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Disparity of the Health Sector in Tunisia in Favor of the Centre-Eastern Region, the Sahel and Sousse Governorate

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Abstract

This research is part of a general study divided into two sections with the overall objective of determining the ins and outs of the private medical real estate development in the city of Sousse. The 1st part aims to identify the ins of real estate development and demonstrate that it has been initiated since Law No. 90-17 of 26 February 1990 (regarding the private real estate development), Law No. 91-63 of 29 July 1991 (relating to the public and private health organisation), the 1995 Free Trade Agreement with the European Union (introducing general measures for the liberalisation of services, including the health sector) and the Decree No. 2007-120 (facilitating complementary activity for doctors in the public sector).

The present research, which represents the 1st part of section 1, permitted us to understand the government sanitary policy and structure. The analysis revealed that public policy has implicitly and explicitly boosted the private health sector. The rise of the private sanitary sector has evolved in synchronicity with that of the public one focusing on the coastal regions. The Centre-East, Sahel regions and their governorates, including that of Sousse, were indeed favoured. This disparity is reflected through the polarization of the public specialized sanitary services and infrastructure at the regional level. Indeed, the universities and the university-hospitals (CHU) are polarized in the governorates of Tunis (the capital of Tunisia), Sfax, Sousse and Monastir. The lack of equipment and specialized medical and technical paramedical staff in public 1st line structures likely justifies the influx of patients and medical service providers to 2nd and 3rd line public hospitals (hospitals, clinics) and private ambulatory infrastructures polarized in the regional capitals of the governorates and delegations (administrative centres). The territorial attractiveness acquired through this polarization of the regional public specialized sanitary service and the dependence between the public health structure and the private structure could explain the polarization of the supply of private health services towards the city of Sousse.

Keywords: Health Sector, Disparity, Polarity

1. Introduction

The national liberalization policy of the 1990s concerned both sectors of health and real estate development. It was implemented following the promulgation of Law No. 91-63 of 29 July 1991 on health organization, Law No. 90-17 of 26 February 1990 on the consolidation of the legislation on real estate development, the 1995 Free Trade Agreement with the European Union (introducing general measures for the liberalization of services, including the sanitary sector) and the Decree No. 2007-120 (facilitating complementary activity for doctors in the public sector).Following the national liberalization policy, the private sanitary sector began to compete with the public sector. The same is true for the private real estate development sector, which is beginning to occupy an increasingly important place in the development, urbanization and transformation of Tunisian cities.

However, from the 2000s onward, we have noticed the spread of buildings exclusively or mainly intended for medical services. The private real estate development sector, specializing in health, medical and paramedical services, which is referred to as 'medical real estate development', has experienced since 2012 great growth in the main Tunisian coastal cities in the process of monopolization: the capital of Tunis and the agglomerations of Sfax and Sousse. In Tunis, the number of buildings intended for private medical real estate development peaked between 1990 and 2010 (Dhahbi 2015). The rise of medical real estate development and the private sanitary sector in these cities aroused our interest, especially since it is specific to Tunisia, is relatively recent and is very little developed in the literature.

2. Problem

In recent years in Sousse, it has been observed that a gradual change has taken place concerning the allocation of residential and office buildings towards that of medical services. Approximately 70% of office buildings are occupied by medical and paramedical service providers. Similarly, the majority of new or newly constructed buildings by private real estate developers are intended for the medical and paramedical sectors. The rise of private medical real estate development has resulted in the reconfiguration of the urban space of the city of Sousse. Obeying its logic, private medical real estate development has produced specific architectural, urban and landscape forms as well as a new urban aesthetic. It introduced a new way of making urban space: ´a medical urbanism´. Sousse therefore presents a favorable case study to analyse the rise of private medical real estate development and identify its ins and outs. To this end, our study has been divided into two sections:

- **The Objective of Section 1** of this study is to identify the drivers of the boom in private real estate development in the city of Sousse and to demonstrate that it was initiated by the development of the private health sector, particularly since its liberalization following the promulgation of Law No. 91-63 of 29 July 1991 on public and private health organization. To achieve this objective, it is first necessary to identify why and how the private sanitary sector has developed, particularly in the city of Sousse.
- **The Objective of this Article**, which constitutes the 1st part of section 1, is therefore to understand what has favoured the development of private medical real estate development by verifying the following two assumptions:
  - ⇒ Assumption 1: National policy has implicitly initiated the development of the private sanitary sector since the country's independence and has explicitly boosted it since the promulgation of Law No. 91-63 of 29 July 1991 (which marks the beginning of the liberalization policy);

⇒ Assumption 2: The development of the private sanitary sector has evolved in synchronicity with the public sector and is the result of the sanitary policy carried out since independence in favour of the coastal regions, including the Centre-East region and its governorates, particularly that of Sousse.

3. Materials and Methods

The verification of the two above-stated assumptions will be done in two steps:

- The 1st step aims to verify assumption 1. This step is based on the available literature to understand the Tunisian sanitary policy and how the public, para-public and private sanitary structure and offers are organized and distributed throughout the Tunisian territory;
- The 2nd step aims to verify assumption 2 and is based on the analysis of statistical data available from the latest official censuses (Directorate of Equipment & DRCPS, 2021). Its purpose is to carry out a cross-comparative analysis of the distribution of all the components structuring the health supply in the public and private sectors.

4. Results and Discussion

4.1. Thematic Context: Public Health, Health or Sanitary Service

Health is, according to the Petit Larousse, the state of someone whose body functions normally in the absence of disease. Medicine is the science whose object is to preserve this health against diseases or to restore it by neutralizing attacks of various kinds. Even though the adjectives health and medical are commonly inverted, the field of health and medicine can have different scopes. Indeed, the scope of the health field is broader. It encompasses everything related to the promotion of public health such as the quality of the environment, the living environment (hygiene, food safety, waste management, pollution), risk management (fire, earthquake, flood, etc.) and social welfare. On the other hand, the medical field only concerns health means or services (medical and paramedical).

Health or sanitary services include the diagnosis of the disease, care, treatment and medical interventions of a preventive and curative nature. This care is deployed by health professionals to preserve and restore the health of patients.

By health professionals, we mean the medical staff (general practitioners and specialists, pharmacists, dentists) and paramedical staff (paramedical agents and technicians such as nurses, physiotherapists, etc.). In both the public and private sectors, the health or sanitary service (medical and paramedical) can be provided by two types of structure: inpatient (with accommodation) and outpatient (ambulatory). In Tunisia, health professionals who provide health services can practice:

- In the private sector (free practice medical staff) in private establishments such as clinics, laboratories, premises, offices, buildings, complexes and medical centres. Pharmacists belong to the pharmaceutical industrial sector which is interdependent on the medicinal field;
- In the public sector, full-time in public health institutions such as hospitals, basic or specialized health centres (etc.);
- Simultaneously in the public and private sectors.

4.2. Public Health and Sanitary Policy in Tunisia

In the aftermath of independence, being aware of the importance of the health sector as a driver of social and economic development, the government directed; within the framework of the four-year plan; its health policy towards three priority aspects (Chadli, 2010, p. 4):

- Demographic balance and the intensification of hygiene prevention;
- The optimization of hospital activity to open the hospital to all social classes:
  - ⇒ By granting doctors the choice of practising full-time in hospitals with the possibility of devoting two afternoons to private activity;
  - ⇒ By increasing staff compensation;
  - ⇒ By improving premises and equipment;
- The creation of medical education.

In 1974, the government created the Ministry of Public Health and granted it the task of monitoring the health of the population by developing, planning and implementing public health policy by decree No. 74-1064 of 28 November. Similarly, the Ministry, which has regional directorates, is responsible for regulating, supervising, assisting, managing and promoting the three public, para-public and private sectors and for ensuring the administrative and financial supervision of all their healthcare establishments. See Figure 1. Health structure in Tunisia and Figure 2. Evolution of health infrastructure by sector from 2011 to 2021.

4.2.1. Public Structure for the Supply of Health Services

To cover the entire Tunisian territory, the Ministry of Health (Ministry of Health, 2023) arranges a hierarchical public structure for the supply of health care. With the public administrative establishments (EPA), non-administrative establishments (EPNA) and public health establishments (EPS) under its supervision, it has an infrastructure that allows the training of health professionals and access to citizens to:

- Basic health care at the level of sanitary districts (1st line);
- Basic and specialized health care at the regional level (2nd line); Health care and university training at the regional level (3rd line) and finally
- Health remedies.

4.2.1.1. Basic Health Care at the Level of Sanitary Districts (1st line)

According to Article 2 of Decree No. 2000-2825 of 27 November 2000, the health district is a functional entity organized territorially in a geographical area that may concern one or more delegations. It includes:

- A hospital infrastructure consisting of district hospitals (HC: hôpitaux de circonscription). These are public administrative establishments (EPAs) that include at least a medical department, a maternity ward and a basic technical platform (National Health Portal 2023). If there is no district hospital, patients are referred to a regional hospital or university-hospital (CHU: hôpital universitaire). Tunisia has a total of 110 district hospitals (Directorate of Equipment & DRCPS, 2021);
- An ambulatory infrastructure consisting of rural maternity wards and basic health centres. The health centres include a maternal and child protection centre, a basic health care centre, and a treatment room. These basic health Centre form a decentralized network that meets the needs for basic preventive and curative care (in 2008, Tunisia had a total of 2,067 health centres or 1 for every 4,500 inhabitants).According to Article 4 of Decree No. 2000-2825 of 27 November 2000, the basic health centres in each district are administratively attached to the district hospital or the basic health group or, where applicable, to a regional hospital (National Health Portal 2023). The basic health group, under the supervision of the Ministry of Health, manages the administrative and financial affairs of all the basic health centres under its supervision. According to Law No. 91-63 of 29 July 1991, the

group ensures through its centres the treatment of common diseases, maternal and child protection as well as the prevention and control of communicable and contagious diseases. School and university medicine is integrated into basic health care. The same staff of basic health centres ensures health coverage of educational and university establishments at the district level.

Figure 1. Health Structure in Tunisia

Source: Author (Ministry of Health Portal, 2023

<table>
<tr><th colspan="4">Public Health Sector (Under the Supervision of the MS)</th></tr>
<tr><th colspan="4">Health Services for Citizens</th></tr>
<tr><th colspan="2" rowspan="2">Territorial Jurisdiction/ Type of Health Service</th><th rowspan="2">Hospital Structure</th><th colspan="2">Outpatient Structure</th></tr>
<tr><th>Medical Care</th><th>Analytical Laboratories</th></tr>
<tr><td colspan="2">3rd Row:
National or inter-regional scale.
University Health and Educational Services in General and Specialized Medicine:
-Medical and surgical
- Preventive and curative, obstetric and emergency in nature under the responsibility of basic health centres;</td><td>University hospitals and university hospitals: CHU</td><td>- Institutes, units and specialized centres for haemodialysis, dental and prosthesis laboratories.</td><td>Laboratories and centres:
- University hospital structures;
-Independent of the Ministry of Health.</td></tr>
<tr><td></td><td>2nd Row:
Regional level: of a governorate or several delegations.
Health Services in General and Specialised Medicine:
- Medical and surgical in nature;
- Preventive and curative, obstetric and emergency in nature under the responsibility of basic health centres.</td><td>Regional Hospitals: HR
May have the vocation of an interregional pole when the regional hospital is in the capital of the governorate or in an area comprising several governorates and when they represent a reference in terms of competence related to one or more services.</td><td>- Regional delegations of the National Office for the Family and Population;
- Regional centres for school and university medicine.</td><td>Laboratories and centres:
- Regional hospitals;
- Regional public health laboratories.</td></tr>
<tr><td></td><td></td><td>1st line: Constituencies
Local level: one or more delegations.
Health Services in General Medicine
- Preventive, educational, curative, obstetric and emergency in nature.</td><td>District Hospitals: HC</td><td>Groups and Basic Health Centres.</td><td>-Laboratories in district hospitals and basic health centres.</td></tr>
<tr><th colspan="4">Health Remedies (Pharmaceutical Industry)</th></tr>
<tr><th colspan="2">Role</th><th colspan="2">Structure</th></tr>
<tr><td colspan="2" rowspan="2">Supply and distribution.</td><td colspan="2">The Central Pharmacy (PC) Public non-administrative establishments (EPNA).</td></tr>
<tr><td colspan="2">The Institute Pasteur de Tunis (IPT).</td></tr>
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<tr><td colspan="2">The National Pharmacovigilance Centre (CNPV).</td></tr>
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<tr><th colspan="3">Broader Public Sector</th></tr>
<tr><th colspan="3">Health Services for Public Staff</th></tr>
<tr><th>Territorial Jurisdiction/ Type of Health Service</th><th>Hospital Structure</th><th>Outpatient Structure</th></tr>
<tr><td>National

- Preventive, curative and emergency in nature under the responsibility of basic health centres;
- Medical and surgical in general and specialised medicine.</td><td>-3 military hospitals of the Ministry of Defence;
-1 hospital of the internal security forces of the Ministry of the Interior.</td><td>CNAM:
-6 Polyclinics (outpatient care structures) in El Omran, Khadhra city, Bizerte, Sousse, Sfax and Metlaoui.
-Haemodialysis centres
-1 Orthopaedic equipment centre in Ksar Said
- Large public companies: medical services and centres for customs personnel, SNCFT, SNT, SNTRI, SONEDE, STEG, OACA and TUNISAIR, etc;
-Occupational medicine groups.</td></tr>
</table>

<table>
<tr><th colspan="3">Private Health Sector</th></tr>
<tr><th colspan="3">Health Services for Citizens</th></tr>
<tr><th>Type of Health Benefit</th><th>Hospital Structure</th><th>Outpatient Structure</th></tr>
<tr><td>- Preventive and curative, obstetric and emergency in nature under the responsibility of basic health centres;
- Medical and surgical in general and specialized medicine.</td><td>Private Clinics</td><td>- Practices of general or specialized medicine;
- Independent specialised centres: authorised haemodialysis centres, assisted medical procreation (ART), thalassotherapy, medical imaging and radiology;
- Independent specialized laboratories: medical biology analysis, pathological anatomy and cytology, cytogenetics, medical analysis.
-Medical complexes, called medical centres.</td></tr>
<tr><th colspan="3">Health Remedies</th></tr>
<tr><th>Role</th><th colspan="2">Structure</th></tr>
<tr><td>Drug manufacturing.</td><td colspan="2">Industrial pharmaceutical drug manufacturing units</td></tr>
<tr><td>Commercialization.</td><td colspan="2">Private pharmaceutical pharmacies and Para pharmacies.</td></tr>
</table>

4.2.1.2. Basic and Specialized Care at the Regional Level (2nd line)

Basic and specialized care is provided at the regional level through:

- A hospital infrastructure made up of regional hospitals. These hospitals have the highest reference level for specialized care and are usually located in the capitals of the governorates (administrative centres) and densely populated delegations. In 2008, there were 34 units with a capacity of 5,479 beds (Achour, 2011);
- An ambulatory infrastructure made up of the regional units of public administrative and non-administrative establishments under the supervision of the Ministry of Health: the regional delegations of the National Office for the Family and Population and the units and centres of the regional school or the university of medicine. Indeed, it is through these units that the regional directorates of public health ensure the management and monitoring of the health program designed at the central level by the Directorate of School and University Medicine of the Ministry of Health.

4.2.1.3. Care and University Training at the Regional Level (3rd Line)

At the regional level, the government has set up a different type of university-hospital infrastructure: healthcare and training services are provided in units, specialized centres, university-hospital laboratories or health structures independent from the Ministry of Health. These are public health establishments (EPS) defined under Law No. 91-63 of 29 July 1991 and Decree No. 2002-846 of 17 April 2002, as health establishments with a university vocation invested in the same way as all public health structures with medical, paramedical and scientific research training missions. These university-hospital infrastructures are equipped with specialized, outpatient ambulatory and/or inpatient hospital services whose main missions are to provide highly specialized care and to contribute to university, post-graduate medical, pharmaceutical and dental education. There are two types of EPS:

- Multipurpose general establishments: There are 2 hospitals in Tunis (Charles Nicolle Hospital, Rabta), 1 hospital in Sfax, 1 hospital in Sousse and 1 in Monastir (Fattouma Bourguiba Hospital);
- Specialized establishments: They are divided according to the type of drained patients (such as the Tunis Children's Hospital), to the pathology (such as the Salah Azzaiez Institute of Cancer and the Institute of Nutrition and Food Technology), or according to medical speciality (such as the Razi Hospital in Manouba and the Institute of Ophthalmology, etc.).

4.2.1.4. Health Remedies: Pharmaceutical Sector

The pharmaceutical sector is regulated by the Ministry of Public Health. In both the public and private sectors, there are very strict regulations governing the manufacture, importation, distribution, marketing of pharmaceutical remedies and the spread of private pharmacies. The management of the pharmaceutical sector is carried out by the Ministry of Health and the public establishments under its supervision:

- The National Laboratory for the Control of Medicines (LNCM);
- The National Pharmacovigilance Centre (CNPV);
- The Central Pharmacy of Tunisia (PCT) plays the role of the national purchasing centre to cover all the country's needs, and is the only establishment authorized to import medicines and vaccines (Achour, 2011, p. 12);
- The Institute Pasteur de Tunis (IPT);
- The network of private wholesale distributors SSP: it is through this network that the central pharmacy ensures the dispensing of medicines to all regions of the country.

4.2.1.5. Training of Health Professionals

The public structure includes a whole public system for training health professionals: faculties, institutes, schools, specialized units and centres with a university vocation. The first faculty of medicine was created in October 1964 and started its activities with 59 students. Ten years later, two other faculties of medicine were created: one in Sousse and another one in Sfax. In 1975, a faculty of dental surgery and a faculty of pharmacy were opened in Monastir.

Since the 1970s and 80s, The public system has not evolved. Currently, it includes the university-hospital structure, as well as the five mentioned above faculties of medicine (of Tunis, Sfax, Sousse, and Monastir). In addition, there are four higher schools of health sciences and techniques (reserved for the training of senior health technicians), 17 sections (reserved for midwives, physiotherapists, hygienists,

and laboratory technicians) and 19 public health professional schools reserved for the training of nursing staff. (Achour, 2011; Chadli, 2010).

4.2.2. Private Structure for the Supply of Health Services

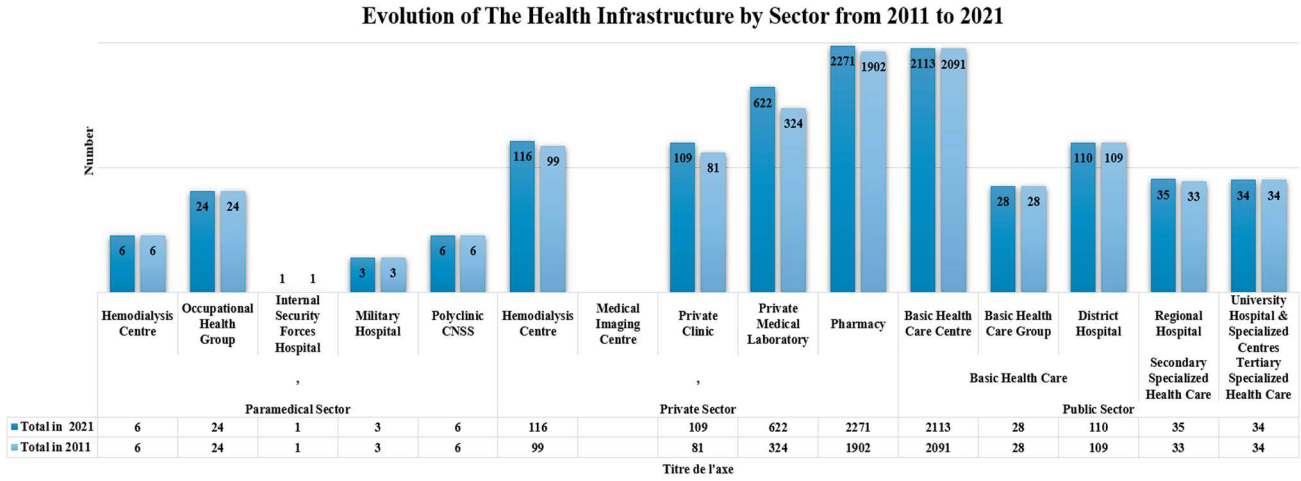
4.2.2.1. Basic and Specialist Healthcare

In the private sector, infrastructure includes:

- A hospital infrastructure (clinics): The development of hospitalization in the practice of private medicine is recent. Indeed, most of the establishments were created in the 1970s and more particularly in the 1990s. In 2008, there were 81 clinics with 2,578 beds, constituting 12.5% of the national hospital capacity (Achour 2011, p 9).
- Outpatient ambulatory infrastructure: This includes:
  - Centres: These are haemodialysis, medical imaging, and radiology centres. The most remarkable evolution has been that of haemodialysis centres, the number of which increased by 5.8 between 1990 and 2004;
  - Specialized laboratories: These are medical analysis, anatomy, cytology laboratories, etc;
  - Practices of general or specialized medicine: the practice of private medicine has always existed on an individual basis in ambulatory outpatient care practices (Achour, 2011, p. 9);
  - Medical complexes, called medical centres.

Figure 2. Evolution of Health Infrastructure by Sector from 2011 to 2021

Source: Author (Directorate of Equipment & DRCPS, 2021)



4.2.2.2. Health Remedies: Pharmaceutical Sector

Private stakeholders are involved at three levels in the pharmaceutical industry and the supply of remedies: manufacturing (manufacturing units or laboratories), dispensing (distributors) and marketing of remedies (pharmaceutical pharmacies and para-pharmacies). Since 1995, the pharmaceutical industry has been characterized by strong growth in the local production of medicines. The number of manufacturing units is 29 and the consumption covered by local manufacturing has increased from 8% to nearly 50% between 1987 and 2008 (Achour, 2011, p. 12). The creation and spread of pharmacies are regulated and subject to numerous clausus.

4.2.3. Structure for the Supply of Health Services in the Paramedical Sector

It is a health structure intended for public personnel, particularly the ministries of state security. It includes:

- A hospital infrastructure: This comprises 3 military hospitals of the National Defence Ministry and 1 hospital of the Ministry of the Interior's Security;
- The National Social Security Fund (CNSS) has a set of six outpatient care structures known as polyclinics. Similarly, some large public companies are equipped with medical services (Achour, 2011; Chadli, 2010). See Figure 1.

Figure 3. Distribution of Tunisian Regions

Source: Author

Administrative Division before 2023		Administrative Division from 2023
Greater Tunis Pop 2,880,969=24 % Tunis Ariana Ben Arous Manouba		Region 1
Northeast Pop 1654 455=14 %	Northwest Pop 1,188: 866=10 %	Region 2
Nabeul	Beja	
Zaghouan	Jendouba	
Bizerte	Le Kef	
Siliana		Region 3
Central East Pop 2,822,891=24 %	Midwest Pop 1,520,595=13 %	
Sousse	Kairouan	
Monastir	Kasserine	
Mahdia		
Sfax	Sidi Bouzid	Region 4
	Southwest Pop 640 294=5 %	
	Gafsa Tozeur	
South East Pop 1,075,653=9 %	Kebili	Region 5
Gabes		
Medenine		
Tataouine		

The 3rd line hospital infrastructure is intended to supply general and specialized medical and surgical health care as well as university educational services at the inter-regional or even national levels. The analysis of the spread by region shows that only the 3 regions of Greater Tunis, Centre-East and North-East have university-hospital structures. The Greater Tunis region occupies 1st place with 17 university-hospital structures, which can justify its deficit in 1st and 2nd line structures. It is followed by that of the Centre-East (6 university hospitals) and then the North-East (1 university hospital). Compared to the governorates, Tunis occupies 1st place (with 13 university hospitals). Far behind the governorates of Sfax, Sousse and Manouba, are equal (2 university hospitals each), followed by those of Monastir,

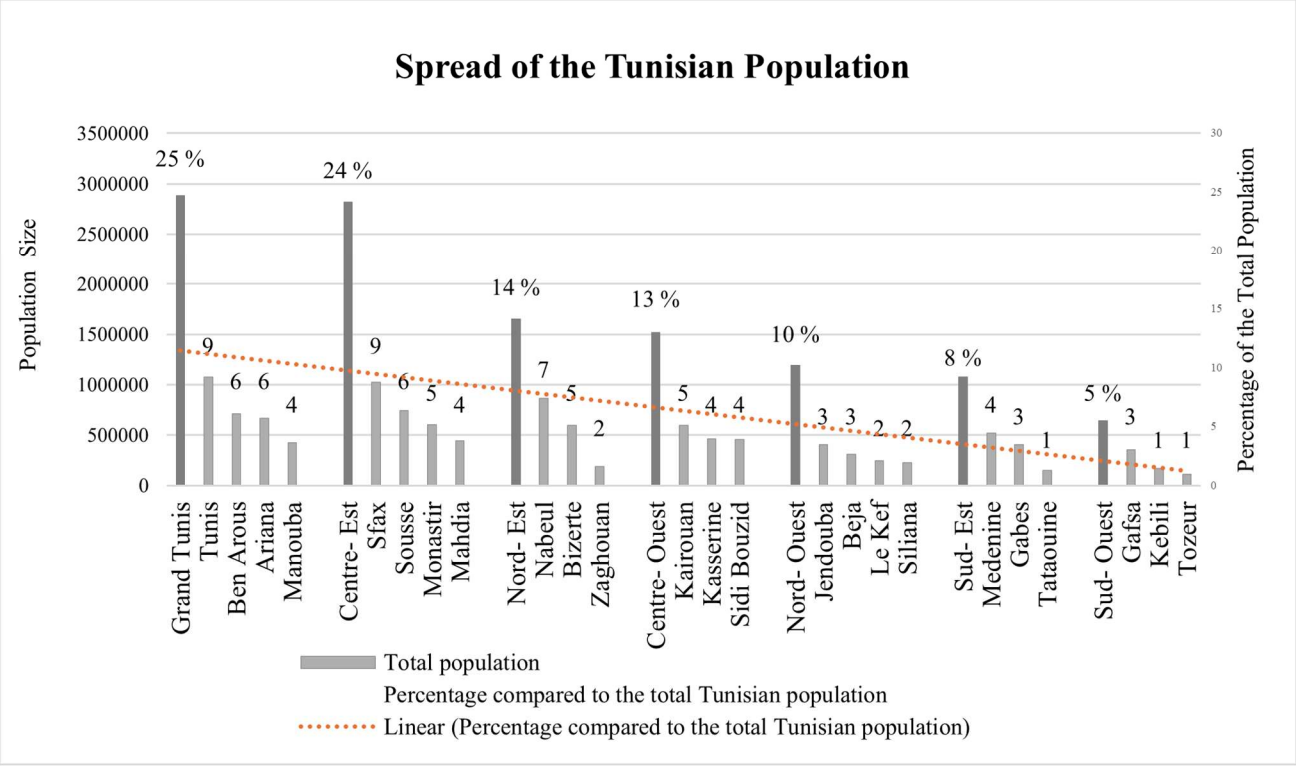
Mahdia, Ariana, Ben Arous and Zaghouan (1 university hospital each). The coastal regions in the North and Centre of the country are exclusively favored by the 3rd line infrastructure. The Tunis metropolitan area seems to take advantage of its function as capital and to have priority in terms of inter-regional services.

It should also be noted that the ranking of the Centre-East region in 2nd position can be explained by the fact that it includes the three governorates of Sfax, Sousse and Monastir, constituting the main coastal agglomerations going through a metropolization process. It should also be recalled that the five Tunisian faculties of medicine are in the coastal governorates: 1 faculty is in Tunis, 1 faculty is in Sfax, and 3 faculties (of medicine, dentistry and pharmacy) are in Monastir.

Concerning the hospital infrastructure (1st, 2nd and 3rd lines), the Centre-East region ranks 1st (38 hospitals) followed by the North-West (29 hospitals), the Centre-West (26 hospitals) and the Greater Tunis (22 hospitals) regions. In terms of bed capacity, the Centre-East region is outpaced by the Greater Tunis region which occupies 1st place with a bed capacity of 6637 against 5410 beds and an index of 23.04 public beds per 10000 inhabitants, followed by the South-West (with an index of 22.85), North-West (with an index of 22.2) and Centre-East (with an index of 19.16) regions.

Figure 4. Spread of the Tunisian Population

Source: Author (Directorate of Equipment & DRCPS, 2021)



4.2.3.1. Private Hospital Infrastructure

The analysis of the 2021 health map (Directorate of Equipment & DRCPS 2021) has shown that in terms of private hospital infrastructure, the Greater Tunis region occupies 1st place (with 38 clinics, a bed

capacity of 3247 beds and an index of 11.27 beds per 10,000 inhabitants). It is followed by the Centre-East region (with 29 clinics, a capacity of 1891 private beds and an index of 6.70 beds per 10,000 inhabitants) and then the South-East region (with an index of 7.73) which is slightly ahead of the Centre-East region in terms of bed index.

As for governorates, Tunis occupies the 1st place (with 34 clinics), far ahead of Sfax (13 clinics) which precedes Sousse (9 clinics). See Figure 7. Spread of private clinics by region and Figure 8. Spread of private clinics by governorate.

Figure 5. Spread of Hospitals by Region

Source: Author (Directorate of Equipment & DRCPS, 2021)

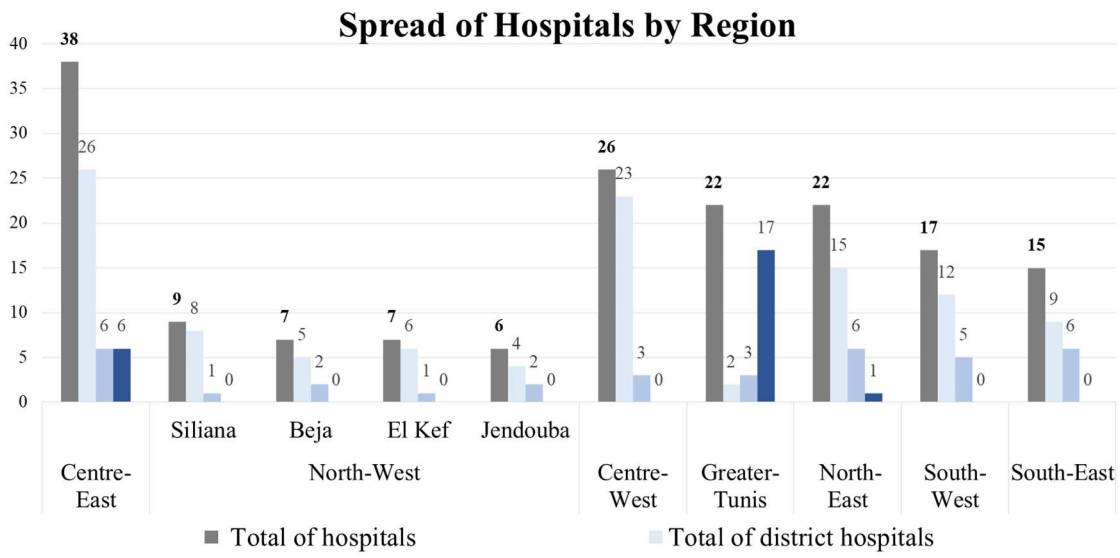


Figure 6. Spread of Hospitals by Governorate

Source: From the author according to the 2021 Health Map (Directorate of Equipment & DRCPS, 2021)

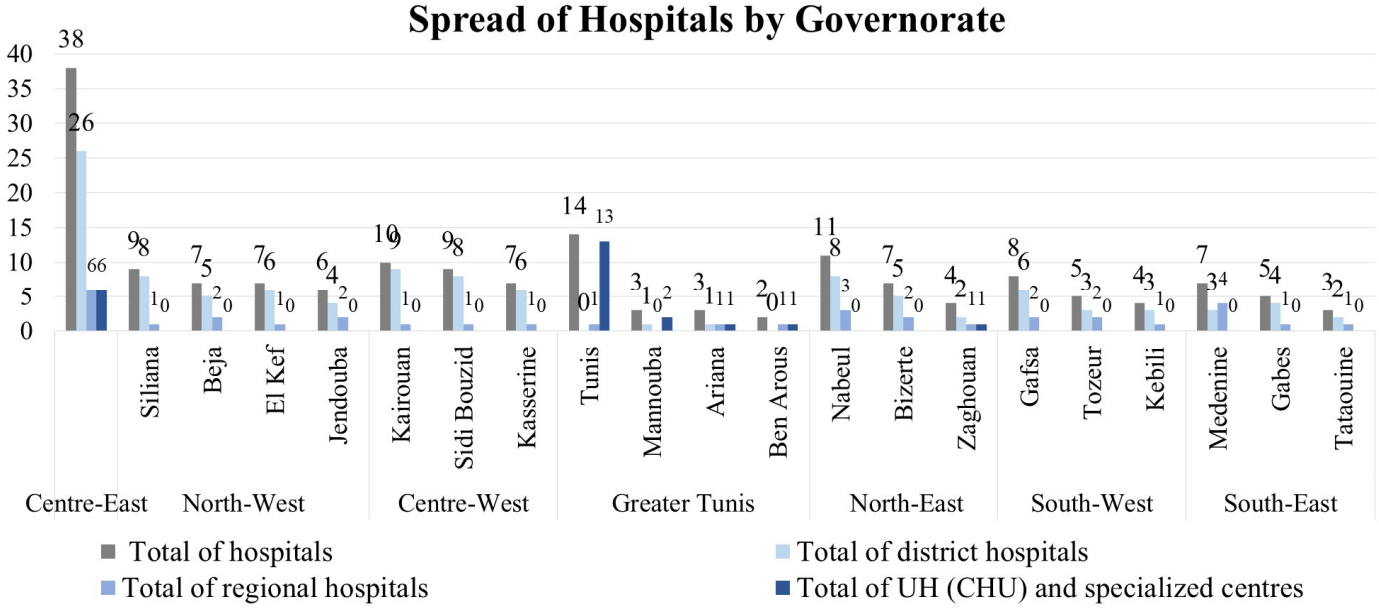


Figure 7. Spread of Private Clinics by Region

Source: Author (Directorate of Equipment & DRCPS, 2021)

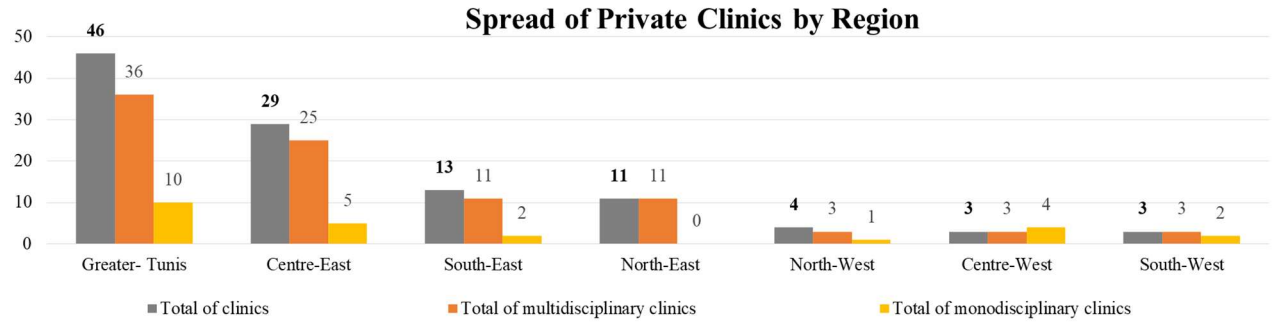
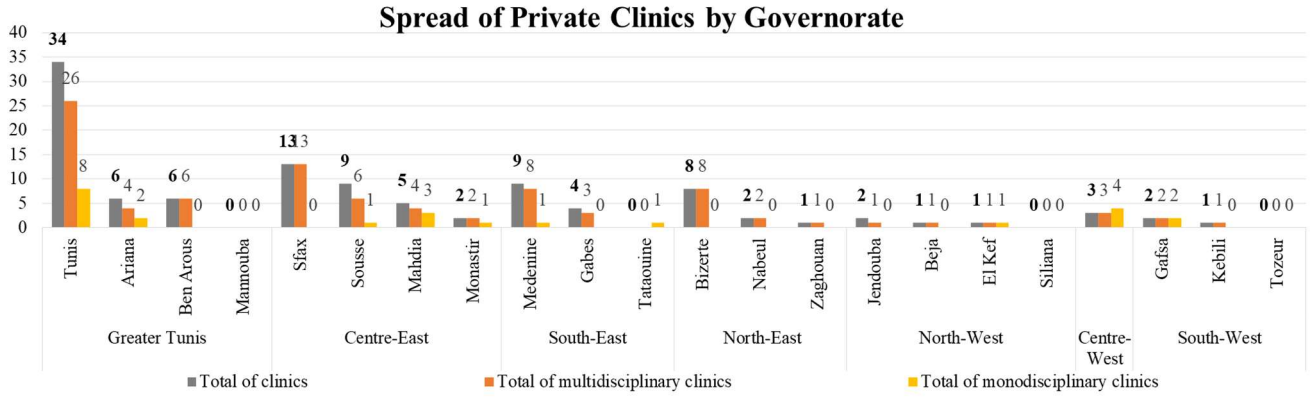


Figure 8. Spread of Private Clinics by Governorate

Source: Author (Directorate of Equipment & DRCPS, 2021)



4.2.4. Territorial Spread of the Ambulatory Outpatient Infrastructure

4.2.4.1. Equipped Haemodialysis Centres

In terms of the number of public and private centres equipped with haemodialysis, the Greater Tunis region ranks 1st, followed by the Centre-East region. Compared to all the governorates, the governorate of Tunis is the largest and is followed by the governorate of Sfax (with 15 private haemodialysis centres compared to 11 and the same number, i.e. 5 public haemodialysis centres each). The governorates of Sousse, Mahdia and Monastir have about the same number of private (5 each) and public centres (3 for Sousse and Monastir and 2 for Mahdia). See Figure 9. Spread of public services and private centres equipped with haemodialysis.

4.2.4.2. Private Imaging and Radiology Centres

In terms of the number of imaging centres, the Centre-East region ranks 1st, ahead of Greater Tunis with 26 private centres against 21. These two regions culminate in a 2nd group with similar values made up of the North-East (10 centres), Centre-West (9 centres) and North-West (8 centres) regions. This second group is followed by a 3rd group made up of the South-West (5 centres) and South-East (4 centres) regions.

The ranking of the Centre-East region in 1st position falls to the governorate of Sfax, which has 11 centres, ahead of all the other governorates. The latter is followed by the governorates of Tunis and Ben Arous (8 centres each) which outpaced the governorate of Sousse (7 centres).
The Greater Tunis region ranks 2nd in terms of imaging centres and second to last in terms of inhabitants per imaging centre. See Figure 10. spread of private imaging centres and Figure 11. Number of inhabitants per private imaging centre.

Figure 9. Spread of Public and Private Unities and Centres Equipped with Haemodialysis
Source: Author (Directorate of Equipment & DRCPS, 2021)

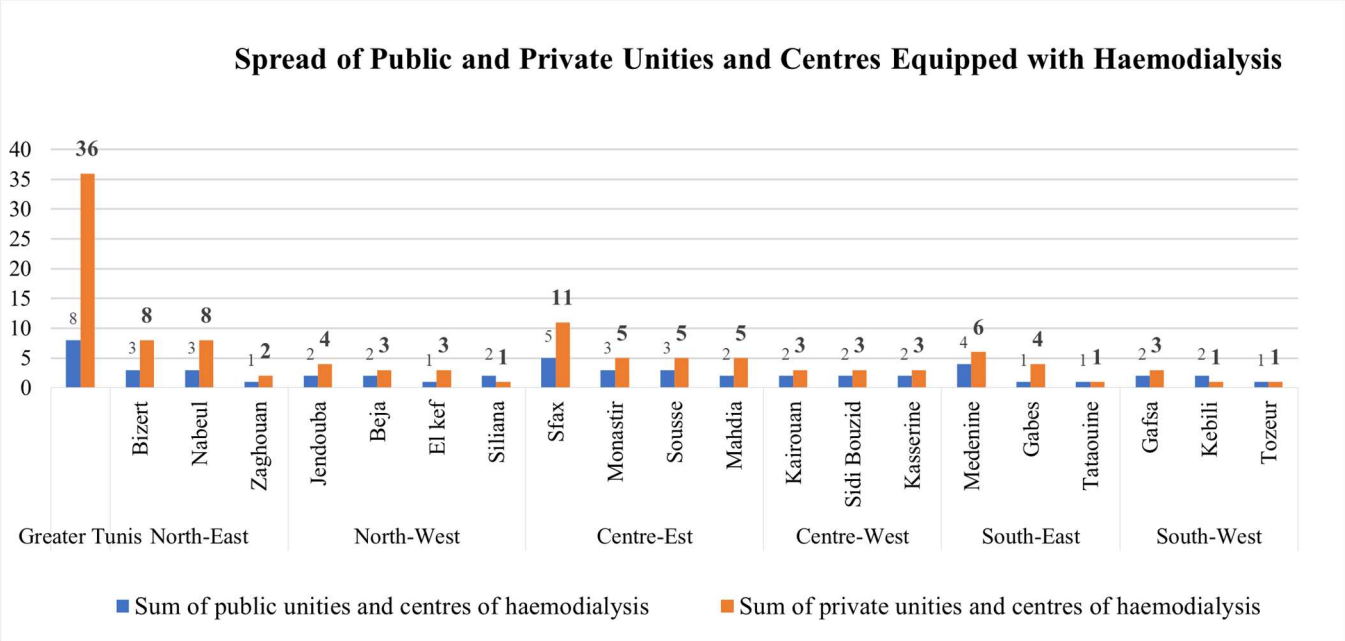


Figure 10. Spread of Private Imaging Centres
Source: Author (Directorate of Equipment & DRCPS, 2021)

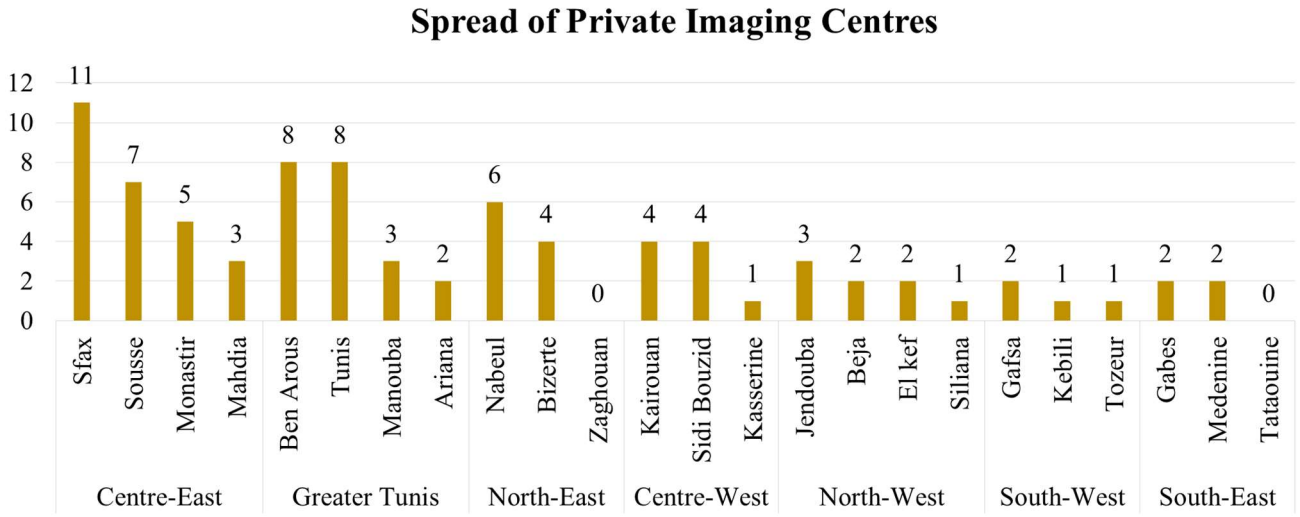


Figure 11. Number of Inhabitants per Private Imaging Centre

Source: Author (Directorate of Equipment & DRCPS, 2021)

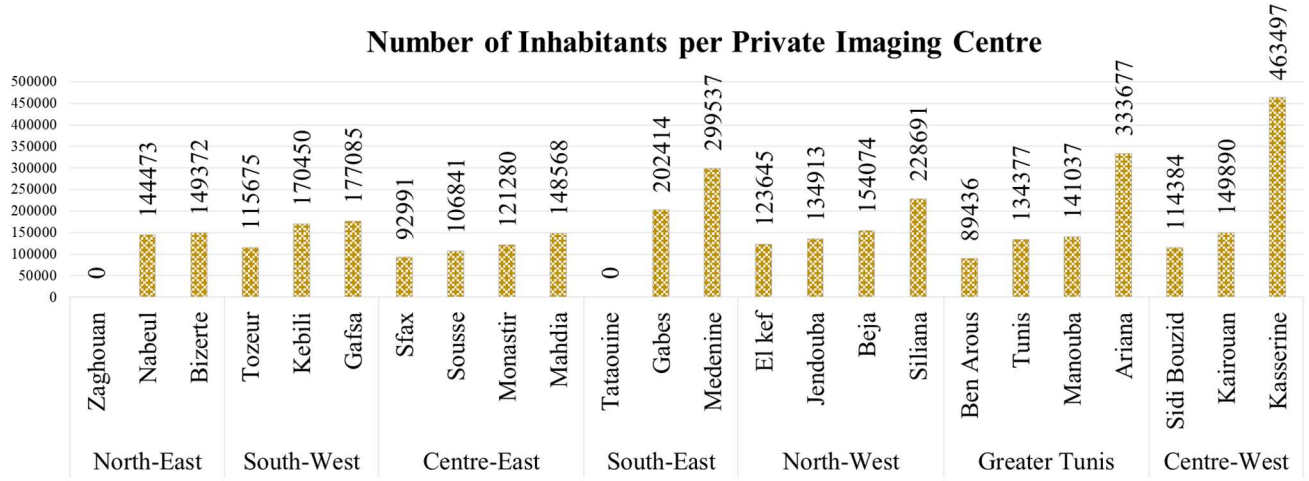
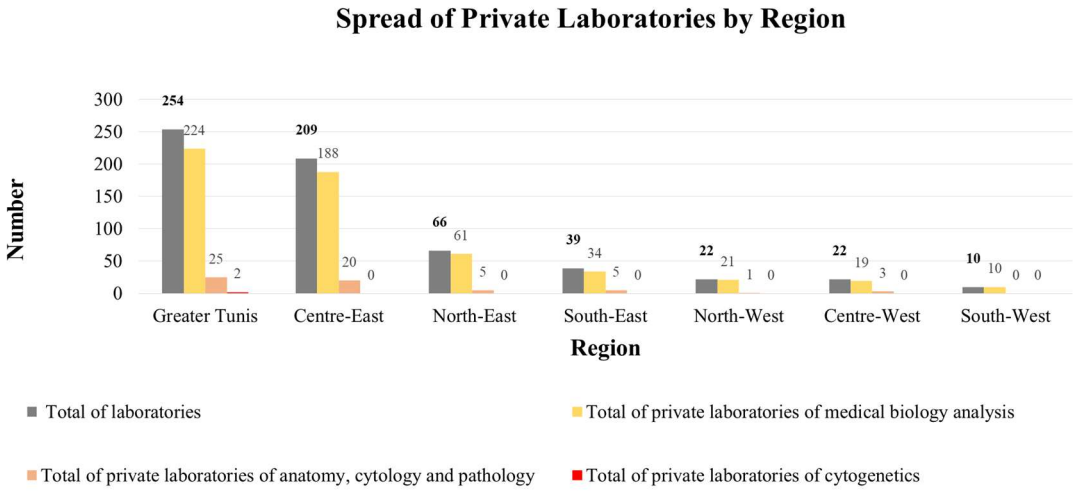


Figure 12. Spread of Private Laboratories by Region

Source: Author (Directorate of Equipment & DRCPS, 2021)

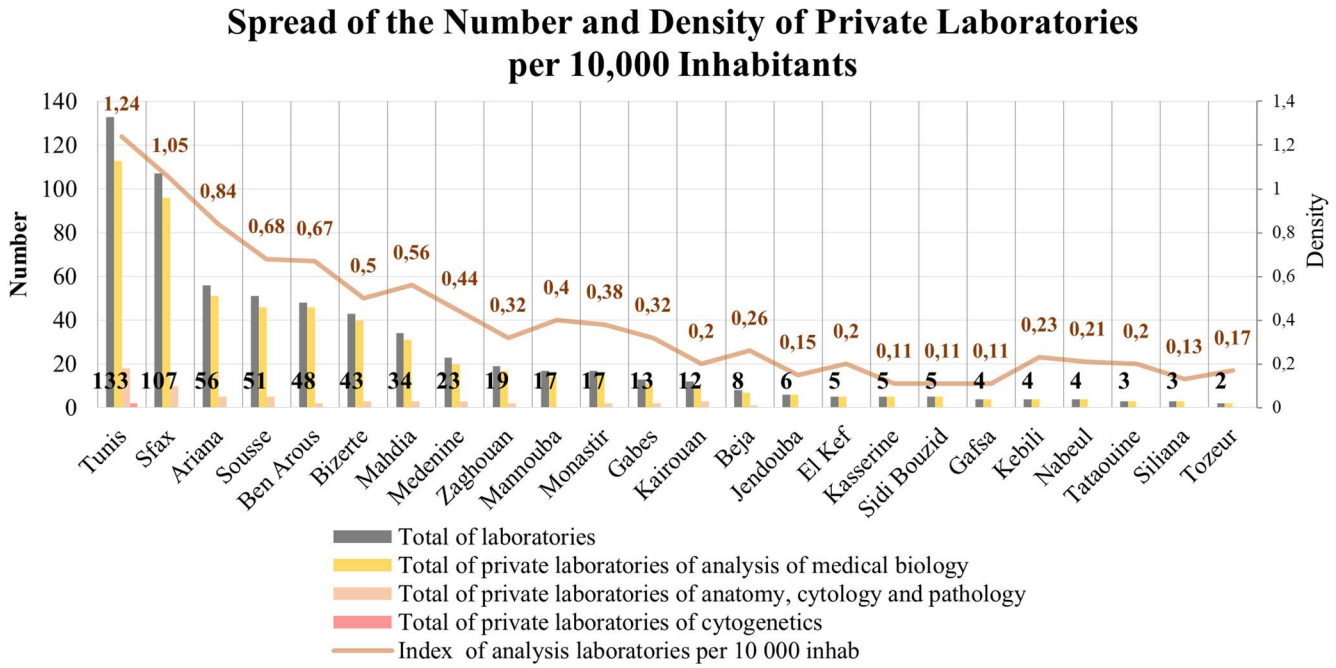


4.2.4.3. Private Medical Laboratories

Regarding the number of private medical laboratories, the Greater Tunis region occupies 1st place, followed by the Centre-East region with 254 private laboratories compared to 209. The North-East region ranks 3rd, far behind these two regions with only 66 private laboratories.

The governorate of Tunis (with 133 laboratories, an index of 1.24 laboratories per 10,000 inhabitants) is at the top of the list, followed by the governorate of Sfax (107 private laboratories, an index of 1.05 laboratories per 10,000 inhabitants), Ariana (56 laboratories, an index of 0.84 laboratories per 10,000 inhabitants) and Sousse (51 laboratories, an index 0.68 per 10,000 inhabitants). See Figure 12. Spread of private laboratories by region and Figure 13. Spread of the number and density of private laboratories per 10,000 inhabitants.

Figure 13. Spread of the Number and Density of Private Laboratories per 10,000 Inhabitants
Source: Author (Directorate of Equipment & DRCPS, 2021)



4.2.5. Territorial Spread of Medical Service Providers

4.2.5.1. General and Specialist Doctors

The Greater Tunis region ranks 1st both in terms of number and index of doctors (general and specialist doctors practicing in the public and private sectors) per 10,000 inhabitants. It is followed by the Centre-East region and then the North-East region:

- Greater Tunis has a total of 6046 doctors, including 1002 general practitioners (3.48 per 10,000 inhabitants) and 1506 specialists (5.23 per 10,000 inhabitants) in the public sector. In the private sector, it includes 1090 general practitioners (3.78 per 10,000 inhabitants) and 2448 specialists (8.50 per 10,000 inhabitants).
- The Centre-Est region has 4773 doctors (16.91 per 10,000 inhabitants) including 821 general practitioners (9.91 per 10,000 inhabitants), and 1262 specialists (4.47 per 10,000 inhabitants) in the public sector. In the private sector, it has 998 general practitioners (3.54 per 10,000 inhabitants) and 1692 specialists (5.99 per 10,000 inhabitants).

The gap between these first two regions (whose values are getting closer, and the rest of the regions is therefore proven.

As for the total number of doctors by governorate in the public and private sectors, Tunis and Sfax are at the top of the list, followed by the governorate of Sousse (which has 242 general practitioners and 424 specialists in the public sector compared to 264 general practitioners and 497 specialists in the private sector) and then that of Monastir.

In terms of the index of general practitioners in free practice, Tunis is at the top of the list (4.87 general practitioners per 10,000 inhabitants) followed by Monastir (3.55 general practitioners per 10,000 inhabitants) and Sousse (with 3.53 general practitioners per 10,000 inhabitants). In terms of the index of private medical specialists, the governorate of Tunis occupies the 1st position (14.56 specialists per 10,000

inhabitants) followed by Sfax (8.03 specialists per 10,000 inhabitants), Sousse (6.65 specialists per 10,000 inhabitants) and Monastir (4.32 specialists per 10,000 inhabitants). See Figure 14. Distribution of doctors by public and private sector and Figure 15. Distribution of the density of general practitioners and specialists per 10,000 inhabitants.

Figure 14. Spread of Doctors by the Public and Private Sector

Source: Author (Directorate of Equipment & DRCPS, 2021)

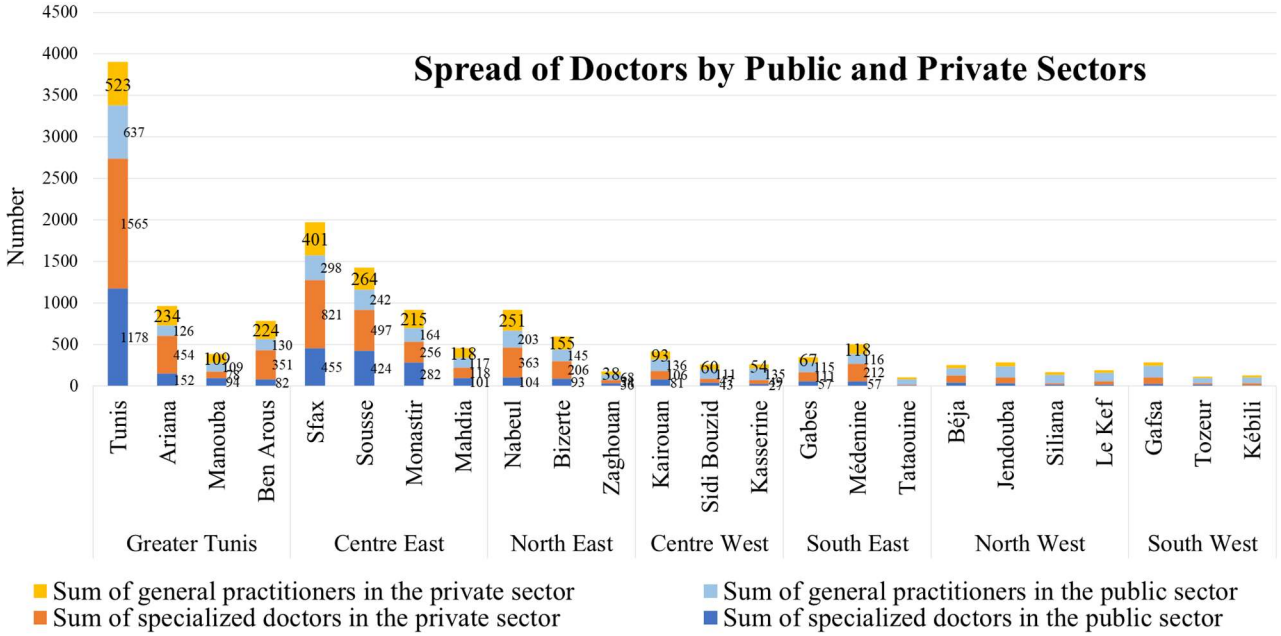


Figure 15. Spread by Region and Governorate of Dentists and Chairs in the Public and Private Sectors

Source: Author (Directorate of Equipment & DRCPS, 2021)

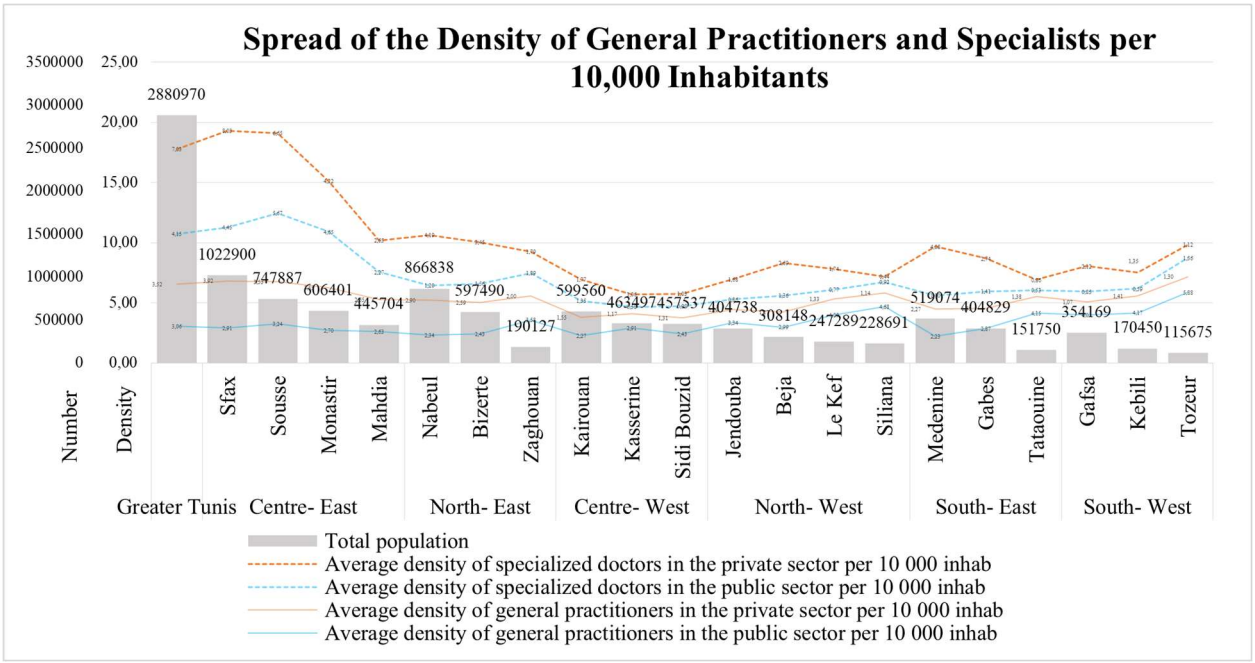


Figure 16. Spread of Doctors by Public and Private Sectors

Source: Author (Directorate of Equipment & DRCPS, 2021)

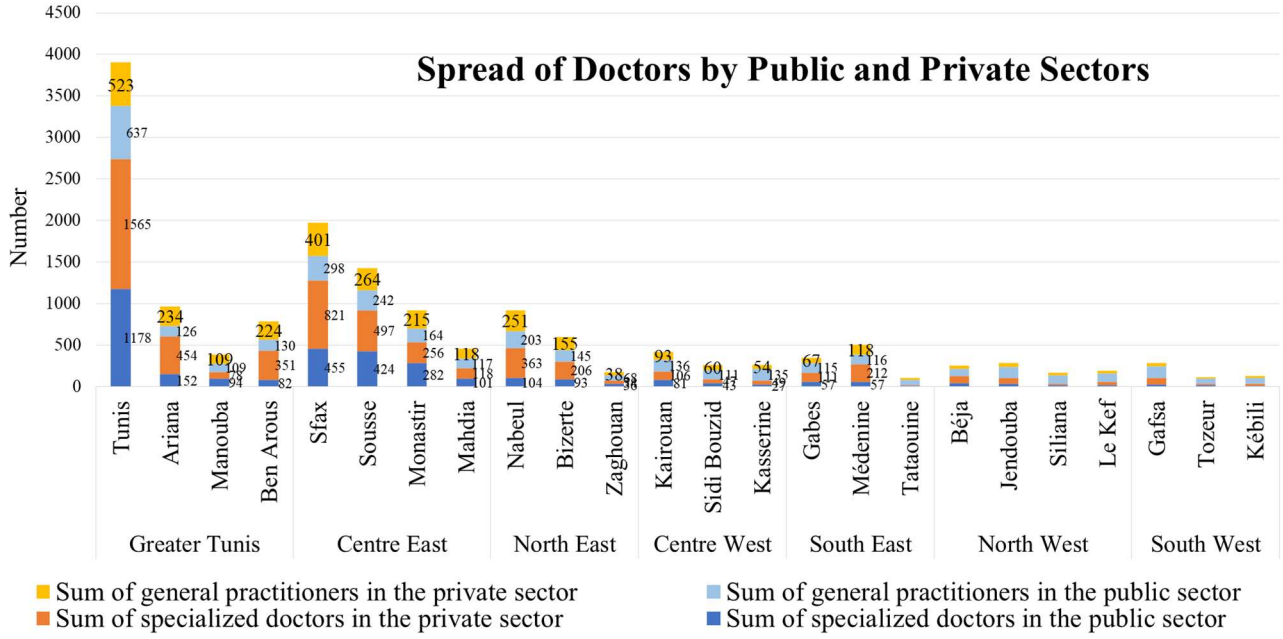
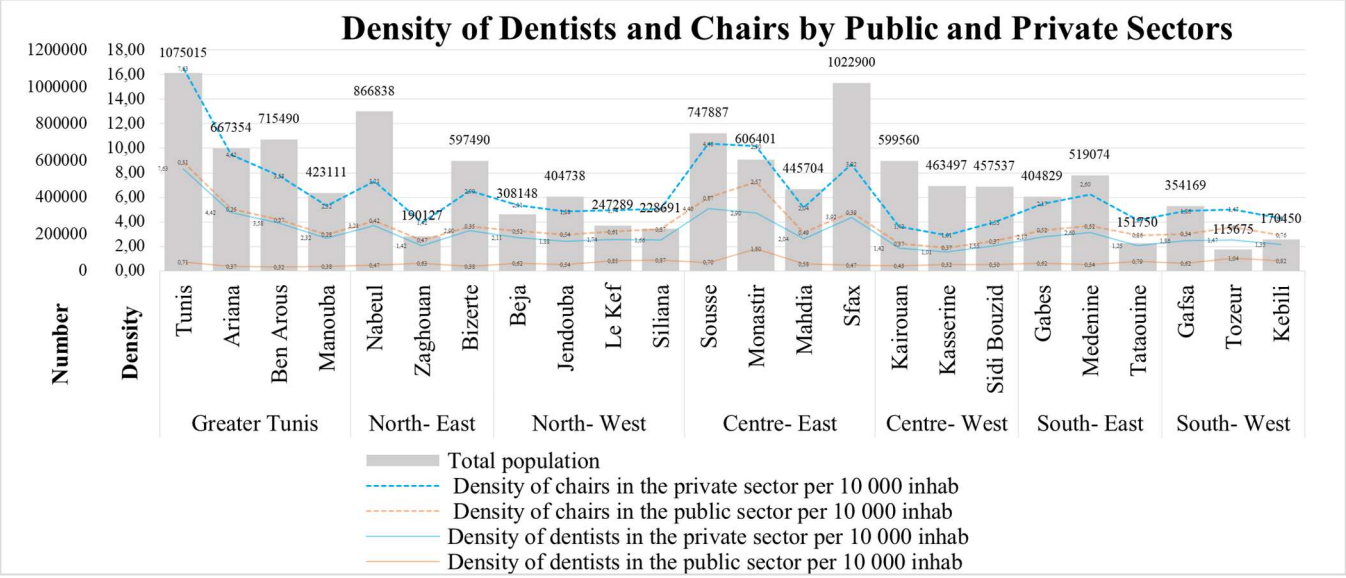


Figure 17. Density of Dentists and Chairs by Public and Private Sector

Source: Author (Directorate of Equipment & DRCPS, 2021)



4.2.5.2. Dentists

The Greater Tunis region occupies the first place with 5.10 dentists in the private sector per 10,000 inhabitants compared to 0.49 in the public sector. It is followed by the Centre-East regions (with 3.53 dentists in the private sector per 10,000 inhabitants compared to 0.83 in the public sector) and the North-East (with 2.89 dentists in the private sector per 10,000 inhabitants compared to 0.46 in the public sector). Regarding the density of dentists in the two sectors, the governorate of Tunis ranks 1st (with an index of 8.33) followed by Sousse (with an index of 5.09), Ariana (4.8), Monastir (4.7) and Sfax (4.39). See Figure

16. Spread by region and governorate of dentists and chairs in the private and public sectors and Figure 17. Density of dentists and chairs by public and private sector.

4.2.5.3. Pharmacists

Although the Greater Tunis region still occupies first place, the number of pharmacists practicing there in the public and private sectors is close to that of the Centre-East region: 664 pharmacists compared to 585 and 2.30 pharmacists compared to 2.07 per 10,000 inhabitants in the private sector; 199 pharmacists compared to 178 and 0.69 pharmacists compared to 0.63 per 10,000 inhabitants in the public sector.

Considering the spread by the governorate of private sector pharmacists, the governorate of Tunis ranks 1st (307 pharmacists and 2.86 per 10,000 inhabitants), followed by Sfax (221 pharmacists and 2.16 per 10,000 inhabitants), Nabeul (193 pharmacists and 2.23 per 10,000 inhabitants), Sousse (161 pharmacists and 2.07 per 10,000 inhabitants) and Monastir (136 pharmacists and 2.24 per 10,000 inhabitants). See Figure 18, Figure 19, and Figure 20.

Figure 18. Spread by Region of Pharmacists in the Public and Private Sectors

Source: Author (Directorate of Equipment & DRCPS, 2021)

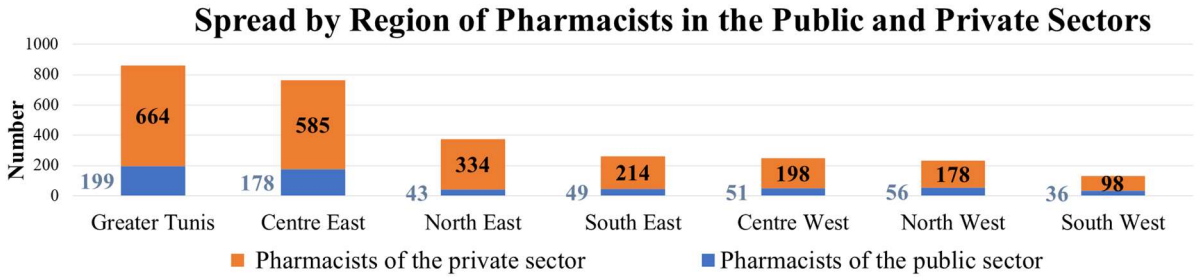


Figure 19. Spread by Governorate of Pharmacists in the public and Private Sectors

Source: Author (Directorate of Equipment & DRCPS 2021)

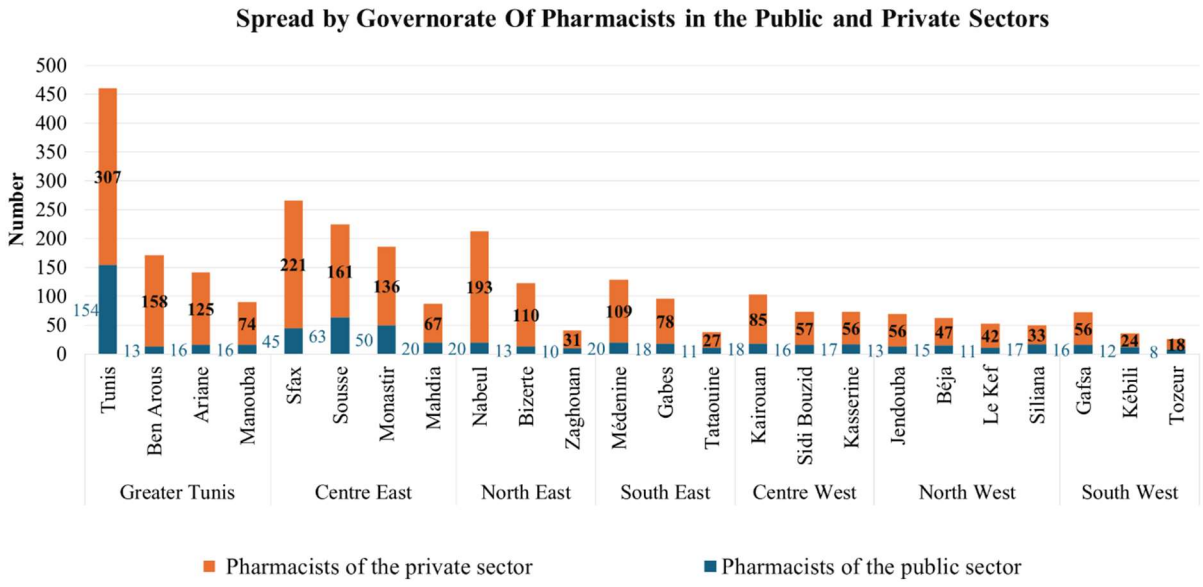


Figure 20. Distribution of Pharmacists and Day and Night Pharmacies

Source: Author (Directorate of Equipment & DRCPS, 2021)

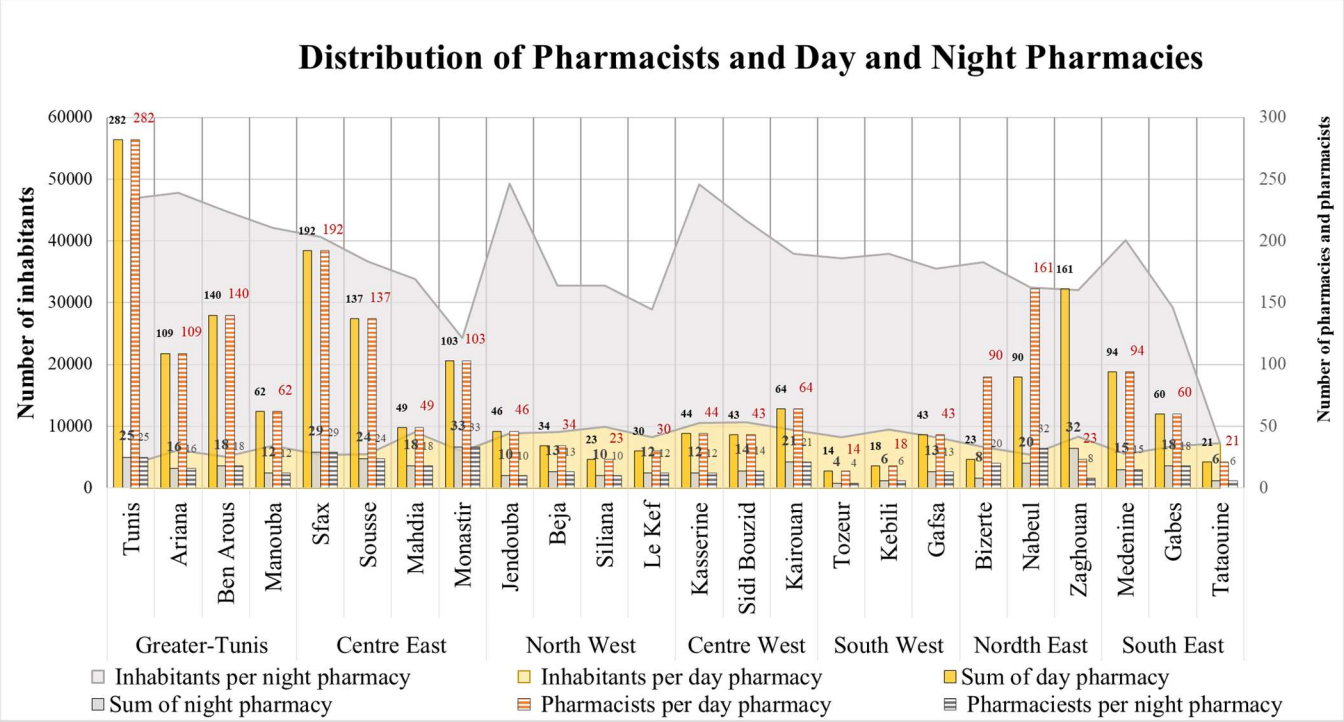
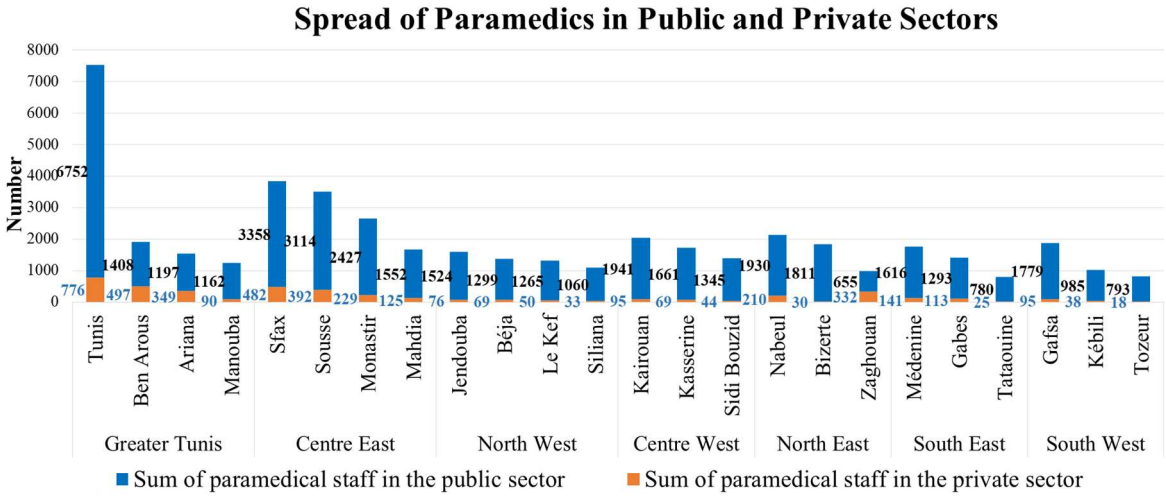


Figure 21. Spread of Paramedics in the Public and Private Sectors

Source: Author (Directorate of Equipment & DRCPS, 2021)



4.2.5.4. Paramedics

Regarding the total number of paramedics in the two sectors, the Greater Tunis region occupies 1st place, followed by the Centre-East region (with 1228 paramedics in the private sector and 10451 in the public sector).

As for the spread by the governorate of all paramedical agents, the governorate of Tunis ranks 1st (with 6752 public servants and 776 free practice agents) followed by (3358 public servants and 482 free practice agents), Sousse (3114 public servants and 392 free practice agents) and Monastir (2427 public servants and 229 free practice agents). The spread of private sector agents by governorate reveals that Tunis is at the top of the list followed by the governorates of Ben Arous, Sfax, Sousse, Ariana, Zaghouan and Monastir. Indeed, this sector seems to be highly dependent on hospital structures which predominates in the public sector. See Figure 21. Spread of paramedics in the public and private sectors

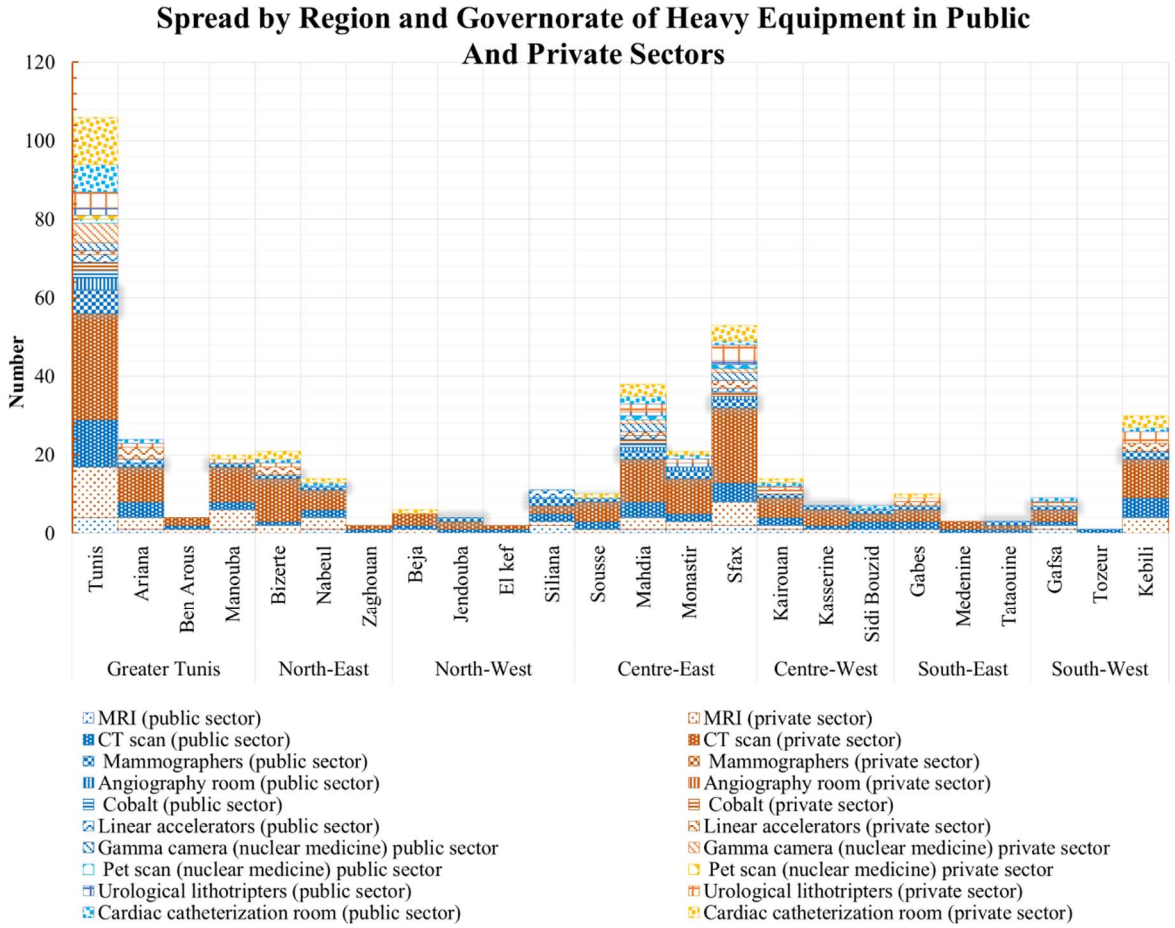
4.2.6. Territorial Spread of Medical Equipment

In terms of equipment, the Greater Tunis region ranks 1st followed by the Centre-East and then the North-East.

The governorate of Tunis is the best equipped, followed by the governorates of Sfax and Mahdia. Monastir occupies the 6th position after the governorates of Kelibia and Ariana. In the public sector, the governorate of Sousse appears to be relatively under-equipped. However, in the private sector, it competes with the governorates of Nabeul and Kairouan. See Figure 22. Spread by region and governorate of heavy equipment in the public and Private Sectors.

Figure 22. Spread by region and Governorate of Heavy Equipment in the Public and Private Sectors

Source: Author (Directorate of Equipment & DRCPS, 2021)



4.3. Synthesis of the Analysis

The 1st part of this work has contributed to understanding how the Tunisian public and private health supply is structured, organized, spread and spatialized throughout the Tunisian territory. The synthesis of the comparative analysis between the public and private health structures (which we will develop in the following paragraph) confirms Assumption 1 arguing that national policy has implicitly initiated the development of the private health sector since the country's independence and has explicitly boosted it since the promulgation of Law No. 91-63 of 29 July 1991, which marks the beginning of the liberalization policy aimed at minimizing the State's burdens. Similarly, the 2nd part allowed us to confirm Assumption 2 concerning the existence of a disparity spread of the health infrastructure in favour of the regions, governorates, and coastal cities, such that of Sousse.

4.3.1. Health Supply in the Public Versus Private Sector

The summary of the 1st part showed that the private health sector is increasingly competing with the public sector in terms of specialized health services. This applies to its hospital and ambulatory outpatient infrastructure, equipment and healthcare service providers:

- **Hospital Infrastructure: Stagnation of Public Supply Versus Development of Private Supply**
  The synthesis of the analysis showed that the hospital component (in terms of number of units and bed capacity) is growing faster in the private sector than in the public sector. The number of hospital units in the public sector is 197 hospitals (district, regional and university hospitals) against 109 in the private sector (private clinics). From 2011 to 2021, i.e. in 10 years, 3 public establishments were added (2 regional hospitals and 1 district hospital) against 28 private establishments (Directorate of Equipment & DRCPS, 2021).As for the hospital capacity, from 1990 to 2008, i.e. in 18 years, the capacity of private hospitals increased from 1142 beds to nearly 2578, thus approaching the public hospital capacity (Directorate of Equipment & DRCPS, 2021).
- **Hospital Infrastructure: Centralization of the Public and Private Supply of Specialized Services**
  In the public sector, the needs and location of the hospital and ambulatory structure and equipment are determined based on the five-year development plans and annual investment budgets with the supervision of the Ministry of Economic Development in charge of planning and the Ministry of Finance and after consultation between the regions. The analysis showed that the 2nd line public hospital infrastructure (regional hospitals) intended to supply specialized healthcare service at a regional level, follows the regional administrative division and is being spread equitably in all governorates. On the other hand, the 3rd line infrastructure (university-hospitals) intended to supply specialized medical and university-hospitals services at the inter-regional and national levels, prioritizes the governorates of Tunis, Sfax and Sousse.
  Regarding the private sector, it is also noted that the hospital infrastructure is denser in the governorate of Tunis, followed by that of Sfax and Sousse.
- **Ambulatory infrastructure: Density and Decentralization of the Public Supply of basic Healthcare Services Versus Centralization of the Private Supply**
  In terms of basic care, the public ambulatory infrastructure is decentralized to cover the entire population throughout Tunisia. Indeed, 95% of the population is within 4 km of a basic health centre (Achour, 2011, p. 19).

Regarding the private sector, following the promulgation of Law No. 91-63 of 29 July 1991 on health organizations, the health sector has developed in the absence of specific regulations for the definition of needs and the implementation of hospital and ambulatory structures. Despite the spectacular development of the private ambulatory structure for specialized health care over the last decade, its implementation has remained centralized. This is most of the time valid even for pharmacies whose creation is subject to the numerus clausus and for private haemodialysis centres subject to prior authorization according to the population needs index by the governorate. Indeed, in practice, professionals in the private sector tend to take advantage of the regulatory vacuum and assert their strategic attitudes by establishing themselves in dense and central urban areas generally corresponding to the capitals of the governorates and delegations. (National Health Portal, 2023; MSP, 2023; Achour, 2011).

- **Ambulatory Infrastructure: the National Policy Strengthens the Public Supply of Basic Health Care and the Private Supply of Specialized Healthcare**

  In terms of ambulatory infrastructure for basic health care, the public sector predominates over the private sector. From 2011 to 2021, i.e. in 10 years, 22 basic health centres were added to increase from 2091 to 2113.

  Relating to specialized services, from 2011 to 2021, i.e. in 10 years, the private sector has shown spectacular development: private medical laboratories have almost doubled from 324 to 622, haemodialysis centres have increased from 17 to 116 in 2021, and the number of private medical practices has been multiplied by 3.3, (Directorate of Equipment & DRCPS, 2021; Achour 2011, p. 9). This shows that during the same period, while the public sector was focusing on intensifying the ambulatory infrastructure of basic health care, the private sector evolved towards the supply of specialized health services.

- **Heavy Equipment: the Public Sector is Under-Equipped Compared to the Private Sector**

  In the public sector, the indices of the population's needs for each type of equipment are defined by the Ministry of Public Health and the list of these facilities is set by joint order of the Ministries of Public Health, Finance and Trade (National Health Portal, 2023).

  In the public and private sectors, the installation of certain buildings and technical equipment is subject to standards. Similarly, the list of heavy equipment being subject to prior installation authorizations is determined by the Health Organization Law (National Health Portal, 2023; MSP, 2023; Achour, 2011).

  Despite this, Figure 23 shows that both in terms of infrastructure and human resources (apart from equipped haemodialysis centres where the public sector takes precedence over the private sector), the public sector is largely under-equipped with heavy equipment. On the other hand, the rapid development of the private hospital sector has led to a multiplication of the number of this heavy equipment, faster than in the public sector (Achour, 2011, p. 20).

  This observation and the development of medical technologies have prompted the public authorities to adopt a health map for heavy equipment as a tool to regulate the installation of this equipment (Directorate of Equipment & DRCPS, 2021).

- **Healthcare System: the National Policy is Favorable to the Private Health Sector**

  After Tunisia's independence, the Tunisian state set up three funds (National Health Portal, 2023; Achour, 2011):

In 1958, a fund was created to cover workers in the private sector. This was replaced in 1960 by the National Social Security Fund (CNSS);

In 1959, two funds (pension and provident fund) were created to cover public sector workers. In 1975 they were replaced by the National Pension and Social Insurance Fund (CNRPS), which had legal personality and financial autonomy.

Since the law of 2 August 2004, a new reform has set up a single health insurance fund (CNAM) to cover public and private health services for workers in the public and private sectors. In addition to the compulsory membership of the CNAM; which has enabled the achievement of social coverage for 98% of the Tunisian population; Private and public sector companies can register their employees with private insurance companies or mutual societies.

In addition, the financing of the provision of health services in Tunisia is based on an effective mechanism that helps propel the public and private health sectors, because:

- It is overall, ensured, in equal parts, between public (State and Social Security) and private funds: direct payment of households and complementary health insurance (Achour, 2011, p. 16);
- It provides care for both providers and beneficiaries of public and private health services;
- It makes it possible to preserve financial balance while extending coverage to all socio-professional categories. Several health care formulas make it possible to adapt to the profile of the insured person: free for the insolvent poor, partial for the disabled, partial subsidy or reimbursement for the middle to well-off classes.

  However, interviews with public officials revealed that in practice, given the current economic crisis, the CNAM is struggling to ensure coverage for all its members. Accumulating debts to public hospitals tends to favor the social security coverage of private service providers.

- **Medical Staff: Exclusively Public Training Structure, Selective and Capped Access to Medical Studies**

  Access to medical studies is highly selective. Access to specialized medical studies is regulated by annual competitive examinations for medical residency for which the number of open positions is set according to the annual budget of the MSP (Achour, 2011, p. 18).Despite the very significant increase in the number of baccalaureate holders, the capacity (which corresponds to that of the 5 national faculties of medicine) has been constant since 1994 and is equal to 800 students per year, including 500 specialists, 120 dentists and 150 pharmacists. (Achour, 2011, p. 12). This partly explains the faster growth in the number of medical specialists, the number of which was multiplied by 6.9 compared to 3.7 for general practitioners from 1970 to 2008 (Achour, 2011, p. 11). Between 2008 and 2009, the number of students in the public university health sector was 21,972 out of a total of 360,172 students (Ministry of Health, 2009).

  As for the assignment of doctors in the public and private sectors, the analysis of the 2021 health map (Directorate of Equipment & DRCPS, 2021), reveals that the share of specialized doctors practicing in the private sector is much higher than that of general practitioners practicing in the private sector and specialized doctors practicing in the public sector.

- **Paramedical body: Tunisia's Political Choice to Invest in the Training of Paramedical Staff Potentially Recruited in the Private Sector**

  Tunisia's political choice to invest in the public training of paramedical staff demonstrates its concern about obeying the standards of supervision of medical personnel in both the public and private sectors.

The annual number of candidates in public training structures is 1400 paramedics specialties. The number of nurses and midwives has increased at a rate close to that of doctors.

The proliferation since the mid-2000s of private structures for the training of only paramedics; the number of which has reached one hundred; demonstrates the political will to democratize the health system and to support both the public and private sectors (National Health Portal 2023; MSP 2023; Achour 2011).

Compared to the assignment of paramedical officers, overall, the number assigned in the public sector far exceeds that of those assigned in the private sector. However, it should be noted that this gap seems disproportionate because it considers public sector employees assigned to 1st line infrastructure (district hospitals and basic centres), 2nd and 3rd line (regional hospitals and university-hospital structures).

According to Achour, even if private clinics are required to comply with standards of 0.3 or 0.4 nurses per bed, depending on the type of care, in practice, there is a supervision rate of about 0.8 paramedics and 0.3 doctors per bed. The number of paramedical staff recruited in the private sector increased from 674 in 1981 to 2773 in 1995 and 4641 in 2004. Between 1998 and 2008, i.e. in 10 years, it is estimated to have multiplied by almost ten, from 500 to 5,000. The number of recruits is therefore growing faster in the private sector than in the public sector.

Ultimately, several facts seem to explain the rise of the private health sector: at the independence of Tunisia, national policy indirectly initiated the development of the private sector, which took off in the 1990s (the phase of its liberalization). With the establishment of a decentralized public infrastructure of basic services and a centralized public infrastructure of specialized health care and university services (regional hospitals, university-hospitals), it implicitly prepared a favorable ground for the prosperity of the private sector relating to the supply of specialized health care services. Indeed, the medical profession is dependent on public hospital and university-hospital structures of 2nd and 3rd grade. This dependence was only to be consolidated later with Law No. 91-21 of 13 March 1991 on the exercise and organization of the professions of doctor and dentist, allowing the latter to practice simultaneously in public hospital facilities and independently in private practices, laboratories or centres.

In addition, the lack of equipment or specialized staff in public 1st line structures can deteriorate the performance and quality of the services offered by the latter and justify the resort of patients to public 2nd and 3rd line hospital infrastructures and private hospitals (hospitals and ambulatory infrastructures. The same applies to service providers who prefer to work in public 2nd and 3rd line hospital structures, private hospitals(clinics) and ambulatory structures to enrich their professional careers. As a result, the centralization of these specialized healthcare infrastructures in certain regions (regional hospitals, university-hospitals, clinics, practices and private centres) may justify the mobility of patients from sparsely populated areas endowed only with public basic healthcare infrastructure to central areas endowed with public or private specialized health care infrastructure.

The performance of specialized services at the cutting edge of the latest technologies can explain the attraction of foreign patients to Tunisian private hospitals and ambulatory infrastructure, which therefore have every interest in maintaining their performance and quality of services and resisting cyclical risks (pandemics, economic crises and currency fluctuations).

4.3.2. Public and Private Health Sectors and Territorial Disparity

The analysis of the territorial distribution of the health structure can only be efficient by considering the demographic component. Indeed, the latest statistics (INS, 2022), have revealed that the Tunisian population is decreasing from North to South. The North of Tunisia is the most populous territory (Greater Tunis, North-East and North-West regions). It is home to 49% of the Tunisian population and is followed by the East and West regions of the Centre (37%) and the East and West regions of the South (13%). The regions of Greater Tunis (home to 25% of the Tunisian population) and Centre-East (home to 24% of the Tunisian population) are therefore the most populous in Tunisia. They both encompass four governorates with equivalent populations respectively: Sfax competes with Tunis, Sousse with Ben Arous, Monastir with Ariana and Mahdia with Manouba. See Figure. 4. Distribution of the Tunisian population. The understanding of the phenomenon of disparity cannot therefore be dissociated from the two variables: number and density.

- **Spread of Public and Private Hospital Infrastructure: Existence of a Disparity Spread in Favor of the Coastal Areas, the Centre-East Region and its Coastal Governorates**

  Concerning the territorial distribution of the public hospital infrastructure of 1st (district hospitals) and 2nd lines (regional hospitals), there is an equitable distribution throughout the Tunisian territory.

  As for the territorial distribution of the 3rd line public hospital infrastructure (supply of health care services and specialized university-hospitals), there is a clear and exclusive disparity in favor of the North, Centre and the governorates of Tunis, Sfax and Sousse.

  It would therefore seem that these three governorates were expressly chosen to polarize this inter-regional and national service. This necessarily has a link with the history and strategic position of these 3 main economic cities. According to Bennasr (2012, p. 2), The primacy of maritime trade and the emergence of Saharan trade in the 16th century made coastal cities such as Tunis, Sfax, Sousse, Bizerte, and Mahdia the interfaces of a "primitive globalization". The three governorates are located on the Maritim coast, respectively in the north, in the centre and the south separated at equal distances. The important infrastructure they inherited from the colonial era (ports, railways, schools, hospitals, etc.) was exploited and developed after independence. These three cities have been favored by their accessibility from the national road (RN1 built in 1931) running along the entire national territory from the northern front to the southern front (on the border with Libya) now reinforced by the motorway (A1 built between 1981 and 2017) as well as the existence of the airports of Carthage (built-in 1972), that of Monastir (dating from 1981) and that of Sfax (dating from 1980).

  This polarization around the main coastal agglomerations is also reflected in bed capacity: 52% of public beds in coastal regions (Achour, 2011). This fact falls to the third-line structures concentrated in these agglomerations: The university-hospital structures whose role is to provide highly specialized care (while supplying an environment to complement university and postgraduate education through practice), are concentrated in the main coastal agglomerations of the Centre-East region. The same applies to the main national university structures for the teaching of medicine and related specialties (pharmacy, dentistry).

  The disparity spread in favor of coastal areas also applies to private hospital infrastructure: 100% of private beds are in coastal regions (Achour, 2011). Similarly, the number of clinics, bed capacity and bed index are decreasing from the eastern coastal regions to the western interior regions. Unlike the

public sector, and apart from pharmacies and private haemodialysis centres, the private hospital sector does not follow a planning logic linked to demography.

Finally, regarding our study area, we note that in terms of public and private hospital infrastructure, the Centre-East and Greater Tunis regions are often best-ranked and more privileged than the interior and southern regions of the country. The governorate of Sousse has a significant public infrastructure of 1st and 2nd lines and a 3rd line university-hospital. It is even more privileged in terms of university infrastructure as it is located near the governorate of Monastir which polarizes the majority of the national faculties of medicine, dentistry and pharmacy benefiting from its inter-regional and national radiance. Its private hospital infrastructure is also important since it ranks 3rd after the governorate of Sfax.

- **Spread of Public and Private Ambulatory Infrastructure**
  - **Equipped-Haemodialysis Centres: Existence of a Disparity Spread in Favor of the Coastal Areas, the Centre-East Region and its Coastal Governorates**

    Concerning the public centres equipped with haemodialysis facilities, there is a general disparity in favor of the coastal areas in the North and South. The public sector largely predominates over the private sector concerning the number of centres. This gap is clearer in the coastal regions of northern and central Tunisia. The number and the gap between the two sectors tend to decrease from North to South and from the East coast to the interior of the country. As for the equipment of these centres, the two sectors have relatively the same number of haemodialysis machines. However, the ratio between the number of centres and the quantity of equipment in the two sectors shows that the private sector is under-equipped compared to the public sector (Directorate of Equipment & DRCPS, 2021). Regarding our study area, the Centre-East region is ranked 2nd in terms of number of centres equipped with haemodialysis in both the private and public sectors. Indeed, the Centre-East region includes the best-ranked governorates: the governorates of Sfax but also Sousse, Mahdia and Monastir.
  - **Imaging and Radiology Centres: Existence of a Disparity Spread in Favor of the Centre-East Region and the Governorate of Sousse**

    If we consider the number of the population, it becomes obvious that there is no regional disparity between private imaging and radiology centres. The distribution of private imaging centres does not follow a planning logic that considers demography. However, the Centre-East region (our study area) has the largest number of private imaging centres, thanks in particular to its governorates of Sfax (ranked 1st) and Sousse (ranked 4th).
  - **Private Medical Laboratories: Existence of Disparity in favor of Coastal Areas and the Centre-East Region**

    Regarding the private medical laboratories, there is a disparity in favor of coastal areas: the number and index of private laboratories decrease from the east (Maritim coast) to the west (interior of the country). The regions of Greater Tunis and Centre-East (our study area) and their respective governorates of Tunis and Sfax are best ranked and favored compared to the rest of the regions and governorates.

- **Spread of Medical Equipment and Staff**

The synthesis of the analysis highlighted that the private sector is generally better equipped than the public one, particularly in terms of CT scans and MRIs. There is also a disparate spread of heavy equipment in the two sectors: values decrease from North to South, from the East (coastal regions) to the West (inland regions) of the country.

- **Spread of medical staff**
  - **Doctors: The Existence of a Disparity Spread in Favor of the Coastal Areas, the Centre-East Region and its Coastal Governorates**
    Concerning the distribution of doctors, we noted a disparity in favor of the coastal areas in the East and the areas in the north of the country: the number of doctors in all categories tends to decrease from the northern regions to the southern regions and from the eastern coastal regions to the interior western regions. This phenomenon is more pronounced for general practitioners in the private sector and specialized doctors in the public sector. In addition, the number of specialized doctors in private practice far exceeds the number of specialists assigned to the public sector, especially in the eastern coastal regions and the North of the country. The Centre-East region, as well as the governorates of Sousse and Monastir, seem to be favored by their strategic locations. This region is distinguished by a wide range of medical services in the private sector, both in general and specialized medicine.
  - **Dentists: Existence of a Disparity Spread in Favor of Coastal Areas, the Centre-East Region and its Coastal Governorates**
    The spread of dentists shows a disparity in favor of coastal areas. Indeed, the number of dentists in both sectors is decreasing from the East Coast to the interior of the country. Generally, an overwhelming majority of well-equipped dentists practice independently in the private sector. In addition, the governorates of Sfax, Sousse and Monastir of the Centre-East region represent the five governorates with the highest ranking in terms of number and density of dentists of the private sector.
  - **Pharmacists: The Existence of a Disparity Spread in Favor of the Governorate of Monastir**
    The overall number of private pharmacists far exceeds and can reach 5 times that of pharmacists assigned in the public sector. In terms of the density of pharmacists and pharmacies throughout Tunisia, the densities (day and night pharmacies) in the private sector are similar and vary between 1.21 and 2.86. Indeed, the private sector is planned and regulated according to the number of inhabitants. Decree No. 2007-4139 of 18 December 2007, amending Decree No. 92-1206 of 22 June 1992 on the organization of the operation of retail pharmacies, stipulates that a new pharmacy is granted, for each tranche, when the population increases by 50% of the numerus clausus for each zone. However, the interior regions of the centre and South of the country are slightly affected. The governorate of Monastir, which is part of the Centre-East region, has a density of 2.24 per 10,000 inhabitants and ranks 2nd after that of Tunis. It is even favored compared to the two governorates of the same region which often monopolize the top places: Sousse and Sfax (see analysis above). This can be explained by the fact that Monastir hosts the only Tunisian faculty of pharmacy.
  - **Paramedics: Existence of a Disparity Spread in Favor of Coastal Areas, the Centre-East Region and its Coastal Governorates**

In terms of the distribution of staff in the two sectors, the Greater Tunis region and its governorate of Tunis, followed by Centre-East and its respective governorates of Sfax, Sousse and Monastir, are the most favored in order of decrease. On the other hand, regarding the private sector, the governorate of Tunis is at the top of the list followed by the governorates of Ben Arous, Sfax, Sousse, Ariana, Zaghouan and Monastir. Indeed, this sector still seems to be highly dependent on the hospital structures that predominate in the public sector. The governorates of Sfax, Sousse and Monastir account for a large proportion of paramedics recruited in the public and private sectors.

5. Conclusion

Ultimately, the synthesis of the analysis confirmed that national policy has favored the development of the public and private health sectors in the coastal regions, particularly in the Centre-East region, which is the subject of our study. Indeed, the concentration of medical density, general practitioners and specialized doctors in coastal regions is not a mere coincidence. Overall, Tunisia has 5 faculties all located in the coastal zone: one faculty of medicine in Tunis, one in Sfax and three in Monastir (of medicine, dentistry and pharmacy). By granting doctors; since the independence; the choice of practicing full-time in hospitals with the possibility of devoting two afternoons to private activity and in the absence of procedures and incentives to encourage the establishment of liberal professionals in the interior of the country, the latter tend to practice independently not far from hospitals, particularly regional hospitals (2nd line) and university hospitals (3rd line).Nevertheless, these hospitals are Located in the coastal regions and major cities. There is a density of 96 general practitioners per 10,000 inhabitants in the district of Tunis against 36 general practitioners per 100,000 inhabitants in the central-western region. This finding is more contrasted for specialized doctors, whose density is 111 doctors in the district of Tunis against 12 specialists per 10,000 inhabitants in the central-western region (Achour, 2011; Directorate of Equipment & DRCPS, 2021).

In addition, the Centre-East region is favored over the West and South regions, since 2/3 of the faculties (i.e. 3 out of 5) are in Monastir and Sousse and belong to the Centre-East region. It becomes perfectly logical to note that the Centre-East region occupies the 2nd position in terms of the number of general practitioners and specialized doctors in the public and private sectors. In this region and its governorates of Sfax, Sousse and Monastir, the number and index of free-practice medical specialists far exceeds that of specialists in the public sector. This is also true for the number and density of dentists and pharmacists where the Centre-East region ranks 2nd after that of Greater Tunis and where the governorates of Sfax, Sousse and Monastir occupy the first 4 places in the ranking. Similarly, the Centre-East region ranks 2nd after Greater Tunis in terms of number of paramedics and heavy equipment in both sectors, while its governorates of Sfax, Monastir and Mahdia rank among the best-equipped governorates.

The implementation of the Centre-East region and its governorates (Sfax, Sousse, Monastir, Madia) on the Maritim coast has given them an advantage that has resulted in a significant supply of medical services in both general and specialized medicine of the private sector. The analysis revealed that the Greater Tunis and Centre-East regions often compete for the top two places in terms of importance of:

- Their public and private hospital and ambulatory health infrastructures;
- Their university and university hospital infrastructure, the number and density of the medical staff;
- The number of heavy equipment made available to medical staff.

5.1. Recommendations for a Better Assessment of the Territorial Disparity of the Health Sector

This research was based on the analysis of the context corresponding to the year 2021 and took into consideration the former administrative division after Decree 589 of 21 September 2023. See Figure 3. Distribution of Tunisian regions. At the time of this study, Tunisia consisted of seven regions: Greater Tunis, Northeast, Northwest, Centre-East, Centre-West, Southeast, South-West, and Southwest. Since September 21, 2023, the Centre-East region, currently called Region 3, has been deprived of the governorate of Sfax in exchange for that of Siliana.

At the end of this study based on the statistical analysis of the data collected from the health map (Directorate of Equipment & DRCPS, 2021), we have identified some aspects that this method does not allow to address. To develop a method in the future that allows us to more fully embrace the issue of territorial disparity concerning the health sector, we need to:

- **Identify the Complexity of the Study Perimeter Delimitation to Explore the Phenomenon of Territorial Disparity**

Following the refinement of the administrative redistricting, we wondered to what extent this new redistribution could compromise the results of our analysis. Won't the omission of the governorate of Sfax and its replacement by that of Siliana alter the results compared to the Centre-East region? Is it wise to systematically rely on the administrative division adopted in the 2021 health map? It is not random to base the analysis of sectoral development in each territory solely on the administer division, knowing that the latter is constantly being refined. In the literature, several researchers have agreed on the need to refine administrative division and tiling, proposing various approaches to better understand the issue of territorial disparity and development. Among the latter are Amor Belhedi, Habib Dlala, Adnene Hayder, Mourad Ben Jelloul, Najem Dhaher, Makram Monatcer, Nejib Mehri and Mohamed Kriaa to name but a few of whom we refer to in the following.

Indeed, the question of territorial disparity seems more complex since territorial development policy is linked to the delimitation of development zones and cannot be dissociated from administrative division. Since Tunisian independence, and since the revolution of 14 January 2011, successive governments have placed issues of regional disparity and development at the heart of their policies, repeatedly justifying the refinement of the administrative division of Tunisian territory.

- **To Understand the Health Sector Disparity Under the Umbrella of the Socio-Economic Territorial Disparity**

The challenge for the first two governments after independence was to ensure tighter control and supervision (administrative and socio-political) over the territory and the population (Belhedi, 1999). Indeed, during the independence period, the government implemented a vertical, pyramidal scheme reflecting a centralized descended power both at the level of the hierarchical organization of its structure than that of the administrative division of its territory (governorates, delegations, shaikhates or sectors) (Belhedi, 1999; Ben Jelloul, 2022). Although the administrative division was gradually refined [1], the

1. Amor, B. (1999). "Spatial disparities in Tunisia, state of play and challenges", *Mediterranean*, 91(1), 63–72. https://doi.org/10.3406/medit.1999.3088

According to Amor Belhedi (1999), the gradual refinement of the administrative division has taken place as follows:

pyramidal scheme with which it complies, has marked the overall fabric of facilities, the distribution of services and hence the entire urban system (Belhedi, 1999, p. 5). Indeed, the administrative centres represented at the 1st level of the hierarchy by the governorate capitals (at the regional level) and at the lower level by the delegation capitals (at the local level) will constitute the core of this system.

Almost parallel to the refining process of the administrative division (which took place between 1960 and 1990), economic planning and the decentralization of socio-economic development began to gradually take place between 1963 and 1993. This started with the definition of 3 investment incentive zones (Montacer et al., 2012).

- The first zoning based on the governorates was established around the 1970s [2]. Since the mid-1970s, Tunisia has been implementing a map grouping delegations into four classes according to vertical bands where incentives increase from the coast to the interior;
- The second zoning based on delegations was set up around the beginning of the 1980s [3];
- The third zoning based on governorates and delegations was created towards the end of the 1980s. The first national master plan and regional plans were created five years later, in 1985 (Daher, 2010). The new Industrial Investment Code of 1987; which marked the transition from the Bourguiba government to that of Ben Ali; foresee investment centres located in the capitals of certain governorates (category 1) or certain delegations (category 2) that are eligible for financial and tax advantages. The latter finally led to the creation of regional development zones around 1994.

According to the same authors (Montacer et al., 2012), as early as 1994, a regional development approach was explicitly carried out based on the new 1993 code of investment incentive and on the administrative division which tends to align with the regional development units, encouraging the integration of industrial, tourist and tertiary activities as well as the projects of infrastructure and collective facilities.

-Between the 1960s and 1980s, the refinement of the administrative division focused on the densification of the regional network: the number of governorates increased from 13 in 1956 to 23 in 1959. During the 1970s, several governorates were created in the interior of the country (central Tunisia) and the central coastal strip, or the Sahel is divided into three governorates: Sousse, Monastir and Mahdia. In the 1980s, three new governorates in the southern border areas were created: Kebili, Tozeur and Tataouine. The size and size of the administrative units will gradually normalize to 335,000 inhabitants for the governorates, The densification of the local network (of delegations): the number of delegations increased from 86 in 1959 to 92 in 1961.
-Between 1960 and 1969, most of them were in the interior and south of the country. The number of inhabitants has stabilized at 34,000 per delegation.
-Around the 1990s, the refining focused particularly on the densification of the local network. 6 new delegations were created in 1991. The municipal network also became denser: from 75 municipalities in 1956 to 250 municipalities with a normative workforce of more than 2000 inhabitants per municipality.

2. Law No. 63-3 of 3 March 1963 on the delimitation of investment incentive zones, and limited it to the southern Tunisian area, which was then made up of the governorates of Gabes, Gafsa and Medenine. This Law introduced the first zoning. Later, Article 15 of Law 74-47 of 3 August 1974 led to the delimitation in 1977 of 4 administrative zones (A, B, C and D) of tax and financial advantages to be granted to investors. This was slightly modified in 1979.

3. Law No. 81-56. Following this law, the zoning considers the delegation and no longer the governorate. In 1981, the 176 delegations (instead of 160 in 1979) of the 20 governorates (instead of 18 in 1979) will be divided into 5 zones of. In 1986, this division was modified following the addition of 3 new governorates and 25 delegations.

This approach will give rise to 3 zonings: the first regional development zones of 1994[4], the priority development zones of 1999[5] and the zones of 2008[6].

It, therefore, appears from the literature review that Tunisian regional development policy has tried very early since independence to reduce the regional disparity between the eastern coastal and the western interior of the country. Although it dates to earlier periods, the disparity between the coastal region and the interior of the country was amplified during colonization (Dlala, 2007; Bennasr, 2012).

In addition, the policy of a decentralized planned economy has been confronted with the centralization of its territorial administration. The latter has led to a development that favors the capitals of the governorates and the delegations, and therefore the administrative and urban centres (Belhedi 1999, Daher 2010). Indeed, the study by Montacer, Mehri and Kriaa (2012) confirmed the existence of a clear dichotomy between urban and rural space, urban centre and periphery. The central delegations (the capitals of the governorates) have better levels of socio-economic development than the peripheral delegations (Montacer et al., 2012).

The analysis of the health map confirmed the disparity of the health sector in favour of the regions and governorates located on the coastal strip and in the governorates of Tunis, Sfax, Sousse and Monastir. There is therefore a concordance between the phenomena of regional socio-economic disparity (at the level of regions and governorates) and the health sectoral disparity in Tunisia. However, it was not possible (due to lack of data) to confirm this concordance relating to the disparity between the central delegations (capitals of the governorates) and the peripheral delegations, and at the local level, between the administrative centres (capitals of the delegations) and their peripheries.

- **Understanding Territorial Health Disparity as a Multivariable Matrix**

Moreover, the successive refinement of the administrative division demonstrates the difficulty of controlling prospectively the evolution of multiple economic phenomena and their interactions in space. In the literature, several researchers have developed approaches that make it possible to better envelop the problem of socioeconomic disparate development, considering all its variables.

All in all, the socio-economic development of a territory can be considered as the result of a matrix with several variables interacting with each other and creating a synergy fuelled by complementarity and spatial

4. Makram, M., Nejib, M., &Mohamed, K., "Vers une nouvelle carte des zones de Développement", Ministère du Développement Régional et de la planification, 2012, 40 p. The regional development zones include the 'A1' zones for the encouragement of activities, manufacturing industries, certain service activities and the 'A 2' zones for the encouragement of tourist activities. The 'A1' zones correspond to the governorates located in the interior (west) of the country and to some delegations, particularly in the governorates of Sousse, Sfax and Mahdia (Montacer et al., 2012).

5. Makram, M., Nejib, M., & Mohamed, K., "Vers une nouvelle carte des zones de Développement", Ministère du Développement Régional et de la planification, 2012, 40 p. The priority development zones include the 'A1' incentive zones (including 1 or 2 delegations from the governorates of Sousse and Sfax) and the 'A1 Bis' priority zones (including the governorates of Sfax, Sousse and Mahdia) for the encouragement of activities, manufacturing industries, certain service activities, the 'A 2' zones for the encouragement of tourism activities, and the 'A 2 Bis' for the encouragement of Saharan tourism activities(Montacer et al., 2012).

6. Makram, M., Nejib, M., & Mohamed, K., "Vers une nouvelle carte des zones de Développement", Ministère du Développement Régional et de la planification, 2012, 40 p. This zoning is carried out based on the new administrative division of the national territory made up of 24 governorates and 264 delegations. It replaces both the 'A1' and 'A1 Bis' zones into 3 groups of encouragement zones. Among these groups are delegations from the governorates of Sfax and Sousse in Group 1, delegations from the governorates of Sfax and Mahdia for group 2 as well as delegations from group 3 that are priorities in terms of encouraging activities, manufacturing industries, certain service activities, mainly delegations located in the interior, including some delegations from the Governorate of Sfax. This zoning highlights an explicit political will to remedy regional disparity by promoting the development of the interior regions located in the west of the country (Montacer et al., 2012).

proximity in a defined space-time. The literature review has enabled us to select two approaches likely to improve our analysis of territorial health or medical supply. In addition, these quantitative methods allow for a better assessment of socioeconomic development and regional disparity based on a multivariable matrix:

- Multivariable analysis based on Spatial Principal Components (PCAs) is used by Monatcer, Mehri and Kriaa (2012) to assess the level of development of the delegations by development region, based on a matrix composed of 11 factors (Montacer et al., 2012) [7];
- The analysis of a multivariate matrix is also used by Amor Belhedi (Belhedi, 1999). The variables chosen make it possible to represent the degree of regional radiance of the capitals based on the degree of influence of 8 public services at a regional level: Equipment, Education, Health, Appellate Jurisdiction, Communications, Planning, Price Control, Land Conservation and 9 regional representations of organizations (STEG, SONEDE, ONTT, ONA, INS, SNIT, SNCFT, OTD, API) (Belhedi, 1999, p. 9).

The 1st approach considers a range of demographic, social and economic factors (including the health sector). The second focuses on regional public services (including the health service) that intervene in the process of territorial development.

- **Considering Proximity, Autocorrelation and Spatial Dependence**

The analysis showed that in terms of the performance of the health supply and its structure, the governorates of Tunis, Sfax and Sousse often compete for the first three places. We have demonstrated the possible correlation between the polarized university structure in the governorate of Monastir and the polarized university hospital structure in the governorates of Sousse and Mahdia. The autocorrelation between the economic phenomena of these 3 governorates, which constituted a single geographical and socio-cultural entity commonly referred to as the Sahel region, deserves to be explored. On the other hand, it seems less obvious to prove that the development of the health sector in the governorate of Sfax has any reciprocal link with these 3 governorates of Sousse, Monastir and Mahdia.

Geographical proximity and the spatial dependence of economic phenomena play an important role in the development of the region. Indeed, multivariable analysis (Montacer et al., 2012) has shown us the importance of considering the neighbourhood or spatial autocorrelation between delegations [8]to identify inconsistencies in the administrative division. These inconsistencies are likely to increase territorial disparity. Belhedi (1999) came to the same conclusion using the Thyssen polygon method: the comparison between the actual division and the theoretical division constructed from Thyssen's polygons allowed him

7. Makram, M., Nejib, M., & Mohamed, K., "Vers une nouvelle carte des zones de Développement", Ministère du Développement Régional et de la planification, 2012, 40 p. The 11 factors are: concentration of urban employment (manufacturing and services), concentration of employment in undeclared activities, specialization in urban services, specialization in manufacturing industries, presence of formal enterprises, presence of small and medium-sized enterprises, level of socio-demographic development, migration potential of delegations, access to amenities of life, access to health services, access to leisure activities (Montacer et al., 2012, p 19).

8. Montacer, M., Mehri, N., & Kriaa, M. Towards a new map of development areas, Ministry of Regional Development and Planning, (2012). Study carried out on behalf the Ministry of Regional Development and Planning to verify whether the delimitation of regional development zones adopted in 2008 is in line with the levels of development of Tunisian delegations.

to identify the governorates or delegations that were far from the centre [9] and therefore disadvantaged because they were not covered by normative services, particularly administrative ones (Belhedi, 1999). These two studies have confirmed at the same time the need to redefine the limits of our exogenous and endogenous study perimeters by considering proximity, autocorrelation and spatial dependence.

- **Considering the Process of Centrality-Autocorrelation-Radiation-Polarization-Monopolization**

The analysis of the multivariate matrix used by Belhedi (1999) to represent regional outreach demonstrated the importance of considering the spatial autocorrelation between the delegations inherent in each region [10]. It led to the conclusion that the extension of urban centres to several neighbouring delegations is conducive to the socio-economic development of the entire region (made up of these delegations) and accentuates its monopolization. This is the case for Tunis, Sousse and Sfax. In the interior of the country, on the other hand, the centre is limited to one or two delegations. The matrix used by Belhedi allowed him to calculate 3 other indicators that allow a better understanding of this mechanism:

- The autonomy index: varying from 0 (total dependence) to 1 (total autonomy), measures the dependence that a governorate has on the services offered by a centre, other than its capital. The governorates of Sfax and Sousse have an index of 0.94 (Belhedi, 1999, p. 11) and are therefore almost autonomous.
- The subordination index varies from zero 0 (the governorate is ruled by its capital) to 1 (the governorate is controlled from the outside), it measures the number of times a space is controlled from the outside (Belhedi, 1999, p. 11). In our case, this index is 0 for the capital, which occupies 1st place after Sfax and Sousse where the index is 0.06. The governorates of Tunis, Sfax and Sousse are therefore ruled by their respective capitals.
- The polarization index: Varying from 0 (the centre only polarizes its administrative perimeter, its governorate) to a value ≥1 (the centre polarizes spaces outside its administrative perimeter. The maximum value is 20), this index measures the degree of polarization (Belhedi, 1999, p.12). In our case, this index is 2 for Tunis, Sfax and Sousse and proves that the centres, and capitals of the governorates of Tunis, Sfax and Sousse enjoy a regional polarization that goes beyond the administrative limits of their respective governorates.

The analysis of the indicators by Belhedi (1999, p. 9) showed that although most of the structures for the supply of basic regional services are based on the governorate and are therefore equitably distributed in all the governorate capitals, other technical services or regional representations of national bodies are confined to a few centres, such as those in Tunis, Sfax, Sousse, etc.

The pyramidal structure of the organization of power is at the centre of the process of territorial development of disparity polarization and monopolization (Hayder, 2006). Belhedi (1999) classifies the process of metropolization into 3 categories according to the type of regional, local, public and private

9. Amor. B., "Spatial disparities in Tunisia, state of play and challenges", Mediterranean, 1999, 91(1), 63–72. https://doi.org/10.3406/medit.1999.3088. Thyssen's polygons consider the optimal distance between governorates and delegations around their capitals (administrative centres)

10. The PCA thus makes it possible to draw up a state of the spatial distribution of the variability of the level of development of the delegations while respecting the multivariate characteristics of the delegations. Spatial autocorrelation is measured using Moran's index (I) (Anselin, 1995a, 1995b and 1996 In Montacer et al., 2012, p. 18).

service and activity. He classifies these services into 7 levels [11]. At the higher level, the capital of Tunis occupies 1st place as a regional metropolis followed by Sfax and Sousse, constituting agglomerations in the process of metropolisation. Monastir is considered an incomplete regional centre while Mahdia is considered a sub-regional centre. The Sahel region is therefore favored by the territorial development of its coastal governorates, whose attractiveness in terms of the supply of services, particularly regional services, works in favor of their polarization and growing metropolisation. According to the same author (Belhedi, 1999), Tunis radiates globally in the north, Sfax in the centre and the south. Sousse (increasingly in competition with Monastir) has an influence on the Sahel and the governorate of Kairouan. Monastir shines on Mahdia, which is not self-sufficient.

The analysis showed that this is valid for the health sector, especially since the governorate of Tunis (Tunisian capital) polarizes the national and supra-regional services and offers highly specialized health services: the latter condenses most of the university-hospital infrastructure with inter-regional and national influence. The same is true for the incomplete regional metropolises of Sfax and Sousse and for the regional centre of Monastir which polarizes most of the university infrastructure with inter-regional and national influence.
The public health, medical and educational sector and its national and inter-regional structure, reinforced by the private sector since the 1970s and 1990s (period of the liberal economy), has contributed to the metropolization of these governorate capitals, which have been elevated to the rank of regional metropolises. According to Belhedi (1999), this same process is valid (but less explicit) for the delegations' capitals.

To conclude, to optimize the results of our analysis, it would be more appropriate to refine the regional area that will constitute our exogenous context and to recontextualize our study by focusing it on the Sahel

11. Amor. B., "Spatial disparities in Tunisia, state of play and challenges", Mediterranean, 1999, 91(1), 63–72.https://doi.org/10.3406/medit.1999.3088.Amor Belhedi classifies the services into 7 levels: local (23), supra-local (10) affecting more than one delegation, regional (36), supraregional (23) affecting more than one governorate, national (35), international (25) and external relations (12). He obtains a total of 164 services and an ordered matrix. Each of the services is scored out of 10 according to its importance and the final score has been reduced to 1000. The matrix in question is calculated based on 164 services and activities classified into 7 levels and scored out of 10 according to importance (the final score has been reduced to 1000):
-Local service (23),
-Supra-local service (10) involving more than one delegation,
-Regional Service (36),
-Supra-regional service (23) affecting more than one governorate,
- National Service (35), International Service (25) and External Relations (12),
This makes it possible to assess the level of metropolization in relation to 3 categories:
1 - Higher level:
A - The capital: Tunis
B - Incomplete regional metropolises: the score is less than 500: Sfax (483), Sousse (430), many services lack them.
2 - Regional level
A - Regional centres: the score varies from 230 to 270, there are two: Gabès (267) and Bizerte (232).
B - Incomplete regional centres: the score varies from 164 to 200, we have El-Kef (199), Monastir (198), Gafsa, Nabeul (196), Béja (195), Kairouan (180), Medenine (172), Jendouba (168), Kasserine (164).
C - Sub-regional centres: the score ranges from 110 to 150: Mahdia (146), Sidi Bou Zid (143), Siliana (140), Zaghouan (137), Tozeur (137), Kébili (128), Tataouine (114).
3 - Local and basic levels: here we find the chief towns of delegations that can be classified into several categories, the score is less than 110. (Cf. A Belhedi 1989 In Belhedi, 1999, p. 13).

region instead of the Centre-East region. The Sahel is a coastal region that has been constituted since ancient times as a geographical and historical unit with specific cultural and socio-economic characteristics. The proximity of these 3 centres located on the East Maritim coast is an advantage for the Sahel region, insofar as each centre benefits from the advantages of the neighbouring centre. Together they complement each other. A synergy is created between the public and private health sectors, of a hospital and ambulatory nature, likely to generate a competitive territorial offer of health services. The centralization of the 3 faculties of medicine in the sub-regional centre of Monastir and the university hospital structures in the incomplete metropolis of Sousse, the incomplete regional centre of Monastir and the sub-regional centre of Mahdia has resulted in an increase in the number of medical service providers in the Sahel region and particularly in the governorate of Sousse. This is what has presented a favorable ground, justifying first the rise of the private health sector since its liberalization in the 1990s and then that of medical real estate development. The multivariate quantitative approach based on the calculation of a multivariate matrix can also be used to perfect this work to evaluate the reasons for the rise in the supply of health and medical services in the incomplete metropolis of Sousse, in the same way as the metropolis of Tunis and the incomplete metropolis of Sfax. This work, which allowed us to validate the initial hypothesis, encouraged us to develop in the next stage a matrix likely to evaluate the development of the private medical sector in the metropolis of Sousse. This must start with the identification of socio-economic variables from the field survey to complement those already addressed in this work.

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