THE GLOBE PROGRAM

Global Learning and Observations to Benefit the Environment

Temperature effect on heart disease

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The 19 Secondary school for girls in Jeddah

Our research achieved the following badges:

1: the science badge

My research has been linked to biology, ecology and climate

2: engineering badge

Atmospheric protocols devices were used as a temperature device forestry suppliers digital max\min Thermometer.

3: technology badge

Programs were used to convert numbers to graphs and to globe.

4: mathematics badge

Mathematical averages and statistical ratios Equations were used.

5: community badge

My research contributed to the further development of society by knowing the effects of climate change, heart disease, and avoiding errors and caution.

6: Collaboration badge

1-Collaborate with Globe team to enter atmosphere data daily.
2-Cooperating with the Ministry of Health and requesting statistical data for patients suffering from heart diseases.
3-Collaborate in translating the search with the class teacher
4-Collaborate with drawings and tables to calculate average temperatures with the Globe teacher .

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Summary

The research aim is to study the relationship between temperature and the increasing rate of heart disease, where I used Globe data and statistics of heart patients from the Ministry of Health, by converting the data into tables and graphs.

I noticed that July has the highest rate of heart disease, the increasing rate was caused by the increase of temperature where it reached 38.96°C causing an *Isolated Arrhythmias*. these data prove the relationship between temperature and heart disease.

And I noticed that I need more data to validity of the results. So, I suggested designing an application that uses smart watches to fetch the data I need related to environmental temperature and heart health. In the end, I recommend a similar study that requires 10-year data on environmental temperature and heart disease to better understand the effects of heat.

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introduction

Every influential disease has a great cause for the cause of the illness, so what is a heart disease? It's a type of chest pain, and a feeling of discomfort, caused by a decrease in blood flow to the heart muscle. but can we predict the environmental effect on such diseases? I will answer this question in this research.

Research problem

My family and I went to Mecca for Umrah and saw an old woman who was complaining of chest tightness and dizziness and the weather was hot and humid, so my colleague and I asked about the effect of the high temperature on human health, as I was curious about this topic, then I went to the Globe program supervisor and mentioned my idea. Then, I went to the biology teacher, who denied that there is a relationship between temperature and heart disease, so I liked the challenge and tried to prove the validity of the hypothesis.

Research aims

Establish a correlation between temperature and heart disease.

Research importance

this research is important to our community. where the city I live in, has high temperatures ,which exposes many to health problems ,and it's possible to shed light on the relationship between heat and heart disease. And it could be important and benefits to health-care professionals regarding knowing how to treat heart patients.

Research question

What is the effect of temperature on increasing rates of heart disease?

Research limits

This research handles the following limits:

Time limits	year 2019
Spatial limits	Jeddah, Longitude 39.236531 Latitude 21.478433 
Human limits	random samples of patients with heart diseases

Search terms

***Temperature*:** It is an indication of the amount of heat energy stored by the body, as well as an indication of the mobility of its atoms, where it is mathematically possible to find an equation between the kinetic energy of a particle or atom of a body and its temperature.
The temperature varies temporally and spatially depending on the variation of the net solar radiation on the different latitude circuits and the variation in the geographic characteristics of the Earth's surface from elsewhere .

Heart disease may be different ,so two diseases were chosen in our research:

1-Isolated Arrhythmias: the heart may beat very quickly or very slowly .The reason for this condition is changes in the electrical system of the heart or a short circuit in the heart .This leads to the inability of the heart to pump blood efficiently ,which leads to poor blood circulation in the body .
Symptoms:
Chest pain, hard breathing, Dizziness and Sweating.

2- Angina Pectoris: Chest pain that occurs when the heart muscle cannot get enough oxygen and the pain often occurs behind the cage bone ,and the patient may complain of severe chest pain ,or as an uneasy feeling .

Previous studies

Ahmed study (2012), where this study showed the effect of heat and extreme heat waves in Bani Walid region in Libya on human health and its impact on some diseases related to heat waves such as drought and sunstroke. Our research agreed with Ahmed's study (2012) in the idea of research in terms of the effect of heat on human health, where our focus was on heart diseases, while his research focused on general diseases that afflict a person in the summer such as heat stroke and heat stroke, and our research differs with the study of Ahmed (2012) In the research sample, where his research focused on the residents of Bani Walid, our research focused on the residents of the city of Jeddah, and our research agreed with Ahmed's study (2012) in the methodology of analytical research, as it was also followed in our research

Research methodology

The quantitative approach was used. and this was done by calculating the average temperature and the patient percentages and analyzing the results to determine the relationship between the temperatures and the increase in heart disease.

Research community

The research population consists of a comparison of "Globe" data, and random statistics of heart patients

Search tools

Globe data were used for temperature and comparison with the Ministry of Health statistics for the percentage of patients coming to Jeddah hospitals.

Steps to conduct a search 1

The temperature was entered into the Globe site using a device, Forestry suppliers digital max \ min thermometer. Where the device contains two sensors, one for measuring air temperature and the other for measuring soil temperature, it was put inside a box at a height of 1.5m from the surface of the earth and heat data was taken at noon on a daily basis and taking the minimum and maximum temperatures for both air and soil on a weekly basis as the device allows this As is shown.

Steps to conduct a search 2:

Then I contacted the Ministry of Health and asked them for statistical data for patients arriving in hospitals in Jeddah city with heart diseases, I asked for the data to be shown in days of the number of patients admitted to hospitals. And not long after, I received the data from the Ministry of Health, which contained many diseases, and I focused on (Isolated Arrhythmias -Angina Pectoris) and excluded the rest. The data was displayed in months ,not days ,as requested ,forcing me to calculate the average maximum temperature for each month instead of the graph as shown in the figure

Table of temperature for the year 2019

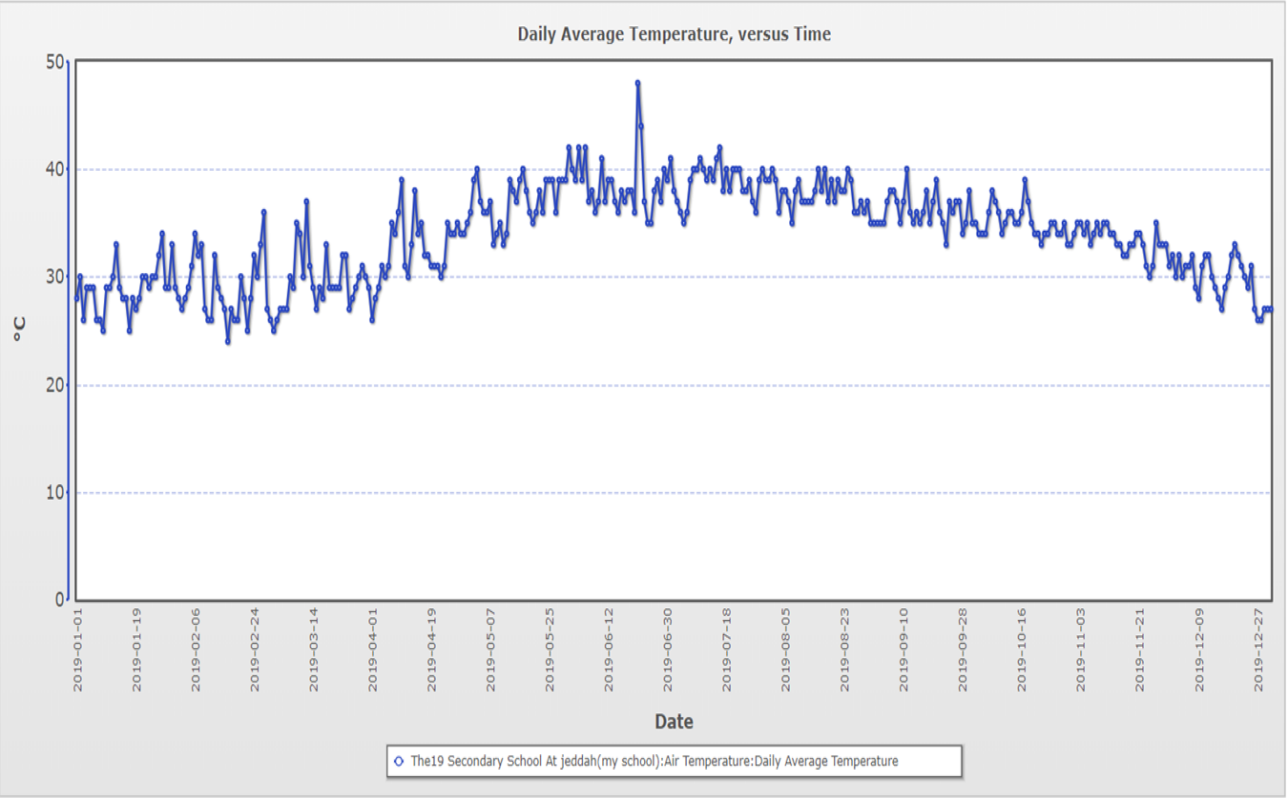
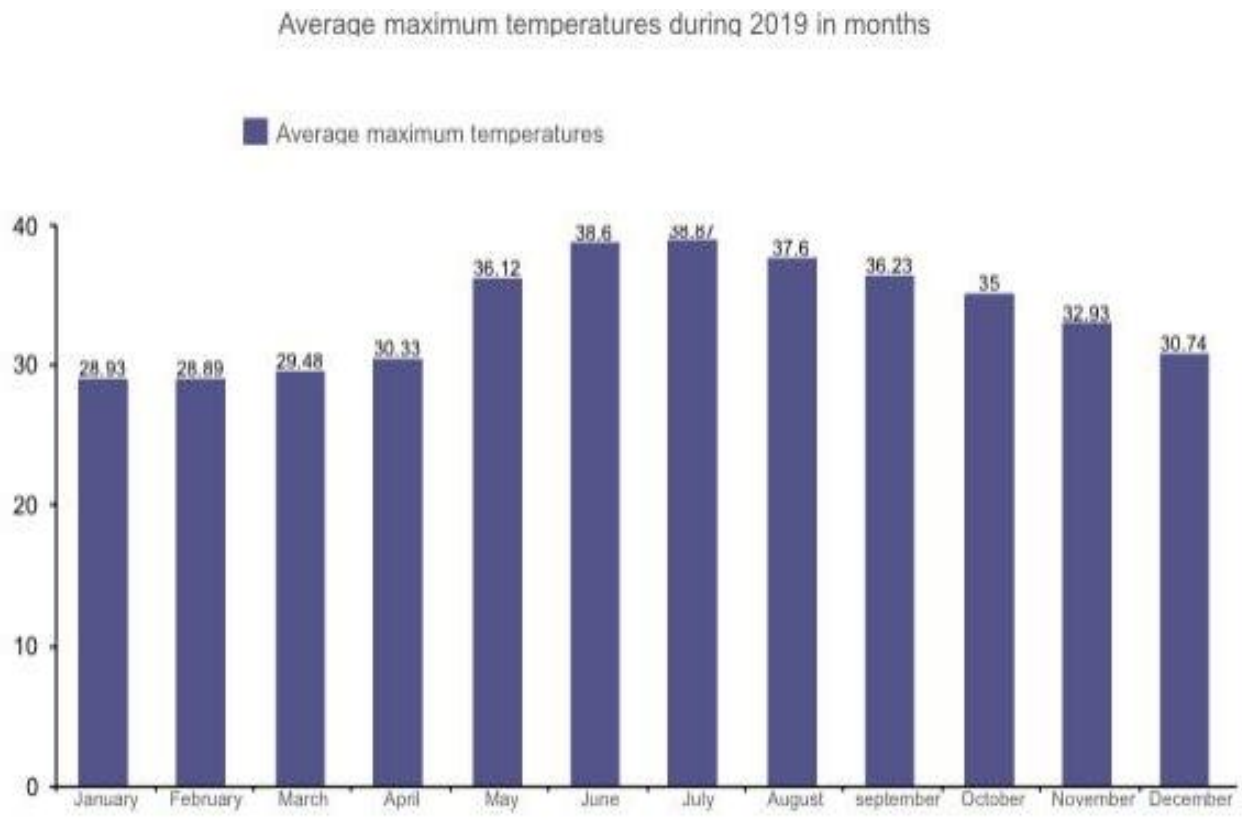


Table of average maximum temperatures for every month of the year2019.

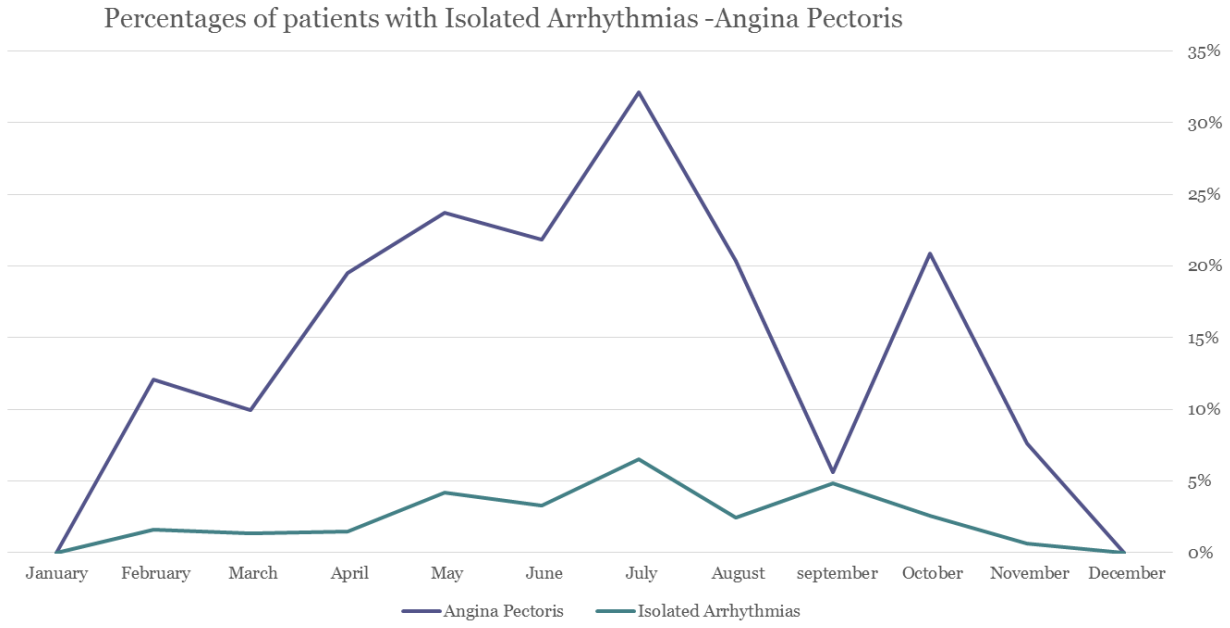


Average maximum temperatures were calculated for each month Using the following equation:

$$\frac{\text{Total maximum temperatures daily during the month}}{\text{Number of days in the month}}$$

Steps to conduct a search 3

Then I converted the number of patients with Angina Pectoris) to percentages to facilitate the comparison process and clarify the existence of the relationship or not between the temperature and the ratios of patients admitted to hospitals. Also, repeated the process for patients with Isolated Arrhythmias As shown in the figure.



The percentage of *Angina* patients was calculated and the *Isolated Arrhythmias* for each month using the following formula:

$$\frac{\text{The number of patients with angina in months}}{\text{The total number of heart patients in months}} \times 100$$

Steps to conduct a search 4

Unfortunately, I received missing data from the Ministry of Health for the months of January and December of 2019 for people with Isolated Arrhythmias -Angina Pectoris. Because the time taken to collect lost data may be prolonged, the spreadsheet was created from February to November.

A spreadsheet showing the number of patients with various heart diseases.

Total	Isolated Arrhythmias	Heart Failure	Acute Myocardial Infraction	Angina Pectoris	
182	3	131	26	22	February
221	3	149	47	22	March
200	3	117	41	39	April
118	5	73	12	28	May
183	6	117	20	40	June
168	11	77	26	54	July
162	4	83	42	33	August
124	6	81	30	7	september
115	3	68	20	24	October
157	1	117	27	12	November

The previous table was used to calculate patient percentages and compare them to medium temperatures as shown in the table.

Average temperatures	Isolated Arrhythmias	Angina Pectoris	Months
32.93 °C	0.63%	7.64%	November
35 °C	2.60%	20.86%	October
36.23 °C	4.83%	5.64%	September
37.6 °C	2.46%	20.37%	August
38.87 °C	6.54%	32.14%	July
38.60 °C	3.27%	21.85%	June
36.12 °C	4.23%	23.72%	May
30.33 °C	1.50%	19.50%	April
29.48 °C	1.35%	9.95%	March
28.89 °C	1.64%	12.08%	February

results

I noticed a relationship between high temperature and heart disease, as in July the proportion of heart patients increased as a result of the high temperature and its impact on them and the absence of cardiac arrhythmias.

Discuss the results

It is clear from the previous table that in the months in which the average maximum temperature was greater than 35 ° C, the ratios were high for *Isolated Arrhythmias* patients where it became clear that the patients were affected by high temperatures and the highest rates were in July where the average maximum temperature was 38.87 ° C and the percentage of patients entering to Jeddah city hospitals 6.54% with *Isolated Arrhythmias* disease was the highest ,While the rates differed for *Angina patients*.

Recommendations

1: I recommend a similar study that requires 10-year data on environmental temperature and heart disease.
2: Not to be exposed to sunlight for a long time.
3: Increase focus and prevent diseases caused by overheating
4: Use smart watches for emergency and assistance the patient can monitor the heart rate.

Conclusion

I concluded that there is a relationship between high temperature and heart disease, as in July the proportion of heart patients increased as a result of the high temperature and its impact on them. It's became clear that I need more data. As I reached my need for accurate data that tracks patients or people during their daily routine, so I suggest adding an application that combines Monitoring the heart rate, such as that found in some smart watches, but the application that I propose also collects the temperature of the environment in which the patient or person is present, which provides a close monitoring of heat effect on heart patients. However, the question is, what is the reason for the decrease in the percentage of heart patients in September?

References

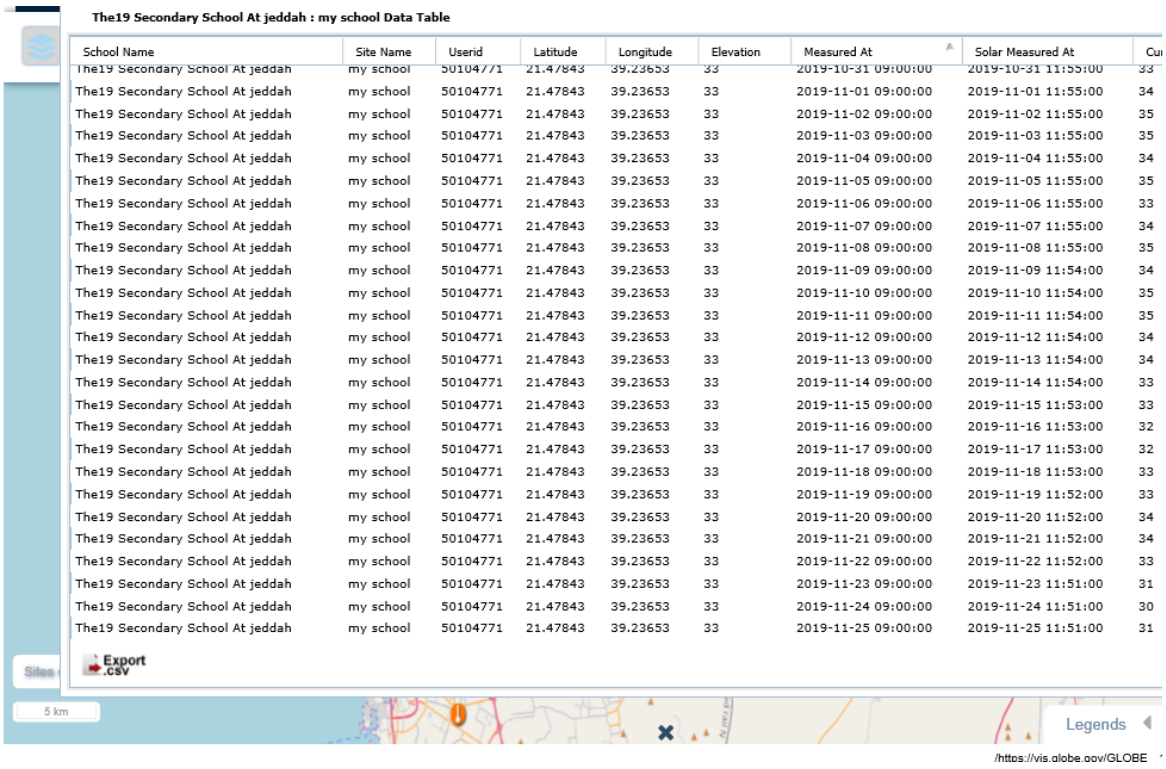
-Globe website https://vis.globe.gov/GLOBE/
-Dr. Hassan Shamsi Pasha, how to protect yourself from heart disease.1998
-Dr. Ahmed qureirea, the effect of thermal extremism on human health. 2012
-The Ministry of Health in Saudi Arabia.
-The Major Hill Physics Series. 2011

Thank four

I want to thank teacher Nadia Al-Samdani for introducing me to the Globe program and helping me to start this project .Thanks to the Ministry of Health for helping collect data

appendix

Some temperature tables have been used to calculate average temperatures:



The19 Secondary School At jeddah : my school Data Table

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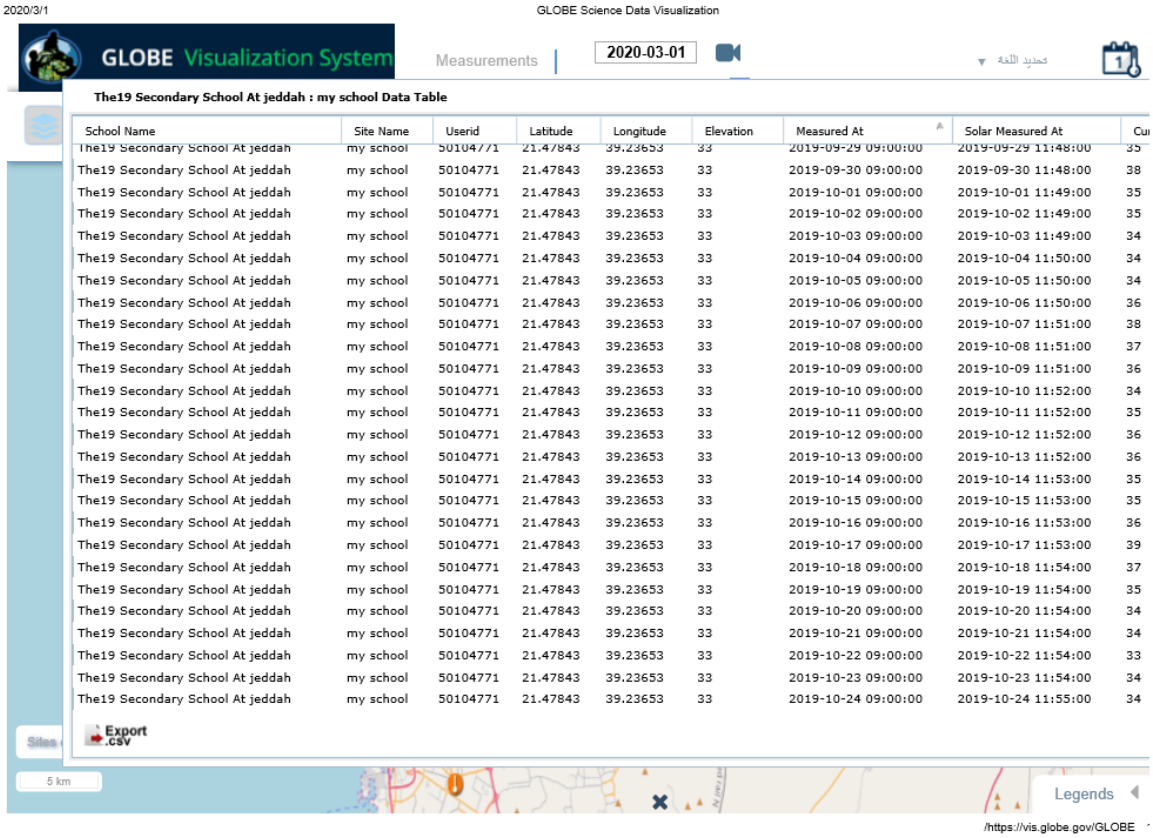
Export .csv

5 km

Legends

/https://vis.globe.gov/GLOBE



GLOBE Visualization System

Measurements | 2020-03-01

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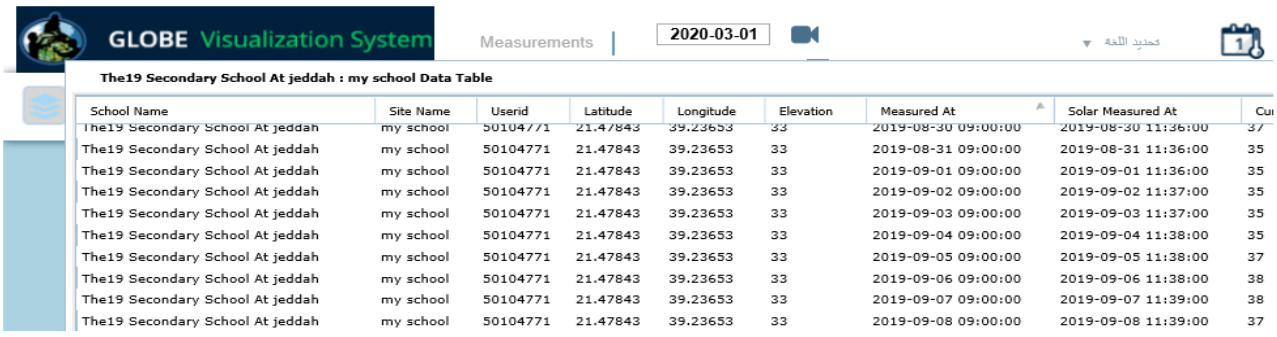
Export .csv

5 km

Legends

/https://vis.globe.gov/GLOBE



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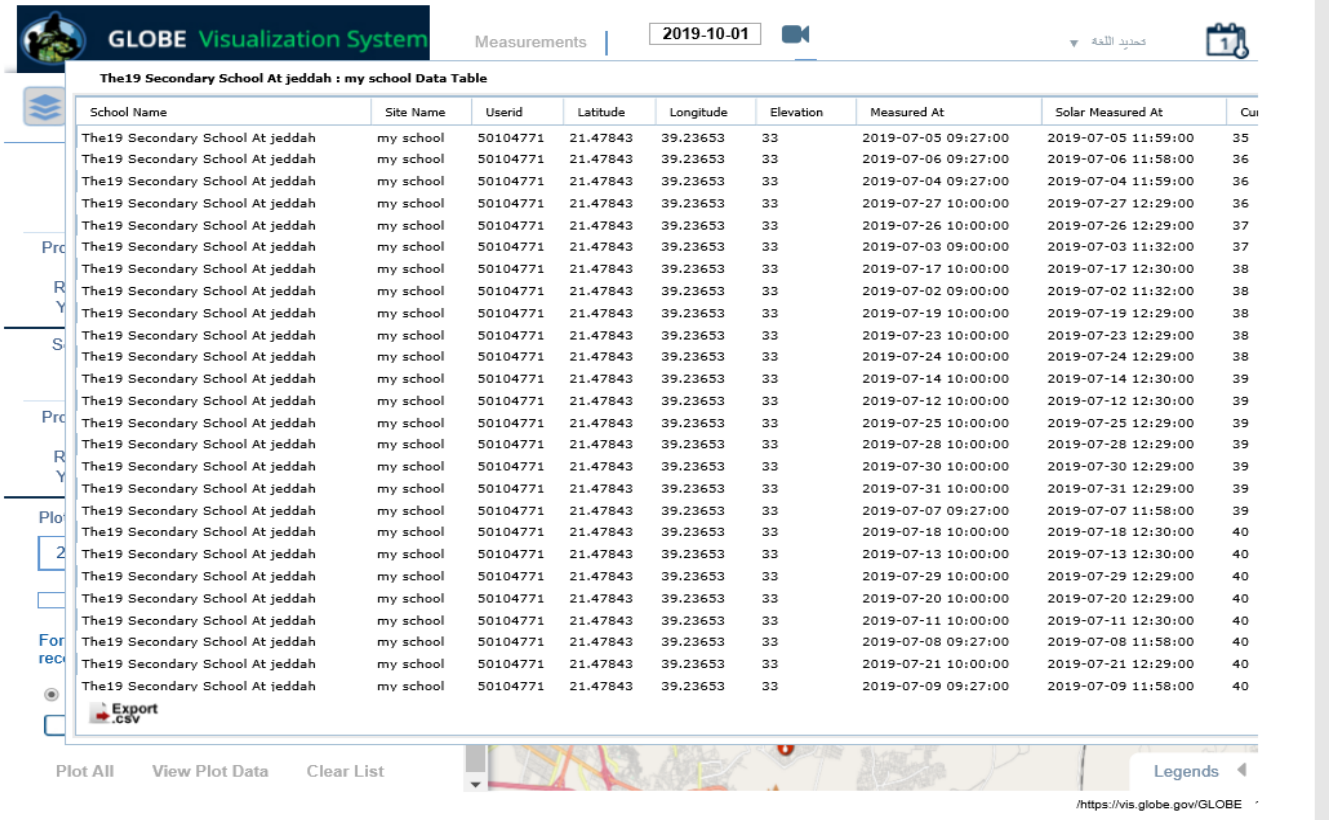

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The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-07-31 10:00:00	2019-07-31 12:29:00	39
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-07-07 09:27:00	2019-07-07 11:58:00	39
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-07-18 10:00:00	2019-07-18 12:30:00	40
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-07-13 10:00:00	2019-07-13 12:30:00	40
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-07-29 10:00:00	2019-07-29 12:29:00	40
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-07-20 10:00:00	2019-07-20 12:29:00	40
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-07-11 10:00:00	2019-07-11 12:30:00	40
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-07-08 09:27:00	2019-07-08 11:58:00	40
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-07-21 10:00:00	2019-07-21 12:29:00	40
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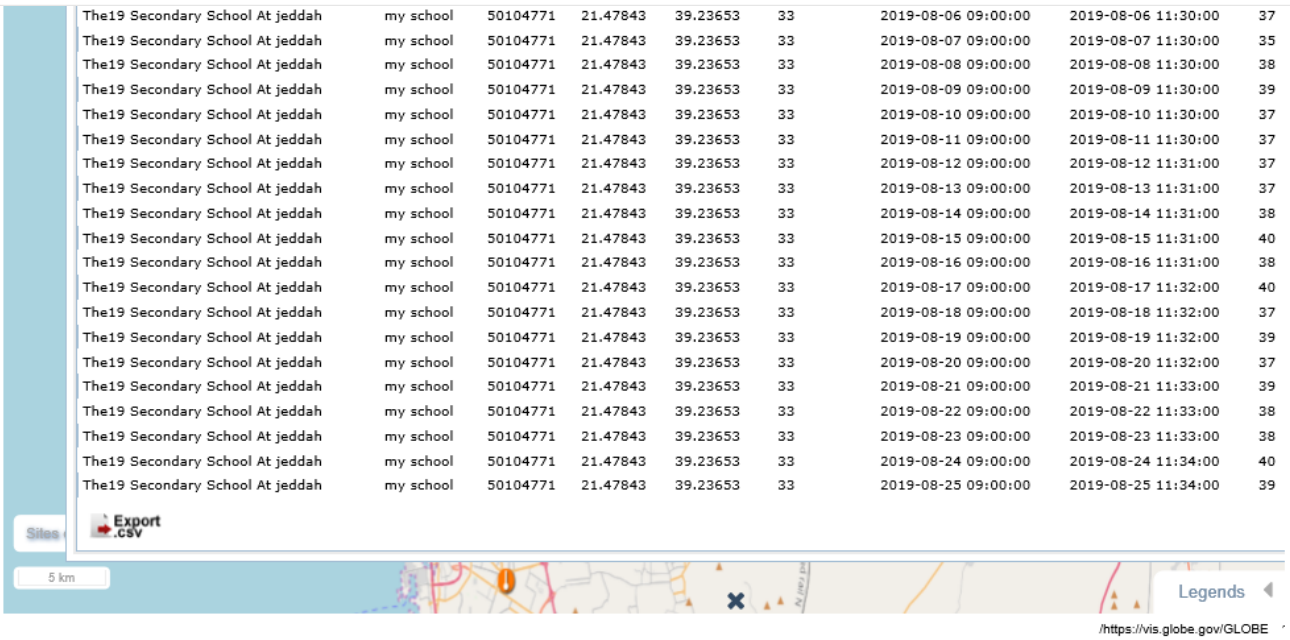

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The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-08-08 09:00:00	2019-08-08 11:30:00	38
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-08-09 09:00:00	2019-08-09 11:30:00	39
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-08-10 09:00:00	2019-08-10 11:30:00	37
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-08-11 09:00:00	2019-08-11 11:30:00	37
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-08-12 09:00:00	2019-08-12 11:31:00	37
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-08-13 09:00:00	2019-08-13 11:31:00	37
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-08-14 09:00:00	2019-08-14 11:31:00	38
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-08-15 09:00:00	2019-08-15 11:31:00	40
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-08-16 09:00:00	2019-08-16 11:31:00	38
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-08-17 09:00:00	2019-08-17 11:32:00	40
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-08-18 09:00:00	2019-08-18 11:32:00	37
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-08-19 09:00:00	2019-08-19 11:32:00	39
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-08-20 09:00:00	2019-08-20 11:32:00	37
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-08-21 09:00:00	2019-08-21 11:33:00	39
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-08-22 09:00:00	2019-08-22 11:33:00	38
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-08-23 09:00:00	2019-08-23 11:33:00	38
The19 Secondary School At jeddah	my school	50104771	21.47843	39.23653	33	2019-08-24 09:00:00	2019-08-24 11:34:00	40
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وزارة الصحة
Ministry of Health

الإدارة: إدارة البحوث والدراسات

الموضوع: تسهيل مهمة باحث

سعادة مديرة / إدارة الاحصاء بالشئون الصحية بجدة

المحترمة ،،،،،،،

السلام عليكم ورحمة الله وبركاته...

نفيدكم بأن الباحثين اسمهم أدناه سوف يقومون بإجراء البحث وجمع البيانات اللازمة لذلك

أسماء الباحثين	نورة حسن الثعلبي،نوف الصيعري
عنوان البحث	أثر تغيرات المناخ في زيادة معدلات الإصابة بالذبحة الصدرية -الأزمة القلبية
أسماء جامعي البيانات	نورة حسن الثعلبي،نوف الصيعري
مدة البحث	سنة واحدة فقط
رقم البحث	١١٦٤.

وبعد الاطلاع ودراسة منهجية البحث من قبل اللجنة العلمية ولجنة أخلاقيات البحث العلمي المسجلة لدى اللجنة الوطنية للأخلاقيات الحيوية والطبية برقم (H-02-J-002) وجد أنه لا مانع من إجراء البحث.

لذا نأمل تسهيل مهمة الباحثين في إجراء البحث في منشأتكم، مع مراعاة الآتي:

١. اتباع قوانين اللجنة الوطنية للأخلاقيات الحيوية والطبية.
٢. في حال أي تغيير في خطة البحث يجب الحصول على موافقة إدارة الأبحاث.
٣. عدم تأثر الخدمة في المرافق المعنية.
٤. المحافظة على حقوق الأشخاص الخاضعين للبحث وخصوصياتهم.
٥. استخدام المعلومات لأغراض البحث العلمي فقط.
٦. تقديم تقرير عن سير الدراسة لإدارة البحوث كل ستة أشهر.

شاكرين تعاونكم.

وتفضلوا بقبول أطيب تحياتي،،

مدير إدارة البحوث والدراسات

د/ علا أكرم عبد الرشيد

مساعد مدير الشؤون الصحية
للتخطيط والتحول

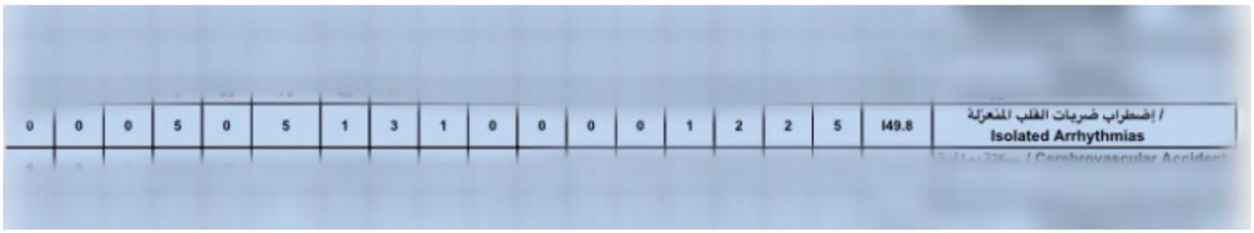
د / نهى أحمد دشاش

Email:Research-Jeddah@moh.gov.sa

Tel#: 0126347308

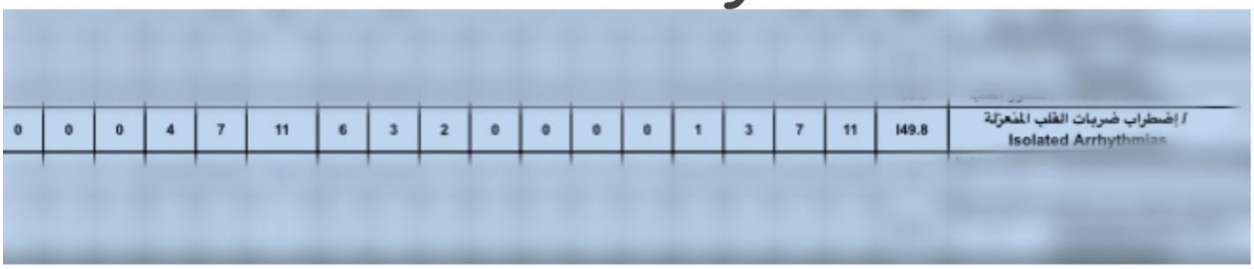
Statistical data for patients with tachycardia in the following months:

May



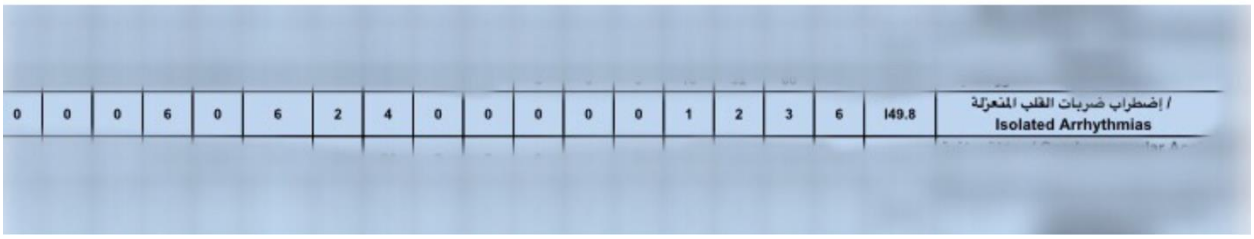
0	0	0	5	0	5	1	3	1	0	0	0	0	1	2	2	5	I49.8	إضطراب ضربات القلب المتعزلة / Isolated Arrhythmias

July



0	0	0	4	7	11	6	3	2	0	0	0	0	1	3	7	11	I49.8	إضطراب ضربات القلب المتعزلة / Isolated Arrhythmias

June



0	0	0	6	0	6	2	4	0	0	0	0	0	1	2	3	6	I49.8	إضطراب ضربات القلب المتعزلة / Isolated Arrhythmias

Statistical data for angina patients in the following months:

May

0	0	0	20	8	28	13	12	3	0	0	0	2	9	12	5	28	I20.9	ذبحة صدرية - غير مستقرة / Angina Pectoris

July

0	0	0	18	36	54	12	30	11	1	0	0	0	9	14	31	54	I20.9	ذبحة صدرية - غير مستقرة / Angina Pectoris

June

0	0	0	6	34	40	5	20	15	0	0	0	0	5	22	13	40	I20.9	ذبحة صدرية - غير مستقرة / Angina Pectoris