgery, obstetrics and pediatrics. The total staff in the workforce are 373 agents in 2018. This hospital, located 220 km from the capital Ouagadougou, is the reference hospital for the entire eastern region of the country which has about 1.7 million inhabitants.

The question of distances and travel times between the CMA and the CHR is important: The Eastern CMA of the country is less than 200kms, but at 2 to 3.30 hours from the CHR (see Figure 3). Transport modes for transfers must be studied to promote the role of the CHR in the health map of the region. The place of the futur regional hospital center of Fada is essential in the health map of Burkina Faso. In addition, this CHR also receives patients from neighbouring countries such as Togo, Benin or Niger.

The analysis of the population distribution by health district makes it possible to note that the health district of Diapaga has more inhabitants than that of Fada N'Gourma (490 000 versus 430 000).

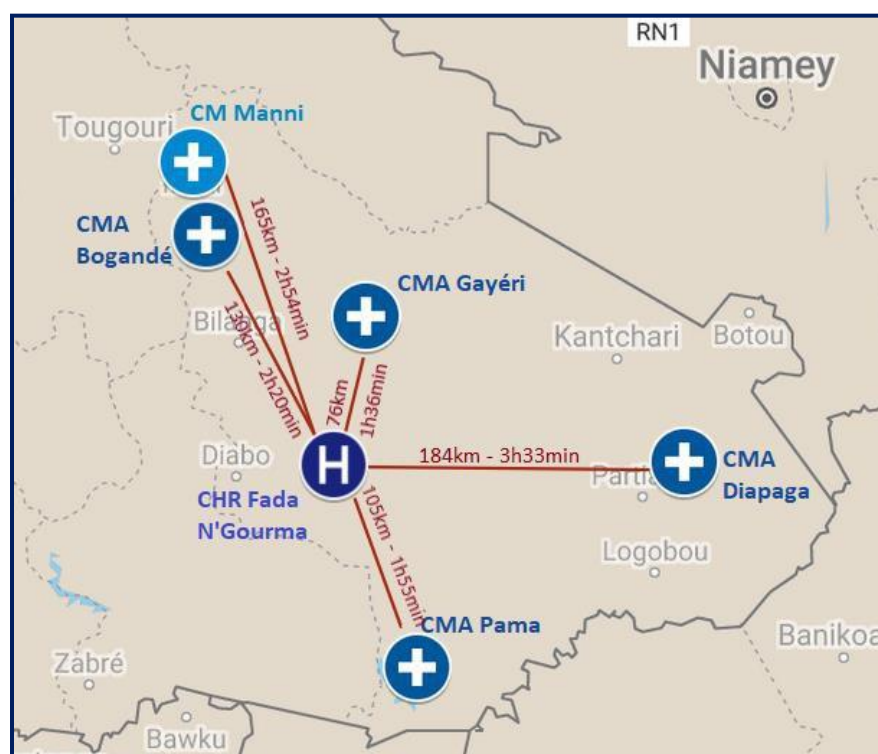
The role of a reference hospital is therefore strengthened. In fact, there are almost as many new patients coming from Diapaga as from Fada N'Gourma in the CHR. The objective pursued by the project is the establishment of a new CHR-U whose vocation, by increasing the supply of health care, particularly specialized, is to become also a regional teaching hospital.

Table 2: Number of health facilities by type and district in the eastern region

District	Total population	CHU	CHR	CMA/HD	CM	HSPC	Isolated dispensaries	Isolated maternities	Infirmaries	Other	Total
DS Bogandé	378 151	0	0	1	0	24	0	0	1	0	26
DS Diapaga	490 847	0	0	1	1	33	0	0	1	0	36
DS Fada	429 709	0	1	0	2	45	0	0	5	0	53
DS Gayéri	117 973	0	0	1	0	13	0	0	0	0	14
Manni DS	184 741	0	0	0	1	13	0	0	0	0	14
PAMA DS	121 092	0	0	1	0	12	0	0	1	0	14
Region	1 722 513	0	1	4	4	140	0	0	8	0	157

Source: 2017 Annual statistics of Burkina Faso

Figure 3: Simplified sanitary facilities (CHR, CMA/CM) in the Eastern health region



Source: Ministry of health, 2016

According to the Annual Statistics of Burkina Faso, the ratio of bed/inhabitants for the eastern region remains low, with 7.9 beds for 10 000 inhabitants, considering an average of 11.3 beds for 10 000 inhabitants across Burkina Faso. The need for beds is therefore particularly acute in this health region. Consequently, the eastern region of Burkina Faso is considered as a priority in the health development plans of the Ministry of Health to improve access to quality care.

Regarding the available human resources (HR), the ratio of 0.3 physicians to 10 000 inhabitants is twice as low as the national average of 0.6 physicians for 10 000 inhabitants. Nurses and midwives reached 5.3 for 10 000 inhabitants against an average of 6.6 for the national average. The total ratio of qualified health personnel thus reaches **5.6 qualified personnel for 10 000 inhabitants**, well below the national average (7.2) and far below the WHO recommendations (23 health personnel – physicians, nurses, midwives-for 10 000 inhabitants). The question of taking these HR needs into account for the eastern region of Burkina Faso is therefore essential.

1.2 ANALYSIS OF THE ACTIVITY OF THE CURRENT CHR OF FADA N'GOURMA

The analysis of the medical and health activities of the current CHR through its activity report 2018 allows us to take the measure of current and future needs in terms of health care provision.

1.2.1 Workforce

The 2018 activity report of the Fada N'Gourma CHR gives a total of 373 staff.

For medical personnel, there are 10 physicians specializing in the following disciplines: surgery, gynecology-obstetrics, cardiology, dermatology, and pediatrics. In addition, the CHR has a radiologist and a dental surgeon. There are also 20 general practitioners, for a total of about 30 physicians.

Concerning the number of paramedics, there are 119 registered nurses and 10 licensed nurses. The number of midwives is 58. The staff are supplemented by “health assistants”: one in epidemiology, 18 in surgery, 12 in anesthesiology, 3 in emergency medicine, 3 in ophthalmology, 4 in stomatology, 4 in ENT, 5 in pediatrics, and 1 in mental health.

The HR analysis is detailed in Chapter 4. Already, it can be emphasized that the number of paramedics will need to be strengthened. Above all, the number of medical specialists is inadequate in view of the needs of a regional hospital for a population of more than 1.7 million inhabitants.

1.2.2 Activities

The analysis of hospital consultations by service helps to measure the importance of persistent needs for maternal and child health.

In terms of consultation activity, pediatrics is in first position with nearly 10 000 new consultants in 2018. Gynecology and obstetrics consultations are in second place with more than 6000 new consultations. The activities for medical and surgical emergencies are also important, respectively close to 5000 new medical consultations and nearly 2500 for surgery.

For hospitalizations, a total of 164 beds is considered. In particular, the bed occupancy rate (BOR), for the whole CHR, reaches more than 93%, while it was 80% in 2017, reflecting an increase in hospital activity. This is even more noticeable as the average length of stay has been shortened from 3.54 days in 2017 to 3.02 days in 2018.

The bed occupancy rate exceeds 100% in pediatrics (164%), medical and surgical emergencies (169% and 108%), postoperative (121%), and in maternity (113%). These hospitalization data underline the need to strengthen the care provision in these areas. The distribution of hospitalized patients by service also underlines the importance of pediatrics (35% of hospitalizations), and obstetrics (23%). Medicine represents only 10% of hospitalization and 5 surgery %.

With regard to the analysis of medical specialties, the activities identified imply cardiology, dermatology, odontology, stomatology, ophthalmology, ENT, and psychiatry. Infectious diseases are not identified as such, and are a priori included in medical activities. No other medical specialties are specified.

The analysis of the maternity activity of the Fada N'Gourma CHR makes it possible to identify among the sensitive points, in addition to the BOR already mentioned and greater than 100%, a total number of childbirths of 2322 in 2018 against 2167 in 2017 (+7%). It is clear that the establishment of a new CHR-U will contribute to the enhancement of this attractiveness, and to a significantly higher number of childbirths in this hospital. The analysis of these childbirths also makes it possible to raise the particularly large number of obstructed births (1664/2322 or 72%), the number of caesarean sections being 567 (24%). The high number of obstructed births is part of the referral role of this hospital. Among the severity factors highlighted, the number of stillbirths accounted for 11% of birth and intra-hospital maternal mortality is worrying (1.8% in 2018; 1.66% in 2017; and 2.35% in 2016). There is a priority in the national health program to secure childbirth, and the future CHR-U must contribute.

For surgical activities, the diversity of surgical specialties is not specified in the 2018 report. The current CHR has three operating rooms but only two would be functional. Surgical procedures were 1670, including 1137 in emergency and 533 programmed. Emergency surgical activity is therefore very predominant (about 70%) but caesarean sections account for nearly 50% of this activity. It should be noted that surgical activity was more important in 2017, but in 2018 technical problems limited the activity of the operating unit for several months.

The breakdown of the type of surgical activity is specified in 2017. Visceral surgery activity is predominant with more than 80% of cases excluding gynecological-obstetrics surgery. Other interventions concern trauma and Urology. There seems to have no neurosurgery or orthopedics in the CHR.

Among the factors of concern in surgery, there is a death rate of almost 3% of the surgeries in particular due to infections (peritonitis) and occlusions. Special attention in the project of establishment should be brought to the questions of hygiene in surgery.

The synthetic analysis of clinical activities allows to identify the main reasons of admission from 2016 to 2018. They concern severe malaria, anemias, complications of pregnancy, high blood pressure various infections including respiratory, prematurity and acute malnutrition. These reasons for admissions can be related to the main causes of death and underline the already mentioned importance of pediatrics and obstetrics. Emerging needs include chronic non-communicable diseases including cardiovascular diseases. The need for cancer or diabetes is poorly identified.

The 2018 activity report analyzes the main difficulties encountered. They mainly relate to the breakdown of medicines and consumables, the reception capacities in pediatrics, emergencies and maternity, and the shortage of specialized medical personnel.

In addition, problems related to electrical current, lack of computer equipment, and low water availability are underlined.

1.2.3 Analysis of the hospital project 2019-2023

A hospital establishment project was developed by the teams of Fada N’Gourma’s CHR and validated by the board of directors. This project is particularly interesting because it comes directly from the health professionals of the CHR. It establishes as a priority strategic objective the reduction of mortality in pediatrics, the improvement of care in obstetrics and neonatology, the improvement of hospital hygiene, the management of quality of care and the reinforcement of clinical services.

This project includes a medical project, a nursing project, a social project and a managerial project.

The analysis of the current situation in the preamble to this draft establishment underlines the following points:

- Insufficiency in number and quality of staff;
- The absence of a job description sheet and the lack of distribution of tasks;
- The absence of a training and research plan;
- Difficult working conditions due to the obsolescence of buildings;
- Inadequate offices, general hygiene problems, fire safety problems: a 2016 satisfaction survey pointed out that two thirds of the officers are not satisfied with the working conditions.

In terms of infrastructure, the document stresses that the majority of buildings are from 1972, and that its infrastructures remain defective and inadequate, in particular because of the small size and tightness of the premises, as well as plumbing problems of electricity. Reception capacities are considered outdated and inadequate.

The current RH report reveals many dissatisfaction and highlights gaps in imagery, endoscopy, biology, and hatchery. The problems of preventive and curative maintenance of supplies and equipment are underlined.

The needs in organization and programming are related to the training of professionals, information and communication management, research management, and maintenance management. The question of quality management has been the subject since 2006 of the creation of a specific department in charge of the quality of care. A quality assurance committee has been set up with "quality units" in all services, but is struggling to be fully operative.

These elements underline the strong momentum that exists within this CHR, and the willingness of management and the Board of Directors to strengthen the healthcare provision, especially in the field of emerging specialties, as well as the concern for a training plan for professionals to ensure the quality of care.

Based on this finding in the CHR, many proposals and themes were used to elaborate the core of the hospital project (PEH) HEP.

These proposals, which deserve to be taken into account in the draft of the future CHR, include in particular the following questions:

- Health map: improving coordination between the CHR and other health structures in the region, in particular by improving the reference procedures and counter-reference between the CHR-U and the CMAs.
- Human resources: definition of a training plan that will take into account the needs for reorganization of activities, the development of new activities, and the requirements related to the definition of job profiles and skills
- IT: development of a health information systems' program.

The priorities outlined for the CHR are based on the following objectives:

(1) Quality and safety of care:

- To improve the quality and safety of care especially in the medical and surgical emergencies sector, and for pediatric emergencies;
- To strengthen the compliance with hospital hygiene rules for the entire healthcare sector;
- To provide a manual of procedures for the management of the care, and the realization of an audit of the professional practices.

(2) Strengthening and improving the supply of health care, taking into account the important needs currently insufficiently addressed, including:

- Implementation of a resuscitation service;
- Reinforcement of several medical specialties in particular cardiology, gastroenterology (especially for endoscopy), and dermatology;
- Development of specialized surgery, orthopedics and traumatology as major priorities with the maintenance of a digestive and urological surgical activity;
- Development of rehabilitation activities;
- the issue of cancers, and especially gynecologic cancers, which is a priority for increasing needs, should be investigated;
- Importance of neonatology for this CHR to which are referred to complex pregnancies, in addition to improving the care of emergencies. This implies a need for equipment especially for incubators, but also a need to strengthen the skills of neonatology staff;
- The issue of child malnutrition remains important, requiring a unit dedicated to nutritional recovery.

In conclusion, the analysis of the current activities of the Fada N'Gourma CHR and the PEH prepared and validated by the Board of Directors of the present Fada N'Gourma CHR are very relevant sources of information to adapt the project of the future CHR-U of Fada N'Gourma to the reality of the needs.

These analytical elements were included for the definition of a relevant medical project for the future CHR-U of Fada N'Gourma.

2. MEDICAL PROJECT OF THE FUTURE FADA N'GOURMA'S CHR-U

2.1 HEALTH ISSUES TO BE ADDRESSED

2.1.1 The context of the PNDS

The project of the future CHR-U of Fada N'Gourma must be part of the national health development plan of Burkina Faso (PNDS).

This national plan is a key strategic objective of taking into account the sustainable development goals of which SDG 3 "enable all to live in good health and promote well-being at all ages."

Three important points are expected:

- access to quality services for all;
- taking into account nutritional issues including women and children;
- taking into account the demographic and epidemiological transition with the issue of emerging pathologies related to this transition.

The PNDS outlines a number of priorities, in particular:

- *child health*: despite the actual improvements observed in the period 2010 to 2015, infant and juvenile mortality rates are unsatisfactory and neonatal mortality is inadequate. The targets set by the MDG have not been achieved
- *Mother's health*: maternal mortality remains at a high rate of 330 for 100 000. The synthetic fertility index remains quite high at 5.4 and the rate of assisted births needs to be improved
- Regarding *infectious diseases*, HIV management has improved, and coverage of people with HIV under ARV is approaching 90% with a number of PLHIV of 94 000. The number of new cases remains significant (4300 cases in 2017 including 660 in 0-14 years according to UNAIDS data 2018). On the other hand, malaria remains very common and very serious, it remains a major priority as the leading cause of hospitalization and mortality in children. For tuberculosis, it remains a priority problem among communicable diseases with an incidence of 9 500 cases in 2017.
- *Non-communicable diseases* are identified and targeted within the PNDS. They are a major issue in the context of the epidemiological transition. Thus, the emergence of *cardiovascular diseases*, the importance of metabolic diseases including *diabetes*, the increasing incidence of *cancers*, especially gynecologic cancers (breast cancer, cervical cancer) are key challenges to meet the health needs of the population. In addition, the rapidly growing *accidentology* generates major needs in the field of *trauma*, *orthopedics*, with the need for support in *rehabilitation*.
- *Psychiatry*, very often the poor relative of strengthening the supply of health care, must also be taken into account, especially at the level of a CHR.
- Finally, the demographic transition is accompanied by an ageing population that contributes to the emergence of non-communicable diseases, and which also raises the question of the organization of care in the field of *geriatrics*.

The response to these major health issues requires to strengthen the provision of care and modernize health facilities, taking into account the issue of accessibility, including accessibility to health products, medicines and medical consumables. The adaptation and modernization of the technical unit of the regional hospital center must respond to these challenges.

2.1.2 The challenges of the future CHR-U of Fada N'Gourma

- **To become the reference hospital for the East of the country**

The project of the future CHR is to be a reference hospital for the whole of the eastern region of the country, and also to be able to cope with requests for care of bordering countries as mentioned in the preamble.

In addition, this CHR is intended to become a CHR-U, i.e. a regional teaching center. In this context, its tasks are those of a center of care, with teaching and research activities: these 3 components will have to be defined in the project of establishment.

- **To be related to a regional health map with 4 CMAs and a medical center**

The CHR must develop its medical program taking into account the necessary links with other institutions in the region. This particularly concerns the 4 medical centers with surgical antenna (CMA) of Bogandé, Diapaga, Gayeri, and PAMA, as well as the medical center of Manni.

- **Take into account the fate of the current CHR to be specified**

The construction of the future CHR-U of Fada N'Gourma raises the question of the future of the current CHR, an establishment of 164 beds employing 373 agents. The current hospital could become a district hospital. Questions related to its technical unit and staff should be clarified in future stages.

2.1.3 The proposal of the technical committee/PCE-3 CHR-U

The Fada N'Gourma CHR project is part of a larger project which includes the construction of 3 new CHRs including Dédougou and Gaoua.

The general scheme for Fada N'Gourma is as follows:

Overall objective: to contribute to the health status' improvement of the Eastern's health region population

Specific objectives:

- To strengthen the reception, diagnostic and therapeutic capacities in the eastern region;
- To provide specialized and secure quality health care to people in the eastern region;
- To contribute to the proper training of health human resources;
- to provide free care for children under the age of five and pregnant women.

Expected results: a new regional hospital with a reinforcement of its capacity meeting the needs identified, equipped according to the standards with the human resources required for the operation, trained and available.

2.1.4 The teaching dimension

The future CHR of Fada N'Gourma is intended to become a CHR-U, i.e. to fulfill a teaching function. This function is very important for the future, it strongly positions the CHR as a reference and excellence hospital.

It requires:

- The recognition of the CHR as a place of academic training by the University;
- The recruitment or assignment of university professors to ensure these trainings;
- Taking into account training needs and dedicated spaces for teaching.

It allows:

- A locally specialized training organization;
- A valorization of the training plan for the future CHR;
- The reinforcement of skills in specialties.

2.1.5 Medical research

Clinical research is a critical aspect within a university-based hospital to promote quality of care, develop innovation, ensure quality dynamics within medical teams, and valorize health professionals. It is mainly related to the commitment of academics. It requires a strong support from the connecting University and the establishment of a structure to support the development of clinical research. Health research is a priority set by the Ministry of health. It is a strategic direction in the current national plan (2011-2020). The CHRs are part of this development. The mobilization of the CHRs in this approach imply to reinforce the clinical research training of the medical teams and to support research projects by the Ministry and the University.

2.2 PROPOSAL FOR ACTIVITIES

2.2.1 The objectives of the CHR medical project

The guidelines and the general framework have been set out:

- To increase the hospitalization offer;
- To diversify medical and surgical specialties to meet current and future health needs;
- To ensure the quality and safety of care for all;
- To strengthen and secure the medicotechnical platform;
- To improve the policy of organization of care at the regional level, in relation to other care structures;
- To provide HR training and recruitment to meet this enhanced the supply of health care.

2.2.2 Activities of care

This includes hospitalization and consultation activities to be developed, here presented by department:

Department of emergencies and resuscitation	Key activity for a reference CHR that includes: (1) <u>Medical and surgical emergencies</u> • Adult emergencies • Pediatric emergencies • Obstetric emergencies With short-term hospitalization unit and shock area. (2) <u>A resuscitation service</u> • Resuscitation sector • Intensive care sector
Mother child health department	(1) <u>Obstetrics gynecology service</u> • Gynecology consultation • Obstetric counselling and pregnancy monitoring • Reproductive health consultations and contraception • Hospitalization maternity • Medical and surgical gynecology hospitalization, reproductive health (2) <u>Pediatrics and neonatology service</u> • Pediatric consultations • Prevention and vaccination unit • Short-term hospitalization unit for pediatric emergencies • Neonatal service, in the immediate vicinity of maternity, with a neonatal resuscitation sector • Hospitalization in pediatrics • Rehabilitation unit and nutritional education
Department of medicine	Medical specialties can be grouped together to improve their organization and management. The current CHR already has an activity of general medicine, cardiology, dermatology, and psychiatry. The necessary reinforcement of medical specialties will focus on infectious diseases, neurology, gastroenterology, nephrology, diabetology, and geriatrics. Functional groupings may concern: • General medicine, diabetes, gastroenterology, neurology and geriatrics • Infectious diseases and dermatology • Cardiology and nephrology This department will be strengthened by: • An endoscopy unit, related to gastroenterology • A unit of functional tests related to cardiology • A hemodialysis unit related to nephrology
Department of surgery	3 surgical services would be included: (1) <u>Orthopedic and traumatology department</u> (2) <u>Visceral and urological surgery service</u> (3) <u>Head and neck surgery</u>: combining ophthalmology, ENT, Stomatology, and maxillofacial surgery. (4) <u>A rehabilitation unit</u> This unit would be in support of Orthopedics and other services (kinesitherapy).

2.2.3 Support services

Department of public health	• Epidemiology and statistics unit and medical information • Occupational health • Hospital hygiene unit (which can also be attached to the microbiology laboratory)
Imaging Department	Equipment to be specified by the list of equipment in a future stage
Department of biology	This department should include microbiology, biochemistry, hematology, and anatomopathological laboratories.
Department of Pharmacy	
Sterilization unit	
The operating unit	It must answer to: • surgical emergencies by definition not programmed (24/24; 7/7) • obstetric emergencies: Caesarean sections (24/24;7/7) • programmed interventions: adults and children Its operation is ensured and programmed by a Board.

2.2.4 Previsional activities

The activity forecasts are useful for dimensioning the medicotechnical unit and the human resources necessary for the proper functioning of the CHR.

They are based on a number of assumptions, by definition uncertain but which allow for a reasonable margin of error to quantify the need to strengthen the provision of care.

The evolutions and the measurement of activities are based on the following parameters:

- Current activities of the CHR measured by the 2018 activity report;
- Increased attractiveness of the new CHR: premises and equipment;
- New care activities;
- Reinforcement of the policy of referencing other structures of the region.

The evolutions of the activity are quantified based on an expected increase of the activity by 20% during the opening of the hospital, and an increase of 7 to 8% per year of activities within 4 years following the opening, rounded to 30% in N+4.

The forecasts are shown in the following tables.

Table 3: Consultations

Consultation activities	Current CHR year 2018	Opening year of the future CHR-U	Activity N + 4 after opening
Surgery	4 303	5 164	6 713
General Medicine	1 029	1 235	1 605
Cardiology	2 594	3 113	4 047
Dermatology	782	938	1 220
psychiatry	494	593	771
Obstetric Gynecology	6 511	7 813	10 157
Pediatrics	10 697	12 836	16 687
Odontology	3 423	4 108	5 340
Ophthalmology	7 304	8 765	11 394
Ent	4 360	5 232	6 802
New activities		4 980	6 474
TOTAL NEW RH	41 497	54 776	71 209

Table 4: Adult emergency activities

Activities	Current CHR year 2018	Opening year of the future CHR-U	Activity N + 4 after opening
Surgical emergencies	2 542	3 050	3 966
Medical emergencies	5 053	6 064	7 883
total	7 595	9 114	11 848

Table 5: Hospitalizations

Hospitalizations	Current CHR year 2018	Opening year of the future CHR-U	Activity N + 4 after opening
Admissions	18 567	22 280	28 965
Days of hospitalization	56 128	67 354	87 560

This estimate of the hospitalization days is based on the assumption of a constant ALS, at 3.03 days in 2018. This ALS is quite low. The management of chronic diseases, or heavier patients (orthopedic care, rehabilitation, complex comorbidity, medical resuscitation) could result in an extension of the ALSS, which, assuming this increase in hospitalizations, would significantly impact the bed occupancy rate (BOR).

Assuming an ALS that would remain at 3 days on average, the 260 conventional beds offer an occupancy rate of 100%, 95 000 days of hospitalization. With a BOR at 90%, this represents approximately 85 000 days of hospitalization. The sizing at 260 beds therefore seems, under this assumption, to meet the needs identified in the four years following the opening of the CHR-U.

The development of ambulatory activity will reinforce the relevance of a capacity to 260 conventional beds. Finally, the compact and functional design of the hospitalization units must allow an adaptation of the structure to the internal evolutions of the bed needs.

Table 6: Childbirth

Childbirth	Current CHR year 2018	Opening year of the future CHR-U	Activity N + 4 after opening
Vaginal delivery	1 755	2 106	2 738
Caesarean sections	567	680	885
total	2 322	2 786	3 622

Table 7: Surgery

The data extracted from the RH activity report concern programmed and unprogrammed surgery (emergencies).

Interventions	Current CHR year 2018	Opening year of the future CHR-U	Activity N + 4 after opening
Trauma	71	85	125
Visceral surgery	524	629	921
Urology	285	342	501
Neurology	-	-	-
Orthopedics	-	-	100
Caesarean sections	561	673	986
Gynecological interventions	93	112	163
Breast	6	7	11
Other	130	156	228
Total	1 670	2 004	3 034

Scheduled surgery currently accounts for only one third of the surgical activity (32%). This is a relatively small number. It is necessary to strengthen the organization of the blocks and the operating rooms to increase the activity as far as possible.

Considering the assumptions about activities development, taking into account that the programmed surgery accounts for one third of the operating activity, this represents approximately 1100 interventions/year at N+4, distributed over 220 working days, reaching about 5 interventions/day. These 5 interventions would justify only 3 functional operating rooms per day dedicated to scheduled surgery.

For urgent surgery, obstetric (caesarean) and non-obstetric (visceral, traumatic in particular), the estimated number of acts is around 2000 interventions per year, spread over 365 days, so $2000/365 = 6$ interventions per day of which half in obstetric emergencies. 2 to 3 rooms should be able to meet these needs of unprogrammed surgery of which, if possible, a room equipped for infant surgery.

However, it is necessary to take into account the predictable recruitment of surgical specialists, particularly in orthopedics, and a greater increase in demand.

These assumptions make it possible to estimate the number of operating rooms with **8 rooms spread over 2 blocks**:

- **1 maternity and gynecology block with 2 operating rooms;**
- **1 central block with 6 operating rooms**
 - 1 room for emergencies;
 - 1 room rather for ambulatory, ENT and ophthalmo;
 - 4 rooms, one of which could be equipped for pediatric surgery.

1.3 PROPOSITION OF BED DIMENSIONNING

The CHR-U project forecasts a significant increase in the hospitalization offer for this future CHR-U with regards to the current situation, leading to a 260 conventional beds hospital with 18 day places (including 12 for hemodialysis and 3 dental chairs).

The essential question for this dimensioning is to meet the needs of hospital care, by setting up an organization that promotes the strengthening of the medicotechnical unit. The evolutions to be promoted include the development of ambulatory activities, in surgery and in medicine, with the allocation of day places.

The table below summarizes the recommendations according to the types of activities specified above.

Table 8: Proposition of bed dimensioning

Departments	Activities	Number of beds	Day places
Emergencies and resuscitation	Medical emergencies	8	
	Surgical emergencies	8	
	Resuscitation	6	
	Intensive care	4	
Subtotal		26	
Mother and child	Maternity	24	
	Gynecology	16	
	Neonatology (including resuscitation)	16	
	Pediatric emergencies	8	
	Pediatrics (including nutrition)	38	
Subtotal		102	
Medicine	Internal medicine/ gastroenterology/ neurology/ geriatrics	22	
	Cardiovascular/diabetes metabolism/nephrology	22	12 hemodialysis
	Infectious diseases/dermatology/hematology	22	
	Psychiatry	8	
Subtotal		74	12
Surgery	General/digestive/urological surgery	22	6
	Orthopedic surgery/trauma and rehabilitation	22	
	ENT/Ophthalmology/maxillo-stomato facial	14	three armchairs
Subtotal		58	6 seats + 3 armchairs
Total		260	18 seats + 3 armchairs

3. PATRIMONIAL APPROACH AND REQUIREMENTS FOR TECHNICAL UNITS

3.1 CHALLENGES OF FUNCTIONALITY

3.1.1 Technical analysis of the existing hospital – choice of a new construction

The following analysis was carried out on the basis of data collected from the resource persons of the present Fada N'Gourma CHR and photographs. The current situation did not permit a "physical" visit of the site. Built in the 70's, the establishment has a pavilion structure, with many buildings implanted in an anarchic way and therefore without any real functional connection. The buildings are on one level whose foundations do not allow to build higher levels.

1st observation: an ageing structure that suffers

Buildings consist of a column-type structure – reinforced concrete beams, solid reinforced concrete slab floors and reinforced concrete facade sails. Their visual state reveals significant structural degradations. According to the testimonies, it seems that the exterior walls as interiors have a state of advanced obsolescence, with a place of erosion despite the campaigns of beautification of certain services.

Longitudinal cracks appear on the facades, as well as the splintering of the concrete coating by corrosion of the steels at the walls and supports of the facades. These disorders are the consequences of insufficient coating thickness or a coating that has not survived the weight of the ages.

2nd observation: technical and safety installations, under-dimensioned

Technical installations (electrical, plumbing, fluids) seem obsolete and undersized in relation to emerging needs.

As an example, the air handling unit (AHU) network is non-existent, forcing surgeons to operate in the block under nonregulatory environmental conditions (non-compliance with air quality in a controlled environment). The bias is to install air conditioning cassettes (units of type split system) which ensure a refreshment and do not reach a class of dust indispensable in the operating blocks or the intensive care units (ICU).

The distribution of medical fluids (medical air, vacuum and oxygen) is not ensured in services whose presence of fluids is indispensable such as intensive care units, resuscitation and operating blocks. These dysfunctions lead to an inability to take the optimal care of patients whose improvement or maintenance of the state of health depends on these networks.

The same applies to networks of strong and weak currents, whose overall state of operation is unsatisfactory in view of their state of obsolescence.

Finally, the establishment does not have any security facilities such as fire safety systems (FSS detectors, smoke extraction), or even patient call system.

These facilities, beyond purely "qualitative" aspects, represent a real danger to users and to patients in the hospital.

3rd observation: inadequate functional links

The current organization of the hospital does not offer an optimal functional circuit. The functional links between services are chopped because of the gradual implantation of services as time progresses, which, in fine, does not allow an ergonomics of operational work, thus altering the care of patients.

An organizational scheme that does not respect the main principles of functionality, causes many malfunctions such as the doubling of forces, equipment, having a direct impact of a disorder both organizational and financial (considerable investment and operating expenses).

4th observation: a problematic restructuring

The structure being weakened, it is unlikely to imagine constructing a "vertical" extension, the foundations cannot bear such a weight without a substantial reinforcement of the latter (with a significant financial impact).

In addition to the state of advanced degradation of the hospital and the difficulties of operating the building from a functional point of view, the crucial problem of the land reserve. It is evident that the construction of an extension called "horizontal" is not feasible given a saturated land reserve. At this stage, even without additional data, the parameters mentioned in this analysis suggest that a total or partial rehabilitation of the existing hospital will result in substantial costs, surrounding the costs of new construction. In addition, this type of operation requires a considerable amount of time (due to several phases with temporary relocation of services) and therefore even higher costs to keep the Hospital operating.

In conclusion: the current hospital of Fada N'Gourma has an appreciable care activity. However, it is experienced by insufficient space, obsolete technical unit and spatial configuration that do not meet the new modes of provision of care

The reconstruction of the hospital on this same site would have substantial consequences on the deadlines of realization and therefore the costs of construction, with a very strong impact on the continuity of services.

Moreover, the need to increase the capacity to meet the care needs of the people of Fada N'Gourma and more broadly in the eastern region of Burkina Faso, notwithstanding the parameters mentioned in this analysis, lead irreducibly towards the new construction of a new hospital in a strategic geographic area.

3.1.2 Main principles

The new construction project will have to meet the great principles of functionality and sustainability to cope with the evolving challenge of contemporary medicine.

Indeed, the success of this kind of project lies in the ability of the designer to accurately translate the medical project and also the capacity of the hospital to adapt to the evolutions of the medical practices throughout its life cycle.

It is difficult for both health professionals, hospital managers and construction professionals to predict exactly what the hospital will be tomorrow.

The trends that emerge, however, suggest that the hospital will consist of several spaces configured differently and allowing:

- The provision of care of a large number of programmed patients, within a controlled timeframe;
- Strengthening ambulatory care including surgery;
- The provision of care of unprogrammed patients, often in critical condition, to benefit from immediate management to mitigate risks.

The entities corresponding to the first model of provision of care must provide patients with comfortable, safe and easy to manage flows, while the spaces corresponding to the second model must be places of great technicality promoting the work of medical and paramedic personnel who will be at the service and at the bedside of the patients.

These two types of spaces must be based on an efficient and scalable technical platform capable of cohabiting the two modes of provision of care taking into account each of their characteristics and ensuring optimal safety.

The designer will also have to take into account the development of multi-disciplinary care. Practitioners and care managers need to be able to coordinate to make the care pathways as smooth as possible.

Throughout the programmatic process, the designer must consider the following questions in order to imagine the Hospital of the 21st century in the Burkina Faso context:

- What will be the new modes of provision of care (impact on care pathways and flows; development of new medical technologies)?
- How do you refocus the caregiver on the primary activity of care?
- What hotel comfort offer the patient?
- The hospital in the heart of a territory?
- The interfaces of the hospital with its environment?
- How open is the hospital to the city and/or the region?
- How to ensure the safety of the hospital and its occupants?
- How to optimize the different types of patient care pathways: external patient; ambulatory patient; unprogrammed patient; patient in vital distress; programmed patient

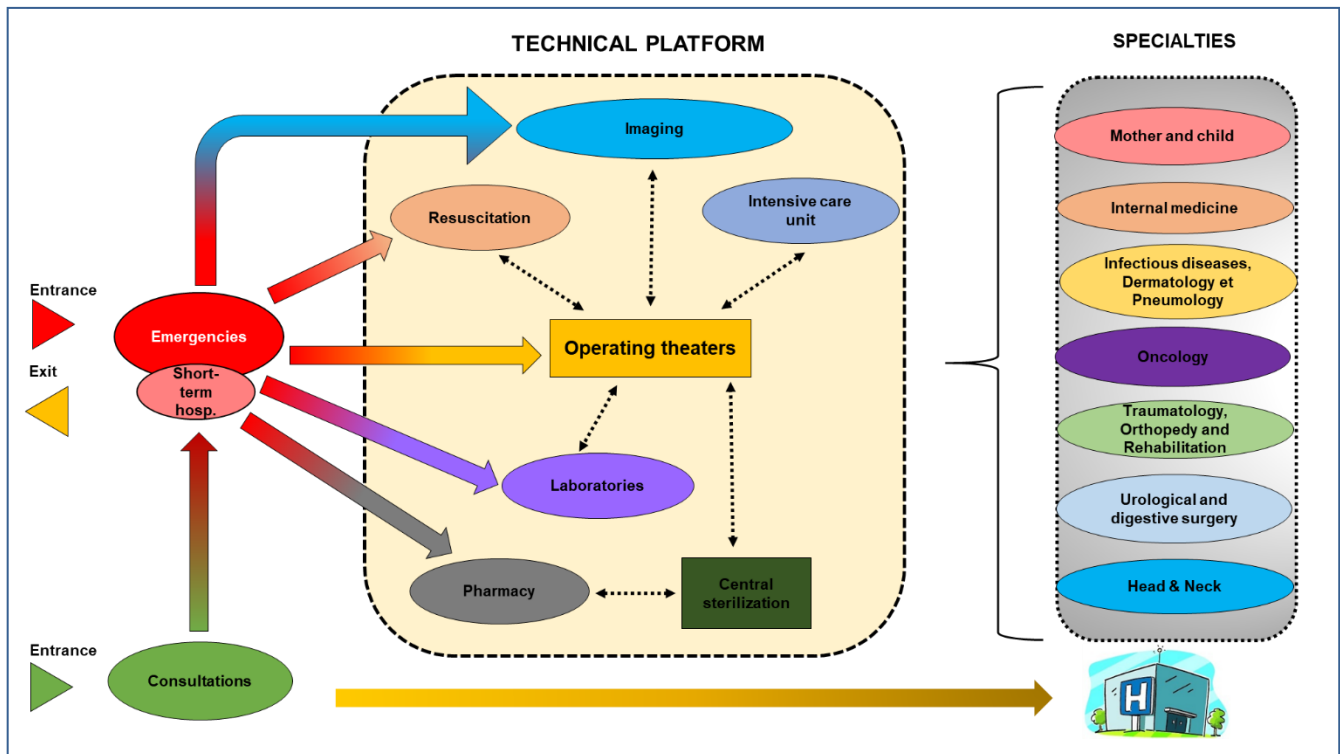
Furthermore, the functional issues between the various components (services and departments of the hospital) must be well defined, among others for:

- Medico-technical functions;
- Ambulatory functions;
- Conventional medico-surgical hospitalizations;
- Critical care;
- Medical support services (laboratories, pharmacy);
- Technical platform ;
- Logistical services and support techniques.

Knowing that all of these functions are interdependent, the designer must prioritize connections and link modes to make the entities as functional as possible, promote the reduction of care delays, limit personnel travel and secure care.

Figure 4: General functional diagram

The general functional diagram prioritizes the desired main functional bindings. This scheme aims towards an ergonomic design of the new hospital (confers diagram below).



The general functional diagram outlines the architecture of the new hospital.

It must draw all the patient care and management services, which will be accessible from the main entrance, without effort for the users.

The force lines of this functional diagram are described below:

- The emergency department must be accessible directly from the outside via a dedicated entrance;
- Imagery should be in the immediate vicinity of emergencies, but also surgical services (i.e. operating blocks);
- The consultations should be grouped together on the same platform to facilitate the patient circuit and to enable the pooling of human and material resources;
- The operating unit is contiguous to the emergency room;
- The conventional hospitalization surgical ward which must benefit from proximity to the operating block via a vertical or horizontal connection as direct as possible;
- The laboratory must be connected to all customer services. It has direct logistical access to supply the products necessary for their activities (solutions, reagents, pallet sampling tubes, etc.);
- The pharmacy must be connected to all the services that depend on it. It must have external access and an unloading dock;

- Sterilization should be provided with a proximity to the operating block (ideally horizontal or vertical connections by a "clean" freight elevator between the storage of sterilized equipment from sterilization to the sterile arsenal of the operating block and by a "dirty" freight elevator between the pre-disinfection areas of the operating room and the sterilization washing area);
- The mortuary service must be easily accessible from all the services of the new hospital and benefit from a specific exit for the departure of funeral convoys;
- Logistical and technical services must be provided with dedicated access/dispatch areas;
- More generally, the services will have to be compact, which should limit the movements of patients, users and personnel, but also limit the costs of investment and exploitation (limitation of maintenance areas).

Focus on the functional principles of medical activities

The functional links are represented by a table of link forces. These allow to highlight the degree of = proximity between the sector described and the sectors with which it interacts.

BOND STRENGTH

+++	++	+
Imperative horizontal contiguity of the two sectors and easy passage from one to another	Strong proximity (direct horizontal or vertical connection)	Easy and readable connection

Table 8: Link matrix

The link matrix below aims to express and prioritize the types of links (contiguity, immediate proximity and easy linking) between services.

	Reception hall	Admissions Office	PC security	Consultations	Endoscopy tray	Emergencies	Imaging	Operating blocks	Resuscitation intensive care unit	Mother child pole	Laboratory of medical biology	Anatomo pathology	Pharmacy	Central sterilization
Reception hall														
Admissions Office	++													
PC security	+++													
Consultations	+++	+												
Endoscopy platform	++			+++										
Emergencies	+		+++	+										
Imaging	+			++		+++								
Operating blocks					++	++	++							
Resuscitation Intensive care units						++		+++						
Mother child pole								++						
Laboratory of medical biology	+++			+++		+			+	+				
Anatomo-pathology								+++						
Pharmacy	+													
Sterilization				L	L	L	L	+++ MC	L	L				

Legend	+ easy links ++ proximity +++ contiguity	MC vertical connections by load mount L logistic links
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The construction project of the new Fada N'Gourma hospital is therefore not only the realization of a very important real estate operation, but also asserts itself as a strategic development project, an organizational project and innovative service to a population in demand.

With this in view, it will have to be designed to meet expectations according to the following 7 priority axes:

1. Hospital performance
2. Improved provision of care
3. Improving working conditions
4. Exemplarity in energy performance and sustainable development
5. Innovation in communication technologies and computer systems
6. Efficiency of administrative and logistical functions
7. Scalability and modularity of certain spaces

According to these 7 axes, the attractiveness to patients/consultants should be developed, as well as medical/paramedic/administrative/technical skills.

3.2 ANALYSIS OF THE TECHNICAL COMMITTEE'S PROPOSAL (INCLUDING SITE SELECTION, ACCESSIBILITY)

3.2.1 The site and its accessibility

The new hospital would be located on a land of 40 ha owned by the State. It is located on the main national road (road to Bogandé), a few kilometers from the city center of Fada N'Gourma.

Figure 5: Access scheme for the future hospital – Technical Committee proposal

This location offers better accessibility to the hospital (the current establishment is located in an area where roads are impassable) both to the population of Fada N'Gourma but also to the population of the eastern region. The significant improvement in accessibility will allow a better availability of the supply of health care.

In addition, the complementary technical studies available (topographical surveys and soil survey) show that the land does not seem to be a disadvantage in terms of soil nature, thus evacuating the risks of land movements, or the presence of tablecloths soils (especially for foundations). Finally, on the basis of the discussions carried out during the mission with the local design office and the project team, the terrain is close to all public facilities allowing the connection of water and electricity.

In the end, the site has no particular constraint. The land of sufficient size allows an ambitious Hospital project in the island as in suburban.

3.2.2 Surface analysis of the project

The study carried out by the Burkina Faso party was drafted on the basis of the major "theoretical" principles of hospital construction in Africa taking into account the adaptation component to the medical project.

The project of the Burkina Faso party highlights a ratio m^2/bed of 82 m^2/bed , ratio approaching the African standards for a hospital of this type namely about 85 m^2/bed .

In general, there is a good coherence in the distribution of medicotechnical, hospitalization and consultation from a spatial standpoint. Nevertheless, the so-called "pavilion" configuration is no longer able to cope with the context of our time, given the rapid evolution of contemporary medicine and the new modes of care. In these circumstances, the Fada N'Gourma hospital will not be able to answer the guidelines for the 7 axes mentioned above.

Table 9: Strengths and weaknesses of the current program

Strengths	Weaknesses
ARCHITECTURE	
	The "pavilion" architecture. The building in islet (or small pavilions) allows a better control of space, an optimization of resources both human and material, a control of the costs of investment (especially related to the savings made on the roads and networks, technical batches etc.) and optimal maintenance management, with direct impact on operating accounts (economy in perspective).
FUNCTIONNALITY	
Distributions within buildings and especially the dissociation of patient/medical personnel circuits are partially appreciable. The functional layout of the block sector can probably be improved in the later phases of the project and in particular by taking into account the constraints of clean and dirty circuits.	The dissociation of clean/dirty circuits is not appreciable, especially in operating blocks. They do not allow a complete hygiene response.

The whole logistic platform (hotel and technical) is grouped, allowing a more fluid management of the interventions of the logistic teams, and an easy distribution of the various tools necessary for the proper functioning of the establishment.	
LOCATION	
The location of the emergency room and its dedicated entrance provides easy access to the emergency service (or all types of ambulances).	Lack of strong functional interaction between the emergency department, the technical platform (including imaging, operating blocks and laboratories) involving a "linear" circuit or "vertical" therefore prompt access to diagnosis and makes better patient care.
	Geographic location of the sterilization service. It must in fact be at the same level as the operating blocks (linear link) or at different level but with a direct connection by elevator or freight elevator (vertical link).
	The location of the pharmacy and the central sterilization does not allow an easy interaction. This may be problematic if the Burkina Faso system is equivalent to the French system. In fact, in France the pharmacist is responsible for sterilization. In this case, it is necessary to offer the latter the possibility of organizing the various services of which he is responsible, pooling the resources, and being present to ensure the supervision (legal obligation in France), guaranteeing the quality of the sterilization process, pre-disinfection to storage and use of the product.
OPERATING ROOMS	
	The number of operating rooms is too large in view of the activity projections in the Fada N'Gourma area. The operating blocks must be designed with the intention of highlighting their function as common tool for all services (the idea of a block dedicated to a specialty must disappear). This approach to optimizing the operating program has an influence on the rate of occupancy of the operating rooms and the operational accounts of the hospital (without suggesting that the reduction of rooms will result in less good care).

NB: special attention should be paid to technical installations. It should be emphasized that in order for a building to be economically stable in terms of operation, it is essential to approach the field well and to measure the impact on operating costs.

In summary, if the suburban architecture of the hospitals in Burkina Faso is appreciated because of the importance of the green spaces existing in the vicinity of each building, it results in many difficulties:

- Increased distances for the transport of patients (carried out by ambulance) and ruptures (between birth rooms and neonatology, between surgical hospitalization and blocks, between emergencies and resuscitation...);
- Lengthening of distances for staff and logistics;
- Isolation of services with little permeability of beds between specialties;
- Technical tray exploded in different buildings;
- Extension of technical networks (water, electricity), a source of increased maintenance needs;
- Increase in investment and operating costs etc.

3.3 PROPOSITION OF AP-HP INTERNATIONAL

3.3.1 The architectural concept

If the monobloc structure ensures an optimization of the medico-real estate organization and thus an economical optimization of the real estate system, it leaves little room for the internal/external interfaces, culturally appreciated by the Burkinabe. Little space is left free for the reception and the occasional installation of the families accompanying the patients.

The architecture of type «islet» has the advantage of responding to the balance of organization medico-real, economic impact and also allows the grouping of activities in a framework of short distances. Patient circuits are short and staff workplaces are optimal. The families of hospitalized patients can in such a configuration, have landscaped outdoor areas, close to the rooms.

This architecture combines a structure by separate buildings, conducive to natural ventilation, internal/external interactions, the needs of links and proximity between services (depending on the link matrix), with buildings very interconnected and very well connected by sheltered and naturally ventilated external corridors. This structure can be described as semi-pavilion.

Thus, this set aims to consolidate medical means on a **compact** and **sustainable** technical unit (better control of buildings, equipment), with focus:

- The display of adult emergencies (medico-surgical) and emergencies of the mother-child pole, with dissociation of flows for a better orientation of patients. The emergency building is used as the central base of the "red axis", with an entry-level situation facilitating access and a quality property infrastructure. By installing the obstetric block and joining the parent/child building, it is possible to address all the "acute" admissions of the CHR-U;

The construction of a technical platform with the creation of the red axis (distribution axis to the "client" units, backbone of all critical care services located nearby (direct horizontal or vertical connections) such as: emergencies, intensive care units, reanimation, medical imaging service, laboratories, sterilization and operating blocks..

The aim is to create the conditions for rapid patient transfers and thus avoid the multiplication of antennas (block, resuscitation, delocalized imagery, laboratories etc. costly in equipment and operating costs);

- The creation of a real mother/child pole adjoining the technical unit building, comprising neonatology (on one level with the obstetric operating unit), obstetrics hospitalization units and pediatric hospitalization units;
- The implantation of the hospitalization units in "comb" (in conjunction with the technical platform).

Such a scenario leads to the project, the following positive impacts:

- Deletion of "relocated antennas" which will be created if the distances to be travelled are too large;
- Creation of sustainable buildings with sufficient height to enable functional optimization while reducing the risk of maintenance costs and energy expenditure (reduction of the number of elevators, compact building with a limited height) : surgical connection of the "clients" units to the central operating block without crossing the entire site (distance control) and logic of strong internal/external relations (interaction between families and patients);
- Reorganization of access by identifying a "pediatric emergency" entry, "gynecology/obstetric emergency" and "adult emergencies" instead of "medicine" and "surgery" access, which is always difficult to grasp for users. This reorganization clarifies the orientation for patients and helps to identify a dedicated care;
- Creation of disciplinary poles. Some units or specialties are grouped in such a way as to create interdisciplinary poles favoring a common, multidisciplinary and close care of patients. The poles, driven by the medical project of the CHR-U, would constitute well-identified functional groupings such as:
 1. Emergencies and critical care,
 2. The "mother child" comprising gynecology-obstetrics and pediatrics;
 3. Medicine with many activities accustomed to interact;
 4. Surgery.
- Real estate reorganizations by maintaining a "controlled land reserve" in green spaces and in order to ensure close relations between services and green spaces so as to preserve the patrimonial nature and allow families to be able to settle in the vicinity of the unit where their relatives are hospitalized;
- Valuation of a part of the land. The creation of islets allows the different units of the Central sector of the CHR-U to be reconciled. Thus, the peripheral buildings, distant from the heart of the hospital are released (compared to the version studied by the Burkinabe party). Part of the land of the site can be liberated and thus valued (financially) or allowing a capacity evolution of the site (increase in the number of beds and optimization of the technical platform) as much as necessary.

Figure 6: Proposed accessibility scheme

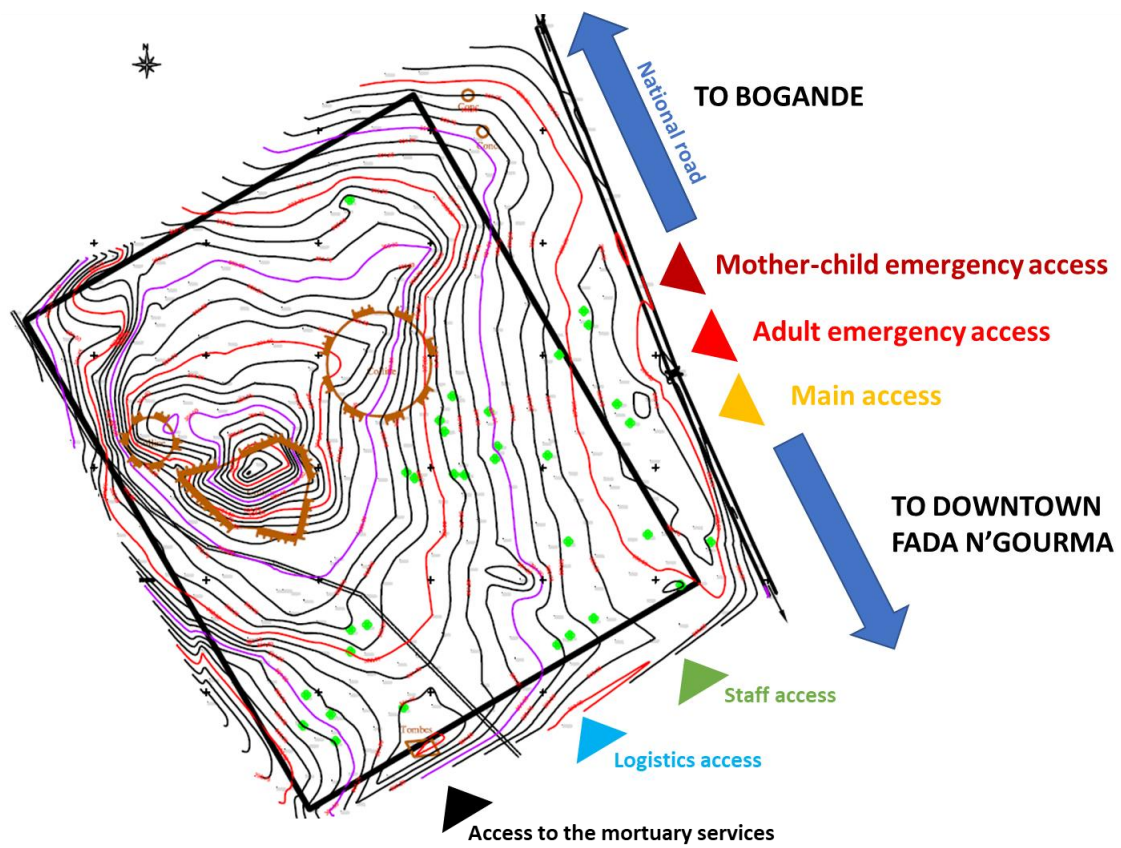
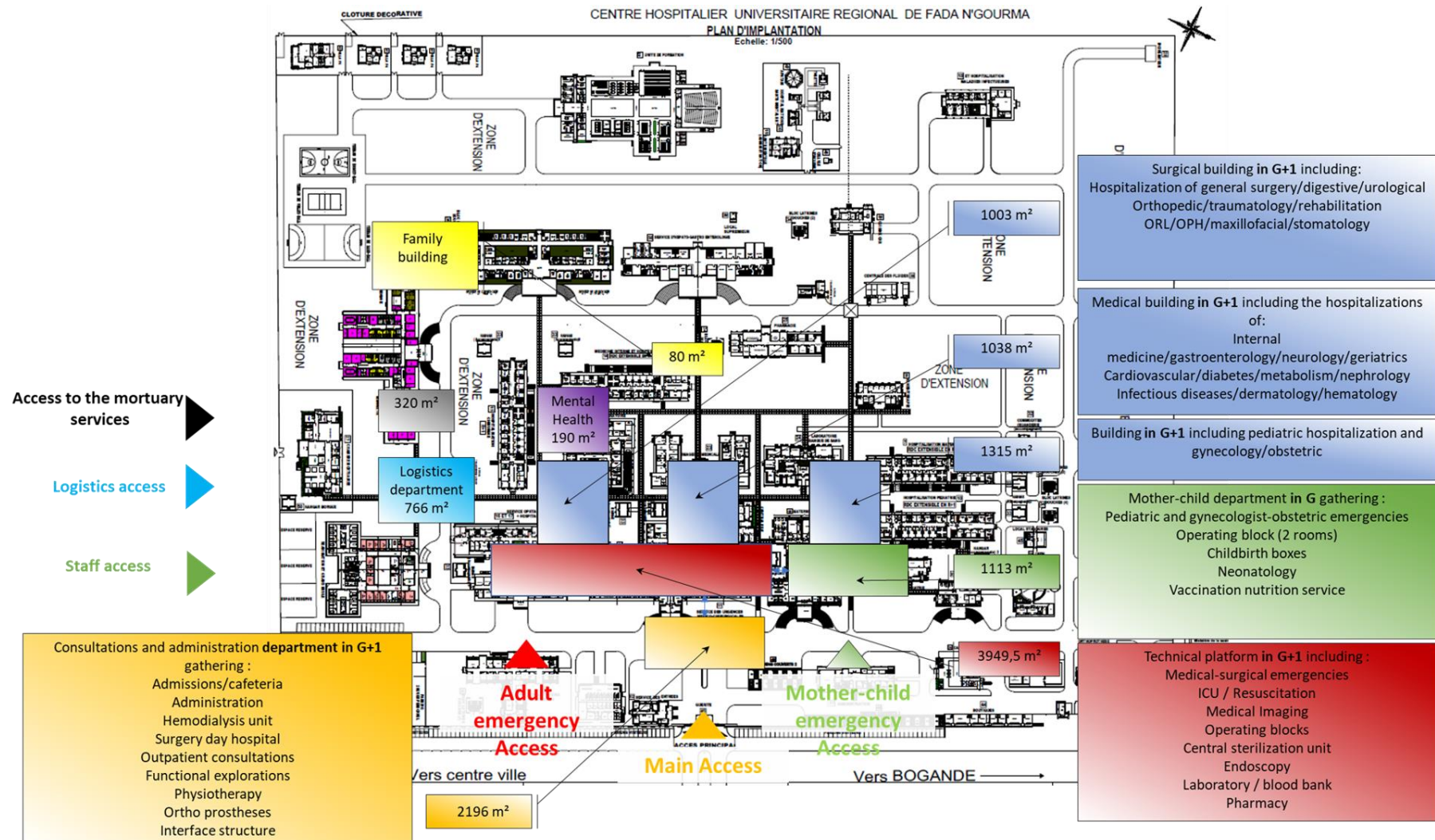


Figure 7: Proposed functional diagram



This design has many strengths, in addition to the advantages already mentioned in this study:

- Respect of the medical project and its declination into a **surface program** that is in line with the main principles of functionality (non-inflationary) and respectful of the budgetary framework (**see below**);
- Grouping of the technical platform on maximum 2 levels;
- Natural ventilation of hospitalization units (investment-sensitive gain);
- Structured units with a central corridor for caregivers and passageways (or corridors) on the front for families and users;
- Regular frame facilitating restructuring (allowing for evolutions);
- Low surfaces for families accompanying patients in in situ units;
- Green spaces limited in areas and away from hospitalization units for families (allowing a de-cluttering "work areas" in situ);
- Optimization of the land reserve.

Note: it is imperative to avoid a structure too vertical (maximum R + 1) which requires many operational patientlifts, when the problem of maintenance of elevators in sub-Saharan Africa (costs and availability parts).

Table 10: Proposed table surface of the future hospital

Services	N ° bed	N ° bf	N ° OR	Remarks	SU (m ²)
TECHNICAL PLATFORM	26	0	6		3949.50
Medical-surgical emergencies	16			Room 2 beds x 8 = 16 beds (UHCD) 4 observation rooms	586.00
Resuscitation	6			6 open space beds	339.50
Intensive care	4			4 open space beds	267.50
Operating block			6	1 operating room ISO 7 for emergencies 1 operating room ISO 7 for ambulatory 2 Multipurpose ISO 7 operating rooms 2 ISO 5 operating rooms for orthopedics and cardiology	740.50
Endoscopy				2 endoscopy rooms 1 room for endoscope cleaning 1 local for storage of endoscopes	232.00
Medical imaging				1 MRI room 1 CT-scan room 1 mammography room 2 x-ray rooms 2 ultrasound rooms 1 dental panoramic room	717.00

Services	N ° bed	N ° Bf	N ° OR	Remarks	SU (m²)
Laboratory and blood bank					490.50
Central sterilization unit					185.50
Pharmacy					391.00
MOTHER-CHILD DEPARTMENT	102	0	2		2428.00
Maternity service	24			Bedroom 1 bed x 4 = 4 beds Bedroom 2 beds x 2 = 4 beds Room 4 beds x 4 = 16 beds	383.00
Gynecology service	16			Bedroom 1 bed x 2 = 2 beds Room 2 beds x 3 = 6 beds Room 4 beds x 2 = 8 beds	303.00
Maternity operating block+ childbirth boxes			2	2 operating rooms ISO 7 6 childbirth boxes 1 obstetric ultrasound room 1 dressing room	596.00
Neonatology	16			2 rooms x 8 incubator = 16 hatcheries 1 room x 10 cradles = 10 cribs 1 nursing room	219.00
Pediatric and gynecologist- obstetric emergencies	8			Bedroom 1 bed x 2 = 2 beds Room 2 beds x 3 = 6 beds 1 observation room	181.00
Pediatric service	38			Unit 1 (22 beds): Bedroom 1 bed x 2 = 2 beds Bedroom 2 beds x 2 = 4 beds Room 4 beds x 4 = 16 beds Unit 2 (16 beds): Bedroom 1 bed x 2 = 2 beds Room 2 beds x 3 = 6 beds Room 4 beds x 2 = 8 beds	629.00
Vaccination nutrition service					117.00
HOSPITALIZATION	132	0	0		2231.00
Internal medicine/gastroenterology/ neuro/ Geriatrics service	22			Bedroom 1 bed x 2 = 2 beds Bedroom 2 beds x 2 = 4 beds Room 4 beds x 4 = 16 beds	346.00
Cardiovascular service/ diabetes/ metabolism/ Nephrology	22			Bedroom 1 bed x 2 = 2 beds Bedroom 2 beds x 2 = 4 beds Room 4 beds x 4 = 16 beds	346.00
Infectious diseases/ dermatological/ Hematology service	22			Bedroom 1 bed x 2 = 2 beds Bedroom 2 beds x 2 = 4 beds Room 4 beds x 4 = 16 beds	346.00
Mental health service	8			Bedroom 1 bed x 2 = 2 beds Room 2 beds x 3 = 6 beds	190.00
General/ digestive/ urological surgery service	22			Bedroom 1 bed x 2 = 2 beds Bedroom 2 beds x 2 = 4 beds Room 4 beds x 4 = 16 beds	346.00

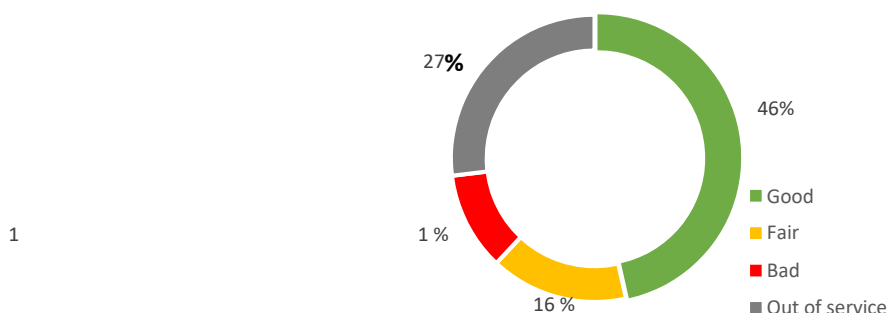
Services	N ° bed	N ° Bf	N ° OR	Remarks	SU (m ²)
Orthopedic surgery/trauma and rehabilitation service	22			Bedroom 1 bed x 2 = 2 beds Bedroom 2 beds x 2 = 4 beds Room 4 beds x 4 = 16 beds	346.00
ORL/Ophthalmology/maxillo-facial stomatology service	14			Bedroom 1 bed x 2 = 2 beds Bedroom 2 beds x 2 = 4 beds Room 4 beds x 2 = 8 beds	311.00
CONSULTATIONS AND ADMINISTRATION DEPARTMENT	0	18	0		2196.00
Entrance service					146.00
Cafeteria					202.00
Administration					387.00
Hemodialysis unit		12			268.00
Surgery day hospital		6			191.00
Outpatient consultations				10 consultation rooms + 3 dental chairs	459.50
Functional explorations				5 rooms	185.50
Physiotherapy				5 boxes	142.00
Ortho prosthesis					153.00
Interface structure				-	62.00
LOGISTIC/TECHNICAL DEPARTMENT + MORTUARY CHAMBER	0	0	0		1086.00
Kitchen					202.50
Laundry room					224.50
Maintenance shop + shop					188.00
Fluid plant					51.00
waste					100.00
Mortuary Chamber					320.00
FAMILY BUILDING					80.00
n ° beds / n ° bf / n ° OR	260	18	8		
USEFUL SURFACE					11970.50
USABLE SURFACE + CIRCULATION					15561.65
TOTAL CONSTRUCTED AREA					17895.90

3.3.2 The equipment program

a) Analysis of existing equipment in the current RH

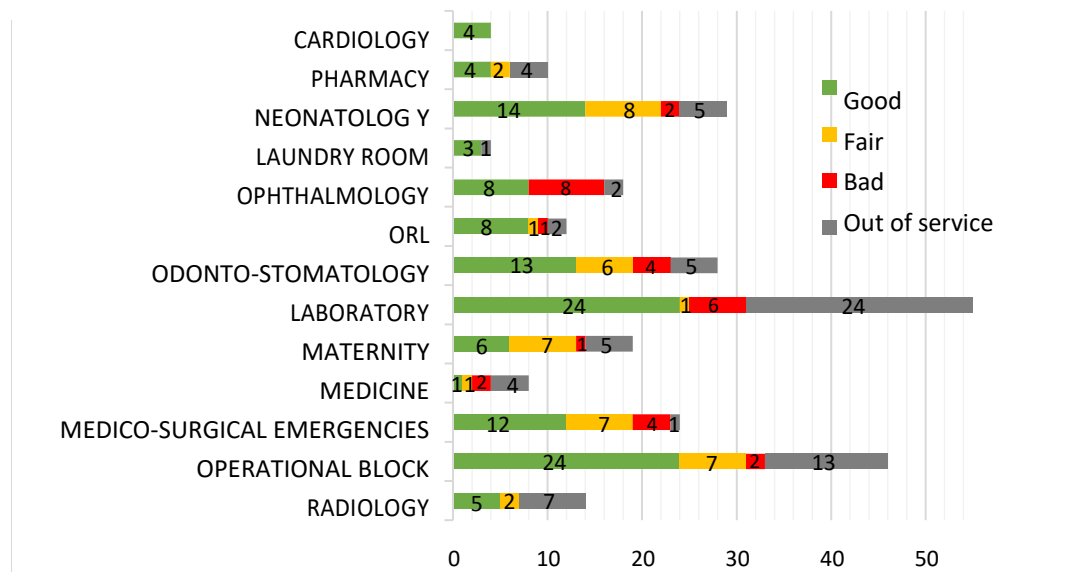
The analysis of biomedical equipment was made on the basis of the annual report 2018. We observe an inadequate and a high rate of obsolescence of the existing equipment. Of the 217 equipment "traced" more than half are not in good condition or are out of service, they do not allow to ensure the proper functioning of the hospital and result in a significant inability to provide care.

Figure 8: State of the “tracers” equipment of the existing CHR Fada (2018)



- Half of the radiology equipment is out of service: it has four x-ray tables, two of which are out of service and four echographs, of which only one is functional. The CHR should eventually have an MRI, a CT-scan, and a mammography equipment to ensure a good care of the patient but also of imaging equipment more specific related to the medical project such as: c-arms for interventional radiology, echocardiography, endoscopes, etc.
- The Neonatology Department has only two good-condition incubators and four heating tables, one of which operates. This need, in equipment and in particular of incubator, leads to poor care of premature babies, putting them at risk;
- The ophthalmology operating room has an operating table and a scialytic in poor condition, which prevents the smooth operation of the interventions;
- As for Odontostomatology, there is only one dental chair in good condition out of the five;
- The laboratory has more than half of its equipment in poor condition or out of service (Biochemistry machines, ELISA chain, microscopes, etc.). The CHR should benefit from a "Broadband" platform for major biological activities, as well as more important equipment including microbiology capacity and the enhancement of serological diagnostics for the most important pathologies. An emergency chain in intensive care must be considered;
- The operating block has operating tables and anesthesia machines out of service, as well as only two functional monitors.

Figure 9: State of the "tracers" equipment by service of the existing CHR Fada (2018)



b) Maintenance policy

The problems of preventive and curative maintenance of the equipment in the current CHR are evident given the amount of equipment out of service (27%). The new Fada hospital needs to put in place a maintenance policy to ensure the proper functioning of the equipment throughout its life cycle.

Internal maintenance must be carried out in the context of well-defined procedures and recorded by a CAMM tool.

c) AP-HP international equipment recommendations

The search for an optimal technical and functional coherence between the building and the future equipment (biomedical, technical, furniture, etc.) is fundamental for the construction of the new hospital in Fada.

The identification of building-equipment interface constraints at an early stage can be very advantageous for their direct integration into the design stage.

An equipment plan in line with the medical project and the user needs must be carried out. Below is a list of the main equipment per service to consider (this list is not exhaustive):

- **Imaging:** MRI (1), CT-scan 64 or 128 slice (1), x-ray table (2), mammography equipment (1), panoramic dental x-ray (1) and ultrasound (2).
- **Endoscopy:** endoscopy column (2), endoscope washer/disinfector (8 bins).
- **Operating unit:** operating table (8), scalytic (8), anesthesia ventilator (8).
- **Hemodialysis unit:** hemodialysis machine (12).
- **Laboratory:** automaton of Biochemistry (2), coagulation automaton (1), blood gas Analyzer (1), Elisa chain (1).
- **Sterilization:** washer desinfector (2), autoclave (4), low temperature autoclave (1), ultrasonic bath (2).
- **Waste:** autoclave (1).

3.3.3 The estimated cost of construction

In the absence of a baseline on new construction costs in Burkina Faso and data on the creation of recent new hospitals, the most reliable construction cost methodology for this project is based on the cost analysis of known construction in the subregion.

Given the complexity of the site and its future status as Regional University Hospital Center, it was decided to retain the median as it approximates (more than an average) the reality of a contemporary hospital building (which includes all standards and regulations governing hospital construction).

In application of this estimated median of €1500/m², the "work" costs are estimated at approximately 30 000 000 €, comprising:

- 1) All the constraints for a perfect completion of the works in the rules of the art including the creation of the big work, technical batches and second work;
- 2) Transport at work, handling, fixtures, collars at all levels;
- 3) The necessary protections, current and end-of-work cleanings;
- 4) Removal of all material and scrap material and other in the execution phase;
- 5) Scaffolds necessary for all work performed at all heights;
- 6) The submission of a file of works executed (F.W.E.) at the end of the works including the recaps plans, datasheets, miscellaneous notices and instructions for use.

These costs do not include the following:

1) The fees of service providers such as:

- Geometer (preliminary studies of soils...) and design office structures;
- Programmer (pre-studies, feasibility, program);
- Main contractor (architect, study offices, synthesis, IFF coordinator, scheduling piloting coordination...);
- Technical control, security coordinator;
- Assistance with project management and coordination of operations;

2) Miscellaneous costs:

- Revaluation of prices (revision or updating);
- Hazards and contingencies on study and works of the order of 5% to 15% according to the complexity of the site;
- Customs fees;
- Insurance related to the real estate transaction (damage-works);
- Connections to networks (electricity, telephone, gas, sanitation, heat networks);
- Advertising, reprography, competition compensation;
- Costs related to the phasing of an operation (e.g. rental of site bungalows and related moving);
- The cost of acquiring land;
- Financial expenses related to the financing of the transaction;

3) Energy and environmental objectives such as standards:

HEQ (high environmental quality); LCB (low consumption building); HEP (high energy performance).

The "construction" cost above does not therefore include certain ancillary costs that will need to be further estimated at a more advanced stage of the project.

The overall estimated cost of the project will depend on the options chosen by the Ministry of health, in particular regarding the level of medical and technical equipment, the required maintenance and training required, the costs of the main contractor and the costs related to finance.

Thus, the estimated overall cost of the project should be around 53 000 000 €, +/-5% depending on the different options chosen in terms of equipment and ancillary costs.

4. HUMAN RESOURCES REQUIREMENTS AND BUDGET ESTIMATE

Following a presentation of the key issues identified in the area of HR and finance, the staffing requirements (medical staff – MS, and non-medical staff - NMS) and estimates of projected accounts for the future CHR of Fada N'Gourma will be addressed.

4.1 HUMAN RESOURCES AND FINANCIAL ISSUES OF THE FUTURE HOSPITAL

If the future CHR is to create a new patrimonial and technical structure, requiring the mobilization of new and specific financing, the means which it will have to dispose of (HR and current functioning) may also result partly in mobilizing existing resources on the current site.

Indeed, an upward revision of these means must be carried out, taking into account the medical project chosen (wider range of activities), a larger capacity of + 96 beds (260 planned + 18 day places against 164 existing conventional beds), and therefore their impact in terms of operations (MS/NMS workforce and current expenditures). However, the prospect of using the current resources of the CHFR would greatly contribute to securing the functioning of the future structure.

It is therefore essential to identify the current HR situation of the Fada N'Gourma CHR (1.1), to ensure an optimal transfer of the current HR of the CHR to the future CHR-U resources (1.2), and to measure the financial resources of the current CHR to forecast the budget of the future hospital (1.3).

4.1.1 Analysis of the current HR situation in Fada N'Gourma

The updated data of the CHR's staff allow the following elements to be observed:

- As at 31 December 2018 (see annual activity report), the number of staff was **373** of which **33 medical staff** (MS) and **340 non-medical staff** (NMS);
- In 2018, the table of medical staff and their distribution by specialties is shown below:

Table 11: Medical staff of RH Fada N'Gourma in 2018

Medical specialties	Number
Surgeon	1
Gynecologist-obstetrician	3
Cardiologist	2
Radiologist	1
Dermatologist	1
Pediatrician	1
Dentist	1
General practitioner	20
Pharmacist	3
Total	33

Table 12: Non-medical staff of RH Fada N'Gourma in 2018

Functions	Number
Administrative	36
Paramedics (nursing/obstetric care/technical platforms) <u>including:</u>	260
- nurses	129
- Health assistants (specialized nurses)	53
- Midwives	58
Technical/logistical/support staff	20
Total	340

Table 13: Breakdown of staff by status as at 31/12/2018

Status	Number	Percentage
Civil servants	328	87.93%
Under hospital contract	45	12.07%
Total	373	100%

This total workforce of 373 officers is composed of a large majority of State officials (87.93%) and non-graduate staff, contracted under the hospital, mainly employed in logistical support functions.

There was a **30.88%** sharp increase in the number of staff between 2017 and 2018, following a positive variation also between 2016 and 2017 (+ **7.95%**). This evolution reflects the State's consideration of the necessary gradual reinforcement of health needs in this region. However, the CHR still faces insufficient resources at the level of:

- physicians, especially in some specialties: internal medicine, specialized medicine (pediatrics, gastro-enterology, dermatology, emergency), anesthesia-resuscitation, surgery, ophtalmology ENT and radiology;
- Health assistants (specialized Snurses), especially in obstetric care, odontostomatology, ENT, etc...);
- of certain transversal functions (biomedical technicians, quality management...).

The existing means (even considered inadequate on certain functions) are an essential asset to ensure the success of the future CHR project, especially as the programmed increase in beds (+ 83%) will require to adapt the workforce to the new scope of activity.

4.1.2 Optimization of HR resources

Ideally, the objective to prioritize is to remove any activity on the current site in order to avoid doubling the structures in the future and thus to duplicate the costs. Everything has to be done to concentrate the financial resources on the new structure: human resources (MS + NMS), medical and hotel expenses, and technical expenses (maintenance of equipment/maintenance of the building).

This choice is crucial for the following reasons:

- To ensure from the start a level of resources consistent with the expected activities, within the framework of national priorities;
- To avoid the spreading of financial means which would inevitably result in malfunctions on the 2 sites and result in a risk of increased fixed costs due to the lack of optimization of the two structures.

Economically, in the context of scarce resources, the search for efficiency must lead to the concentration of activities and resources within the new hospital entity to ensure quality care for the largest number of patients, while promoting an appropriate use of public funds.

Admittedly, long-term needs may require developments in terms of bed capacity, but in this case the extensions on the future site will be preferred in order to control operating costs, rather than maintaining two close structures.

If, however, the continuation of an activity on the current site should be retained, it would be advisable to do everything to keep only a limited number of disciplines requiring only a few activities with a limited medicotechnical unit. .

As an example, first-level consultations, but also health education and prevention could be maintained within the premises of the current site..

4.1.3 Current resources of the CHR and evolution

Table 14: Evolution of CHR funding from 2016 to 2018 (in CFA francs)

Sources of funding	2016		2017		2018	
	Amount	%	Amount	%	Amount	%
State budget	848 002 472	73.06	1 082 148 633	71.96	1 521 799 079	76.44
Equity capital	312 683 538	26.94	421 638 070	28.04	468 997 150	23.56
Total	1 160 686 010	100.00	1 503 786 703	100.00	1 990 796 229	100.00

There has been an increase in funding over the past three years. This variation is mainly due to the increase, between 2016 and 2018, of State subsidies (+ 79.45% of which + 11% for operating costs) and the significant increase of the equity capital (+ 50%), related to the implementation of free care for the benefit of women and children under 5 years of age.

The State funding (subsidy) represents approximately 3/4 of the CHR's revenues and equity funds (product of tariffs) constitute almost the remaining 1/4.

Table 15: Evolution of the revenues/expenses of the CHR from 2016 to 2018

Revenues	2016	2017	2018
<i>Own revenue generated</i>	312 683 538	421 638 070	468 997 150
<i>State subsidies</i>	749 638 200	856 688 000	1 246 909 107
<i>Operating revenues</i>	744 638 200	856 688 000	827 660 000
<i>Investment</i>	5 000 000		419 249 107
Total revenue	1 062 321 738	1 278 326 070	1 715 906 257
<i>Performance surplus budget (n-1)</i>	174 846 704	301 943 065	301 943 065
Total available resources	1 237 168 442	1 580 269 135	2 017 849 322
Expenses	2016	2017	2018
<i>Functioning</i>	918 850 377	1 109 043 631	1232 620 686
<i>Staff</i>	474 021 304	547 281 327	542 120 836
<i>Other operating expenses</i>	444 829 073	561 762 304	690 499850
<i>Investment and equipment</i>	16 375 000	119 644 100	522 185 533
Total expenses	935 225 377	1 228 687 731	1 754 806 219
<i>Self-financing (own revenues/operating expenses)</i>	34.03%	38.02%	38.05%

Key points:

- Operating expenses increased by 34% between 2016 and 2018;
- Staff costs account for 44% of expenditure, a relatively small percentage, but, in fact, a significant portion of the salary is outside the budget ("the balance") as part of the State budget, especially for civil servants allocated during the year;
- Budget execution reveals a regularly positive gap, with all revenues being used between 76% and 87% depending on the years;
- The tariffs in force do not cover all the costs incurred, which penalizes the site whose activity is very strong;
- Investment expenses (522 million FCFA in 2018 compared with 119 million FCFA in 2017) recorded a very strong increase, explaining the increase in the State subsidy.
- Self-financing (amount of own revenues related to operating expenses) increased from 34% to 38% between 2016 and 2018;

The evolution of the budget between 2016 and 2018 shows an increase of the revenues to accompany the strong activity of the site, despite the limiting factor of tariffs, considering the limited financial capacity of the population. Although revenues are not fully utilized, this situation is the result of the site's willingness to preserve its financing capacity by protecting itself against certain hazards (cash-in of the State grant and late reimbursements by the State of activities related to the free access and/or care of the poor¹).

¹ the remains to be recovered reach an amount of 162 million FCFA while the site has only 469 million of FCFA of own revenues in 2018

4.2 ESTIMATION OF HUMAN RESOURCES NEEDS – MEDICAL STAFF

4.2.1 Analysis of available health human resources

a) At the national level

According to the balance sheet of the Ministry of health in June 2016, the national number of staff available is of 25 625 people, of whom:

- 1240 medical specialists and generalists
- 281 pharmacists
- 2532 midwives
- 3682 birth attendants
- 2805 itinerant agents
- 602 health technicians

In terms of ratios, staff are inadequate, especially for medical staff and midwives:

- The physician ratio is 1/15 000 per capita (WHO standard 1/10 000)
- Nurse ratio: 1/2653 (WHO standard 1/3000)
- Midwives ratio: 1/7518 (WHO standard 1/5000)

The distribution of these agents is also problematic: for physicians, there is a concentration of general practitioners in the central region which comprises 40% of the workforce for 14% of the population. Only 12% of medical specialists practice in CHRs.

In terms of planning, an average of 200 physicians and 1 000 paramedics are recruited annually..

From this general data, it can be concluded that the medical ratio is generally low, and especially that the distribution of physicians is not homogeneous to properly cover the needs of the whole population.

As part of the needs coverage at the level of a CHR, which is intended to be a CHR-U, thus a reference and training hospital, it is important to study the distribution of specialist physicians and to measure the needs to broaden the specialized supply to regional level, in accordance with the medical project.

b) The current situation in Fada N'Gourma

According to the 2018 activity report, the CHR has a total of 373 employees, including 328 staff members and 45 contract employees.

For medical personnel, there are about ten specialist physicians (one surgeon, three gynecologist, two cardiologists, one radiologist, one dermatologist, one pediatrician, and two dentists) and about 20 general practitioners.

The numbers are therefore relatively low, especially in terms of medical specialists.

The increase of healthcare provision at the CHR level and its increase in capacity to 260 beds should lead to a prospective analysis of the medical and paramedical HR needs.

4.2.2 Estimation of required medical staff

a) The principles

With regard to medical professions, there are no standard rules defining the number of physicians required for each medical activities. The estimates of needs in terms of medical workforce are thus difficult to develop, except for specific activities that operate 24h/24h (emergencies and resuscitation in particular). Activities which have a duty of service 24/24, 7/7 must imperatively be strengthened in HR to ensure the constraints of night-care and public holidays.

The question of the working time by physicians is a major point for the proper functioning of the hospital. The calculation of the number of physicians required for the proper functioning of medical activities must take into account a full-time medical activity, i.e. morning and afternoon for all disciplines.

The discontinuous presence of physicians during the day, especially in the afternoon, is problematic because:

- It does not allow to optimize the means and activities in relation to the needs of care, and monitoring of patients
- It creates dysfunctions in the care of patients, especially for follow-up in hospitalization;
- It makes the non medical staff insecure, and does not allow a good coherence of the teams;
- It entails risks of demotivation of non-medical personnel.

b) Methodology for medical personnel

The adjustment of the number of physicians must take into account:

- *The duration of working time*, and the number of days of activities;
- *The quantitative importance of activities and actions*, which may require an evaluation of active patient queues, and their evolution over time; number of beds is a possible criterion of presumed activity, in relation to the occupancy rate (80% is a basic objective); the planned development of ambulatory should be taken into account and may justify the strengthening of medical HR while conventional beds are reduced;
- *The major constraints of an activity 24/24 and 7/7*, which mainly impact adult medical and surgical emergencies, including short-term hospitalization units, pediatric and obstetric emergencies, resuscitation and intensivecareunits, but also support functions in pharmacy, biology, radiology for which a possible medical presence at night must be discussed and its modalities specified: on-site attendance or on-call at home. In the area of emergencies and resuscitation, "standards" or recommendations have been issued, taking into account the number of emergency beds, resuscitation and intensive care.

c) The approach

Regarding the clinical services providing 24/24, 7/7 presence for emergencies, we took into account the recommendations of the learned societies (EMS, emergencies) for the staffing calculations and the recommendations of the SFAR (Société French Anesthesia – Resuscitation), with weighting factors to take into account considering the human resources available in the country.

Regarding clinical services with hospital beds, it appears relevant that each specialized activity selected in the medical project should have at least one specialist doctor and if possible, a deputy, when the activity is important, supported by general practitioners or residents to monitor hospitalized patients and lead consultation activities.

The day places require a priori a doctor dedicated to this ambulatory activity; this is the case especially for the unit of hemodialysis.

The following table summarizes the distribution needs of medical specialists and their assistants.

Table 16: Estimation of medical resources for clinical services

Departments	Activities	Nb of beds	Day places	Planned activities at N + 4	Number of specialists	Nb of physicians or residents
Emergencies and reanimation	Medical emergencies	8		11 848 emergencies visits; or 34 emergencies/days	3	4
	Surgical emergencies	8				
	Resuscitation	6		12 beds; 24/24 = 4380 days of Hosp.; BOR 80% = 3500d , from Hosp.; ALS at 4.5d 778	3	4
	Intensive care	4				
Subtotal		26			6	
Mother and child	Maternity	24		3600 births/year; 24/24 1000 Caesarean sections; ALS 2.5 days + 200 programmed surgical procedures	3	5
	Gynecology	16				
	Neonatology (including resuscitation)	16		Needs to be reinforced because of difficult pregnancies; neonatal resuscitation required	3	6
	Pediatric emergencies	8		16 000 consultations/day; over 60/day		
	Pediatrics (including nutrition)	38				
Subtotal		102			6	

Medicine	Internal medicine/ Diabetes/ Gastro-entéro/ Neuro/ Geriatrics	22		Difficult quantitative forecasting in the absence of previous data on specialized activities, including endoscopy.	3	3
	Cardiovascular / nephrology	22	12 hemodialysis	Cardiology should undergo important developments if the equipment for Interventional cardiology is present; Nephrology is a new discipline that will quickly fill the dialysis positions in ambulatory	3 (2 Cardiologists, 1 nephrologist)	3
	Infectious diseases/ Dermato/ HeMato	22		Only previous data available in dermatology; capacity to cope with epidemic phenomena; isolation of the infectious beds to be foreseen in the unit.	3	3
	psychiatry	8			1	2
Subtotal		74	12		10	
Surgery	General Surgery/ digestive/ Urologic	22	6	Forecasts go to 1400 operative acts/year (emergencies and programmed); in the order of 5-6 interventions/day	3	3
	Orthopedic/tr aumatology surgery and rehabilitation	22		Difficult prediction in the absence of previous orthopedic activities; high probable demand	2	3
	ENT/ Ophtalmo/ma xillo -stomato refacial	14 + 3 armchairs		Ambulatory activities to be preferred	3 + 1 dentist	3
Subtotal		58	6 places + 3 armchair		9	
Total		260	18 places + 3 Armchair		31	39

This table specifies the estimates of the number of physicians, specialists and generalists or residents necessary for clinical services in relation to the medical project of the CHR-U, which answers to the estimated development of the activities 4 years after the opening of CHR-U.

It is also necessary to take into account the needs of specialists, who are not necessarily physicians but counted in specialized medical resources: biologists, pharmacists, radiologists, and anatomopathologists. The numbers defined in the table below are quite minimalist. In principle, each specialist should be strengthened by a deputy to cope with absences and holiday leave.

Table 17: HR estimation of specialized medical resources

Services	Specialists responsible for unit or service	Assistants	Comments
Radiology	1	1	Night Guard 24/24 and 7/7
Biology/Hematology	1	1	
Bacteriology	1	1	
Pathology	1	1	
Pharmacy	1	1	
Total	5	5	

Ideally, each technical unit should have at least one specialist. As a first step, groupings are possible. The table gives examples.

Regarding medical human resources, the sizing of human resources is a key point to answer to new care requests from the future reference hospital, and keeping in mind the three functions of a CHR-U: care, teaching, and research.

The prospective analysis highlights the major need to reinforce specialized care and cover the scope of the medical and surgical disciplines of the project. It takes a first approach to **bring the number of specialists to more than 30** against a dozen currently.

Adjustments will be necessary depending on the evolution of the activities. Already, it is essential to **recommend the elaboration of a multiannual HR plan for the opening of vacancies and recruitments**, in order to address the needs in human resources from the opening of the future hospital.

4.3 ESTIMATION OF HUMAN RESOURCES NEEDS – NON MEDICAL STAFF

4.3.1 Principles

With regard to paramedic occupations, there are no standards defining the number of caregivers needed for all activities.

In France, with the exception of a few sectors for which certain ratios are standardized (dialyses, day hospital, post-Interventional surveillance room-PISR, neonatology, intensive neonatal care, neonatal resuscitation, resuscitation, continuous surveillance, Pediatric resuscitation, cardiac surgery, cardiac surgery resuscitation, intensive cardiac surgery, emergencies and cardiology intensive care), other activities are not subject to particular standards.

ANAP (National Agency for performance support) formulated a "recommendation" for "non-standardized" activities:

For a full adult hospitalization unit of 25 to 32 beds (in medical and multipurpose surgery, excluding geriatrics), the workforce to be considered is: **1 nurse and 1 assistant nurse for 13 to 16 Patients (ANAP 2015)**

However, this recommendation does not have an opposable character in the assessment of the level of resources available: it is neither a minimum threshold nor a ceiling, particularly in hospitals of the CHR-U type.

Therefore, the "target workforce" must be calculated taking into account several parameters:

- the size of the care unit (the recommended size is 28 to 32 beds for optimal use of staff);
- type of care provision (emergency/programmed);
- the average number of occupied beds (BOR);
- ALS (the workload of caregivers vary significantly depending on patient turnover);
- the burden of care and technicality of the acts (however difficult to evaluate on a prospective basis);

The setting of the theoretical workforce is therefore more based on the expertise of professionals than on given standards.

4.3.2 Analysis focused on direct and indirect care

The predictive analysis of HR needs focuses solely on caregivers at the bedside of patients, or staff indirectly related to care. Consequently, other personal (administrative and technical staff) is not included in the HR estimates for non medical staff.

Indeed, the evaluation of these categories of staff depends on the organizational modes prevailing in the country, depending on the administrative processes for the first and the types of management adopted (direct or outsourced) for the latter.

In this regard, the hospital project (PEH) 2019-2023 of the CHR of Fada N'Gourma clearly underline its willingness to continue a concession policy for maintenance and cleaning, restoration, stretcher-bearing and guarding (see page 147 of the PEH).

As a result, the following estimates of HR needs are mainly related to the number of medical activities in relation to the medical project and the bed dimensioning.

Finally, an estimation of human resources required for maintenance is provided to support the sustainability of the planned investments (building and equipment), , and ensure the effectiveness of the future structure.

4.3.3 Methodology for non-medical staff calculation

In order to calculate the necessary manpower, consideration should be given to the current situation prevailing in Burkina Faso:

- Working time: 40hrs/week;
- Organization of working time, for hospitalization services 24h/24: 3 teams (7-12am/12-(pm/5pm-7am); the agents ensure shifts, over a cycle of several weeks, to cover all these time slots;
- Number of public holidays: 15/year;
- Number of days of leave: 31 days/year reduced to 20 day (weekends of the month of leave are included in the 104 annual weekends).
- **Number of days worked per year: 226 days** (365 days – 15 holidays – 104 days of weekends – 20 days of annual leave.

Assessments are based on the following elements:

- Support for " *indirect care* " (various support for bedtime, lift, toilet, clothing, displacement, etc...): In France, this role –is played by the assistant nurses (AN) and does not exist so far in Burkina Faso, nor in terms of mission or in term of degree, usually assumed by the families (or partly by specific support staff). Nevertheless, the prediction carried out integrates this mission which appears indispensable in terms of professionalisation of activities;
- In the absence of a fine knowledge of the workload in health care/pathology in Burkina Faso, estimates are adjusted according to the workload envisaged per unit of care, in view of the planned medical activities;
- The spatial configuration of the hospitalization units (1 hospitalization unit = 1 nursing station) is also to be taken into consideration: the optimum size of a workspace is considered to be in the order of **28 to 32 beds** to define a level of staff as efficient as possible, but attention should also be given to the consequences of pooling activities on the organization of care and required skills to perform the tasks;
- Two corrective elements are included in the calculation of the staff/service:
 - absenteeism (sickness) even if the current rate is very low (3 days/agent) and far from the authorized ceiling (10 days/year);
 - training days, considering the medical project that includes training for the staff (around 3 days/agent/year).
- Thus, a 6 days/agent/year adjustment has been included in the calculations.

4.3.4 Estimation of required non medical staff

Nurses, assistant nurses, nurse team managers, midwives Depending on the parameters used, **workstations** to be filled for each service and for each team were defined based on three slots: morning (AM), afternoon (PM) and afternoon/night (N).

In order to calculate the staffing of the **overall workforce** to be foreseen for the future CHR-U, it is necessary to take into consideration the following elements:

- The number of working days due per agent/year: 226 days/year (see above) or 1808 working hours/year (8h x 226 days);
- The **multiplier** to ensure the permanence of care 24/24h and 365/365d: as each agent actually works 226 days/year, 139 days remain to be filled/year (365 – 226). This coefficient is therefore of **1.61** ($365/226 = 1.61$), calculated in a global way because despite the diversity of organizations and daily work amplitudes, the contract and the work constraints are identical for all agents, from the moment they ensure shifts over a cycle of several weeks, to cover all the needs.

Therefore, the table below presents, on the basis of the selected workstations, the needs of non-medical staff to be provided to ensure a full coverage 24h/24h and 365/365d.

Table 18: Number of full-time (FTE) jobs required based on planned work stations

Work stations	1	2	3	4	5	6
Overall workforce required (impact of multiplier)	1.61	3.22	4.83	6.44	8.05	9.66

Table 19: Identified need for daily staffing within services according to the clinical activities departments of the future hospital (morning "AM"/afternoon "PM"/night "N")

The table below distinguishes the staff needed per unit, depending on the specialties and whether they are morning, afternoon or night shifts. In the "activities" column, the main elements that have been taken into account to estimate the needs are specified:

Departments	Activities	Number of beds	AM/PM/N	Nurses	Assistant nurses	Midwives
EMERGENCIES/R ESUSCITATION/INTENSIVE CARE	Emergencies and short-term hospitalization units (medico-surgical) <i>The forecast remains fairly low (25 emergencies/24h at opening and 32 emergencies on 24H in n+4) but staffing includes staff at the emergency and UHCD reception; It is also essential to equip this structure to be able to receive an influx of patients if necessary.</i>	16	AM	4 1/4 beds	4 1/4 beds	-
			PM	4 1/4 beds	4 1/4 beds	-
			N	3 1/5 beds	3 1/5 beds	-
	Adult resuscitation and intensive care <i>The chosen estimates is less than the standardized French ratios (2 nurses/5 and 1 AN/4 day and night; 1 nurse/4 and 1 AN/4 1 the day; and 1 nurse/8 and 1 AN/8 at night in CICU) and is not based on a separate endowment in resuscitation and IC, due to the difficulty of predicting the % of intubated and ventilated patients.</i>	10	AM	3 1/3-4 beds	2 1/5 beds	
			PM	3 1/3-4 beds	2 1/5 beds	
			N	3 1/3-4 beds	2 1/5 beds	
MOTHER AND CHILD	Obstetrics <i>The choice was made to provide midwives rather than nurses within the obstetrics unit in accordance with the practices observed. The ratios selected for the morning and afternoon correspond to the ANAP recommendations (1 nurse and 1 AN for 13 to 16 patients (ANAP))</i>	24	AM	-	2 1/12 beds	2 1/12 beds
			PM	-	2 1/12 beds	2 1/12 beds
			N	-	1 1/12 beds	1 1/24 beds

	Childbirth rooms <i>To ensure safety of care, the option chosen is to provide day and night, the same density of specialized personnel (1 midwife/childbirth room + 1 midwife/3 pre-work rooms but a less strong presence of AN at night.</i>		6 childbirth rooms + 3 pre-work rooms	AM	-	3 1/3 rooms	7 1/sleeping room + 1 /3 pre-work rooms
				PM	-	3 1/3 rooms	7 1/sleeping room + 1 /3 pre-work rooms
				N	-	2 1/4 rooms	7 1/sleeping room + 1 /3 pre-work rooms
	Gynecology <i>The ratios selected correspond to the high estimate of ANAP recommendations (1 nurse and 1 AN for 13 to 16 patients (ANAP), except for the morning team regarding nurses (high concentration of nursing actions at this time).</i>		16	AM	2 1/8 beds	1 1/16 beds	
				PM	1 1/16 beds	1 1/16 beds	
				N	1 1/16 beds	1 1/16 beds	
	Pediatrics including nutrition (2 units) <i>A stronger density was predicted for nurses in the unit of young children during AM and night.</i>	Children	22	AM	3 1/7-8 beds	2 1/11 beds	
				PM	2 1/11 beds	2 1/11 beds	
				N	2 1/11 beds	2 1/11 beds	
		Younger children	16	AM	2 1/8 beds	2 1/8 beds	
				PM	2 1/8 beds	1 1/16 beds	
				N	2 1/8 beds	1 1/16 beds	

MEDICAL SPECIALTIES	Neonatology and neonatal resuscitation <i>The selected staffing corresponds to an average ratio whereas the French standardized ratios provide for a different density of personnel in neonatology (1 nurse/6 and 1 AN/6 during the day and 1 nurse/2 and 1 AN/2 day and night) due to the difficulty of predicting the % of intubated and ventilated patients and the importance of small weights.</i>	16	AM	4 1/4 beds	3 1/5 beds	
			PM	4 1/4 beds	3 1/5 beds	
			N	2 1/8 beds	2 1/16 beds	
	Pediatric emergencies <i>Staffing may seem high but it also integrates staff in the reception of emergencies; It seems essential to ensure a good staffing of this structure so that it can receive a great flow of patients if necessary.</i>	8	AM	2 1/4 beds	2 1/4 beds	
			PM	2 1/4 beds	2 1/4 beds	
			N	2 1/4 beds	1 1/8 beds	
	Internal medicine, hepato-gastro-enterology, neurology, geriatrics <i>The selected ratios are different from from ANAP recommendations (1 nurse and 1 ANA for 13 to 16 patients), for the morning teams due to the grouping of several sub-specialties. In addition, neurology and geriatric activities lead to an increase in the workload of caregivers, given the dependence of many patients.</i>	22	AM	3 1/7-8 beds	3 1/7-8 beds	
			PM	2 1/11 beds	3 1/7-8 beds	
			N	1 1/22 beds	1 1/22 beds	
	Cardiovascular, diabetes metabolism, Nephrology <i>The ratios selected correspond to the high range of ANAP recommendations (1 nurse and 1 AN for 13 to 16 patients, for the morning and afternoon teams due to the grouping of several sub-specialties; during night two agents are scheduled (1 nurse + 1 AN).</i>	22	AM	2 1/11 beds	2 1/11 beds	
			PM	2 1/11 beds	2 1/11 beds	
			N	1 1/22 beds	1 1/22 beds	

	Infectious diseases, dermatology, onco-hematology <i>The ratios selected correspond to the upper range of ANAP recommendations (1 nurse and 1 AN for 13 to 16 patients, for the morning and afternoon teams due to the grouping of several sub-specialties; at night two agents are scheduled (1 nurse + 1 AN)</i>	22	AM	2 1/11 beds	2 1/11 beds	
			PM	2 1/11 beds	2 1/11 beds	
			N	1 1/22 beds	1 1/22 beds	
	Psychiatry <i>The unit is of a limited size but the nature of the activities requires to have a permanent team of 2 agents</i>	8	AM	1 1/8 beds	1 1/8 beds	
			PM	1 1/8 beds	1 1/8 beds	
			N	1 1/8 beds	1 1/8 beds	
SURGICAL SPECIALTIES	General Surgery, digestive, Urologic <i>The selected ratios derogate from the range of ANAP recommendations (1 nurse for 13 to 16 patients, for the morning team due to the grouping of several sub-specialties; at night, two nurses are planned given the technicality of care.</i>	22	AM	3 1/7-8 beds	2 1/11 beds	
			PM	2 1/11 beds	2 1/11 beds	
			N	2 1/11 beds	1 1/22 beds	
	Orthopedic, traumatological and rehabilitation surgery <i>The selected ratios derogate from the range of ANAP recommendations (1 nurse for 13 to 16 patients, for the morning team due to the grouping of several sub-specialties; at night two nurses are planned given the technicality of care.</i>	22	AM	3 1/7-8 beds	2 1/11 beds	
			PM	2 1/11 beds	2 1/11 beds	
			N	2 1/11 beds	1 1/22 beds	

	ENT, ophthalmology, maxillofacial surgery, Stomatology <i>The selected ratios derogate from the range of ANAP recommendations (1 nurse for 13 to 16 patients, for the morning team and afternoon due to the grouping of several specific sub-specialties; at night, the size of the unit makes it possible to predict 1 nurse and 1 AN).</i>	14	AM	2 1/7 beds	1 1/14 beds	
			PM	2 1/7 beds	1 1/14 beds	
			N	1 1/14 beds	1 1/14 beds	
DAY hospital 5d/7	Hemodialysis posts <i>(2 sessions/day at the beginning and then 3 sessions/d at n+4:8h opening at the beginning and 12h at n+4 (session time: 4h); the number of assistant nurses is very low and will have to be adjusted depending on the density of patients.</i>	12	AM	3 1/4 Posts	1 1/12 Posts	
			PM	3 1/4 Posts	1 1/12 Posts	
	Day places Surgery (operation lasting maximum 8h) <i>The ratio for day care is one of the standardized ratios: the proposal exceeds the standard (1 nurse/5 beds) due to the number of beds selected.</i>	6	D	2 1/3 beds	2 1/3 beds	
	Stomatology chairs <i>(operation in max. 8h)</i>	3	D	1 1/3 Armchairs	1 1/3 Armchairs	

Based on these objectified needs, the calculation of the number of FTE required in one year of activity is determined by applying the multiplier coefficient (**1.61**) shown in table 19 for nurses, midwives and assistant nurses (excluding nurse managers). The following table summarizes the results.

Table 20: FTE requirements for paramedic personnel by Department (rounded digit)

Departments	Activities	Nb of	Managers	Nurses	AN	Midwives
EMERGENCIES, RESUSCITATION, INTENSIVE CARE	Total	26	3	32	28	
	Emergencies and short-term hospitalization unit (medico-surgical)	16	2	18	18	
	Adult resuscitation and intensive care	10	1	14	10	
MOTHER AND CHILD	Total	102	nurse 4 midwife 2	53	63	42
	Obstetrics (hospitalization)	24	midwife 1		8	8
	Childbirth rooms		midwife 1		13	34
	Gynecology	16	1	6.50	5	
	Pediatrics including nutrition (2 units)	38	2	21	16	
	Neonatology and neonatal resuscitation	16	0.5	16	13	
	Pediatric emergencies	8	0.5	10	8	
MEDICAL SPECIALTIES	Total	74	4	31	32	
	Internal medicine, hepato-gastro-enterology, Nephrology	22	1	10	11	
	Cardiovascular, diabetes metabolism, Nephrology	22	1	8	8	
	Infectious diseases, dermatology, onco-hematology	22	1	8	8	
	Psychiatry	8	1	5	5	
SURGICAL SPECIALTIES	Total	58	3	30	21	
	General Surgery, digestive, Urologic	22	1	11	8	
	Orthopedic, traumatological and rehabilitation surgery	22	1	11	8	
	ENT, ophthalmology, maxillofacial surgery, stomatology	14	1	8	5	
DAY CARE (5/7 days)		12 Hemodialysis + 6 day care places + 3 armchairs	1	13	7	
GENERAL TOTAL OF PARAMEDICAL STAFF FOR ALL DEPARTMENTS		260 beds + 24h+ 18 day places + 3 armchairs	17 (15 Nurse managers + 2 midwives managers)	159	151	42
			369			

These numbers concern all clinical services: emergencies, resuscitation/intensive care, medical hospitalization, surgery, gynecology-obstetrics and pediatrics (conventional hospitalization and daycare places).

The needs of nursing staff are identified based on experience and benchmark. Overall, it is necessary to define one manager per service or unit, with some adaptations depending on the activity and the capacity of the service.

b) Other HR needs for clinical services

Other needs for clinical services should be taken into account. This includes external consultations and transversal activities (physiotherapy, nutritionist). These needs have been summarized in table 22. Requirements for the technical services - laboratories, imaging, and pharmacy - are shown in the following table.

For consultations, the requirements for nurses were calculated based on four consultation areas using a nurse/service ratio and distinguishing between morning and afternoon shifts.

It is necessary to add to this estimate of needs other activities that require caregivers (nurses, assistant nurses, managers and technicians), especially for rehabilitation and nutrition department.

Table 21: Paramedic needs of the future hospital

	Midwives	Nurses	AN	Physiotherapists	Nutritionists
Consultations	5	8 + 1 frame	4		
Rehabilitation				6	
Nutrition					3

c) Other HR needs for the medicotechnical platform and maintenance

❖ NMS for the services of the medicotechnical unit

These resources are mainly including:

- Nurses and anesthesia technicians (for operating blocks);
- Senior technicians in radiology, biology-with 1 manager for each technical service.

Related departments:

- Operating blocks: 8 rooms of which 3 operate 24h/24 (1 for emergencies and 2 for maternity/obstetrics);
- Endoscopy (2 rooms) + laundromat;
- Imaging: 5 functional units: MRI, scanner, ultrasound (2), mammography, conventional Radiology (2), 1 dental station;
- Biology: microbiology, biochemistry, hematology, anatomopathology;
- Pharmacy (4 assistants with 24-hour distribution);
- The hygiene department.

The application of the calculation methodology is done using the elements below:

- 365 days – 15 holidays – 104 weekends – 20 days of leave = 226 working days per year
- It is considered that it takes 1 to 2 technician(s) per activity the day (12h) and 1 to 2 technician(s) at night for the whole unit (12h)
- Data in table 19 are used as a reference for the number of FTEs required 24h/24h
- Data are also adjusted according to the activity, the nature of the services and the capacity.

Table 22: HR needs for medicotechnical unit's services

Technical services	Number of units	Specialized Nurses	midwives	Managers			Senior technicians
				Nurses	Midwives	Other	
Operating blocks	8 rooms including 5 open rooms from 8am to 4pm and 3 rooms open 24h/24 (emergencies and caesarean sections)	2 1	10	1 manager	1		
biology	4 activities: biochemistry microbiology Hematology Anatomopathology					1	12
Imaging	5 units					1	12
Pharmacy	one					1	10
Hygiene	1 unit	2 nurses hygienists		1 nurse manager			2 hygiene technicians
Total		2	10	6			36

Calculating the number of nurses and specialized nurses

Programmed operating rooms (5) from 8am-4pm: 1 nurse x 1.09 x 5 = **6 nurses** (rounded)

- 246 working days (365 – 15 holidays – 104 weekends) or 1968h (246 x 8h) operating
- working proportion available: 226 d/agent/year or 1808 h/agent/year
- multiplier coefficient: **1.09** in (246/226)

Emergency room (1) open 24h/24: 3 nurses x 1.61 x 1 = **5 nurses** (rounded)

- operating 24/24, 365d/yr or 8760 h (365 x 24)
- working proportion available: 226 d/agent/year or 1808 h/agent/year
- multiplier coefficient: **1.61** in (365/226)

Caesarean sections (2) open 24 hours a day: 3 nurses x 1.61 x 2 = **10 nurses** (rounded)

- operating 24/24, 365d/yr or 8760 h (365 x 24)
- working proportion available: 226 d/agent/year or 1808 h/agent/year
- multiplier coefficient: **1.61** in (365/226)

Calculating the number of midwives

Caesarean section room (2) open 24h/24: 3 midwives x 1.61 x 2 = **10 midwives** (rounded)

- operating 24/24, 365d/yr or 8760 h (365 x 24)
- working proportion available: 226 d/agent/year or 1808 h/agent/year

Calculation of senior pharmacy technicians

Day pharmacy assistants + 24/24 duty. Total = 10 pharmacy assistants.

❖ **HR for maintenance and work**

The needs were estimated based on the capacity of the future hospital and its surface.

Table 23: HR requirements for equipment and building maintenance

Services	Engineers	Technicians
Biomedical	1	1 manager 2 technicians 1 workshop manager 1 plumbing 1 electrical network 1 air conditioning 1 heating specialist 2 multi-skilled
Works	1	
Maintenance	1	
Total	3	8 technicians + 2 managers

4.3.5 Summary of HR needs in non medical staff

Table 24: Summary of adjusted HR needs for direct care: nurses, assistant nurses, midwives

	Nurse managers	Midwives managers	Nurses	Assistant nurses	Midwives
Hospitalization	15	2	159	151	42
Medicotechnical platform	2	1	23		10
Consultations and other	1		8	4	5
TOTAL by category	18	3	190	155	57
TOTAL	423				

Table 25: Summary of other HR needs in staff

	Kiné	Nutrition nists	Specialized technicians	Executives specialized technicians	Engineers	Psychologists	Social workers
Hospitalization						2	2
Medicotechnical platform			36	3			
Consultations and other	6	3					
Maintenance and equipment			8	2	3		
TOTAL by category	6	3	44	5	3	2	2
TOTAL	65						

Synthesis:

Total staff is estimated at **488 agents** for non-medical staff and equipment/maintenance teams (excluding managerial, administrative and logistical personnel, for reasons given in introduction to this chapter).

This analysis of needs performed is not much higher than the provisions carried out by the project group PCE-3 CHR-U of the Ministry of Health of Burkina Faso. With regard to the Dédougou CHR, considering a similar bed dimensioning, the project group calculated the needs of paramedical personnel at **416 jobs**.

The difference between the two estimates is the integration of the assistant nurse function (indirect care to patients) that does not exist so far in Burkina Faso, given the place left to the family (the number of AN is estimated at **155 agents**).

In addition, the estimates of the Burkina Faso project group include of the function of “support team” (*garçons et filles de salle*) to which are given the logistical tasks of maintenance/hygiene of the premises (they are estimated at **68 agents** in the future Dédougou CHR).

Ignoring these staff on the one hand, and the AN positions on the other hand, the assessment of staff requirements for patient care are close between the two proposals: **348 for the project group and 333 for APHPI**.

Considering absenteeism (3d/agent/year) and absences due to training to be foreseen (3d/agent/year), the number of additional days to be filled for all staff represents 1998 working days/year (6d x 333 agents), or an equivalent of 8.84 agents rounded to 9 (1998d/226d). In fine, the gap between the 2 estimates is only 6 agents (**348** for the project group compared to **342** on APHPI side).

It is highly desirable, at the time of the opening of the future CHR-U, not to immediately affect all the staff estimated in this model, in order to adjust them regularly according to the evolution of the activity of each department. The CHR-U will thus have the ability to adapt its personnel resources to the level of the activity observed on the one hand, and to the actual burden of care on the other hand, which may vary depending on the complexity of the cases treated.

4.4 ESTIMATION OF THE PREVISIONAL ACCOUNTS

The estimation of the projected accounts must provide a tool to improve the medico-economic performance of the future hospital of Fada N'Gourma and to ensure its financial sustainability.

The following estimates were based on the 2018 budget of the existing Fada N'Gourma CHR. It takes into account the evolution of human resources and other parameters according to the assumptions detailed for each item of expenditure and revenue.

It relies on operating incomes and expenditures, as investment are not integrated to reflect only the operating budget necessary for the future hospital.

4.4.1 Projected revenues

With regard to projected revenues, the analysis identified three major revenue items from the current Fada N'Gourma hospital: (1) the budgetary surplus for the previous year; (2) the State subsidy and (3) product sales. The table below contains data from the 2018 budget of the current Fada N'Gourma CHR.

Table 26: Operating revenues of the Fada N'Gourma CHR, fiscal year 2018

Description	2018
BUDGET SURPLUS FROM 2017	107 422 746
SALES	469 365 080
<i>Pharmaceutical sales</i>	<i>187 439 646</i>
<i>Kit sales</i>	<i>16 215 205</i>
<i>Medical and sanitary services</i>	<i>255 598 666</i>
<i>Accessory products</i>	<i>10 111 563</i>
STATE SUBSIDIES	827 660 000
TOTAL OPERATING REVENUES	1 404 447 826

The budget surplus is not taken into account in the simulation. Thus, the budget line is shaded in the final projection of the operating accounts (table 37).

The methodology chosen aims to reconstruct each item of revenue and has been adapted according to the data available.

a) Sales of services

Sales represent all pharmaceutical products, surgical kits, medical and health benefits, and ancillary products sold by the hospital. This element represented 469 million CFA francs in 2018.

According to the IMF based on a basket of commodities, inflation should be 2%/an. However, considering the specificity of health products, the methodology presented proposes a controlled inflation of 0.5%/year for the sales of kits, accessories and pharmaceutical products.

Medical and health services are considered stable over the coming years, taking into account the health policies to stabilize tariffs, especially in a country with low incomes and no universal medical coverage. Thus, inflation is not taken into account for this revenue item.

The methodology used for these revenue items is based on the calculation of revenue in N+4 a including the following elements:

- Number of consultations and admissions recorded in 2018;
- Total revenue related to sales included in the current CHR activity report 2018;
- The prediction of the number of consultations and admissions in N+4 as presented on page 22 of this report based on activities developed in the future hospital;
- An inflation forecast of around 0.5% per year, i.e. **12.63% inflation** between 2018, year of reference budget, and 2027, year considered n+4 considering the opening of the future hospital in 2023 (year N)² for sale of kits, pharmaceutical products and accessories;
- No inflation for medical and health services;
- The creation of a **technology coefficient of 8%** taking into account an increase in the average tariff of consultations, considering the specialized activities to be developed in the future hospital which results in more expensive products and medical devices.

Table 27: Unit cost by type of sales, 2018

Type of sales	Consultations /Admissions	Sales revenue	Unit cost
Health services	60 064	213 766 414	3 559
Product sales	60 064	255 598 666	4 255

Table 28: Estimation of the "sales" expenditure item in N + 4 of the future hospital

	Unit cost	Forecast			TOTAL SALES
		Consultations/Admissions	Inflation	Technology coefficient	
Health services	3 559	100 174	0.00%	8.00%	385 040 807
Sale of products	4 255	100 174	12.63%	8.00%	518 480 491
TOTAL SALES					903 521 298

The total estimated amount of the hospital's income for sales and services is therefore, in total, **903 521 298 CFA francs**.

b) State subsidies

It is proposed to distinguish between the operating State subsidy and the subsidy intended to pay the salaries of public servants. Considering the activity report 2018 of the CHR of Fada N'Gourma, it is indicated that 88% of the staff of the hospital are civil servants, and 12% are under contract. Taking into account the changes planned by the hospital with an increase in the number of under-contract staff, and a forecast of activities that would allow it to increase the share of agents paid on equity funds, a distribution 75% employees and 25% of contractors at N+4 is assumed.

² data International Monetary Fund (IMF):

<https://www.imf.org/external/pubs/ft/weo/2018/02/weodata/weorept.aspx?sy=2016&ey=2023&scsm=1&ssd=1&sort=cou nTry & ds =. & br = 1 & PR1. x = 62 & PR1. y = 13 & c = 748 & s = PCPI% 2CPCPIPC% 2CPCPIE% 2CPCPIEPCH & GRP = 0 & a = #download>

Total staff costs are estimated at **3 176 209 268 CFA francs**. Without being able to fine-tune the assumptions of wage allocation between civil servants and under-contract staff due to the lack of sufficiently precise data, the share of civil servants is estimated to remain at 75% of the expenses which equals to **2 382 156 951 CFA francs**.

The State subsidy to cover all the salaries of public servants represents about 50% of the State's total annual subsidy, the other part being related to operating expenses (source: budget 2019 of the CHR of Fada N'Gourma, average 2016-2017-2018 years of 49.8% for the State subsidy dedicated to staff). It is therefore expected that the State subsidy for the operation of the hospital will be roughly equivalent to that considering the staff costs.

Table 29: Estimation of State subsidy in N+4

State subsidy	
Staff	2 382 156 951
Functioning	2 401 290 742
Total	4 783 447 693

N.B: the estimate of the State subsidy over the coming years for the payment of salaries and the functioning of the future CHR-U is difficult to predict, partly dependent on the political and economic decisions of the State. In view of the limited resources available, the commitment of the State is crucial to ensure the proper functioning of the future CHR-U.

4.4.2 Projected expenses

The expenses include several items summarized below, based on the expenditures taken from the current RCHR of Fada N'Gourma.

Table 30: Operating expenditure of the Fada N'Gourma CHR, fiscal year 2018

WORDING	2018
PURCHASES AND STOCKS	418 336 579
<i>Pharmaceutical purchases</i>	150 000 000
<i>Materials and consumables</i>	249 190 959
<i>Other purchases</i>	15 145 870
<i>Packaging</i>	3 999 750
TRANSPORT AND MISSIONS	47 000 000
EXTERNAL SERVICES A	102 453 251
EXTERNAL SERVICES B	110 614 520
TAXES	50 000
OTHER EXPENSES	12 070 000
STAFF EXPENSES	542 120 836
<i>Civil servants salaries</i>	255 818 020
<i>Under-contract staff salaries</i>	43 802 212
<i>Civil servants allowances</i>	170 680 539
<i>Under-contract staff allowances</i>	37 656 665
<i>Social security charges</i>	34 163 400
<i>Other social security charges</i>	-
Depreciation charge	-
TOTAL OPERATING EXPENSES	1 232 645 186

The methodology aims to reconstruct each item of expenditure and has been adapted according to the available data.

a) Purchases and stocks

This expenditure item incorporates the same methodology previously applied to product sales. The number of consultations and admissions in 2018 related to the total cost of purchases and stocks resulted in an average cost per patient. This average cost was applied to the consultations planned in N+4, with an inflation rate of 19.51% and a technology coefficient of 8% for all budget lines, except for purchases of pharmaceuticals for which an average inflation rate of 0.5% was applied with an overall rate of 12.63% between 2018 and 2027.

Table 31: Unit cost by type of purchase, 2018

Type of purchases	Consultations/ admissions	Spending on purchase	Unit cost
Pharmaceutical purchases	60 064	150 000 000	2 497
Other purchases	60 064	268 336 579	4 468

Table 32: Estimation of the "purchasing" expenditure item in N + 4 of the future hospital

	Unit cost	Forecast			TOTAL PURCHASES
		Consultations/ admissions	Inflation	Technologic coefficient	
Pharmaceutical purchases	2 497	100 174	12.63%	8.00%	304 264 580
Other purchases	4 468	100 174	19.51%	8.00%	577 691 772
TOTAL					881 956 352

The theoretical amount calculated is **881 956 352 CFA francs**.

b) Transport and missions / External services A and B / Other charges

The "transport and missions" item includes all expenses related to the movement of hospital staff and postal services.

"External services A" represent the different rental costs, the maintenance of all the hospital's property, insurances, communication, documentation and communication costs. For this very general post, maintenance expenses were excluded and carried forward in a specific budget line "maintenance" detailed further on.

"External services B" includes hospital bank charges, staff training (no budget allocated in 2018), remuneration of external personnel (guarding and cleaning) and other external charges.

The "other expenses" item includes subsidies to mutual funds, duty allowances and remuneration of directors, and other miscellaneous expenses.

A hypothesis of stability of the expenses has been applied for these four items. Thus, only an inflation of 19.51% was applied to the expenditures for the 2018 fiscal year.

Table 33: Estimation of expenditure items transport and missions / external services A and B

	TRANSPORT AND MISSIONS
Budget 2018	47 000 000
Forecast N+4	56 169 700

	EXTERNAL SERVICES A
Budget 2018	45 819 568
Forecast N+4	54 758 966

	EXTERNAL SERVICES B
Budget 2018	110 614 520
Forecast N+4	132 195 413

	OTHER EXPENSES
Budget 2018	12 070 000
Forecast N+4	14 424 857

The theoretical amounts calculated represent **56 169 700 CFA francs** for transport and missions, **54 758 966 CFA francs** for external services A, **132 195 413 CFA francs** for external services B, and **14 424 857 CFA francs** for other charges.

c) Taxes

The estimate reflects the stable forecasts for the last three years, with an estimated expense item of **150 000 CFA francs**.

d) Staff expenses

The estimate of staff costs is based on the medical project and the activities chosen for the future CHR-U, i.e. 83 medical staff and 488 non-medical staff. Estimates of the project group for administrative staff, estimated at 95 officers, are added to staff estimates for a total of **666 agents**.

The average annual salary per employment category (MS/NMS/administrative) was weighted using the existing staff of the Fada N'Gourma CHR. For example, health assistants (53) account for 20% of the total non-medical staff. The average annual salary of the non-medical staff was thus weighted taking into account this variable.

The table below summarizes the estimated staff expenses forecast in N+4.

Table 34: Estimated staff costs in N+4 of the future hospital

Type of position	Average annual salary	Number of employees	Average annual cost
Medical staff	7 257 750	80	580 620 000
Non-medical staff	4 538 401	488	2 214 739 493
Administrative staff	3 779 753	95	359 076 526
TOTAL STAFF EXPENSES			3 154 436 018

Staff costs are estimated at **3 154 436 018 CFA francs** in N+4 after the commissioning of the future hospital.

e) Maintenance

The maintenance amount for the present Fada N'Gourma CHR is 56 633 683 CFA francs for the 2018 fiscal year (ext. 624, external services A).

The calculation method for estimating maintenance costs for the future CHR-U of Fada N'Gourma is based on the estimation of several parameters:

- The cost of maintenance of the equipment in N+4 is estimated at 5% of the total cost of equipment excluding taxes, calculated at 1/4 of the overall cost of works for illustrative purposes, with an exchange rate: €1 = 655.96 CFA francs;
- The cost of maintenance of buildings in N+4 is estimated at 1% of the total cost of the works excluding taxes.

Table 35: Estimation of the "maintenance" item in N+4

	Total amount N+4
Equipment maintenance	206 627 400
Building maintenance	164 645 960
TOTAL MAINTENANCE	371 273 360

Total maintenance expenses in N+4 is estimated at **371 273 360 CFA francs**.

f) Depreciation charge

There is currently no budget dedicated to depreciation charges in the current CHR. In order to estimate it and integrate it into the overall budget of the future hospital, the depreciation of equipment and buildings is estimated at 8 years for equipment and 35 years for buildings.

Table 36: Estimate of the depreciation expense in N+4

	Total amount N+4
Depreciation of equipment	516 568 500
Depreciation of buildings	470 417 029
TOTAL DEPRECIATION	986 985 529

The total depreciation charges in N+4 is estimated at **986 985 529 CFA francs**.

4.4.3 General balance of revenues and expenses

In terms of a general balance of revenues and expenses, all costs borne by the hospital and the State (salaries of civil servants and grant for the hospital functioning) are integrated in the projected operating account. The increase in medical and non-medical staff to ensure the functioning of the new hospital will have a significant impact on the financial part covered by the State expenses.

The table below presents a projected operating account based on the assumptions previously detailed for all expenditure and revenue items.

Table 37: Projected operating account

**Projected annual budget in N+4 (CFA francs)
CHR-U DE FADA N'GOURMA**

Title I: Revenues

TYPE OF REVENUES	PREDICTIONS IN N+4
PRODUCT SALES	903 521 298
STATE SUBSIDY	4 783 447 693
<i>Staff</i>	2 382 156 951
<i>Functioning</i>	2 401 290 742
TOTAL REVENUES	5 686 968 991
BUDGET SURPLUS 2017	

Title II: Expenditures

TYPES OF EXPENSES	PREDICTIONS IN N+4
PURCHASES AND CHANGES IN INVENTORIES	881 956 352
TRANSPORT AND MISSIONS	56 169 700
EXTERNAL SERVICES A	54 758 966
EXTERNAL SERVICES B	132 195 413
TAXES	150 000
OTHER EXPENSES	14 424 857
STAFF EXPENSES	3 154 436 018
MAINTENANCE	371 273 360
DEPRECIATION CHARGE	986 985 529
TOTAL EXPENSES	5 652 350 195

Summary

Total revenues	Total expenses	Net income
5 686 968 991	5 652 350 195	34 618 796

5. GENERAL PROJECT MANAGEMENT: KEY SUCCESS FACTORS

The project of the future CHR-U of Fada N'Gourma is a major project to improve access to quality and specialized care for the whole of the eastern region of the country. This project, legitimately ambitious, aims to make the current CHR a CHR-U, capable of responding to a triple mission of care, teaching and research. His medical project has been elaborated based on the needs of the population, and on the strategic vision shared by the health authorities, and related to the sustainable development goals (SDG).

The achievement of these objectives requires to address issues such as human resources, job management and skills, and the mobilization of a local team to accompany this project. As such, several points deserve attention:

1/Developing a provisional jobs and skills planning (GPEC) of the future CHR-U

It seems essential to base the analysis the approach developed by the project group in charge of the conception of the future three CHR-U (see *"terms of references for the development of human resources of the DÉDOUGOU CHR-U as part of the PCE-3RH project"*, of December 2018).

In order to allow for a comprehensive model taking into account human resources, a job planning and staffing was organized for the future CHR-U of Dédougou, whose mission was to set up a provisional jobs and skills plan (GPEC) with the following elements:

- exploring the future needs in jobs, manpower and skills, quantitatively and qualitatively, globally and per unit of care;
- identifying the specialized jobs required by the future structure;
- analysing gaps between current human resources and the future needs of the new CHR-U;
- Developing an adapted training plan.

Considering the new activities planned, the expertise to be mobilized, the skills to be developed and the difference required in human resources between the current and future hospital, this approach should be replicated for the future CHR-U of Fada N'Gourma.

The rigorous anticipation of HR needs as soon as the new structure is opened is all the more indispensable as the demand for care is very high: the Fada N'Gourma hospital records the highest occupancy rate (85.6%), among all hospital structures of the CHR/CHR-U types in Burkina Faso (cf. Annual Statistics 2017)³.

The six training structures for non medical staff in the country (including Fada N'Gourma) should develop their recruitment and training plans to meet the identified needs.

The adjustment of financial resources to the needs expressed in terms of HR will benefit from the recent action at the level of the Ministry of the Public of organizing a census of all civil servants (staff per State body and region) and, in the establishment of ratios of health workforce in order to harmonize staff allocations.

³ In 2017, for the record, the BOR of Dédougou CHR, with comparable nb of beds, is only 50.2% and the average BOR of all hospital structures is 57.7%.

Existing standards for medical personnel in CHR/CHR-U (medical staff ratio/number of consultations) should be completed by other indicators (population density and importance of the technical unit). Finally, at the initiative of the Ministry of Health, an approach aiming at = defining the work positions of non-medical staff should be undertaken soon by the hospitals with the support of health authorities, and the objective of defining the job descriptions and realizing a manual of procedures.

This action should lead to the drafting of a competency decree for certain specific hospital jobs.

All of these measures should facilitate redeployments in order to balance the human resources available across the different regions.

2/ Involving, the earliest possible, Fada N'Gourma CHR's executives into the project

The close participation of the management team of the hospital seems essential, as soon as possible, so they can bring their knowledge of the existing site, explain the specific needs in view of the future project, and analyze HR's strengths and weaknesses, and anticipate actions to be conducted in terms of:

- preparing the opening of the future structure;
- implementing future internal organizations (medical care and patient pathway);
- defining training programs.

This seems all the more necessary that the management of the hospital of Fada N'Gourma is very well organized and thus in the capacity to contribute effectively to the project and its concrete implementation.

Indeed, the management of the current CHR includes an autonomous human resources department, as well as a nursing department and a quality management unit, which enables the team, in relation with the medical and non medical teams on site, to coordinate a successful transfer of the personnel in the future structure and ensure the success of the different stages of the project..

The very high quality of the nursing project which is an integral part of the Fada N'Gourma PEH (2019-2023 Hospital project) demonstrates the expected requirements and the managerial capacity needed to mobilize the nursing teams and ensure quality of care.

3/Strengthening measures to promote the attractiveness of the future site

Because of the remoteness of Fada N'Gourma, the challenge is to recruit and keep staff. In that matter, the Ministry launched a study on the motivations of health workers and their incentives. Among the most appropriate measures are the increase of salaries and the creation of specific allowances for the most distant health facilities.

In addition, a law adopted in 2017 provides for the creation of a specific Hospital public service which could be extended to the HSPC (health and social promotion centers) and would create rules and regulations for civil servants working in health facilities.

It is also envisaged to create a specific institution whose mission would be to manage all non medical staff.

As far as physicians are concerned, the State has scholarships in Burkina Faso or abroad to attract future specialists, in exchange for a 6 years commitment to exercise in a public hospital, with at least 3 years in a region outside the capital.

This topic of HR valorization and attractiveness of distant sites is, obviously, major to ensure the proper functioning of the future CHR-U.

From these considerations, it appears that the feasibility and the success of the project are based on a number of strategic points in terms of implementing and monitoring the project, which can be summarized with the following points:

- 1) **To define a local team** to implement and follow-up the project, with a regular timetable for the development and analysis of the project situation.
- 2) **To share and validate the medical project** with the teams of Fada N'Gourma who will have to ensure the success of the project; and specify with them which medical and surgical specialties to develop within 4 years, and the modes of organization and equipment needed to achieve the shealthcare provision objectives.
- 3) **To clarify the future of the current hospital in Fada N’Gourma**, its missions and which human resources will be maintained, keeping in mind the importance of an optimized territorial approach avoiding any duplication of the medicotechnical units.
- 4) **To elaborate a training plan** for human resources (MS, NMS, and administrative staff). As far as possible, to implement these training plans during the period of construction of the hospital.
- 5) **To ensure an operational link with the university** to take into account the teaching and research missions of the future CHR-U.
- 6) **TO establish, with the Ministry of health, the modalities of a HR recruitment and allocation plan** to ensure quantitative HR adjustments.
- 7) **To promote a policy for quality of life at work and safety of care for staff** through training and equipment.
- 8) **To develop a local communication** with civil society on the project bypromoting information for patients and families and ensuring the validation and adherence to an inpatient charter.
- 9) **To ensure optimal conditions for the installation and operation of equipment** and their maintenance, through the recruitment and training of technical staff.
- 10) **To launch a territorial plan for the organization of care, considering the framework of the PCE- 3 CHR-U project**, , in relation with other institutions involved, in particular the CMA of the region.

CONCLUSION

The CHR-U project of Fada N'Gourma well answers to a legitimate concern of the health authorities to modernize the provision of hospital care in light of a broader territorial strategy to improve the health coverage of the population of eastern Burkina Faso.

The choice of Fada N'Gourma appears very relevant due to the current strong activity of the CHR. An increase of the number of beds is justified looking at the current occupancy rate and the necessary reinforcement of medical specialties in the region.

The current state of the CHR also justifies the choice of building a new facility.

The feasibility of the project appears solid due to:

- The commitment of the relevant authorities;
- The existing local, medical and administrative dynamics of high quality;
- The coherence of the establishment project elaborated by the local teams.

The success of this project must integrate a territorial framework so that the future hospital will be able to ensure its function of a reference CHR-U; and should develop human resources to allow a real improvement of the provision of care considering the existing needs in specialized care.

Appendix A
Table of surfaces

ROOM	QTE	SU per room (m2)	SU (m2)
EMERGENCIES SERVICES			586.00
BATHROOM	1	7.00	7.00
LADIES LOCKER ROOM	1	20.00	20.00
2-BED ROOM	4	20.00	80.00
OBSERVATION 1	1	26.00	26.00
OBSERVATION 2	1	26.00	26.00
MEDICAL EMERGENCIES SECRETARIAT	1	12.00	12.00
MEN'S LOCKER ROOMS	1	20.00	20.00
BATHROOM	1	7.00	7.00
STAFF	1	30.00	30.00
DOCTOR'S OFFICE 2	1	12.00	12.00
DOCTOR'S OFFICE 1	1	12.00	12.00
NURSE	1	12.00	12.00
HANDICAPPED TOILETS	1	4.50	4.50
RELAXATION ROOM	1	15.00	15.00
TECHNICAL ROOM	1	3.00	3.00
HALL OF SHOCK	1	28.00	28.00
BATHROOM	1	3.50	3.50
BATHROOM	1	3.50	3.50
SORTING ROOM	1	15.00	15.00
SECRETARIAT SURGICAL EMERGENCIES	1	12.00	12.00
COMMENTS 2	1	26.00	26.00
OBSERVATION 1	1	26.00	26.00
2-BED ROOM	4	20.00	80.00
SORTING ROOM	1	15.00	15.00
WAITING HALL	1	25.00	25.00
WASHING	1	3.50	3.50
TECHNICAL ROOM	1	3.00	3.00
HANDICAPPED TOILETS	1	4.50	4.50
BATHROOM	1	3.50	3.50
NURSE	1	12.00	12.00
DOCTOR'S OFFICE 1	1	12.00	12.00
DOCTOR'S OFFICE 2	1	12.00	12.00
PLASTER ROOM	1	15.00	15.00
REANIMATION (8 BEDS)			339.50
OPEN SPACE ROOM	8	18.00	144.00
SHOWER AND SANITARY ROOM	1	8.00	8.00
NURSING STATION	1	15.00	15.00
DIRTY UTILITY	1	5.00	5.00
CLEAN UTILITY	1	5.00	5.00
TECHNICAL ROOM	1	3.00	3.00
TECHNICAL ROOM (STORAGE)	1	5.00	5.00
TRASH CAN	1	3.00	3.00
DOCTOR'S OFFICE	1	12.00	12.00
INTERNAL OFFICE	1	20.00	20.00
FRAMEWORK OFFICE OF CARE	1	15.00	15.00
GUARD ROOM	1	12.00	12.00
RELAXATION ROOM	1	15.00	15.00
WAIT	1	20.00	20.00
WASHING	1	3.50	3.50
SECRETARIAT	1	12.00	12.00
DIRTY LOCKER MAN	1	8.00	8.00
DIRTY DRESSING ROOM WOMAN	1	8.00	8.00
CLEAN MAN LOCKER ROOM	1	8.00	8.00
OWN WOMAN DRESSING ROOM	1	8.00	8.00
HARDWARE STORAGE	1	10.00	10.00

Appendix A
Table of surfaces

ROOM	QTE	SU per room (m2)	SU(m2)
INTENSIVE CARE (4 BEDS)			267.50
OPEN SPACE ROOM	4	18.00	72.00
SHOWER AND SANITARY ROOM	1	8.00	8.00
NURSING STATION	1	15.00	15.00
DIRTY UTILITY	1	5.00	5.00
CLEAN UTILITY	1	5.00	5.00
TECHNICAL ROOM	1	3.00	3.00
TECHNICAL ROOM (STORAGE)	1	5.00	5.00
TRASH CAN	1	3.00	3.00
DOCTOR'S OFFICE	1	12.00	12.00
INTERNAL OFFICE	1	20.00	20.00
FRAMEWORK OFFICE OF CARE	1	15.00	15.00
GUARD ROOM	1	12.00	12.00
RELAXATION ROOM	1	15.00	15.00
WAIT	1	20.00	20.00
WASHING	1	3.50	3.50
SECRETARIAT	1	12.00	12.00
DIRTY LOCKER MAN	1	8.00	8.00
DIRTY DRESSING ROOM WOMAN	1	8.00	8.00
CLEAN MAN LOCKER ROOM	1	8.00	8.00
OWN WOMAN DRESSING ROOM	1	8.00	8.00
HARDWARE STORAGE	1	10.00	10.00
OPERATING ROOM			740.50
TECHNICAL ROOM	1	3.00	3.00
LOCAL DEVICES	1	30.00	30.00
ROOM OPERATION 1 ASEPTIC	1	40.00	40.00
ARSENAL STERILE	1	8.00	8.00
PATIENT PREPARATION	1	10.00	10.00
PREDESINFECTION	1	8.00	8.00
SURGICAL DRESSING	1	8.00	8.00
SURGICAL WASHING	1	6.00	6.00
OPERATION ROOM 2 ASEPTIC	1	40.00	40.00
PATIENT PREPARATION	1	10.00	10.00
ARSENAL STERILE	1	8.00	8.00
OPERATION ROOM 3 ASEPTIC	1	40.00	40.00
ARSENAL STERILE	1	8.00	8.00
PATIENT PREPARATION	1	10.00	10.00
PREDESINFECTION	1	8.00	8.00
SURGICAL DRESSING	1	8.00	8.00
SURGICAL WASHING	1	6.00	6.00
OPERATION ROOM 4 ASEPTIC	1	40.00	40.00
PATIENT PREPARATION	1	10.00	10.00
ARSENAL STERILE	1	8.00	8.00
TECHNICAL ROOM	1	3.00	3.00
WAITING SICK	1	24.00	24.00
BATHROOM	1	3.50	3.50
ANESTHESIST OFFICE	1	15.00	15.00
MEN'S BACK DRESSING ROOM	1	15.00	15.00
MEN'S ENTRANCE DRESSING ROOM	1	15.00	15.00
LADIES ENTRANCE DRESSING ROOM	1	15.00	15.00
LADIES BACK DRESSING ROOM	1	15.00	15.00
TECHNICAL ROOM	1	3.00	3.00
BATHROOM	1	3.50	3.50
ALARM ROOM	1	80.00	80.00
SUPERVISING OFFICE	1	15.00	15.00
BATHROOM	1	3.50	3.50

Appendix A
Table of surfaces

ROOM	QTE	SU per room (m2)	SU (m2)
CHANGING ROOMS WOMEN	1	10.00	10.00
BATHROOM	1	3.50	3.50
BATHROOM	1	3.50	3.50
OFFICE OF THE BLOCK MANAGER	1	15.00	15.00
OFFICE	1	12.00	12.00
GUARD ROOM	1	15.00	15.00
ROOM OPERATION 1 ASEPTIC	1	40.00	40.00
ARSENAL STERILE	1	8.00	8.00
PATIENT PREPARATION	1	10.00	10.00
PREDESINFECTION	1	8.00	8.00
SURGICAL DRESSING	1	8.00	8.00
SURGICAL WASHING	1	6.00	6.00
OPERATION ROOM 2 ASEPTIC	1	40.00	40.00
PATIENT PREPARATION	1	10.00	10.00
ARSENAL STERILE	1	10.00	10.00
PREDESINFECTION	1	8.00	8.00
SURGICAL DRESSING	1	8.00	8.00
SURGICAL WASHING	1	6.00	6.00
ENDOSCOPIA			232.00
WAIT	1	12.00	12.00
BATHROOM	1	3.50	3.50
BATHROOM	1	3.50	3.50
PATIENT SAS	1	8.00	8.00
PATIENT PREPARATION	1	20.00	20.00
ENDOSCOPY ROOM	2	25.00	50.00
ENDOSCOPE CLEANING	1	20.00	20.00
ENDOSCOPES STORAGE	1	15.00	15.00
PATIENT REST	1	40.00	40.00
NURSING STATION	1	12.00	12.00
DIRTY UTILITY	1	5.00	5.00
CLEAN UTILITY	1	5.00	5.00
TECHNICAL ROOM	1	3.00	3.00
TECHNICAL ROOM (STORAGE)	1	5.00	5.00
TRASH CAN	1	3.00	3.00
DOCTOR'S OFFICE	1	12.00	12.00
FRAMEWORK OFFICE OF CARE	1	15.00	15.00
MEDICAL IMAGING			717.00
GENERAL INTERPRETATION ROOM (RADIO-SCANNER-TEACHING)	1	30.00	30.00
DOCTOR'S OFFICE	1	12.00	12.00
MAJOR OFFICE	1	15.00	15.00
HOME MAKING APPOINTMENTS	1	20.00	20.00
WAITING FOR DIAPERS	1	20.00	20.00
WAITING ROOM SCANNER/MRI	1	40.00	40.00
HANDICAPPED TOILETS	1	4.50	4.50
BATHROOM	1	7.00	7.00
BATHROOM	1	7.00	7.00
MEETING ROOM	1	30.00	30.00
RELAXATION ROOM	1	15.00	15.00
BATHROOM	1	7.00	7.00
MRI ROOM	1	45.00	45.00
UNDRESSING	2	3.00	6.00
MRI TECHNICAL ROOM	1	10.00	10.00
PATIENT PREPARATION	1	24.00	24.00
PATIENT CARE PREPARATION	1	10.00	10.00
LOCAL MATERIALS	1	10.00	10.00
RADIOLOGIST OFFICE	1	15.00	15.00

Appendix A
Table of surfaces

ROOM	QTE	SU per room (m2)	SU(m2)
ARCHIVING ROOM/CLASSROOM	1	25.00	25.00
RELAXATION ROOM	1	15.00	15.00
PREPARATION ROOM-CLOAKROOM	1	10.00	10.00
SCANNER ROOM	1	40.00	40.00
TECHNICAL ROOM SCANNER	1	10.00	10.00
UNDRESSING	2	3.00	6.00
PATIENT PREPARATION	1	24.00	24.00
PATIENT CARE PREPARATION	1	10.00	10.00
LOCAL MATERIALS	1	10.00	10.00
DOCTOR'S OFFICE 01	1	15.00	15.00
DOCTOR'S OFFICE 02	1	15.00	15.00
RX/ECHOGRAPHY WAITING ROOM	1	40.00	40.00
RADIOGRAPHY OS/LUNG	2	30.00	60.00
UNDRESSING	4	3.00	12.00
RADIOLOGIST'S ROOM (MANIPULATOR)	1	15.00	15.00
MAMMOGRAPHY	1	15.00	15.00
UNDRESSING	1	3.00	3.00
LOCAL REPROGRAPHY	1	10.00	10.00
ECHOGRAPHY 02	1	15.00	15.00
ECHOGRAPHY 01	1	15.00	15.00
UNDRESSING	2	3.00	6.00
DENTAL PANNING	1	15.00	15.00
BATHROOM	1	3.50	3.50
BLOOD BANK LABORATORY			490.50
BACTERIOLOGY ROOM	1	30.00	30.00
BIOMOLLECULE ROOM 1	1	15.00	15.00
BIOMOLLECULE ROOM 2	1	15.00	15.00
BIOCHEMISTRY ROOM	1	20.00	20.00
PARASITOLOGY ROOM	1	30.00	30.00
IMMUNOLOGY ROOM	1	25.00	25.00
HEMATOLOGY ROOM	1	30.00	30.00
BATHROOM	1	7.00	7.00
BATHROOM	1	7.00	7.00
CLOAKROOM	1	10.00	10.00
MEETING ROOM	1	40.00	40.00
RELAXATION ROOM	1	20.00	20.00
MEDIA PREPARATION ROOM	1	15.00	15.00
LAUNDROMAT + STERILISATION	1	15.00	15.00
MAINTENANCE	1	3.00	3.00
BATHROOM	1	3.50	3.50
SPECIAL LEVY	1	12.00	12.00
CURRENT COLLECTION	1	15.00	15.00
GUARD ROOM	1	15.00	15.00
MAJOR OFFICE	1	15.00	15.00
TECHNICAL ROOM	1	3.00	3.00
STORAGE	1	15.00	15.00
BLOOD BANK	1	15.00	15.00
HEAD OFFICE UNITE	1	15.00	15.00
SECRETARIAT + ARCHIVES	1	20.00	20.00
STORE	1	40.00	40.00
ANATOMO-PATHOLOGY	1	40.00	40.00
STERILIZATION PLANT			185.50
BATHROOM	1	3.50	3.50
MEN'S LOCKER ROOM	1	5.00	5.00
CHANGING ROOMS WOMEN	1	5.00	5.00
OFFICE ONE	1	12.00	12.00

Appendix A
Table of surfaces

ROOM	QTE	SU per room (m2)	SU (m2)
OFFICE 2	1	12.00	12.00
WASHING	1	25.00	25.00
CONDITIONING ROOM	1	30.00	30.00
STERILIZATION	1	20.00	20.00
STERILE HARDWARE STORAGE	1	30.00	30.00
BACK TROLLEYS	1	15.00	15.00
DEPARTURE TROLLEYS	1	15.00	15.00
TECHNICAL ROOM	1	3.00	3.00
LOCAL STORAGE	1	5.00	5.00
LOCAL STORAGE	1	5.00	5.00
PHARMACY			391.00
HALL/WAITING HALL DISPENSATION	1	40.00	40.00
OFFICE 2	1	12.00	12.00
OFFICE ONE	1	12.00	12.00
MEDICAMENTS AND ASSIMILES STORAGE ROOM (25-30C): FREE STORE	1	60.00	60.00
MEDICAMENTS AND RELATED STORAGE ROOM (25-30C): STORE SALE	1	60.00	60.00
STORAGE ROOM FOR PRODUCTS BETWEEN 2-8 C	1	15.00	15.00
HAZARDOUS PRODUCT STORAGE ROOM	1	15.00	15.00
DISPENSATION ROOM	1	15.00	15.00
PREPARATION AND PACKAGING ROOM	1	15.00	15.00
TECHNICAL ROOM	1	3.00	3.00
BATHROOM	1	7.00	7.00
INFORMATION SERVICE	1	15.00	15.00
CLINICAL SERVICES DISTRIBUTION ROOM	1	25.00	25.00
RECEPTION AREA	1	20.00	20.00
MEDICAL AND MEDICAL CONSUMABLES STORAGE ROOM AND MEDICO TEC EQUIPMENT	1	50.00	50.00
STORAGE ROOM FOR DECLASSES PRODUCTS	1	15.00	15.00
LOCAL BLEACH	1	12.00	12.00
HOSPITALIZATION MATERNITY CARE			383.00
MEETING ROOM	1	20.00	20.00
DIRTY UTILITY	1	5.00	5.00
CLEAN UTILITY	1	5.00	5.00
TECHNICAL ROOM	1	3.00	3.00
WASHING	1	7.00	7.00
HOSPITALIZATION 1 BED	1	15.00	15.00
HOSPITALIZATION 1 BED	1	15.00	15.00
HOSPITALIZATION 1 BED	1	15.00	15.00
HOSPITALIZATION 1 BED	1	15.00	15.00
WASHING	1	7.00	7.00
TREATMENT ROOM	1	10.00	10.00
TRASH CAN	1	3.00	3.00
TECHNICAL ROOM	1	3.00	3.00
LOCAL MAINTENANCE	1	5.00	5.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
WASHING	1	7.00	7.00
HEAD OF UNIT OFFICE	1	15.00	15.00
RELAXATION ROOM	1	15.00	15.00
LOCAL STRETCHER-BEARER	1	8.00	8.00
NURSING OFFICE	1	12.00	12.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
WASHING	1	7.00	7.00
DOCTOR'S OFFICE	1	12.00	12.00

Appendix A
Table of surfaces

ROOM	QTE	SU per room (m2)	SU (m2)
INTERNAL OFFICE	1	20.00	20.00
WASHING	1	7.00	7.00
GYNAECOLOGY HOSPITALIZATION			303.00
MEETING ROOM	1	20.00	20.00
DIRTY UTILITY	1	5.00	5.00
CLEAN UTILITY	1	5.00	5.00
TECHNICAL ROOM	1	3.00	3.00
WASHING	1	7.00	7.00
WASHING	1	7.00	7.00
HOSPITALIZATION 1 BED	1	15.00	15.00
HOSPITALIZATION 1 BED	1	15.00	15.00
TREATMENT ROOM	1	10.00	10.00
TRASH CAN	1	3.00	3.00
TECHNICAL ROOM	1	3.00	3.00
LOCAL MAINTENANCE	1	5.00	5.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
HEAD OF UNIT OFFICE	1	15.00	15.00
RELAXATION ROOM	1	15.00	15.00
LOCAL STRETCHER-BEARER	1	8.00	8.00
NURSING OFFICE	1	12.00	12.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
DOCTOR'S OFFICE	1	12.00	12.00
INTERNAL OFFICE	1	20.00	20.00
WASHING	1	7.00	7.00
MATERNITY OPERATING BLOCK + CHILDBIRTH BOX			596.00
OPERATION ROOM	1	40.00	40.00
ARSENAL STERILE	1	8.00	8.00
PRE-INFECTION	1	8.00	8.00
PATIENT PREPARATION	1	10.00	10.00
SURGEON DRESS UP	1	8.00	8.00
SURGEON WASH	1	6.00	6.00
OPERATION ROOM	1	40.00	40.00
ARSENAL STERILE	1	8.00	8.00
PRE-INFECTION	1	8.00	8.00
PATIENT PREPARATION	1	10.00	10.00
SURGEON DRESS UP	1	8.00	8.00
SURGEON WASH	1	6.00	6.00
EMPTY ROOM AND AIR MEDICAL	1	5.00	5.00
OXYGEN LOCAL AND NITROUS OXIDE	1	5.00	5.00
DIRTY LOCKER MAN	1	8.00	8.00
DIRTY DRESSING ROOM WOMAN	1	8.00	8.00
CLEAN MAN LOCKER ROOM	1	8.00	8.00
OWN WOMAN DRESSING ROOM	1	8.00	8.00
ALARM ROOM 4 BEDS	1	24.00	24.00
SAS 1	1	6.00	6.00
SAS 2	1	6.00	6.00
INSTRUMENTS SALES	1	12.00	12.00
SAS 3	1	6.00	6.00
SAS 4	1	6.00	6.00
SAS 6	1	6.00	6.00
PRE- ANESTHESIC CONSULTATION	1	12.00	12.00
TECHNICAL ROOM	1	3.00	3.00
TECHNICAL MONITORING POOL	1	15.00	15.00

Appendix A
Table of surfaces

ROOM	QTE	SU per room (m2)	SU(m2)
BOX 1 CHILDBIRTH	1	12.00	12.00
BOX 2 CHILDBIRTH	1	12.00	12.00
BOX 3 CHILDBIRTH	1	12.00	12.00
BOX 4 CHILDBIRTH	1	12.00	12.00
BOX 5 CHILDBIRTH	1	12.00	12.00
BOX 6 CHILDBIRTH	1	12.00	12.00
PRE-WORK ROOM 1	1	12.00	12.00
PRE-WORK ROOM 2	1	12.00	12.00
PRE-WORK ROOM 3	1	12.00	12.00
NEWBORN REANIMATION ROOM	1	10.00	10.00
NEWBORN REANIMATION ROOM	1	10.00	10.00
OFFICE SAGE WOMAN	1	15.00	15.00
OBSTETRICAL ECHOGRAPHY ROOM	1	15.00	15.00
LEARNER'S ROOM	1	15.00	15.00
BOX PREMATURE	1	25.00	25.00
DOCTOR'S GUARD ROOM	1	15.00	15.00
DOCTOR'S OFFICE	1	12.00	12.00
DOCTOR'S OFFICE	1	12.00	12.00
RECEPTION SECRETARIAT	1	12.00	12.00
OFFICE SAGE WOMAN	1	15.00	15.00
DRESSING ROOM	1	12.00	12.00
STORE	1	12.00	12.00
TECHNICAL ROOM	1	3.00	3.00
WASHING	1	7.00	7.00
NEONATOLOGY			219.00
NURSING ROOM	1	20.00	20.00
CRADLES ROOM (QTE = 10)	1	25.00	25.00
SURVEILLANCE ROOM	1	15.00	15.00
DOUBLE SECURITY DOOR	1	4.00	4.00
HATCHERY ROOM 1	1	40.00	40.00
HATCHERY ROOM 2	1	40.00	40.00
LOCKER ROOM	1	15.00	15.00
STORE	1	10.00	10.00
STORAGE EQUIPMENT	1	20.00	20.00
TECHNICAL ROOM	1	3.00	3.00
SUS OFFICE	1	15.00	15.00
TREATMENT ROOM	1	12.00	12.00
PEDIATRIC EMERGENCIES			181.00
HOME SECRETARIAT	1	8.00	8.00
DOCTOR'S OFFICE	1	12.00	12.00
1 BED ROOM	2	15.00	30.00
2-BED ROOM	3	20.00	60.00
NURSING	1	12.00	12.00
RELAXATION ROOM	1	12.00	12.00
LOCKER ROOM	1	10.00	10.00
OBSERVATION	1	24.00	24.00
TECHNICAL ROOM	1	3.00	3.00
ARCHIVES	1	10.00	10.00
PEDIATRICS DEPARTMENT			629.00
MEETING ROOM	1	20.00	20.00
DIRTY UTILITY	1	5.00	5.00
CLEAN UTILITY	1	5.00	5.00
TECHNICAL ROOM	1	3.00	3.00
WASHING	1	7.00	7.00
WASHING	1	7.00	7.00
HOSPITALIZATION 1 BED	1	15.00	15.00

Appendix A
Table of surfaces

ROOM	QTE	SU per room (m2)	SU(m2)
HOSPITALIZATION 1 BED	1	15.00	15.00
TREATMENT ROOM	1	10.00	10.00
TRASH CAN	1	3.00	3.00
TECHNICAL ROOM	1	3.00	3.00
LOCAL MAINTENANCE	1	5.00	5.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
HEAD OF UNIT OFFICE	1	15.00	15.00
RELAXATION ROOM	1	15.00	15.00
LOCAL STRETCHER-BEARER	1	8.00	8.00
NURSING OFFICE	1	12.00	12.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
DOCTOR'S OFFICE	1	12.00	12.00
INTERNAL OFFICE	1	20.00	20.00
WASHING	1	7.00	7.00
DIRTY UTILITY	1	5.00	5.00
CLEAN UTILITY	1	5.00	5.00
TECHNICAL ROOM	1	3.00	3.00
HOSPITALIZATION 1 BED	1	15.00	15.00
WASHING	1	7.00	7.00
WASHING	1	7.00	7.00
HOSPITALIZATION 1 BED	1	15.00	15.00
WASHING	1	7.00	7.00
TREATMENT ROOM	1	10.00	10.00
TRASH CAN	1	3.00	3.00
TECHNICAL ROOM	1	3.00	3.00
LOCAL MAINTENANCE	1	5.00	5.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
WASHING	1	7.00	7.00
HEAD OF UNIT OFFICE	1	15.00	15.00
RELAXATION ROOM	1	15.00	15.00
LOCAL STRETCHER-BEARER	1	8.00	8.00
NURSING OFFICE	1	12.00	12.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
DOCTOR'S OFFICE	1	12.00	12.00
INTERNAL OFFICE	1	20.00	20.00
VACCINATION NUTRITION DEPARTMENT			117.00
STORE	1	30.00	30.00
MAJOR OFFICE	1	15.00	15.00
CONSULTATION ROOM AND CARE	1	30.00	30.00
CLOAKROOM	1	10.00	10.00
BATHROOM INFANTS	1	12.00	12.00
VACCINATION ROOM	1	20.00	20.00
INTERNAL MEDICINE DEPARTMENT /GASTROENTERO /NEURO /GERIATRY			346.00
MEETING ROOM	1	20.00	20.00
DIRTY UTILITY	1	5.00	5.00
CLEAN UTILITY	1	5.00	5.00
TECHNICAL ROOM	1	3.00	3.00
HOSPITALIZATION 1 BED	1	15.00	15.00
WASHING	1	7.00	7.00

Appendix A
Table of surfaces

ROOM	QTE	SU per room (m2)	SU (m2)
WASHING	1	7.00	7.00
HOSPITALIZATION 1 BED	1	15.00	15.00
WASHING	1	7.00	7.00
TREATMENT ROOM	1	10.00	10.00
TRASH CAN	1	3.00	3.00
TECHNICAL ROOM	1	3.00	3.00
LOCAL MAINTENANCE	1	5.00	5.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
WASHING	1	7.00	7.00
HEAD OF UNIT OFFICE	1	15.00	15.00
RELAXATION ROOM	1	15.00	15.00
LOCAL STRETCHER-BEARER	1	8.00	8.00
NURSING OFFICE	1	12.00	12.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
DOCTOR'S OFFICE	1	12.00	12.00
INTERNAL OFFICE	1	20.00	20.00
CARDIOVASCULAR SERVICE /DIABETE /METABOLISM /NEPPHROLOGY			346.00
MEETING ROOM	1	20.00	20.00
DIRTY UTILITY	1	5.00	5.00
CLEAN UTILITY	1	5.00	5.00
TECHNICAL ROOM	1	3.00	3.00
HOSPITALIZATION 1 BED	1	15.00	15.00
WASHING	1	7.00	7.00
WASHING	1	7.00	7.00
HOSPITALIZATION 1 BED	1	15.00	15.00
WASHING	1	7.00	7.00
TREATMENT ROOM	1	10.00	10.00
TRASH CAN	1	3.00	3.00
TECHNICAL ROOM	1	3.00	3.00
LOCAL MAINTENANCE	1	5.00	5.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
WASHING	1	7.00	7.00
HEAD OF UNIT OFFICE	1	15.00	15.00
RELAXATION ROOM	1	15.00	15.00
LOCAL STRETCHER-BEARER	1	8.00	8.00
NURSING OFFICE	1	12.00	12.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
DOCTOR'S OFFICE	1	12.00	12.00
INTERNAL OFFICE	1	20.00	20.00
INFECTIOUS DISEASES AND HOSPITALIZATION			346.00
MEETING ROOM	1	20.00	20.00
DIRTY UTILITY	1	5.00	5.00
CLEAN UTILITY	1	5.00	5.00
TECHNICAL ROOM	1	3.00	3.00
TECHNICAL ROOM	1	3.00	3.00
HOSPITALIZATION 1 BED	1	15.00	15.00
WASHING	1	7.00	7.00
WASHING	1	7.00	7.00

Appendix A
Table of surfaces

ROOM	QTE	SU per room (m2)	SU (m2)
HOSPITALIZATION 1 BED	1	15.00	15.00
WASHING	1	7.00	7.00
TREATMENT ROOM	1	10.00	10.00
TRASH CAN	1	3.00	3.00
LOCAL MAINTENANCE	1	5.00	5.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
WASHING	1	7.00	7.00
HEAD OF UNIT OFFICE	1	15.00	15.00
RELAXATION ROOM	1	15.00	15.00
LOCAL STRETCHER-BEARER	1	8.00	8.00
NURSING OFFICE	1	12.00	12.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
DOCTOR'S OFFICE	1	12.00	12.00
INTERNAL OFFICE	1	20.00	20.00
MENTAL HEALTH SERVICE			190.00
DOCTOR'S OFFICE	1	12.00	12.00
HEAD OF UNIT OFFICE	1	15.00	15.00
INTERNAL OFFICE	1	20.00	20.00
TREATMENT ROOM	1	15.00	15.00
BATHROOM	1	7.00	7.00
TECHNICAL ROOM	1	3.00	3.00
STORE	1	8.00	8.00
WAIT	1	20.00	20.00
BEDROOM 1 BED	2	15.00	30.00
ROOM 2 BEDS	3	20.00	60.00
GENERAL SURGERY /DIGESTIVE /UROLOGICAL SURGERY DEPARTMENT			346.00
MEETING ROOM	1	20.00	20.00
DIRTY UTILITY	1	5.00	5.00
CLEAN UTILITY	1	5.00	5.00
TECHNICAL ROOM	1	3.00	3.00
TECHNICAL ROOM	1	3.00	3.00
HOSPITALIZATION 1 BED	1	15.00	15.00
WASHING	1	7.00	7.00
WASHING	1	7.00	7.00
HOSPITALIZATION 1 BED	1	15.00	15.00
WASHING	1	7.00	7.00
TREATMENT ROOM	1	10.00	10.00
TRASH CAN	1	3.00	3.00
LOCAL MAINTENANCE	1	5.00	5.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
WASHING	1	7.00	7.00
HEAD OF UNIT OFFICE	1	15.00	15.00
RELAXATION ROOM	1	15.00	15.00
LOCAL STRETCHER-BEARER	1	8.00	8.00
NURSING OFFICE	1	12.00	12.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
DOCTOR'S OFFICE	1	12.00	12.00
INTERNAL OFFICE	1	20.00	20.00

Appendix A
Table of surfaces

ROOM	QTE	SU per room (m2)	SU(m2)
ORTHOPEDIC SURGERY / TRAUMA AND REHABILITATION DEPARTMENT			346.00
MEETING ROOM	1	20.00	20.00
DIRTY UTILITY	1	5.00	5.00
CLEAN UTILITY	1	5.00	5.00
TECHNICAL ROOM	1	3.00	3.00
HOSPITALIZATION 1 BED	1	15.00	15.00
WASHING	1	7.00	7.00
WASHING	1	7.00	7.00
HOSPITALIZATION 1 BED	1	15.00	15.00
WASHING	1	7.00	7.00
TREATMENT ROOM	1	10.00	10.00
TECHNICAL ROOM	1	3.00	3.00
TRASH CAN	1	3.00	3.00
LOCAL MAINTENANCE	1	5.00	5.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
WASHING	1	7.00	7.00
HEAD OF UNIT OFFICE	1	15.00	15.00
RELAXATION ROOM	1	15.00	15.00
LOCAL STRETCHER-BEARER	1	8.00	8.00
NURSING OFFICE	1	12.00	12.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
DOCTOR'S OFFICE	1	12.00	12.00
INTERNAL OFFICE	1	20.00	20.00
ENT SERVICE / OPHTHALMIC / MAXILLOFACIAL STOMATO SERVICE			311.00
DOCTOR'S OFFICE	1	12.00	12.00
HEAD OF UNIT OFFICE	1	15.00	15.00
NURSING OFFICE	1	12.00	12.00
INTERNAL OFFICE	1	20.00	20.00
DIRTY UTILITY	1	5.00	5.00
CLEAN UTILITY	1	5.00	5.00
TRASH CAN	1	3.00	3.00
WASHING	1	7.00	7.00
TECHNICAL ROOM	1	3.00	3.00
TECHNICAL ROOM	1	3.00	3.00
LOCAL MAINTENANCE	1	5.00	5.00
LOCAL STRETCHER-BEARER	1	8.00	8.00
HOSPITALIZATION 1 BED	1	15.00	15.00
HOSPITALIZATION 1 BED	1	15.00	15.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
HOSPITALIZATION 2 BEDS	1	20.00	20.00
TREATMENT ROOM	1	15.00	15.00
MEETING ROOM	1	50.00	50.00
WASHING	1	7.00	7.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
HOSPITALIZATION 4 BEDS	1	28.00	28.00
RELAXATION ROOM	1	15.00	15.00
ENTRANCE SERVICE			146.00
PHARMACY	1	30.00	30.00
DEPOT STORE	1	15.00	15.00
TECHNICAL ROOM	1	3.00	3.00
RESPONSIBLE OFFICE	1	12.00	12.00
RELAXATION ROOM	1	12.00	12.00

Appendix A
Table of surfaces

ROOM	QTE	SU per room (m2)	SU (m2)
BATHROOM	2	7.00	14.00
LOCAL MAINTENANCE	1	4.00	4.00
BOX 1 (OPEN SPACE)	1	6.00	6.00
BOX 2 (OPEN SPACE)	1	6.00	6.00
BOX 3 (OPEN SPACE)	1	6.00	6.00
CASE 4. (OPEN SPACE)	1	6.00	6.00
INVOICING	1	10.00	10.00
BILLING 2	1	10.00	10.00
OFFICE OF THE ENTREES	1	12.00	12.00
CAFETERIA			202.00
MEN'S TOILETS	1	7.00	7.00
WOMEN'S TOILETS	1	7.00	7.00
CAFETERIA	1	80.00	80.00
DRINK RESERVE	1	6.00	6.00
OFFICE	1	10.00	10.00
DIVES	1	12.00	12.00
MEN'S LOCKER ROOM	1	10.00	10.00
COLD ROOM	1	8.00	8.00
WOMEN'S LOCKER ROOM	1	10.00	10.00
KITCHEN	1	35.00	35.00
FOOD STORE	1	8.00	8.00
LOCAL GAS	1	6.00	6.00
TECHNICAL ROOM	1	3.00	3.00
ADMINISTRATION			387.00
DIRECTOR OF NURSING OFFICE	1	15.00	15.00
OFFICE COORDINATION OF CARE UNITS	1	12.00	12.00
BUREAU EVALUATION AND RESEARCH	1	12.00	12.00
OFFICE	1	8.50	8.50
BATHROOM	2	7.00	14.00
LOCAL INVERTER	1	8.00	8.00
REPROGRAPHY	1	10.00	10.00
TECHNICAL ROOM	1	3.00	3.00
MEETING ROOM	1	35.00	35.00
ARCHIVES LIBRARY	1	25.00	25.00
STANDARD	1	8.50	8.50
SANITATION TECHNICIAN OFFICE	1	10.00	10.00
ASSISTANT OFFICE	1	10.00	10.00
OFFICE OF THE DIRECTOR OF ECONOMIC SERVICES	1	12.00	12.00
LEGAL AFFAIRS AND LITIGATION OFFICE	1	12.00	12.00
CAREER OFFICE AND CONTINUING EDUCATION	1	12.00	12.00
TOILET 3	2	7.00	14.00
LOCAL SERVER	1	8.00	8.00
OFFICE CASHIER	1	10.00	10.00
TECHNICAL ROOM	1	5.00	5.00
OFFICE SECRETARIAT	1	12.00	12.00
OFFICE SECRETARIAT MEDICAL	1	12.00	12.00
HEAD DOCTOR OFFICE	1	12.00	12.00
GENERAL MANAGER OFFICE	1	20.00	20.00
EXECUTIVE SECRETARIAT	1	12.00	12.00
WAITING ROOM	1	15.00	15.00
STATISTICAL COMPUTER OFFICE	1	12.00	12.00
SOCIAL OFFICE	1	12.00	12.00
ACCOUNTING OFFICE	1	12.00	12.00
OFFICE MANAGER	1	12.00	12.00
CHIEF FINANCIAL OFFICER	1	12.00	12.00
EXTERNAL CONSULTATIONS			459.50

Appendix A
Table of surfaces

ROOM	QTE	SU per room (m2)	SU (m2)
PROSTHESES LAB	1	25.00	25.00
LOCAL DENTAL TECH	1	5.00	5.00
DENTAL SURGEON OFFICE	1	15.00	15.00
OFFICE	1	15.00	15.00
DENTAL CARE ROOM	1	20.00	20.00
ODONTOLOGICAL CONSULTATIONS	1	15.00	15.00
OFFICE	1	15.00	15.00
NURSING OFFICE	1	12.00	12.00
PERSONAL TOILETS	1	7.00	7.00
WAIT	1	50.00	50.00
WOMEN'S LOCKER ROOM	1	8.00	8.00
PERSONAL TOILETS	1	7.00	7.00
CONSULTATION	1	15.00	15.00
CONSULTATION	1	15.00	15.00
TREATMENT ROOM	1	15.00	15.00
STORE	1	7.00	7.00
TECHNICAL ROOM	1	5.00	5.00
ARCHIVES	1	12.00	12.00
INTERN ROOM	1	20.00	20.00
TOILETS + PMR	1	11.50	11.50
CONSULTATION	1	15.00	15.00
CONSULTATION 2	1	15.00	15.00
CONSULTATION	1	15.00	15.00
MEN'S LOCKER ROOM	1	8.00	8.00
PERSONAL TOILET	1	7.00	7.00
CONSULTATION	1	15.00	15.00
CONSULTATION	1	15.00	15.00
CONSULTATION	1	15.00	15.00
SECRETARIAT	1	12.00	12.00
RESPONSIBLE OFFICE	1	15.00	15.00
TECHNICAL ROOM	1	3.00	3.00
CONSULTATION	1	15.00	15.00
CONSULTATION	1	15.00	15.00
HEMODIALYSIS UNIT			268.00
WAIT	1	15.00	15.00
BATHROOM	1	3.50	3.50
BATHROOM	1	3.50	3.50
DIALYSIS ROOM (12 BEDS)	1	96.00	96.00
WATER TREATMENT	1	12.00	12.00
PHARMACY RESERVE	1	15.00	15.00
NURSING STATION	1	15.00	15.00
DIRTY UTILITY	1	5.00	5.00
CLEAN UTILITY	1	5.00	5.00
TECHNICAL ROOM	1	3.00	3.00
TECHNICAL ROOM (STORAGE)	1	5.00	5.00
TRASH CAN	1	3.00	3.00
FRAMEWORK OFFICE OF CARE	1	15.00	15.00
PERSONAL TOILET	2	3.50	7.00
PERSONAL LOCKER ROOM	2	8.00	16.00
PERSONAL RELAXATION	1	12.00	12.00
OFFICE	1	10.00	10.00
FRAMEWORK OFFICE OF CARE	1	15.00	15.00
MEDCIN OFFICE	1	12.00	12.00
DAY HOSPITAL SURGERY			191.00
WAIT	1	15.00	15.00
BATHROOM	1	3.50	3.50

Appendix A
Table of surfaces

ROOM	QTE	SU per room (m2)	SU (m2)
BATHROOM	1	3.50	3.50
ARMCHAIR SPACE	3	10.00	30.00
SINGLE ROOM HDJ	3	15.00	45.00
PATIENT LOCKER ROOM	2	3.50	7.00
PATIENT TOILET	2	3.50	7.00
NURSING STATION	1	15.00	15.00
DIRTY UTILITY	1	5.00	5.00
CLEAN UTILITY	1	5.00	5.00
TECHNICAL ROOM	1	3.00	3.00
TECHNICAL ROOM (STORAGE)	1	5.00	5.00
TRASH CAN	1	3.00	3.00
FRAMEWORK OFFICE OF CARE	1	15.00	15.00
PERSONAL TOILET	2	3.50	7.00
PERSONAL RELAXATION	1	12.00	12.00
OFFICE	1	10.00	10.00
FUNCTIONAL EXPLORATIONS			185.50
WAIT	1	15.00	15.00
BATHROOM	1	3.50	3.50
BATHROOM	1	3.50	3.50
FUNCTIONAL EXPLORATION ROOM	5	15.00	75.00
NURSING STATION	1	15.00	15.00
FRAMEWORK OFFICE OF CARE	1	15.00	15.00
MEDCIN OFFICE	1	12.00	12.00
DIRTY UTILITY	1	5.00	5.00
CLEAN UTILITY	1	5.00	5.00
TECHNICAL ROOM	1	3.00	3.00
TECHNICAL ROOM (STORAGE)	1	5.00	5.00
TRASH CAN	1	3.00	3.00
PERSONAL TOILET	1	3.50	3.50
PERSONAL RELAXATION	1	12.00	12.00
OFFICE	1	10.00	10.00
KINESITHERAPY			142.00
TREATMENT ROOM	1	15.00	15.00
STRETCHER SPACE	1	8.00	8.00
BOX (5 UNITS)	1	40.00	40.00
REEDUCATION MATERIAL STORAGE	1	15.00	15.00
DOCTOR'S OFFICE	1	12.00	12.00
KINESITHERAPIST OFFICE	1	12.00	12.00
SECRETARIAT	1	12.00	12.00
STORE	1	10.00	10.00
TECHNICAL ROOM	1	3.00	3.00
DRESSING ROOM AND PERSONAL TOILET	1	15.00	15.00
ORTHOPROTHESIST			153.00
TOOLS	1	6.50	6.50
BAND SAW	1	7.50	7.50
RESIN SPACE	1	7.50	7.50
ELECTRIC FURNACE THERMOFORMING SPACE	1	10.00	10.00
MILLING MACHINE	1	6.50	6.50
SURFACE MILLING MACHINE	1	6.00	6.00
BATHROOM	1	3.50	3.50
STORE	1	6.00	6.00
SEWING MACHINE	1	5.00	5.00
VACUUM PUMP (COMPRESSOR)	1	7.00	7.00
GRINDING ROTOR	1	3.00	3.00
MOUNTING WORKBENCH	1	10.00	10.00
FINISHING	1	5.00	5.00

Appendix A
Table of surfaces

ROOM	QTE	SU per room (m2)	SU (m2)
DRILL COLUMN	1	7.00	7.00
PLASTER MEASURE TRIES	1	15.00	15.00
OFFICE	1	12.00	12.00
TECHNICAL ROOM	1	3.00	3.00
BUREAU CONSULATION	1	15.00	15.00
DOUBLE SECURITY DOOR	1	7.50	7.50
WAITING SPACE	1	10.00	10.00
INTERFACE STRUCTURE			62.00
STORAGE STORE	1	15.00	15.00
LOCAL FOR SALE	1	25.00	25.00
BATHROOM	1	7.00	7.00
CONSULTATION 1	1	15.00	15.00
KITCHEN			202.50
CHANGING ROOMS + TOILETS	1	15.00	15.00
TECHNICAL ROOM	1	3.00	3.00
STORE	1	10.00	10.00
COLD ROOM	1	10.00	10.00
THE DECONDITIONING	1	8.00	8.00
LOCAL TRASH	1	5.00	5.00
LOCAL GAS	1	5.00	5.00
VEGETABLE DAIRY	1	8.00	8.00
COOKING	1	40.00	40.00
OFFICE MANAGER	1	15.00	15.00
REFECTORY	1	60.00	60.00
OFFICE	1	10.00	10.00
DIVES	1	10.00	10.00
WASHING	1	3.50	3.50
BUANDERY RH			224.50
CLEAN LINEN STORAGE AREA	1	50.00	50.00
DRYING IRONING	1	80.00	80.00
WASH AREA	1	36.00	36.00
DOUBLE SECURITY DOOR	1	12.00	12.00
OFFICE	1	12.00	12.00
TOILETS CHANGING ROOMS WOMEN	1	15.00	15.00
DOUBLE SECURITY DOOR	1	4.50	4.50
MEN'S LOCKER ROOM	1	15.00	15.00
MAINTENANCE WORKSHOP + WAREHOUSE			188.00
CLOAKROOM	1	10.00	10.00
MAIN WORKSHOP	1	25.00	25.00
TECHNICAL ROOM	1	3.00	3.00
ELECTRONIC AND BIOMEDICAL WORKSHOP	1	25.00	25.00
HEAD OFFICE WORKSHOP	1	15.00	15.00
STORE	1	110.00	110.00
FLUID POWER PLANT			51.00
CENTRAL AIR MEDICAL	1	18.00	18.00
CENTRAL ROOM BOTTLE O2	1	15.00	15.00
MEDICAL VACUUM PLANT	1	18.00	18.00
WASTE			100.00
BURIAL CHAMBER			320.00
HALL + WAITING	1	15.00	15.00
FORMALITE WINDOW	1	12.00	12.00
WAITING ROOM VIP	1	15.00	15.00
VESTIARES MEN	1	10.00	10.00
CHANGING ROOMS WOMEN	1	10.00	10.00
SHOWROOM AND MEDITATION	1	50.00	50.00
MORTUARY TREATMENT ROOM	1	20.00	20.00

Appendix A
Table of surfaces

ROOM	QTE	SU per room (m2)	SU (m2)
AUTOPSY ROOM	1	15.00	15.00
WHITE/COLD ROOM	1	80.00	80.00
LOCKER ROOM	1	10.00	10.00
WASTE	1	3.00	3.00
STORE	1	8.00	8.00
FORENSIC MEDICINE OFFICE	1	15.00	15.00
WASHING	1	3.50	3.50
STOREROOM	1	5.00	5.00
BEDROOM PERSONAL REST ROOM	1	15.00	15.00
TECHNICAL ROOM	1	3.00	3.00
WASHING	1	3.50	3.50
OFFICE RESPONSIBLE FOR ROOM	1	15.00	15.00
TECHNICAL ROOM	1	12.00	12.00
KITCHEN BUANDERY ACCOMPANENTS			80.00
KITCHEN	1	25.00	25.00
STORAGE	1	15.00	15.00
CONDITIONING	1	15.00	15.00
WASHING	1	25.00	25.00