University College of Applied Sciences
Department of Engineering
Information Security Program
Data Mining
ISSE 5318

The relationship between population density, sex, and the method of infection with Covid-19 virus

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Abstract

The unprecedented growth of the novel corona virus (SARS-CoV-2) as a severe acute respiratory syndrome escalated to the corona virus disease 2019 (COVID-19) pandemic. It has created an unanticipated global public health crisis that is spreading rapidly in Gaza as well, posing a serious threat to 2 million persons. Among the factors, population density is foremost in posing a challenge in controlling the COVID-19 contagion. In such extraordinary times, In this scientific paper the relationship of the spread of the Corona virus to the residential area and the relationship of how infection is transmitted with this disease, and also explains the relationship of gender to the possibility of infection with Corona virus , we examined the wise transfers of the new Corona virus in 6 cities from the central region of the Gaza Strip December 2020, Fp-Growth algorithm was used To produce association role Combine gender, method of infection, and city to estimate the incidence and likelihood of infection

Introduction

The study was conducted within the State of Palestine in the Gaza Strip, Central Governorate, using the results of injuries in the daily reports of the Ministry of Health**.**

According to the nature of the data that are present in the reports, **the study of the effect of the residential area and the nature of its population on the increase in the number of injured in the cities of the central governorate (Deir Al-Balah - Nuseirat - Al-Bureij - Al-Maghazi - Al-Zawaida),**Nuseirat recorded the highest number of injuries, because it had a high population and it contained a central market, so it was easy to transmit the infection, and the second center was Deir al-Balah It also contains a refugee camp, as most of the injuries are from this area. Also, according to the study, it was found that males are exposed to infection at a greater rate than females

Also, **the results of infection were studied by the method of transmitting the infection (contact - suspect - random survey - directed scan)** It turns out that whoever has been suspected of being infected or in contact with infected persons has a high rate of infection.

And based on the previous results and the siege and scarcity of medical equipment in the Gaza Strip, especially necessary to diagnose the virus, surveys must be directed to a large extent in these two areas, especially those in contact and suspected infection.

Related work or Background

1. The study data were collected from daily reports issued by the Ministry of Health ,The Ministry is making statistics of the number of injured persons according to each region and centers of each city, and the results are almost similar to the results obtained from this study of the Central Governorate.

   Figure (1) a template for a report by the Ministry of Health We note that the first place in injuries in the central governorate was Nuseirat, **and this result was also reached through this study.**

Figure (1)

2. Population density is very much important since it directly affects the patterns of communication and interaction levels among individuals in a population; theoretically, population density tends to closer contact and greater interaction between people, which makes them potentially hotspots for the high prevalence of emerging COVID-19 disease. And found many studies proving this information, including (3) this study of the wise

transmission of the new Corona virus in the region in five states of southern India until July 20, 2020 and its relationship to the population density of each of them. Based on the Central Statistical Organization, which shows the population density in each region. Figure (2) shows the population density in the central governorate, and we note that Nuseirat and Deir al-Balah have a high population density compared to the rest of the governorate's cities, and thus the infection rate is higher. **And this is what has been proven in this study.**

اسم التجمع	رمز التجمع	عدد السكان في منتصف العام			
		2017	2018	2019	2020
محافظة دير البلح		**269,946**	**277,964**	**286,070**	**294,260**
مُخَيَّم النُصَيْرَات	653065	31,369	32,301	33,243	34,194
النُصَيْرَات	653070	54,198	55,807	57,435	59,079
مُخَيَّم البُرَيْج	653140	27,690	28,513	29,344	30,184
البُرَيْج	653145	15,306	15,761	16,221	16,685
الزَوايْدَة	653180	23,557	24,257	24,964	25,679
مُخَيَّم دِير البَلَح	653200	6,902	7,107	7,314	7,523
مُخَيَّم المَغَازِي	653210	17,941	18,474	19,012	19,557
المَغَازِي	653215	9,555	9,839	10,126	10,415
دِير البَلَح	653240	74,237	76,442	78,671	80,924
المُصَدَّر	653250	2,556	2,632	2,709	2,786
وادِي السَلْقَا	653275	6,635	6,832	7,031	7,233

Figure(2)

3. According to confirmed and correct studies, it was found that a large proportion of the infected people transmit the disease to them because of contact with other infected people Also, 9 to 26% of infections in the European Union were among health workers who had contact with patients infected with the virus(4). **It was observed in This study showed that the majority of contacts and suspected cases had contracted the virus.**

4. Emerging evidence from China suggests that coronavirus disease 2019 (COVID-19) is deadlier for infected men than women with a 2.8% fatality rate being reported in Chinese men versus 1.7% in women. Further, sex-disaggregated data for COVID-19 in several European countries show a similar number of cases between the sexes. There are many studies indicating this, including "Impact of sex and gender on COVID-19 outcomes in Europe" (5) The paper present review summarizes latest clinical and epidemiological

evidence for gender and sex differences in COVID-19 from Europe and China show figure(3). **In this study, it was also found that the rate of infection with Corona virus in males is higher than that of females.**

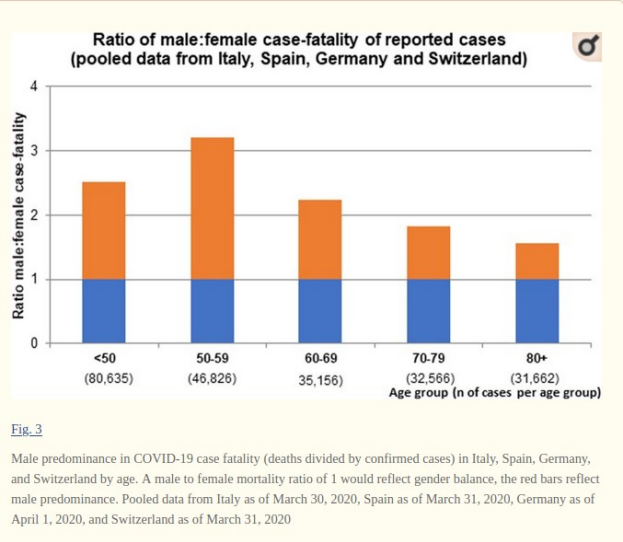

Fig. 3

Male predominance in COVID-19 case fatality (deaths divided by confirmed cases) in Italy, Spain, Germany, and Switzerland by age. A male to female mortality ratio of 1 would reflect gender balance, the red bars reflect male predominance. Pooled data from Italy as of March 30, 2020, Spain as of March 31, 2020, Germany as of April 1, 2020, and Switzerland as of March 31, 2020

Figure(3)

Discussion

Preprocessing:

1-Data collection

At the beginning, the data for the study were collected from the daily statements issued by the Ministry of Health, 15-day statements were chosen and these statements were in pdf format, which were combined and converted into an Excel file to deal with

2- Understand the nature of data

These statements contained 10 columns (ID number, name, mobile, classification, source, result, governorate, city, district, date)

الادارة العامة للخدمات الطبية المساندة
كشف الأحد - الدورة الثانية ٠٦/١٢/٢٠٢٠
المختبر المركزي
رقم الكشف: ٠٦١٢٢ B

م	رقم الهوية	الاسم	الجوال	التصنيف	المصدر	النتيجة	المحافظة	المدينة	الحي

Figure (4)

6 columns were chosen for the study work on them only and 900 rows of data

الجنس	النتيجة	التاريخ	المدينة	المحافظة	المصدر	التصنيف
أنثى	مصاب	16/12/2020/	البريج	محافظة الوسطى	طب وقائي	مخالطين
أنثى	مصاب	16/12/2020/	البريج	محافظة الوسطى	طب وقائي	مخالطين
أنثى	مصاب	16/12/2020/	البريج	محافظة الوسطى	طب وقائي	مشتبه اصابة
أنثى	مصاب	16/12/2020/	البريج	محافظة الوسطى	طب وقائي	مشتبه اصابة

Figure (5)

3- Data cleaning

The data contained missing values, such as the name of the governorate or the date, using the rapid miner. The blank values were replaced by the name of the governorate because they are constant for all data. Also replace the blank date with the word “missing”

Finely export to the new file

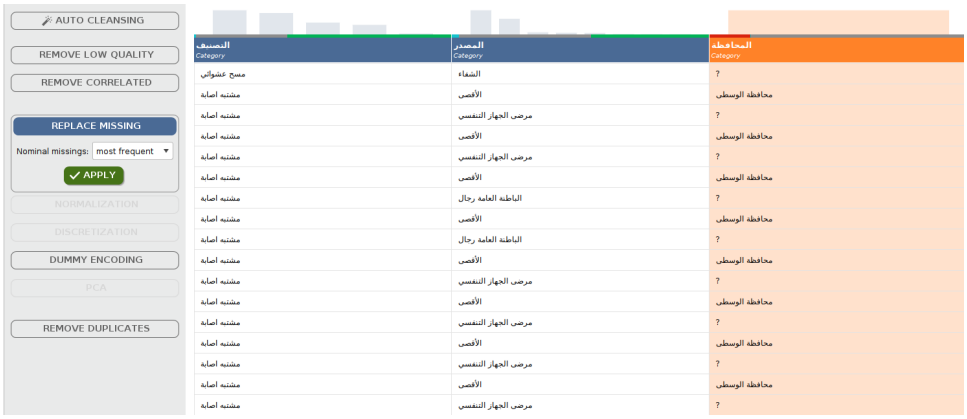

Figure (6)

4- Conclusion of the idea

Using the Orange data mining program An attempt was made to find out the relationships between the data to conclude a pure study, According to Figure (6) attached We notice the difference in the rate of injuries in the cities of the governorate, where Nuseirat formed the highest rate over the course of 15 days, followed by Deir al-Balah for the reason mentioned previously.

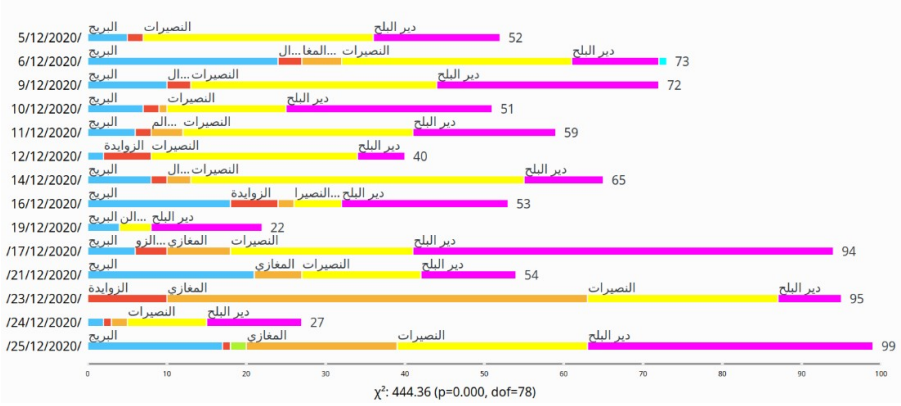

Figure (7-1)

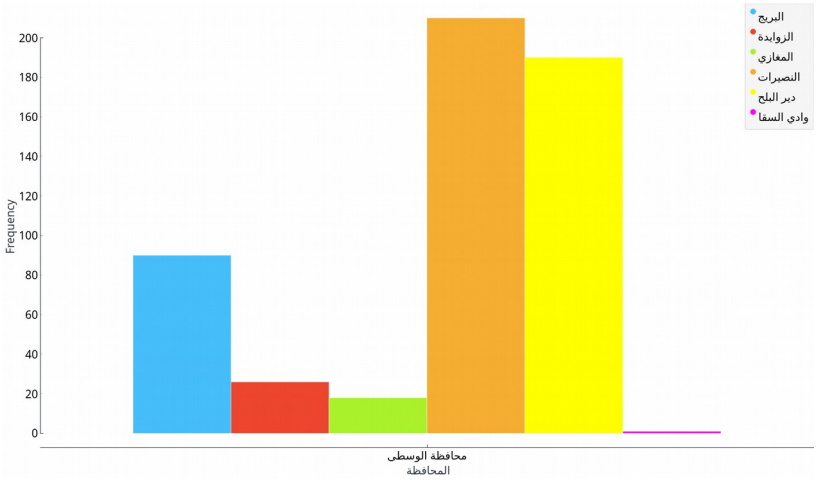

Figure (7-2)

From Figure (8), we note that most of those who are in contact or suspected of being infected with the virus are confirmed. The cause of the infection is most likely either a contact or a suspect

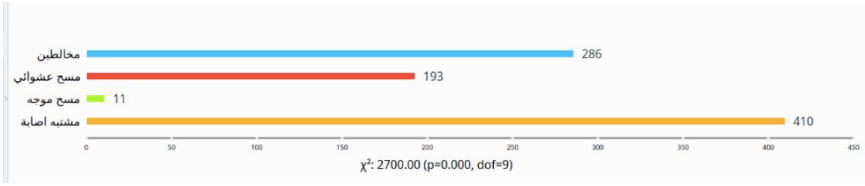

Figure (8-1)

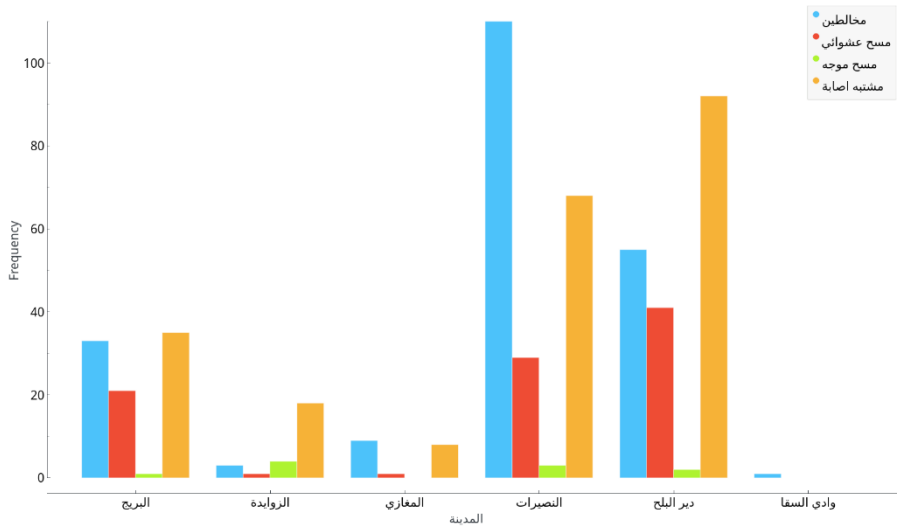

Figure (8-2)[i]

Figure (9) shows the percentage of males and females infected in each city, and as it appears from the chart, the rate of male infection is higher.

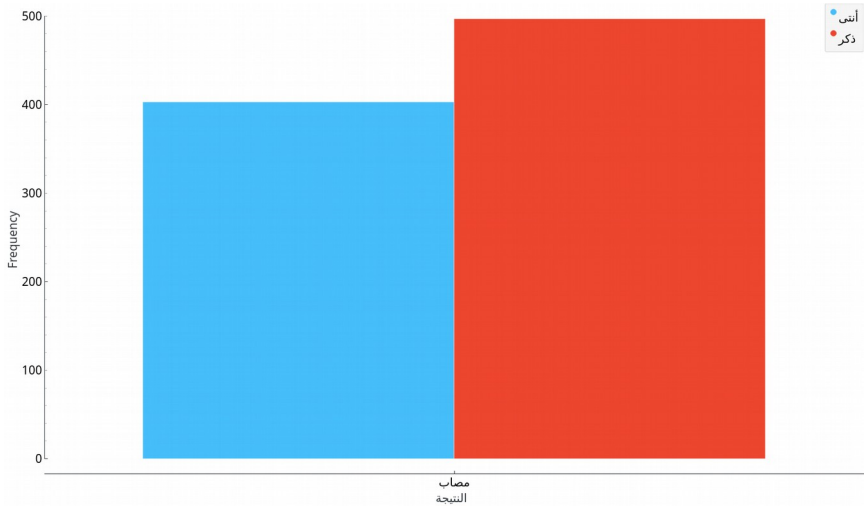

Figure (9-1)

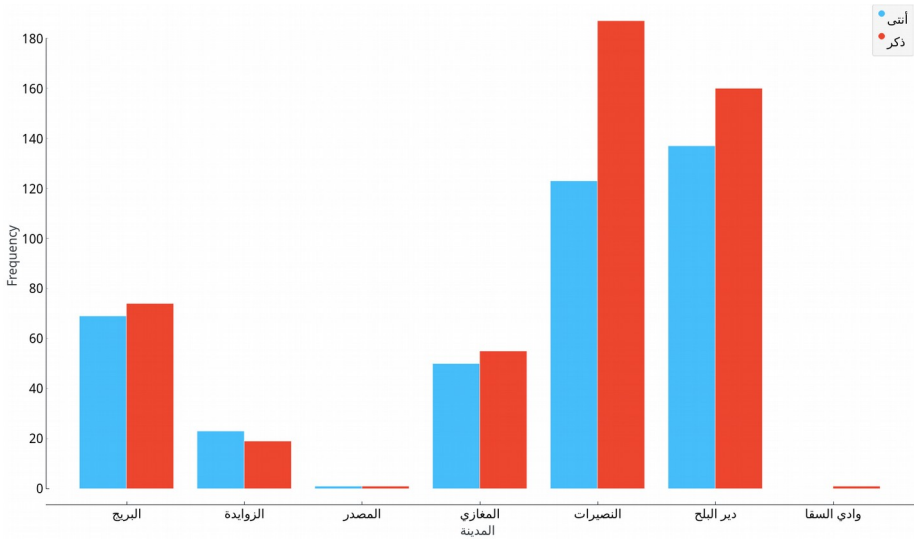

Figure (9-2)

5- Association Rule Generator

From the previous results that were reached, it was found that if the person was a resident of Nuseirat or Deir al-Balah and had contacts with Corona virus or suspected of being infected, and sex was mentioned, then the rate of infection with the Corona virus would be high compar other cases. Accordingly, an Association Rule was created using a rapid miner program, AS in Figure (10), The association between population density, gender, mode of infection, and positive cases of COVID-19 was discussed through the application of the FPG growth model. This form is designed to compare experimental variables with answers. The significance test and regression analysis for these variables are computed by predicting the correlation response and the results were as in Figure (11)

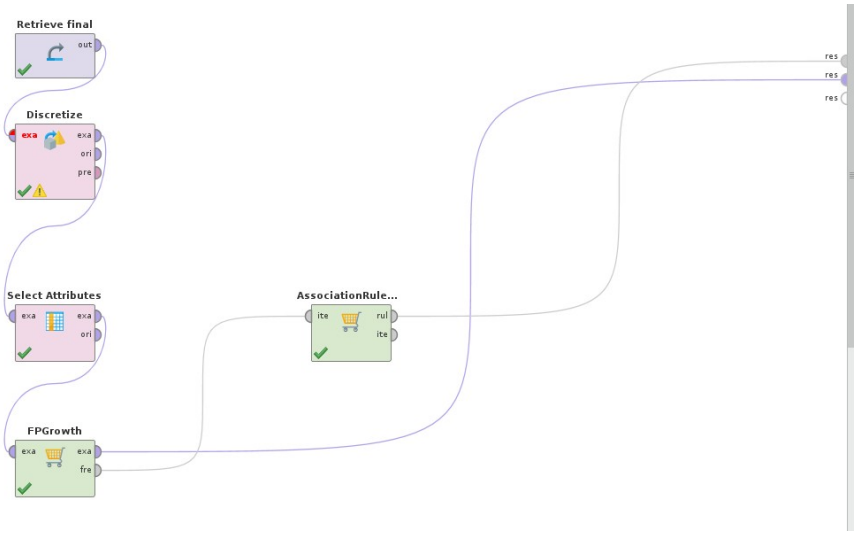

Figure (10)

No.	Premises	Conclusion	Support	Confidence
1	ذكر, مشتبه اصابة, النصيرات	مصاب	0.069	1
2	ذكر, مشتبه اصابة, دير البلح	مصاب	0.104	1
3	ذكر, مشتبه اصابة, البريج	مصاب	0.042	1
4	ذكر, مشتبه اصابة, المغازي	مصاب	0.017	1
5	ذكر, مشتبه اصابة, الزوايدة	مصاب	0.012	1
7	ذكر, مشتبه اصابة, المصدر	مصاب	0.001	1
8	ذكر, النصيرات, مخالطين	مصاب	0.097	1
9	ذكر, النصيرات, مسح عشوائي	مصاب	0.039	1
10	ذكر, النصيرات, مسح موجه	مصاب	0.003	1
11	ذكر, دير البلح, مخالطين	مصاب	0.047	1
12	ذكر, دير البلح, مسح عشوائي	مصاب	0.026	1
13	ذكر, دير البلح, مسح موجه	مصاب	0.001	1
14	ذكر, مخالطين, البريج	مصاب	0.031	1
15	ذكر, مخالطين, المغازي	مصاب	0.008	1
16	ذكر, مخالطين, الزوايدة	مصاب	0.001	1
19	ذكر, مخالطين, وادي السقا	مصاب	0.001	1
20	ذكر, مسح عشوائي, البريج	مصاب	0.009	1
21	ذكر, مسح عشوائي, المغازي	مصاب	0.037	1
22	ذكر, مسح عشوائي, الزوايدة	مصاب	0.004	1
23	ذكر, الزوايدة, مسح موجه	مصاب	0.003	1
24	مشتبه اصابة, أنثى, النصيرات	مصاب	0.051	1
25	مشتبه اصابة, أنثى, دير البلح	مصاب	0.087	1
26	مشتبه اصابة, أنثى, البريج	مصاب	0.038	1

Figure (11)

Conclusion

He knew that Coronavirus (COVID-19) has been recognized as the most serious public health threat since the 1918 influenza pandemic (Parmet and Rothstein 2019). This study uses a systematic and modern approach to explore the relationship between population density, gender, and the mode of transmission of COVID-19. Among those infected with Coronavirus in the Central Governorate of the Gaza Strip. . Our results from the accumulated data of casualties from the 5 cities in the central governorate show that most cities have infection rates that have a high population density compared to others.

Also, the percentage of males infected is higher than that of females, and from which rules of assouations were extracted that predict the probability of infection

References

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[3] Department of Geography, Visva-Bharati (A Central University), Santiniketan, West Bengal 731235 India , Nexus between population density and novel coronavirus (COVID-19) pandemic in the south Indian states: A geo-statistical approach,2020

4- https://www.msf.org/ar/%D9%83%D9%88%D9%81%D9%8A%D8%AF-19-%D8%AD%D8%A7%D8%AC%D8%A9-%D9%85%D8%A7%D8%B3%D9%91%D8%A9-%D8%A5%D9%84%D9%89-%D8%AA%D8%A2%D8%B2%D8%B1-%D8%A7%D9%84%D8%AF%D9%88%D9%84-%D8%A7%D9%84%D8%A3%D9%88%D8%B1%D9%88%D8%A8%D9%8A%D8%A9-%D9%84%D8%AD%D9%85%D8%A7%D9%8A%D8%A9-%D8%A7%D9%84%D8%B7%D9%88%D8%A7%D9%82%D9%85-%D8%A7%D9%84%D8%B7%D8%A8%D9%8A%D8%A9

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https://globalhealth5050.org/the-sex-gender-and-covid-19-project/

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