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Retrospective Study of Epidemiological Profiles of Cardiorespiratory Pathologies Before and After the Covid-19 Era at Kenitra Provincial Hospital, Morocco

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Abstract
Background: The present study aims to assess the impact of COVID-19 on the epidemiological profile of circulatory, respiratory, and haematological pathologies at the provincial Hospital of Kenitra, Morocco, utilizing a before-and-after comparative approach.
Methods: This work consists of a retrospective investigation involving 13,067 cases (excluding cases related to COVID-19) admitted to the provincial hospital of Kenitra between January 1, 2017, and April 30, 2022.
Results: The findings revealed a substantial reduction in the overall number of consultations, decreasing from 11,956 consultations before the emergence of COVID-19 to 1,111 consultations afterwards, indicating a 90% decline. Furthermore, there was a notable shift in the gender distribution for respiratory diseases, transitioning from a male predominance with a sex ratio of 2.03 before the COVID-19 pandemic to a female predominance with a sex ratio of 0.83 post-pandemic. Regarding age group distribution, no significant difference was observed between before and after Covid-19. A comparison of the duration of hospital stays before and after Covid-19 pandemic revealed a notable decrease in respiratory ($t = 4.96$; $p < 0.001$) and haematological ($t = 3.62$; $p < 0.001$) pathologies, with no significant difference for circulatory pathologies. Before COVID-19, patients with circulatory pathologies had a twofold higher risk of mortality compared to other patients, whereas respiratory patients faced a three times higher risk of death. No significant risk of death was associated with haematological pathologies. Following the COVID-19 pandemic, the mortality risk increased for respiratory pathologies but decreased for circulatory pathologies. The risk of mortality for haematological pathologies remained insignificant.
Conclusion: the COVID-19 pandemic substantially impacted the epidemiological profile of circulatory, respiratory, and haematological pathologies.

Keywords: Covid-19, Epidemiological profile, Risk of Mortality, Hospitalization, Morocco.

Introduction

The COVID-19 pandemic, caused by the SARS-CoV-2 coronavirus first identified in China in December 2019 (World Health Organization, 2021), swiftly spread across the globe (Lai *et al.*, 2020). Faced with this global health crisis, governments worldwide initiated management plans to mitigate the transmission of SARS-CoV-2 by adopting countermeasures such as physical distancing, banning mass

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gatherings, shutting down transportation, and closing extensive community facilities. According to Morocco's National Response to the COVID-19 Pandemic: Public Health Challenges and Lessons Learned, in Morocco, since the declaration of the first COVID-19 case in March 2020, the government has integrated itself into this operation by closing borders, limiting social interactions, and creating Covid-19 isolation rooms in hospitals (Barkia *et al.*, 2021). The impact of the pandemic in Morocco has been less profound, with only 1,274,180 confirmed cases and 16,297 deaths reported (MHSP., 2023).

The spread of the coronavirus disrupted healthcare systems worldwide, forcing countries to cope with the contagion while maintaining the integrity of their healthcare systems. Hospitals faced immense pressure to balance the ongoing healthcare needs of their communities with the additional burden of Covid-19 cases, necessitating a shift in care priorities. Healthcare facility preparedness is a critical element in responding to the Covid-19 pandemic. It was crucial to ensure appropriate space, supplies, and staffing, prioritize care, activate triage procedures, and provide training for staff in infection prevention, control, and Covid-19 clinical management (Baum *et al.*, 2020). Previous studies reported the impact of Covid-19 on the total number of hospitalizations, consultations, and fewer patients visiting the emergency room. For instance, Baum *et al.* (2020) discussed a 41% decline in hospital admissions in the United States due to emergencies in the first 16 weeks of 2020 compared to the same period in 2019. In Germany, the number of patients admitted to the emergency room declined by approximately 30% from February to April 2020 (Tschaikowsky *et al.*, 2020), and in Guinee, by approximately 71,1 % from March to April 2020 (Barry *et al.*, 2021). The results of a survey in Morocco on the impact of COVID-19 on ophthalmology consultation activity show that most ophthalmologists report a 90% drop in the number of consultations compared with their usual activity (Shamil *et al.*, 2020).

In Morocco, the pandemic strained healthcare systems and disrupted the supply and accessibility to healthcare (Ababsa and Aouissi, 2020; WHO, 2023). In response to this situation, the Moroccan government has taken steps to adapt the provision of hospital care to align with the prevailing circumstances. The Provincial Hospital of Kenitra was designated a COVID-19 treatment centre, admitting patients with COVID-19-related illnesses requiring hospitalization. Moreover, most Moroccan hospitals established COVID-19 isolation units, and most hospital beds were designated for Covid-19 cases.

In this context, this study aimed to assess the impact of the COVID-19 pandemic on the epidemiological profiles of circulatory, respiratory, and haematological pathologies at the Provincial Hospital of Kenitra through a comparative analysis before and after the pandemic. This attempt tried to answer the following questions: (i) What are the changes in epidemiological profiles before and after the COVID-19 Era? (ii) How did the haemo-cardio-respiratory pathologies feature during the pandemic? and (iii) Is the "before-and-after comparison" approach enough to investigate trends of epidemiological profiles caused by the COVID-19 countermeasures?

Methods

Study design and population: The present research comprises a retrospective investigation encompassing 13,067 cases admitted to the Provincial Hospital of Kenitra between January 1, 2017, and April 30, 2022.

Study variables:

The study focused on various variables, including pathology-related variables such as the type of pathology and the duration of hospitalization, patient-related factors like age and gender, and outcome variables related explicitly to mortality. The admission period was categorized into two phases: before COVID-19 (spanning from January 1, 2017, to March 1, 2020) and after the onset of COVID-19 (from March 2, 2020, to April 30, 2022). Notably, the investigation concentrated on circulatory, respiratory, and haematological pathologies directly associated with Covid-19.

Inclusion and exclusion criteria:

- Inclusion criteria:
    - patients admitted to the Provincial Hospital of Kenitra from January 1, 2017 to April 30,

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2022
    - patients residing in the province of Kenitra
- Exclusion criteria:
    - patients admitted to the Provincial Hospital of Kenitra before January 1, 2017
    - patients admitted to the Provincial Hospital of Kenitra after April 30, 2022
    - patients not residing in the province of Kenitra

Study area: The study site, the Provincial Hospital of Kenitra, situated in the city of Kenitra in North West Morocco, represents one of the country's largest hospitals. The Province of Kenitra encompasses an area of 3,052 km² with a population of 1,061,435 (High Commission for Planning of Morocco, 2023).

Data collection and Ethical considerations

After being informed about the purpose and duration of the study and how data will be collected, the Provincial Hospital of Kenitra administration authorized us to use the data contained in the patient care charts with full respect to the confidentiality of the information and patients' anonymity. Data collection was carried out from January to April 2022. The ethical approval was obtained on December 15th, 2021, at the level of the Biology department of Kenitra University, where the present work was done.

Data analysis

For qualitative variables such as gender, pathologies, and mortality, data were presented as numbers and percentages. In contrast, for quantitative variables like length of hospital stay and age, mean ± standard deviation was employed. The association between qualitative variables was assessed using the Chi-square test. To compare the means of length of hospital stay and age across various pathologies, the ANOVA test was utilized. Additionally, a two-proportion Z-test was conducted to compare frequencies before and after the onset of COVID-19 for each pathology, age group, and gender. This test, commonly applied to compare two proportions from independent groups under the null hypothesis of equality, was performed for each pathology independently (Ryeji, 2018). The significance levels for the Z-test and Chi-square test were set at 0.05 and 0.001, respectively.

To quantify the strength of the association between an event and an exposure, the odds ratio (OR) was calculated. It is calculated as the ratio of the odds of the event occurring in an exposed group to the odds of occurring in a non-exposed group. Essentially, the OR helps assess exposure's impact on the likelihood of a specific event. An odds ratio (OR) greater than one implies that the event is more likely to occur with the exposure, indicating an increased risk. Conversely, an OR less than one suggests that the event is less likely to occur with the exposure, signifying a reduced risk (Szumilas, 2010; Andrade, 2015). In the present work, OR was used to analyze the risk for each pathology (presence/absence) according to admission period (before and after the occurrence of COVID-19) and patient gender (male/female). Statistical analyses were performed using SPSS software version 25.0.

Results

Repartition of COVID-19 according to pathology types:

A comparison of the repartition of patients according to the type of pathology before and after the occurrence of COVID-19 showed that digestive and cardiovascular pathologies were the most frequent before Covid-19, with 20.6% and 14.6%, respectively, followed by trauma and fractures, kidney and excretory pathologies and otorhinolaryngology pathologies with 12.5%, 9.2% and 6.9% respectively. A minimum frequency was observed for psychiatric pathologies. After COVID-19, digestive and cardiovascular pathologies remained at the top of the ranking with 33.8% and 30.5%, respectively, while kidney and otorhinolaryngology pathologies gave way to respiratory and haematological pathologies with 6% and 5%, respectively, whereas psychiatric pathologies remained the least frequent. It should be noted that specific pathologies significantly decreased in frequency after Covid-19, notably dermatological pathologies, which dropped from 2.3% to 0.3%,

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and infectious pathologies from 2.6% to 0.6%. On the other hand, circulatory and digestive pathologies saw a significant increase in frequency, from 14.6% to 30.5% and from 20.6% to 33.8%, respectively (Table 1).

In the following results, only circulatory, respiratory, and haematological pathologies will be considered.

Table 1: Repartition of patients' hospitalization according to the type of pathology before and after the occurrence of the COVID-19 pandemic.

Pathologies	Before		After		Total	
	Number	Rate (%)	Number	Rate (%)	Number	Rate (%)
Circulatory system	1750	14.6	339	30.5	2089	16.0
Digestive system	2457	20.6	375	33.8	2832	21.7
Respiratory system	584	4.9	67	6.0	651	5.0
Surgery	710	5.9	0	0.0	710	5.4
Dermatology	271	2.3	3	0.3	274	2.1
Endocrinology	481	4.0	6	0.5	487	3.7
Gynaecology and obstetrics	82	0.7	10	0.9	92	0.7
Haematology	456	3.8	55	5.0	511	3.9
Neurosurgery	413	3.5	30	2.7	443	3.4
Ophthalmology	666	5.6	19	1.7	685	5.2
Otorhinolaryngology	822	6.9	23	2.1	845	6.5
Infectious diseases	311	2.6	7	0.6	318	2.4
Psychiatry	18	0.2	1	0.1	19	0.1
Kidney and excretory tract	1097	9.2	65	5.9	1162	8.9
Rheumatology	152	1.3	33	3.0	185	1.4
Trauma and fractures	1525	12.8	76	6.8	1601	12.3
Tumors	161	1.3	2	0.2	163	1.2

Quarterly trends of circulatory, respiratory, and haematological cases before and during Covid-19:

The analysis of the quarterly trends in the percentage of circulatory, respiratory, and haematological pathologies during the study period is presented. It must be noted that for the year 2017, only the last quarter was taken into consideration because of a substantial number of missing data in the previous quarters. The Figure 1 reveals a significant decrease in the overall frequency of pathologies following the onset of Covid-19. Particularly striking was the more pronounced decline observed in circulatory pathologies, where the average quarterly frequency decreased from 167 cases before the occurrence of Covid-19 to 44 cases after its onset.

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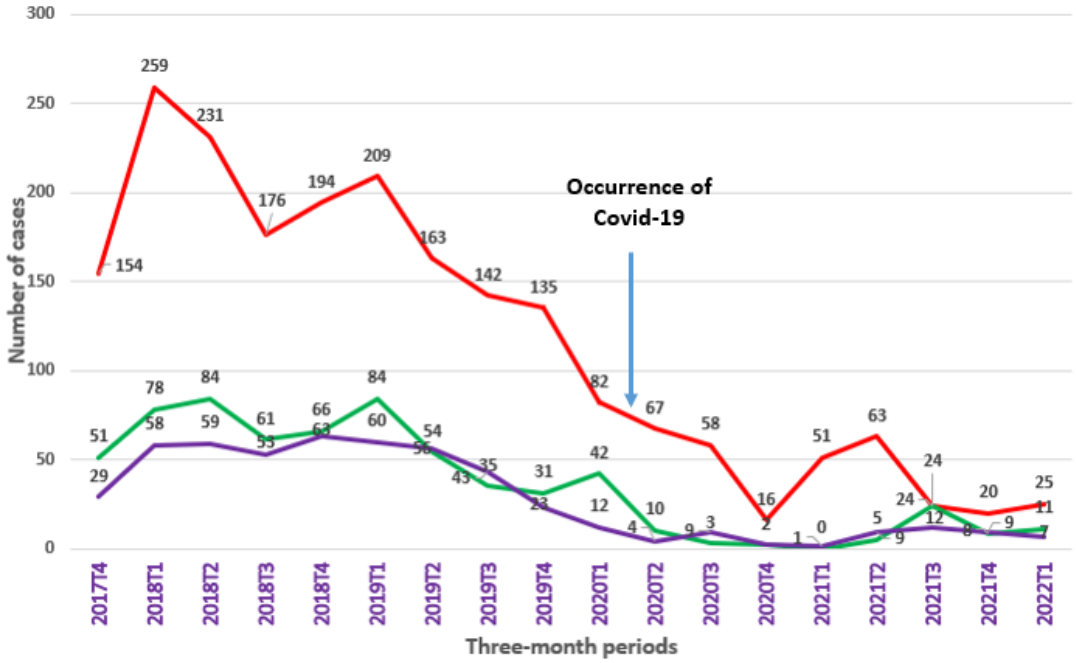

Figure 1: Quarterly trends of circulatory (red line), respiratory (green line), and haematological (violet line) cases before and during the COVID-19 pandemic

Impact of Covid-19 according to gender:

Of the 13,067 patients admitted to Kenitra Provincial Hospital from 2017 to 2022, 3,251 cases were diagnosed with circulatory, respiratory, or haematological diseases. Among these, 1,759 (54.3%) were male and 1,482 (45.7%) were female, yielding an average male-to-female sex ratio of 1.2. As shown in Table 2, the post-Covid-19 gender repartition remained relatively unchanged for circulatory and haematological pathologies. However, a substantial shift was observed for respiratory pathologies. The male-to-female ratio dropped from 2.03 before Covid-19 to 0.86 after the pandemic. A Z-test revealed a significant change in both male and female distributions, with Z-values of 2.34 (p-value < 0.05) and 2.32 (p-value < 0.05), respectively.

Further risk analysis based on gender and pathology unveiled the following associations: i) Circulatory pathologies: After the emergence of Covid-19, a statistically significant association was observed in both men and women. The likelihood of circulatory issues doubled post-Covid-19, with average odds ratios (OR) of 2.7 [2.23 - 3.28] for men and 2.35 [1.92 - 2.89] for women; ii) Respiratory pathologies: Among women, a significant association between Covid-19 and respiratory issues was identified. The risk doubled after Covid-19 (OR = 1.9 [1.3 - 2.8]). Conversely, as shown in Table 2, no notable link was found for men; and iii) Haematological pathologies: Both in men and women, there was no significant association observed between the occurrence of Covid-19 and Haematological pathologies.

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Table 2: Association between pathologies and hospitalization rate depending on gender before and after the Covid-19 pandemic.

Pathologies	Gender	Before Covid-19		After Covid-19		Z-value (p-value)	Chi-square (p-value)	Odds Ratio (Confidence Interval 95%)
		Number (%)	Male/ Female Ratio	Number (%)	Male/Female Ratio			
Circulatory	Male	888 (50.7 %)	1.03	175 (51.7 %)	1.07	0.24 (p>0.05)	110.7 (p<0.001)	2.7 (2.23 - 3.28)
	Female	862 (49.3 %)		164 (48.3 %)		0.23 (p>0.05)	72.42 (p<0.001)	2.35 (1.92 - 2.89)
Respiratory	Male	391 (67 %)	2.03	31 (46.2 %)	0.86	2.34 (p<0.05)	1.08 (p=0.29)	0.81 (0.54 - 1.2)
	Female	193 (33 %)		36 (53.2 %)		2.32 (p<0.05)	11.47 (p<0.001)	1.9 (1.3 - 2.8)
Haematology	Male	253 (55.5 %)	1.25	28 (51 %)	1.04	0.45 (p>0.05)	1.49 (p=0.22)	1.28 (0.86 - 1.9)
	Female	203 (44.5 %)		27 (49 %)		0.44 (p>0.05)	2.68 (p=0.1)	1.41 (0.9 - 1.9)

Impact of COVID-19 according to age:

Regarding age distribution, the 60-79 and 40-59 age groups were the most prevalent for all three pathologies, both before and after the onset of Covid-19. However, there were no significant differences in age distribution before and after the Covid-19 period. The average ages of patients were 62.2 ± 16.9 years before COVID-19 and 61.6 ± 16.3 years after COVID-19 for Circulatory pathologies, 50.8 ± 21.7 years before COVID-19 and 47.9 ± 25.7 years after Covid-19 for Respiratory pathologies, and 51.3 ± 19.7 years before Covid-19 and 47.9 ± 19.6 years after Covid-19 for Haematological pathologies (Table 3). T-tests revealed no significant difference in mean age before and after COVID-19 for all three types of pathologies (p-value = 0.53, p-value = 0.33, and p-value = 0.25, respectively).

Table 3: Repartition of patients according to their age before and after the Covid-19 period

Age groups (years)	Circulatory pathologies			Z-test	Respiratory pathologies			Z-test	Haematological pathologies			Z-test
	Before	After	Total		Before	After	Total		Before	After	Total	
Under 20	23 (1.3%)	6 (1.8%)	29 (1.4%)	0.09 (p>0.05)	50 8.6%	12 (18 %)	62 (9.5%)	0.96 (p>0.05)	13 (2.9%)	5 (9.1%)	18 (3.5%)	0.56 (p>0.05)
20 to 39	187 (10.7%)	26 (7.7%)	213 (10.20%)	0.47 (p>0.05)	135 23.1%	12 (18 %)	147 (22.6%)	0.40 (p>0.05)	141 (30.9%)	13 (23.6%)	154 (30.1%)	0.55 (p>0.05)
40 to 59	465 (26.6%)	102 (30.1%)	567 (27.2%)	0.72 (p>0.05)	178 30.5%	13 (19.4%)	191 (29.3%)	0.85 (p>0.05)	113 (24.8%)	19 (34.5%)	132 (25.8%)	0.89 (p>0.05)
60 to 79	819 (46.8%)	164 (48.4%)	983 (47%)	0.37 (p>0.05)	177 30.3%	25 (37.3%)	202 (31 %)	0.71 (p>0.05)	162 (35.5%)	17 (30.9%)	179 (35%)	0.38 (p>0.05)
80 and over	256 (14.6%)	41 (12.9%)	297 (14.2%)	0.29 (p>0.05)	44 7.5%	5 (7.5%)	49 (7.5%)	<0.001 (p>0.05)	27 (5.9%)	1 (1.8%)	28 (5.5%)	0.17 (p>0.05)

Impact of Covid-19 according to the length of hospitalization:

According to the results, after the occurrence of Covid-19, the mean hospitalization time period decreased significantly for respiratory pathologies (t = 4.96 days; p-value < 0.001) and for

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haematological pathologies (t = 3.62 days; p-value < 0.001), but not for circulatory pathologies (t = 0.55 days; p-value = 0.58). Indeed, it went from 10.79 to 5.58 days for respiratory pathologies and from 5.90 to 2.73 days for haematological pathologies.

Impact of COVID-19 according to the mortality

Following the Covid-19 era, the mortality rates exhibited noticeable shifts. For circulatory pathologies, the death rate increased from 28% before Covid-19 to 42% after the pandemic. Similarly, in cases of respiratory pathologies, the death rate escalated significantly from 13% before COVID-19 to 22.5% after the pandemic. Conversely, there was no recorded risk of death for haematological pathologies during the occurrence of COVID-19. Analysis of odds ratios based on pathology exposure revealed the following patterns: i) Prior to Covid-19, patients with circulatory pathologies faced a twofold higher risk of death compared to other conditions (OR = 2.3 [1.88 - 2.91], on average), while those with respiratory issues had a threefold higher risk (OR = 3.11 [2.31 – 4.18]), as depicted in Table 4. Notably, haematological pathologies did not exhibit a significant risk of death. ii) Post the COVID-19 period, the odds ratios increased from 3.1 to 5.6 for respiratory diseases, decreasing from 2.3 to 1.7 for circulatory diseases. After COVID-19, the risk of death for respiratory pathologies surged to five times higher (OR = 5.62 [2.54 - 12.42]). As before, no significant risk of death was observed for haematological pathologies.

Table 4: Impact of COVID-19 on death. The table covers the number of deaths (N) and the related percentage (%) and Odds Ratio (OR) with a 95% Confidence Interval (CI 95%) by pathology. * stands for statistical significant values.

Pathologies	Before			After		
	Deaths Number (%)	Odds Ratio	Confidence Interval 95%	Deaths Number (%)	Odds Ratio	Confidence Interval 95%
Circulatory	188 (28%)	2.3*	1.88 -2.91	17 (42.5%)	1,7	0.8 – 3.22
Respiratory	55 (13%)	3.1*	2.31 – 4.18	9 (22.5%)	5.6*	2.54 -12.42
Haematology	10 (2.4%)	0.6	0.32 – 1.13	0 (0%)	1.04	0.9 – 1.05

Discussion

The study findings revealed a significant decrease in consultations for various pathologies, indicating a substantial impact on hospital service utilization due to pandemic countermeasures. These observations align with similar outcomes reported in numerous studies. For instance, Burt *et al.* (2021) reported that during the 3-month lockdown, the number of antenatal attendances significantly decreased in Uganda. In Italy, the use of pediatric healthcare decreased by 77.5% from 2019 to 2020 (Cozzi *et al.*, 2020; Iozzi *et al.*, 2020), while the decrease was 40.6% in Japan compared to the number of emergency room visits in 2020 to the number over the previous 3 years (Yamamoto *et al.*, 2021).

Notably, challenges in maintaining normal service levels, even in essential sectors like maternal health, oncology, and mental health, have been highlighted in several studies (Shakespeare *et al.*, 2021; Benjamen *et al.*, 2021; Khan *et al.*, 2021; Gichuna *et al.*, 2020; Hailemariam *et al.*, 2021; Ahmed *et al.*, 2020; Das Neves *et al.*, 2021; Abdelbadee & Abbas,2020). This global impact has been particularly felt in middle- and low-income countries, a point emphasized in various opinion pieces (Krushna et al., 2021; Kobiané, JF *et al.*, 2020; Pêgo,AC, *et al.*, 2024). Discrepancies between healthcare systems and geographical contexts have potentially played pivotal roles in driving these observed changes. For instance, in regions such as Africa and South Asia, sexual and reproductive health services have experienced a significant decline in accessibility. This recession is not limited to maternal and child health services but extends to other healthcare areas, such as family planning and treatment for sexually transmitted diseases (Riley *et al.*, 2020).

At Kenitra's hospital, a noticeable decline in hospitalization rates has been observed. This decrease in consultations can be attributed, firstly, to the heightened anxiety and stress among

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patients during the health crisis. Secondly, the challenges in accessing the hospital during the confinement period following its designation as a COVID-19 centre have contributed to this decline (Riley *et al.*, 2020; Lazzerini *et al.*, 2020). Initial measures primarily focused on controlling the spread of COVID-19 and managing the surge in medical attention demand. Consequently, certain services and procedures were deemed non-essential, leading to a reduction in resources allocated to meet these healthcare needs (Linn *et al.*, 2020; Ma *et al.*, 2020; Teslya *et al.*, 2020). One of the critical individual factors creating new barriers during the pandemic is the fear of contagion (Kahraman *et al.*, 2021; Nicholson *et al.*, 2020; Benjamen *et al.*, 2021; Halley *et al.*, 2021; Ahmed *et al.*, 2020). This aspect has been extensively discussed in various publications, including opinion articles (Riley *et al.*, 2020; Lazzerini *et al.*, 2020; Shayganfard *et al.*, 2020; Mauro *et al.*, 2020; Goyal et al., 2021), and has historically played a significant role in causing delays or problems in seeking medical care during previous epidemics. For instance, in South Africa, Jensen *et al*. (2020) observed notable decreases in clinic attendance and hospital admissions for children under 5 from April to June 2020.

Similarly, a study conducted in Italy by Marzia *et al.* (2020) reported significant declines in the number of pediatric emergency consultations, ranging from 73% to 88%, during the period from March 1 to 27, 2020, compared to the same timeframe in 2019 and 2018 (Ly *et al.,* 2016; Chang *et al.,* 2004; Jensen *et al.,* 2020; Shakespeare *et al.,* 2021). Other reported factors include the stigma associated with seeking care (Khan *et al.,* 2021; Gichuna *et al.,* 2020; Hailemariam *et al.,* 2021; Nicholson *et al.,* 2020), as well as individuals underestimating the necessity for medical treatment (Hailemariam *et al.,* 2020; Das Neves et al, 2021) and perceiving a lack of responsiveness from health services (Kahraman *et al.*, 2021; Karavadra *et al.*, 2020).

The male predominance in respiratory pathology before COVID-19 might be linked to differences in social and cultural activities between genders. In Moroccan society, men often serve as the primary financial providers for their families, consequently exposing them to a higher risk of infection. Many researchers (Guan *et al.,* 2020; National Institute of Public Health of Quebec (inspq) 2023) suggested that the lower hospitalization rates of women in intensive care units could be attributed to their reduced susceptibility to viral infections and the higher prevalence of smoking among men. Conversely, the shift in the male-to-female ratio of respiratory diseases post-Covid-19 is likely influenced by the SARS-CoV-2 virus, known for its respiratory impact, affecting women more than men (Guan *et al.*, 2020; Underner *et al.*, 2020).

Piva *et al.* (2020) indicated that men and women exhibit differing susceptibilities and responses to viral infections, leading to variations in disease incidence and severity. Regarding the age of patients, this study demonstrated that circulatory pathologies primarily affect the older population, with an average age of 62.2 years and ranged from 50 to 76, lower than that observed in the USA (mean age, 70 years and range [43-92] years) (Arentz *et al.,* 2020) and Europe (median age, 63 [56-70] years) (Grasselli *et al.,* 2020; Agostoni *et al.,* 2020). This difference may be attributed to the higher life expectancy in those regions.

Another significant finding was the reduction in hospital stay durations for respiratory and haematological pathologies following COVID-19. This decline primarily stems from the overwhelming demand for hospital beds and a scarcity of medical resources, notably personal protective equipment. As a result, health control measures emphasizing distancing and hygiene were recommended, consequently leading to shortened hospital stays. Additionally, hospital admission was typically conditional on the severity of the illness. Conversely, the length of hospital stays remained unchanged for circulatory pathologies. This could be explained by the critical condition of patients upon hospitalization, particularly as cardiac pathologies heighten the risk of mortality, necessitating more frequent intensive care and more extended hospital stays (Lippi *et al.,* 2020).

Regarding the impact of COVID-19 on mortality rate, our study revealed that following the onset of the pandemic, the risk of death remained significantly linked to respiratory and circulatory pathologies. However, it increased for respiratory and decreased for circulatory pathology. The heightened risk of death for respiratory pathologies is directly attributed to their correlation with Covid-19. Conversely, the decrease in risk for circulatory pathologies might be attributed to reduced

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admissions of patients with chronic circulatory conditions due to limited access to hospital services or the general population's anxiety about SARS-CoV-2 infection while seeking medical care. Some studies have highlighted instances of non-hospitalized patients with mild symptoms found deceased at home during lockdown periods (Marijon *et al.,* 2020; DeRosa *et al.,* 2020; Ciacchini *et al.,* 2020; Lynn *et al.,* 2021; Duncanson *et al.,* 2020; Wise, 2020).

Regarding the study limitation, the study was conducted at the provincial hospital, which represents the public health sector of Kenitra province. The study did not cover the private health sector. Therefore, results are not necessarily generalizable to the province population.

From a research perspective, the present work could be completed by a similar study in the private healthcare sector of Kenitra province. That would provide more generalizable results and allow comparison of pathology profiles between the public and private healthcare sectors in this province.

Conclusion

This study provides a comprehensive insight into the far-reaching impact of the COVID-19 pandemic on healthcare dynamics, particularly evident in the notable decrease in hospital consultations for various pathologies. The findings resonate with a global trend underlining the unprecedented challenges healthcare systems face. At the Provincial Hospital of Kenitra, a discernible decline in hospitalization rates underscores the multifaceted impact of the pandemic on healthcare-seeking behavior. Contributing factors include heightened patient anxiety during the health crisis and logistical challenges in accessing healthcare facilities designated as Covid-19 centres. The overarching measures to control the spread of the virus, including the reclassification of specific services as non-essential, have led to a reduction in resources allocated to meet broader healthcare needs.

The findings underscore the adverse impact of the COVID-19 pandemic on hospital consultations, which is a cause for significant concern, particularly for pathologies demanding effective hospital treatment to avert adverse consequences. Reducing hospital admissions for such critical medical pathologies raises severe implications for patient well-being. In response, public health system managers must focus on devising effective strategies to ensure that patients requiring hospital care continue to receive it during the ongoing pandemic. Key measures should be directed toward a comprehensive approach from the government and its partners, focusing on rebuilding healthcare structures, restoring user confidence through awareness initiatives, and securing additional resources for sustained service provision during this critical period.

Author Contributions:

- Conceptualization, methodology, writing—original draft preparation M.Z., A.A., A.B., and M.T.;
- formal analysis, M.Z., A.A., H.H., and M.T.;
- resources, I.A.;
- writing—review and editing, A.A., M.T., and A.B.;
- supervision, A.Q., M.T., A.A.
- All authors have read and agreed to the published version of the manuscript

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