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A Statistical Study of Corona Virus in the City of Tarhuna from 2020 to 2022 and Their Impact on Patients with Chronic Diseases

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دراسة إحصائية لفيروس كورونا في مدينة ترهونة من 2020 إلى 2022 وتأثيرها على مرضى الأمراض المزمنة

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Abstract
Background: The study aimed to evaluate the risk factors and prevalence of Coronavirus infection among residents and expatriates in Tarhuna, highlighting the importance of virus detection and preventive measures like vaccination and antiviral therapies.
Materials and methods: From mid-February through late April 2025, researchers examined 718 coronavirus cases reported in Tarhona, Libya. They used information provided by the local pandemic task force to understand how frequently – moreover, where – the virus appeared across different people, regardless of their nationality.
Results: A look at 718 people revealed that roughly 12% more men than women tested positive for Coronavirus. Also within the group, nearly 3% lived with diabetes - a condition often linked to health problems. Among those with syndromes, 2.2% also had issues involving blood pressure or blood sugar - specifically, 16 were found to have high blood pressure. Smaller portions of individuals presented with conditions like diabetes (0.8%), kidney failure (0.7%), asthma (0.3%), underactive thyroid (0.3%) or Parkinson's disease (0.3%).
Conclusion: The study concludes that there is a statistically significant difference in infection rates based on gender, with males being more frequently infected. It identifies that 2.9% of participants had diabetes, consistent with global trends regarding chronic illnesses.

Additionally, 16.2% of individuals with both diabetes and hypertension faced health issues related to these conditions.
Recommendations: Highlight the importance of awareness campaigns aimed at men's health and the necessity of continuous education for individuals with chronic illnesses regarding health maintenance and infection prevention.

Keywords: Corona viruses, Epidemiological Study, Chronic Disease and Infection.

الملخص
هدفت الدراسة إلى تقييم عوامل الخطر وانتشار عدوى فيروس كورونا بين السكان والمغتربين في ترهونة، مع تسليط الضوء على أهمية الكشف عن الفيروس والتدابير الوقائية مثل التطعيم والعلاج المضاد للفيروسات.
الطـــرق والمـواد المستخدمـة: أجريت الدراسة من 16 فبراير إلى 28 أبريل 2025 واستخدمت بيانات اللجنة العليا لمكافحة وباء فيروس كورونا في ترهونة، ليبيا، لتقييم معدل انتشار وباء كوفيد-19 بين الأفراد من الذكور والإناث من مختلف الجنسيات، والتي شملت 718 حالة تم الإبلاغ عنها.
النتـــــــــائج: في دراسة شملت 718 مشاركًا، وُجد أن انتشار فيروس كورونا كان أعلى بنسبة 12.2% بين الرجال مقارنة بالنساء من بين المشاركين، كان 2.9% مصابين بالسكري، مما يمكن أن يؤدي إلى مضاعفات فسيولوجية مختلفة. بالإضافة إلى ذلك، عانى 2.2% من المشاركين الذين لديهم متلازمات من اضطرابات في ضغط الدم والسكر، حيث تم تصنيف 16 حالة على أنها مصابة بارتفاع ضغط الدم.
تشمل الأمراض المصاحبة الأقل انتشارًا داء السكري (0.8%)، والفشل الكلوي (0.7%)، والربو (0.3%)، وقصور الغدة الدرقية (0.3%)، ومرض باركن سون.(0.3)
الاســتنتـــاج: توصلت الدراسة إلى أن هناك فرقًا ذا دلالة إحصائية في معدلات العدوى بناءً على الجنس، حيث كان الذكور أكثر عرضة للإصابة. يحدد أن 2.9% من المشاركين كانوا مصابين بالسكري، وهو ما يتماشى مع الاتجاهات العالمية المتعلقة بالأمراض المزمنة.بالاضافة إلى ذلك، أن 16.2% من الأفراد الذين يعانون من كل من السكري وارتفاع ضغط الدم مشاكل صحية مرتبطة بهذه الحالات .
التوصـيـــــات: تسليط الضوء على أهمية حملات التوعية الموجهة لصحة الرجال وضرورة التعليم المستمر للأفراد المصابين بأمراض مزمنة بشأن الحفاظ على الصحة والوقاية من العدوى.

الكلمات المفتاحية :الفيروسات التاجية، دراسة وبائية، الأمراض المزمنة، العدوى.

Introduction:

People have been aware of coronaviruses—a class of viruses that cause diseases including colds, SARS, and even MERS—since the 1960s [1]. Then, in late December, the first case of an unusual pneumonia was discovered by medical professionals in Wuhan, China. They quickly identified the coronavirus as the cause. Researchers have tentatively identified the pathogen responsible for the illness as severe acute syndrome coronavirus. It is currently travelling across the world. Coronaviruses, like the one that causes SARS, may provide more immunity than previously thought, according to research. Breathing issues are always the result of these coronaviruses. Within cells, they replicate their genetic material [2]. We can combat the virus more effectively if we understand how it spreads locally [3]. Alongside persistent infections, new ones are constantly emerging, thus we need to develop new strategies to combat them. Knowing what viral proteins look like is essential for creating effective medications because of how diverse viruses are and how quickly they can change. [3]. Many people have persistent health problems after contracting COVID-19. These include breathing issues, changed sensations, nerve problems, difficulty falling asleep, and decreased endurance. People frequently struggle with mental upheaval in addition to these physical repercussions, such as stress, grief, or even tragedy. As a result, their immediate well-being significantly deteriorates [4]. We started this project since not much research had been done on Tarhona City residents' experiences with the coronavirus. Although researchers examined broader regions, specific local data—which is essential to understanding what transpired here—was lacking. In order to get a comprehensive understanding, we looked at historical documents in addition to first-hand recollections from that era. In order to better

prepare Tarhona for the future, this effort aims to acquire insights from the current situation, particularly with regard to its schools, healthcare system, and community support systems. It aims to provide data-driven, actionable recommendations for stricter health regulations and continued education during disease outbreaks. In essence, we need to immediately understand how the coronavirus impacted Tarhona's way of life. The rise of illness made life in Tarhona extremely difficult; it affected people's occupations, well-being, and even social interactions. Children lagged behind since schools were closed for a long time. However, no one has really investigated what transpired in Tarhona, which makes it challenging to determine how to proceed. We must look back and carefully document the virus's impact on daily life in order to fully understand what it did to Tarhona. This is very important because it provides us with a clear picture of how the pandemic directly affected Tarhona City. The examination of relationships, health, and financial concerns will highlight the unique challenges faced by the people. This study examines the extent to which the coronavirus spread across Tarhuna, affecting both locals and visitors. It also takes into account what occurred to education, including the challenges faced by students, teachers, and homes during difficult times. The findings should help authorities better prepare for future health emergencies, enhancing Tarhuna's resilience and the well-being of its citizens. The goal of the study is to identify illnesses associated with the virus and determine how frequently they manifest. Concurrently, it investigates whether a person's age, sex, place of origin, duration of stay, pre-existing medical conditions, or time of illness affect their risk of contracting the coronavirus while residing overseas.

Materials and Methods:

Researchers examined patient data from Tarhona, Libya, to determine the frequency of coronavirus infections. They took into account a person's age, place of residence, illness, gender, and country of origin. This study, conducted between February 16 and April 28, 2025, examined relationships between these specifics and the illness itself, using personal traits as potential factors and treating coronavirus cases as what was being explained. Both domestic and foreign patients were included in the study. This was made feasible by a team that collaborated with the local health authorities. There were no restrictions on who may take part in this inquiry, which involved 718 people, including locals and tourists. Records maintained by the health authority during the pandemic from 2020 to 2022 provided the information. We gathered information such as age, sex, country of origin, residence, peak infection time, and length of illness. There were 718 participants in all, with 454 men and 264 women, ages ranging from eight months to 97 years. We used SPSS software to organise the data for analysis, searching for outcomes that were statistically significant (P less than or equal to 0.05).

Results: The information was entered into the computer after it had been coded. After that, we ran statistics using SPSS in the hopes of finding significant results—that is, results that showed a difference with a value of 0.05 or less, which is a common criterion in disciplines like sociology. Solid numbers—values that accurately depict what is happening—are necessary to understand how science operates. We accomplish this by identifying usual amounts or comparing the similarity of data points. We can identify true differences between various aspects of a study with the aid of statistics. We use a straightforward tally that reveals patterns to determine how frequently each item appears in the data. Additionally, when working with measurements that aren't neatly arranged, we use a tool called the Pearson Correlation to determine whether changes in one thing connect to changes in another. This foundation increases our confidence in our findings by assisting us in understanding connections and distinctions.

Table 1: Distribution of study cases by age group

Ages	Frequency	Percent
Less than 20	49	6.8%
20 to 40	322	44.8%
41 to 60	245	34.1%
more than 61	102	14.2%
Total	718	100%

The study found that the predominant age group (20-40 years) represented 44.8% of the total participants, followed by the middle age group (41-60 years) at 34.1%. The elderly group (over 61 years) constituted 14.2%, while the under-20 age group (under 20 years) was the least represented at 6.8%, indicating a primarily adult population focus.

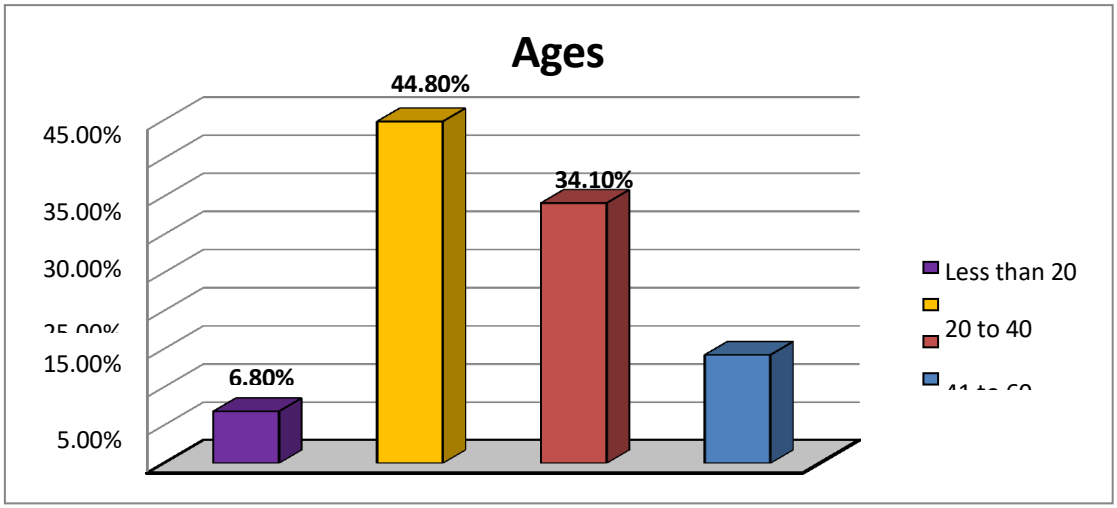

Figure 1: Distribution of study cases by age group.

Table 2: Distribution of study cases by gender.

Gender	Frequency	Percent
Male	454	63.2%
Female	264	36.8%
Total	718	100%

Table (2) shows that (454) samples out of the total samples representing what I forgot 63.2% were males, while (264) samples out of the total samples representing what I forgot 36.8% were females.

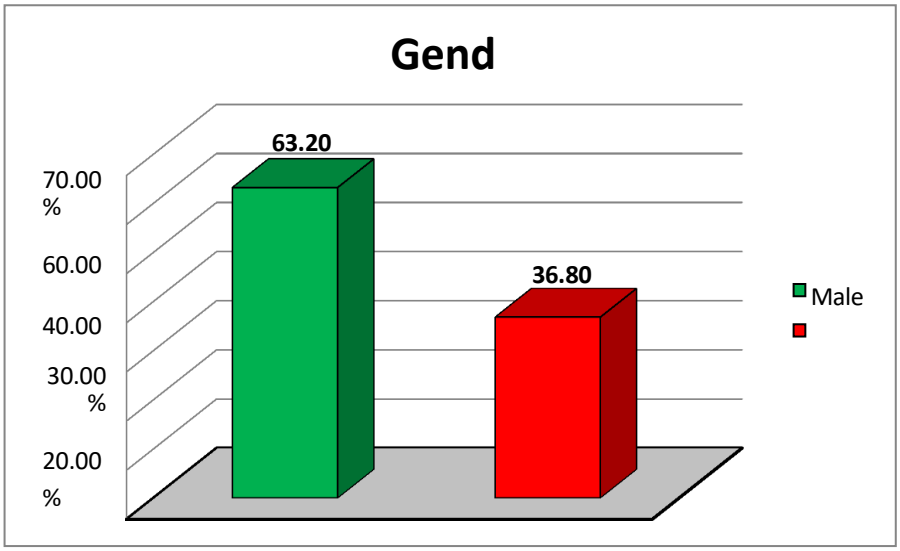

Figure 2: Distribution of study cases by gender

Table 3: Distribution of study cases by nationality

nationality	Frequency	Percent
British	3	0.4%
Chadian	4	0.6%
Georgian	2	0.3%
Libyan	701	97.6%
Tunisian	5	0.7%
Turkish	1	0.1%
Ukranian	2	0.3%
Total	718	100%

The study shows that Libyan nationality dominates the majority of cases, accounting for 97.6% of the total (718 cases), with a small representation of other nationalities, such as Tunisian, Chadian, British, Georgian, Ukrainian, and Turkish.

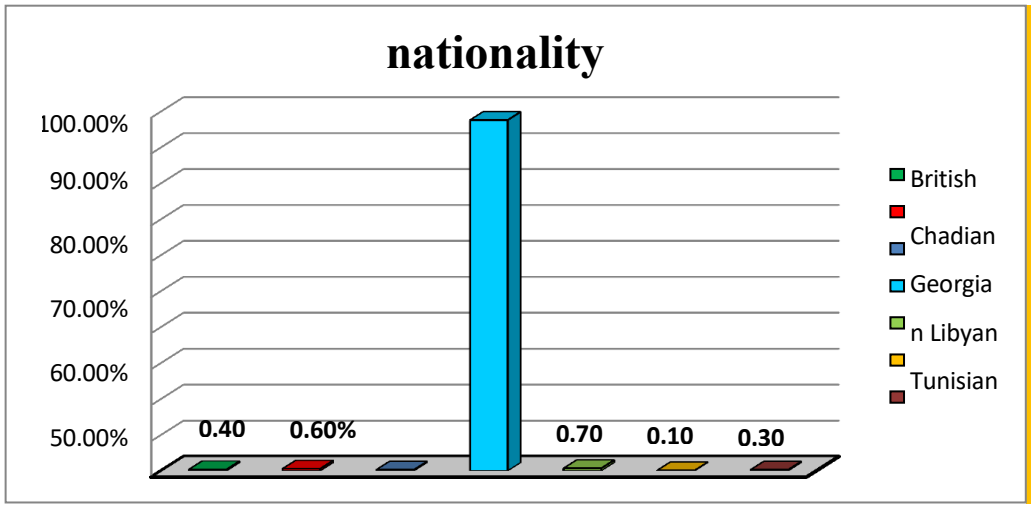

Figure 3: Distribution of study cases by nationality

Table 4: Distribution of study cases by place of residence

Residence	Frequency	Percent

Abiar majjy	31	4.3%
Addaown	44	6.1%
Alhoatem	5	0.7%
Alkhdra	50	7%
Ashersharah	8	1.1%
Assaqiah	9	1.3%
Azzerah	3	0.4%
Dooghah	20	2.8%
Fum mulghh	4	0.6%
Olad Abozaid	2	0.3%
Olad Ali	4	0.6%
Sidi assaid	106	14.8%
Souq Alahd	10	1.4%
Souq Aljoumah	8	1.1%
The center's Tarhouna	409	57%
Weshtatah	5	0.7%
Total	718	100%

Table .4 indicates that the vast majority of study cases are located in Tarhuna Center, representing a significant 57% (409 individuals) of the total participants. This is followed by Sidi Essayd with 14.8% (106 individuals). Al-Khadhra (7%) and Al-Dawun (6.1%) also recorded significant numbers of participants. Abyar Maji (4.3%) and Douga (2.8%) represented smaller proportions, while the remaining areas were very underrepresented, each representing less than 2% of the total study cases.

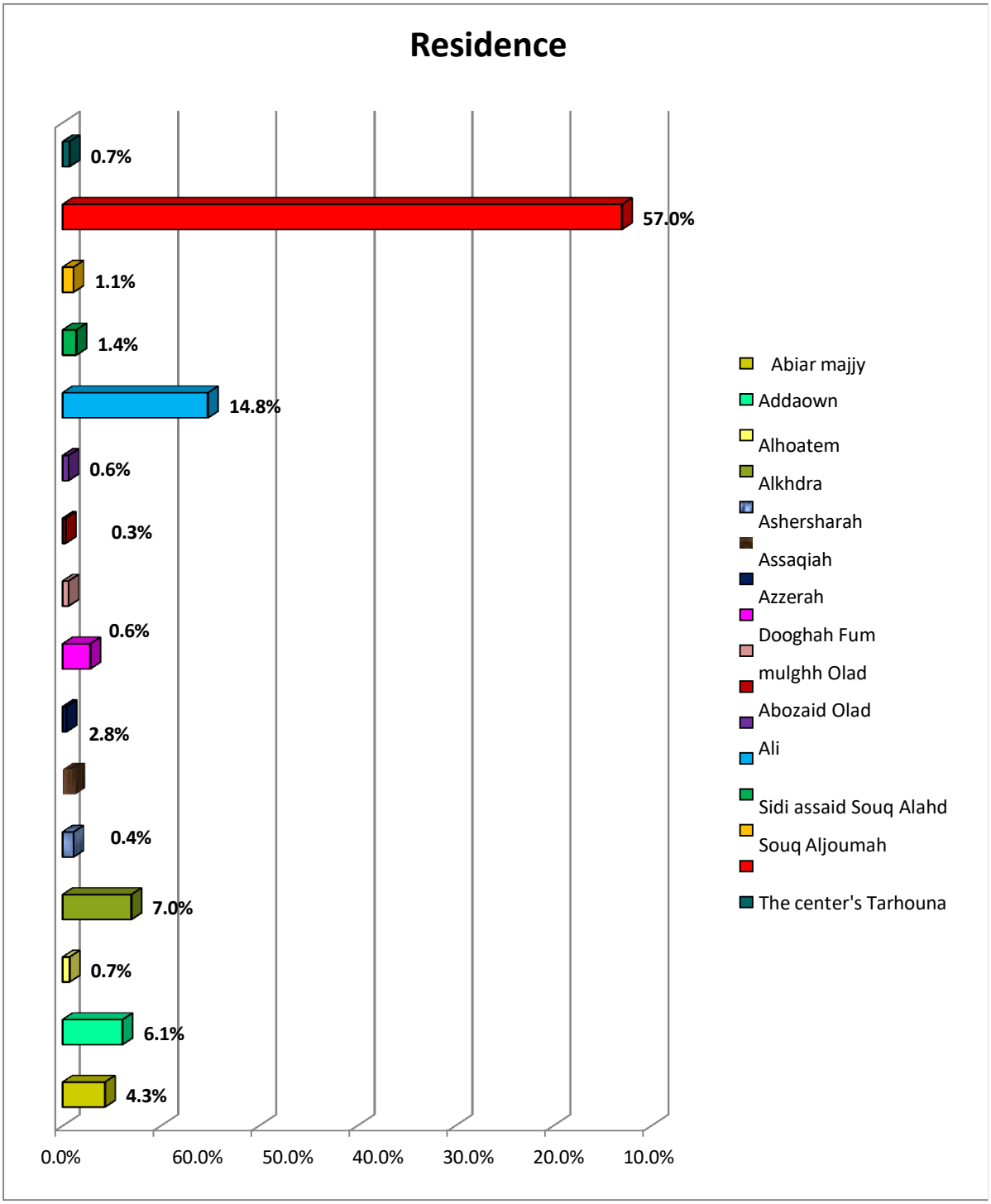

Figure 4: Distribution of study cases by place of residence.

Table 5: Distribution of study cases according to those infected with and not infected with the Coronavirus

Infection	Frequency	Percent
Infected	346	48.2%
Non- infected	372	51.8%
Total	718	100%

Table (5) divides study cases into infected and uninfected groups, with 346 cases representing 48.2% and 372 cases representing 51.8% respectively. The data indicates widespread virus spread in the study sample. close distribution between the two groups.

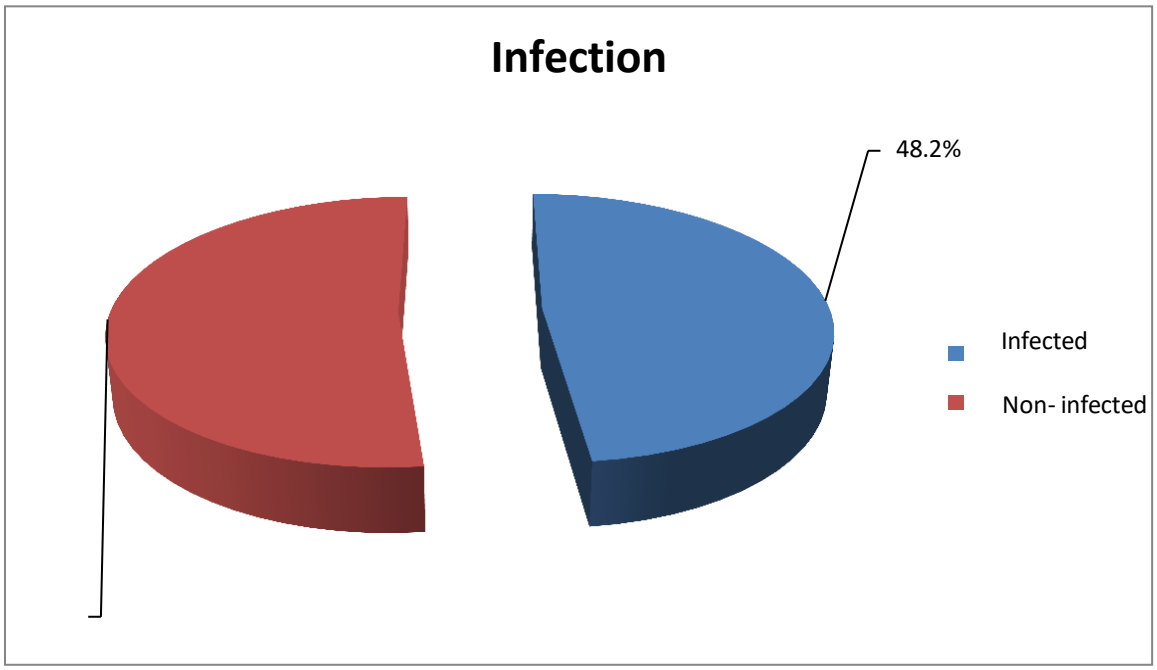

Figure 5: Distribution of study cases according to those infected with and not infected with the Coronavirus

Table 6: Distribution of study cases according to their suffering from other diseases

diseases	Frequency	Percent
asthma	2	0.3%
diabetes	21	2.9%
diabetes and hypertension	16	2.2%
diabetes and kidney failure	6	0.8%
hypertension	16	2.2%
hypothyroidism	2	0.3%
kidney failure	5	0.7%
no thing	648	90.3%
Parkinson's disease	2	0.3%
Total	718	100%

The study revealed that 90.3% of participants had no other comorbidities, indicating their health issues were primarily related to their condition. However, 2.9% had diabetes, a common comorbidity, and other less common ones.

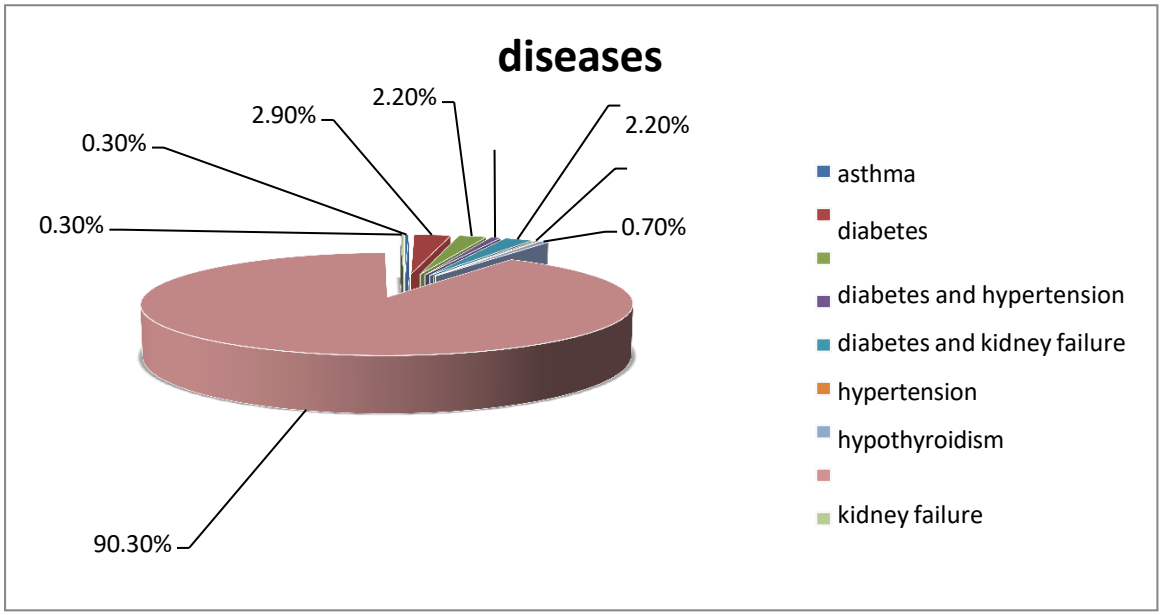

Figure 6: Distribution of study cases according to their suffering from other diseases

Table 7: The relationship between the increase in Coronavirus infections and demographic variables (age, gender, nationality, place of residence, diabetes, high blood pressure, kidney failure)

demographic variables		age	gender	Nationality	Residency	disease	Infection
age	Pearson Correlation	1	.152**	-.039-	-.086-*	-.326-**	-.066-
	Sig. (2-tailed)		.000	.292	.022	.000	.079
	N	718	718	718	718	718	718
gender	Pearson Correlation	.152**	1	-.077-*	-.038-	-.023-	-.143-**
	Sig. (2-tailed)	.000		.039	.309	.538	.000
	N	718	718	718	718	718	718
Nationality	Pearson Correlation	-.039-	-.077-*	1	.035	-.020-	-.018-
	Sig. (2-tailed)	.292	.039		.348	.589	.634
	N	718	718	718	718	718	718
Residency	Pearson Correlation	-.086-*	-.038-	.035	1	.028	.146**
	Sig. (2-tailed)	.022	.309	.348		.456	.000
	N	718	718	718	718	718	718
disease	Pearson Correlation	-.326-**	-.023-	-.020-	.028	1	.006
	Sig. (2-tailed)	.000	.538	.589	.456		.876
	N	718	718	718	718	718	718
	Pearson	-.066-	-.143-	-.018-	.146**	.006	1

Infection	Correlation		**				
	Sig. (2-tailed)	.079	.000	.634	.000	.876	
	N	718	718	718	718	718	718

Table (7) displays Pearson correlation coefficients between coronavirus infection and demographic variables like age, gender, nationality, and place of residence. The results show a weak negative association between age and coronavirus infection, but not statistically significant. There is a slight decrease in infection rates with age, but this is not a reliable trend. The data suggests that age is not a significant factor in coronavirus infection.

Also, the study reveals a weak, negative association between gender and coronavirus infection, with males having a higher infection rate than females, indicating that gender is a significant factor in predicting infection. The study discovers a weak, negative association between gender and coronavirus infection, with males having a higher infection rate than females, indicating that gender is a significant factor in predicting infection. The Pearson correlation coefficient reveals a positive but weak relationship between place of residence and coronavirus infection, with high statistical significance, suggesting that certain areas, such as urban or rural areas, are associated with higher infection rates. The study reveals a weak positive association between specific diseases and COVID-19 infection, with no statistically significant linear relationship between the presence of these diseases as a composite disease variable and increased infection with the virus, as indicated by the Pearson correlation coefficient. Overall the study found that gender and place of residence are significant factors associated with coronavirus infection, with a negative correlation indicating sex differences. The positive association is due to geographic or community factors, such as population density, healthcare access, and adherence to preventive measures. Age, nationality, and combined disease variables did not show a significant linear association with coronavirus infection.

Table 8: Distribution of study cases according to years of infection with the Coronavirus

Year of injury	Frequency	Percent
2020	133	38.4%
2021	77	22.3%
2022	136	39.3%
Total	**346**	**100%**

The study's table obtains a significant disparity in coronavirus cases over three years (2020, 2021, and 2022). In 2020, 38.4% of infected cases were recorded, indicating the early stages of the pandemic's widespread spread. In 2021, the number of cases decreased by 22.3% due to global vaccination campaigns and increased public awareness, but in 2022, the number increased significantly, reaching 136 cases, representing 39.3%. The 2020 pandemic saw the highest percentage of cases among the three years due to limited scientific knowledge, lack of vaccines, and reliance on social distancing and public closures, leading to a strong first wave of infections. The global vaccination campaigns in 2021 led to a temporary decrease in the number of cases, as the availability of vaccines reduced the severity and spread of the disease, resulting in a general improvement. In 2022, the emergence of new virus variants like Omicron, which are highly transmissible even among vaccinated individuals, and the ease of restrictions and preventive measures in many countries contributed to the resurgence of the virus.

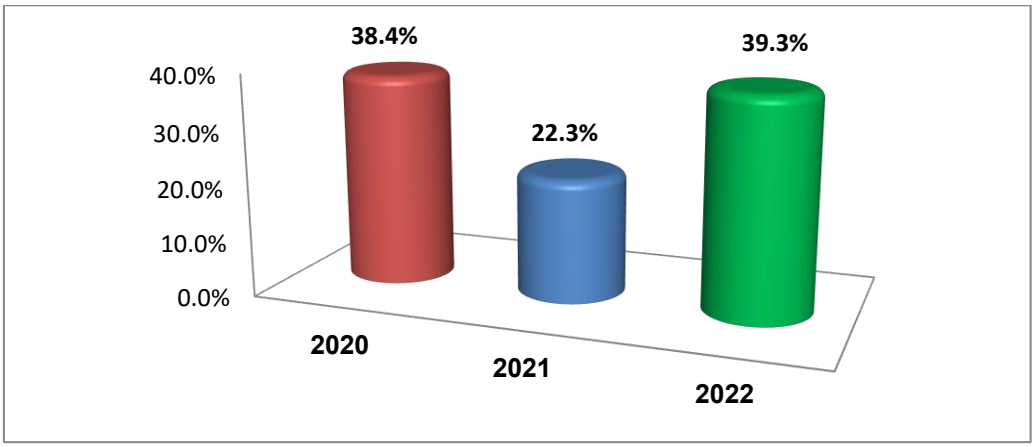

Figure 7: Distribution of study cases according to years of infection with the Coronavirus

Table 9: Distribution of study cases by gender for cases infected with the Coronavirus

Gender	Frequency	Percent
Female	152	43.9%
Male	194	56.1%
Total	**346**	**100%**

The table shows the distribution of coronavirus cases in the study by gender. Males constitute the largest proportion of infected cases, with 194 cases, equivalent to 56.1% of the total cases, while females constitute the smallest proportion of cases, with 152 cases, equivalent to 43.9%. The results indicate that coronavirus cases in this study were more common among males than females, by a difference of approximately 12.2%.

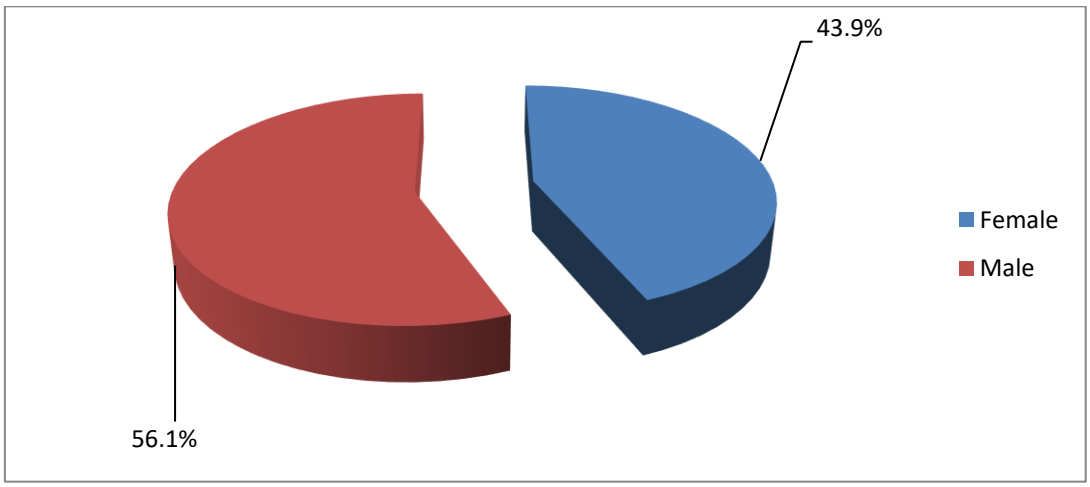

Figure 8: Distribution of study cases by gender for cases infected with the Coronavirus.

Discussion: The research looked at how often locals versus non-locals got sick with coronavirus, how their illnesses connected, also how sickness rates related to various risks. Most participants were adults; nearly half - 322 out of 720 people, or 44.8% - were between 20 and 40 years old. Then came those aged 14 to 60 (245 cases, 34.1%), subsequently older folks over 61 representing 14.2% (102 cases); younger than 20 made up only 6.8% (49 cases). Outcomes didn't quite align with a French study, likely because things differ there or methods weren't identical [5]. while also showing differences when compared with a study from China [6.7]. After thirty, growth hormone levels slowly fall - roughly 15% less with

each ten years. This change connects to weaker signals from hormones that control its release. Moreover, shifts in how our bodies are made up, what we eat, how much we move, our energy use, when we sleep, alongside illnesses tied to getting older, also play a role [8]. Studies show people with severe breathing problems - specifically ARDS - tend to have lower IGF-1 levels, which seems linked to a higher risk of death from it [9]. As people age, declining growth hormone levels seem linked to worse outcomes from covid-19 [8]. Lower growth hormone might worsen the virus's effects, so boosting those levels offers a possible treatment path. Recombinant growth hormone therapy could lessen the illness - meaning we should investigate treatments accounting for age-related hormonal shifts [10]. Growth hormone therapy could help, given links between growth hormone issues alongside the coronavirus [11]. The group examined showed more men - 63.2%, totaling 454 people - whereas women comprised just 36.8% (264 people). The data clearly show more men than women in this group. Moreover, these outcomes differ from a U.S. study, hinting that sex ratios may vary by location [12]. Findings echo an Italian investigation concerning similar traits (source [13]), yet diverge from research done in Bangladesh [14]. Nationality proved key; most people involved held citizenship. Nearly all - 97.6% or 701 people out of 718 - were citizens. Few others appeared in the records. Five were Tunisian, alongside four from Chad. Three had British passports, two each were Georgian or Ukrainian, while just one person claimed Turkish citizenship. The data presents a distribution of cases centered predominantly in Tarhuna, reflecting a significant concentration of 660 cases, accounting for 91.9% of the total sample. The cases can be categorized as follows: the center holds the majority with 409 cases (57%), followed by the "" sidi assaid " category with 106 cases (14.8%). Other notable categories include " alkdra " with 50 cases (7%), " addawn" with 44 cases (6.1%), "Abyar Maji" with 31 cases (4.3%), and "dooghah" with 20 cases (2.7%). Additional categories such as "aShershara" consist of 8 cases (1.1%), and categories like "The 9" with 9 cases (1.3%), "soug alahad with 10 cases (1.4%), and "olad ali" with 4 cases (0.6%) follow suit. Lesser represented categories include "souq algoumah" (8 cases - 1.1%), "Diaspora" (5 cases - 0.7%), "olad Bouzid" (2 cases - 0.3%), and a few others with minimal representations, including "Mouth Canceled" (4 cases - 0.6%), "Agriculture" (3 cases - 0.4%), and "Alhautem" (5 cases - 0.7%). The numbers show cases clustered in specific types, largely connected to Tarhuna. Testing revealed the virus spread readily through people studied - infection levels were comparable between groups. Remarkably, most individuals, around 90.3% representing 648 cases, had no other health conditions. Of patients with existing health issues, diabetes surfaced in 2.9% – that's 21 individuals. A similar 2.2% - 16 people - had diabetes alongside high blood pressure, whereas a further 2.2% (also 16) experienced just high blood pressure. Less often, we observed diabetes mellitus in 0.8%, kidney failure in 0.7%, also asthma, underactive thyroid, or Parkinson's disease each affecting 0.3%. These findings contrast with research done elsewhere, specifically in the United States plus Italy [15, 16], [17, 18]. The outcomes really differ when looking at the United States - specifically concerning how often long-term illnesses appear, revealing distinct rates versus what's seen there [19]. These results also stand apart from studies done in Ethiopia likewise Saudi Arabia [20] [21]. Though they do align with research from the UK, hinting that chronic disease prevalence varies considerably depending on location [22]. Long-lasting illnesses share traits with infections - specifically issues like damaged blood vessels, ongoing inflammation, also changes in how the body initially fights off invaders. Because of these overlaps, it's clear that chronic disease and infection are connected; grasping this link could lead to better health for people [23-24]. Diabetes, alongside high blood sugar, ramps up stress on the body's systems while also irritating blood vessels. When blood vessels experience too much stress from this process, it contributes to problems with how they function - a key sign being changes

detectable through sound. Long-term illnesses tied to failing blood vessel health often involve both localized irritation of those vessels coupled with widespread bodily inflammation. Studies reveal how both quick-acting and learned immunity affect blood vessel health when blood pressure is high. For instance, a certain immune process - the complement pathway - can harm these vessels, especially with hypertension. However, increased amounts of interleukin-10, a substance from the body's learning immune defenses, seems to lessen the damage caused by high blood pressure [25, 26]. Folks with diabetes face a greatly heightened danger of really bad lung inflammation from viruses - it can even be deadly. Take SARS back in 2003: diabetics were three to just over three times more likely to die from it compared to people without diabetes, demonstrating how crucial managing diabetes is when fighting off these kinds of illnesses [27,28]. In 2009, people with type H1N1 diabetes were hospitalized in intensive care nearly four and a half times more often than those without diabetes. Later, during the 2014 MERS outbreak, having diabetes significantly raised the chance of becoming seriously ill. These events demonstrate that diabetics face bigger threats from severe lung diseases [29]. When the immune system doesn't work right - with fewer T3+ cells alongside uneven levels of different T cells (too few helper T cells compared to suppressor T cells) - Natural Killer T cell activity drops. Consequently, the body struggles to fight off illness [30]. We don't yet grasp why these conditions frequently occur together, though several ideas exist. High or low blood sugar might contribute to infections. Irregular glucose impacts immunity, disrupting its function then weakening defenses. Consequently, people face higher risks from COVID-19 alongside various bacterial illnesses [31]. Furthermore, viruses like SARS-CoV and its successor utilize ACE2 – found on cells lining lungs, intestines, kidneys, also blood vessels – to attach themselves. Notably, those managing diabetes with specific medications experience significantly increased levels of this ACE2 protein. Thiazolidinediones alongside ibuprofen could boost ACE2. This, in turn, may allow coronaviruses to infect more easily [32]. People who recovered from coronavirus generally showed less high blood pressure when compared to those who didn't survive the infection. Moreover, higher blood pressure seemed linked to more serious sickness - necessitating intensive care. Studies indicate around 17% of coronavirus patients experienced hypertension, varying between 14% and 22%. People who were very sick faced more than double the chance of high blood pressure when contrasted with those less affected (odds ratio 2.36, 95% confidence interval: 1.46–3.83) [33]. Separately, a review calculated that about 16% of individuals contracting the virus developed hypertension (95% confidence interval: 10–24%) [34]. A review of studies showed that about one in six people hospitalized with coronavirus also had high blood pressure - specifically, 17.1% [35]. Those needing intensive care or experiencing severe illness were nearly twice as likely to develop this condition when compared with those who weren't critically ill. People with high blood pressure often take medicines - ACE inhibitors or ARBs - that boost ACE2. Seeing as how the coronavirus uses ACE2 to get into cells, those on these medications might find it simpler for the virus to latch on [32]. Heart trouble, high blood sugar, plus diabetes seem linked to getting sick with coronavirus - as do things that make people more likely to develop them. Long-term sicknesses resemble infections because they both stir up inflammation while weakening the body's first line of defense. Individuals already dealing with health issues didn't fare as well as healthy ones. More health issues alongside Covid-19 meant people didn't fare well. Thoroughly checking a patient's existing conditions could help doctors estimate their danger level when they arrive at the hospital [33, 36]. We still need to learn much about how this sickness starts, spreads, lasts, and affects individuals [37]. Looking at who got sick, the research showed more men than women. Of all the cases, 194 – about 56% – were male. Women made up 162 cases, roughly 44%. So, men experienced infection at a rate 12% higher

than women. Our findings echo earlier work from Saudi Arabia, which also pointed to differences in infection rates between genders [38]. Conversely, these outcomes contrast with an Irish investigation [39], yet they largely confirm those of a Bangladeshi study [105]. Long COVID seems heavily influenced by who you are - your age, whether you're pregnant, or if you've gone through menopause. Research indicates women face roughly a 31% greater likelihood of developing lasting effects following a coronavirus infection. This holds true even when considering things like where people live, their access to healthcare, hospital stays, plus prior vaccinations. Even looking at just age, racial background, and ethnic origin, this heightened risk for women persists. It appears accounting for related health issues tied to gender could reduce how much greater the chance is of developing lasting coronavirus symptoms. What's more, current research generally agrees women face a higher likelihood of experiencing different forms of lingering coronavirus - a point supported by this study [40,41,42,43,44]. Looking back at previous coronavirus scares - like SARS and MERS - research showed women faced different, often worse, long-term effects than men. They seemed to struggle more with breathing difficulties, also with things like stress, worry, or feeling down; ultimately reporting a poorer overall sense of wellbeing [45]. Looking closely at women going through menopause, researchers discovered no real difference in how likely those between 40 and 54 were to get a long-lasting COVID infection - compared to men the same age. This connects with changes in immune function seen during menopause, similar to what happens with HIV [46], Perhaps this outcome stems from shifting female hormones as women get older - higher estrogen seems connected to lower testosterone, potentially impacting how bodies fight off lasting coronavirus infections.[47-48] Altered hormone levels clearly affect immunity when viruses strike. Shifts happen naturally - with periods, birth control, after a woman stops having periods, while taking hormones, or when expecting a baby. These times involve fluctuating hormones, potentially weakening how well the body fights off viruses [49]. Specifically, dropping estrogen around menopause seems key to why older women sometimes struggle more against infection [50]. Gender differences in the risk of coronavirus are influenced by aging and the occurrence of menopause in women. The onset of menopause results in the blockage of estrogen's protective effects, which increases the vulnerability of postmenopausal women to infections, including Coronaviruses[51]. As estrogen drops during menopause, certain immune system components - specifically IL-6, IL-2, IL-8, alongside GM-CSF - tend to rise (61). Because of this connection, giving supplemental estrogen might help ward off coronavirus infection or ease milder cases of COVID-19, notably in women after menopause [52]. Looking at coronavirus cases from 2020 through 2022 showed they went up then down. There were 133 cases in 2020 - over a third of everything we tracked. However, numbers dropped quite a bit to just 77 cases by 2021, which was less than a quarter. Yet, things shifted by 2022; reports climbed to 136 instances – a substantial 39.3%, marking the peak across the three years we looked at. This outcome doesn't quite align with what researchers found in Spain [53], highlighting how much infection numbers fluctuated during our investigation. Indeed, these discoveries diverge from earlier work done in Germany [54]. The SARS-CoV-2 virus changes - it's how it operates. Since appearing, many forms have popped up worldwide, each spreading and impacting people differently [55]. For instance, the Delta variant surfaced in India during December 2020 [56, 57]. It stood out because individuals carried lots of virus for longer periods, also getting sick again more often [58]. The Delta version of COVID-19 spread much more easily than previous ones, also dodging immunity better [59]. Then, in November 2021, the Omicron variant appeared in South Africa, raising alarms because it too was highly contagious. Soon after being found, Omicron outpaced Delta, ultimately becoming the main global version [60]. Omicron spreads much faster - perhaps 3.31 to 100 times quicker than

Delta - meaning it could quickly become dominant. Because of this swift change, keeping watch on the situation alongside smart plans to deal with it remains crucial [61, 62]. Researchers now see Omicron dodging some immune protection, yet it doesn't seem to make people quite as sick as earlier versions of the virus [63]. Despite this change in how well defenses work, evidence suggests Omicron isn't as dangerous overall [64]. This suggests potential variations in clinical outcomes between patients infected with the Omicron variation versus those with the Delta variant, prominence the differing impacts of these two strains on patient health [65].

Conclusion: Based on the result of this research we concluded that:

Analyzed 718 corona virus cases, revealing that 44.8% were adults aged 20–40, and 34.1% aged 41–60, with a predominance of males. Most cases originated from Tarhuna and Tripoli. Findings indicated a near-equal split of corona virus positive (48.2%) and non-positive cases (51.8%), with diabetes and hypertension being the most prevalent comorbidities. Utilized Pearson's correlation coefficient to assess the relationship between corona virus cases and various demographic and health factors. A significant negative correlation was found between gender and corona virus cases infection ($r = -0.143$, $p = 0.000$), indicating higher infection rates in males. Additionally, there was a significant correlation with place of residence ($r = 0.146$, $p = 0.000$), suggesting higher infection probabilities in urban areas, particularly Tarhuna. Contributing factors may include access to healthcare and population density. No significant correlations were observed between infection rates and age, nationality, or comorbidity. The findings indicate a need for further research into factors like occupational exposure, social behaviors, and environmental influences that may affect higher infection rates among males and certain residential areas. Age, nationality, and common Comorbidities are not significant predictors of corona virus cases infection. Gender-specific prevention strategies and local interventions in high-prevalence areas are recommended, with gender and place of residence identified as key factors linked to corona virus cases transmission in the study population.

Recommendations: Upon the results of this study it's highly recommended that: The study revealed a significant negative correlation between gender and Coronavirus infection rates, with higher rates in males. It also identified a positive association between place of residence and infection rates, particularly in Tarhuna. Recommendations include health awareness campaigns aimed at males and local health interventions in Tarhuna. Suggested public health improvements involve expanding testing facilities, increasing disinfection, promoting mask use and social distancing, and enhancing access to health information. The need for further research to investigate these correlations, considering various variables, is also highlighted. Comorbidities affect disease severity but not necessarily infection risk. Educating patients with chronic diseases on self-protection and health management is crucial. Future research should include a diverse geographical sample and consider additional factors like socioeconomic status, education level, healthcare access, and vaccination history.

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Compliance with ethical standards

Disclosure of conflict of interest

The authors declare that they have no conflict of interest.